

rappor



# Staverton House, Trowbridge

Fidelia Care Home Ltd

## Drainage Strategy Technical Note

April 2026





## Document Control

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|                |                             |            |
|----------------|-----------------------------|------------|
| 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      |
| 02       | 30/04/26 | Surface Water strategy updated   | CG      |
|          |          |                                  |         |
|          |          |                                  |         |

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## Contents

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|                                           |   |
|-------------------------------------------|---|
| Document Control.....                     | 1 |
| <b>1</b> Introduction .....               | 3 |
| <b>2</b> Existing Site Conditions.....    | 4 |
| <b>3</b> Proposed Drainage Strategy ..... | 5 |
| <b>4</b> 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 & Correspondence
- Appendix G – Exceedance Flow Plan



## 1 Introduction

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- 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

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- 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  $8.05 \times 10^{-7}$  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

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#### 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 ultimately be sought to the Wessex Water Surface water asset.
- 3.5 As per Wiltshire Councils Drainage Betterment Strategy<sup>1</sup>, 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

---

<sup>1</sup>[https://www.wiltshire.gov.uk/media/13768/Wiltshire-Council-Drainage-Betterment-Strategy/pdf/Wiltshire\\_Council\\_Drainage\\_Betterment\\_Strategy\\_\\_June\\_2024.pdf?m=1731336788693](https://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:

$$0.365 / 1997 = 0.183 \text{ mm/hr}$$

$$0.183 \times 1440 = 264\text{mm in 24 hours}$$

$$0.730 - 0.264 = 0.466\text{m}$$

- 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 MH8323, which is a private surface water manhole, with flows ultimately directed to the Wessex Water asset. The proposed connection to MH8323 has received agreement between the Client and the Housing Association, Selwood Housing, with Wessex Water also providing agreement to the proposed indirect connection to their asset. Refer to **Appendix F** for correspondence on this.
- 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                                                    |                     |                        | <b>0.5</b>             | <b>0.4</b> | <b>0.4</b>    |
| SuDS Component                                           | Permeable Paving    |                        | 0.7                    | 0.6        | 0.7           |
| Total                                                    |                     |                        | <b>0.7</b>             | <b>0.6</b> | <b>0.7</b>    |
| Total SuDS Mitigation Indices ≥ Pollution Hazard Indices |                     |                        | <b>Yes</b>             | <b>Yes</b> | <b>Yes</b>    |

**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                                              |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>Pipework, manholes, flow control chambers, catch pits and silt traps</b> | 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                                                       |
| <b>Cellular Storage</b>                                                     | 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                                                       |
| <b>Rainwater Butts</b>                                                      | 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 <sup>2</sup>         |
| GROUND FLOOR                            | 1,115 m <sup>2</sup>         |
| FIRST FLOOR                             | 130 m <sup>2</sup>           |
| TOTAL GIFA:                             | 2,510m <sup>2</sup>          |
| SPACE PER RESIDENT                      | 54.6m <sup>2</sup>           |
| 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

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Design the best, to live the best

Client FIDELIA CARE

Project STAVERTON HOUSE EXTENSION

Title PROPOSED SITE PLAN C+A no. A-1075

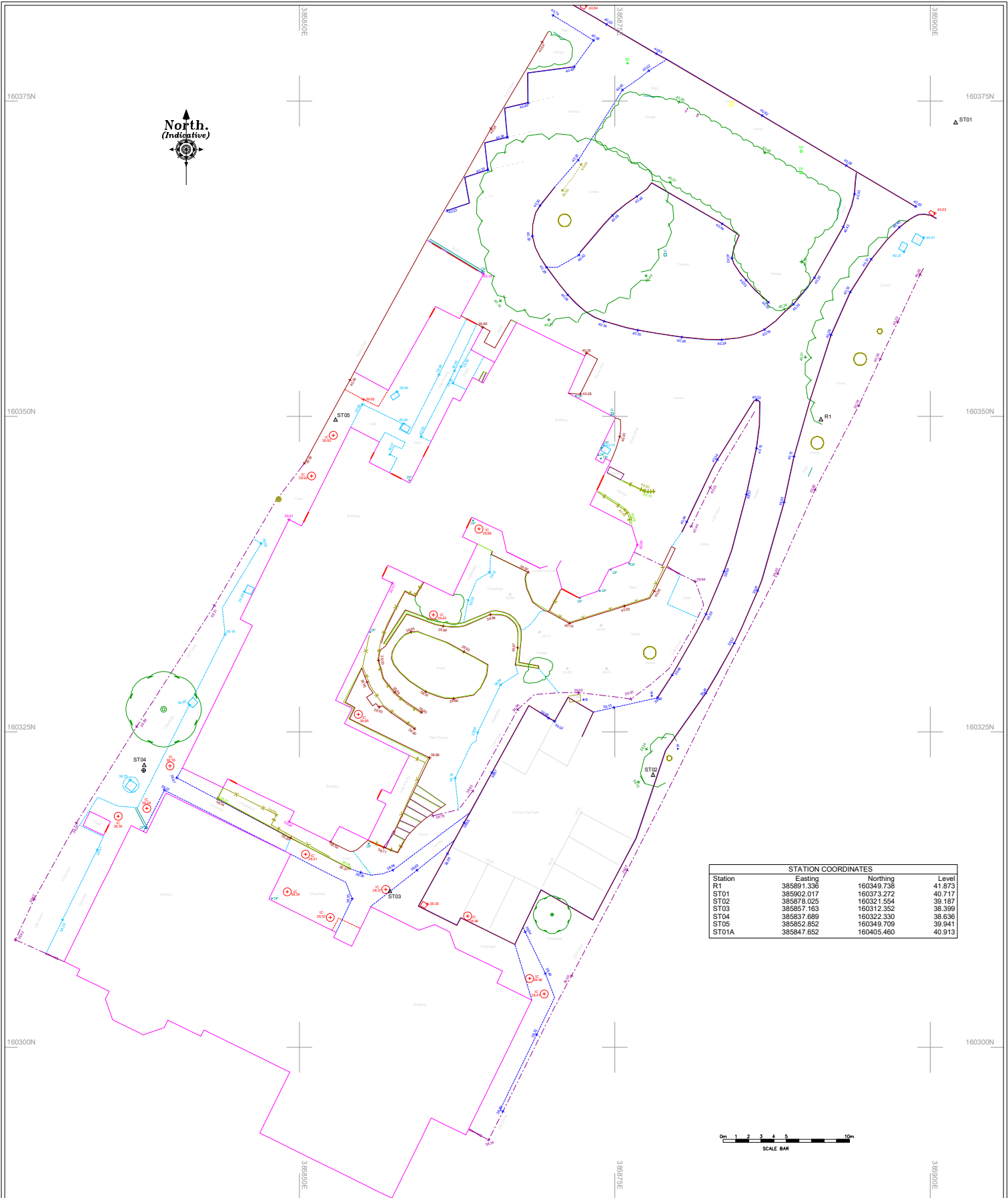
scale 1:250 author RZ chkd VK date Mar. 7, 25 sheet size A1

| 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



| STATION COORDINATES |            |            |        |
|---------------------|------------|------------|--------|
| Station             | Easting    | Northing   | Level  |
| R1                  | 385891.336 | 160349.738 | 41.873 |
| ST01                | 385902.017 | 160373.272 | 40.717 |
| ST02                | 385878.025 | 160321.554 | 38.157 |
| ST03                | 385857.163 | 160312.352 | 38.399 |
| ST04                | 385837.689 | 160322.330 | 38.636 |
| ST05                | 385852.852 | 160349.709 | 39.941 |
| ST01A               | 385847.652 | 160405.460 | 40.913 |

# 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

|                            |                                 |                         |                      |                       |
|----------------------------|---------------------------------|-------------------------|----------------------|-----------------------|
| Bin                        | Bottom of Bank                  | Retaining Wall          | LP                   | Lamp Post             |
| BH                         | Bin                             | French Drain            | Mr                   | Marker                |
| Borehole                   | Bottom of Kerb                  | Sign                    | S                    | Tree Stump            |
| BW                         | Building Line                   | Style                   | AV                   | Air Valve             |
| Bollard                    | Boundary                        | Top of Bank             | BT                   | British Telecom Cover |
| CCTV                       | Edge of Path / Back of Pavement | Top of Kerb             | CB                   | Cable TV Cover        |
| Column                     | Centre Line of Road             | Watercourse Bottom      | Tap                  | Water Tap             |
| Col                        | Telephone Call Box              | White Line              | TL                   | Traffic Light         |
| Tree Trunk (Varying Sizes) | Canopy Line                     | Wall                    | TP                   | Telegraph Post        |
| Downpipe                   | Change of Surface               | White Line              | Tree (Varying Sizes) | TV Point              |
| DP                         | Door                            | Watercourse Top         | VP                   | Vent Pipe             |
| DPG                        | Downpipe / Gully                | Overhead Electric Cable | FH                   | Fire Hydrant          |
| Electric Post              | Fence                           | Gate                    | Gas                  | Gas Valve             |
| ER                         | Earthing Rod                    | Gutter / Drain          | IC                   | Inspection Cover      |
| Gas                        | Gas Cover                       | Hedge / Vegetation      | JB                   | Junction Box          |
| Small Gully                | Small Gully                     | Metal Railings          | IC                   | Inspection Cover      |
| IC                         | Inspection Cover (Round)        | Open Sided Building     |                      |                       |
| JB                         | Junction Box                    | Quarry Face             |                      |                       |
| LB                         | Letter Box                      |                         |                      |                       |

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)

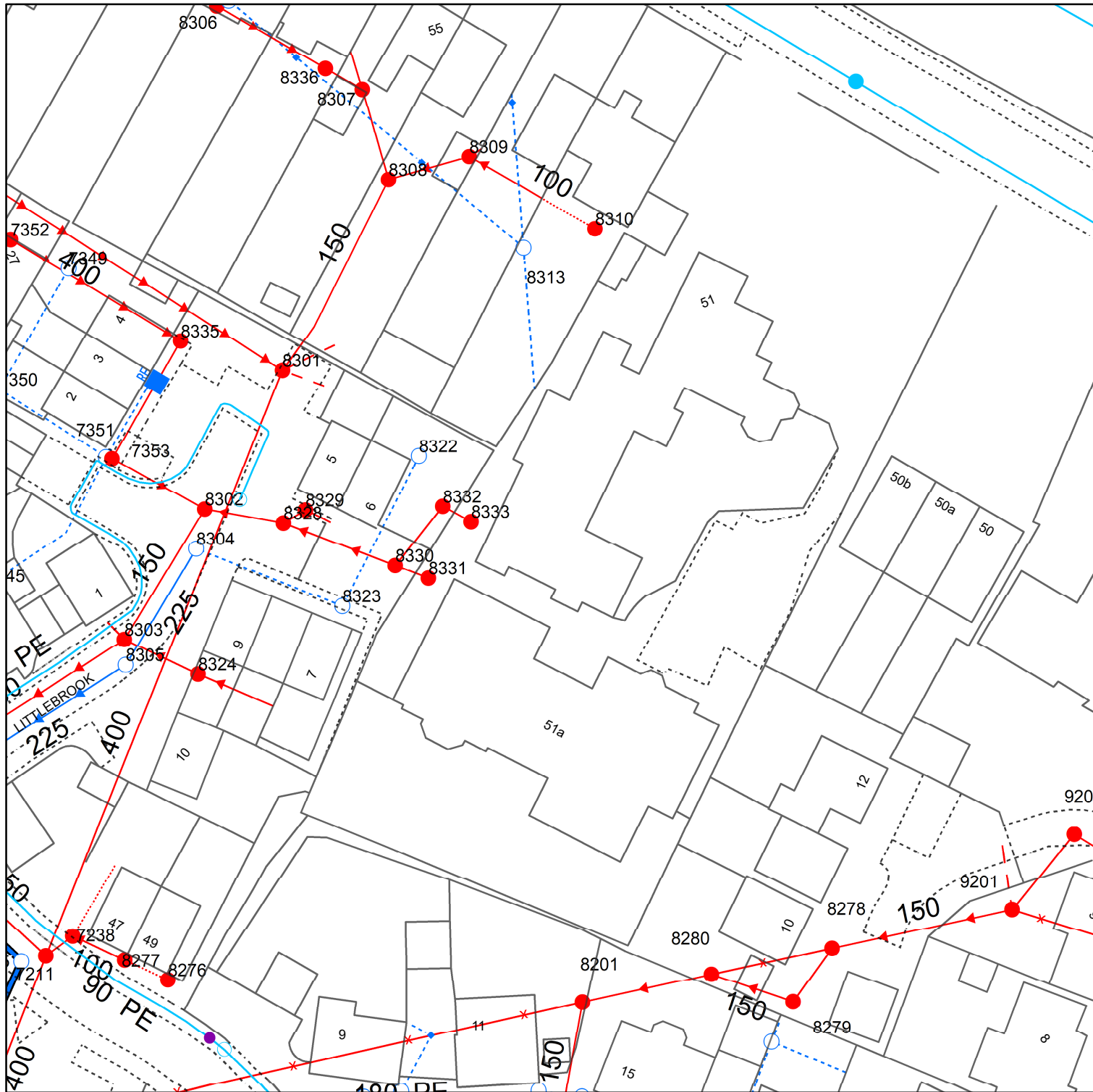
Plotting on paper may lead to a variety of scaling risks/errors due to paper stretching or inaccurate plotter settings etc.

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



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| WATER MAINS                                                                                                                                                                                                                                                               |              | SEWERS     |                          | STRATEGIC |                             | PUBLIC |                  | PRIVATE |             | SECTION 104 |  | OTHER WESSEX PIPES |                       | NON-WESSEX / UNKNOWN |                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------|--------------------------|-----------|-----------------------------|--------|------------------|---------|-------------|-------------|--|--------------------|-----------------------|----------------------|-----------------------|
|                                                                                                                                                                                                                                                                           | Distribution |            | Foul                     |           |                             |        |                  |         |             |             |  |                    | Rising Mains          |                      | Private Rising Mains  |
|                                                                                                                                                                                                                                                                           | Washout      |            | Surface                  |           |                             |        |                  |         |             |             |  |                    | Standby Rising Mains  |                      | Culverted Watercourse |
|                                                                                                                                                                                                                                                                           | Raw Water    |            | Combined                 |           |                             |        |                  |         |             |             |  |                    | EDM Effluent Disposal |                      | Highway Drain         |
|                                                                                                                                                                                                                                                                           | Abandoned    |            | Abandoned                |           |                             |        |                  |         |             |             |  |                    | Overflow              |                      | Use Unknown           |
|                                                                                                                                                                                                                                                                           | Private      |            |                          |           |                             |        |                  |         |             |             |  |                    | Syphon                |                      | Status Unknown        |
| <p>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).</p> <p>Some styles of line and symbol are shown on the key in sample/typical colours.</p> |              |            |                          |           |                             |        |                  |         |             |             |  |                    |                       |                      |                       |
| FITTINGS                                                                                                                                                                                                                                                                  |              | STRUCTURES |                          |           |                             |        |                  |         |             |             |  | OTHER STRUCTURES   |                       |                      |                       |
|                                                                                                                                                                                                                                                                           | Hydrant      |            | Manhole - Foul           |           | Pumping Station - Surface   |        | Attenuation Tank |         | Tunnel      |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           | Other        |            | Manhole - Surface        |           | Pumping Stn - Foul/Combined |        | Storage Tank     |         | Interceptor |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Manhole - Combined       |           | Gully                       |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Inlet                    |           | Vent Column                 |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Outfall                  |           | Rodding Eye                 |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Lamphole                 |           | Catchpit                    |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Bifurcation - Foul       |           | Flushing Chamber            |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Bifurcation - Surface    |           | Soakaway                    |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Bifurcation - Combined   |           | Non Return Valve            |        |                  |         |             |             |  |                    |                       |                      |                       |
|                                                                                                                                                                                                                                                                           |              |            | Combined Sewage Overflow |           | Air Valve                   |        | Hatch Box        |         | Washout     |             |  |                    |                       |                      |                       |

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 526633 or e-mail: [developer.enquiries@wessexwater.co.uk](mailto:developer.enquiries@wessexwater.co.uk) to discuss your proposals. Details of assets within Wessex Water's land ownership are unavailable through this service.

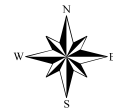
OTHER STRUCTURES

|                                                                                       |                  |                                                                                       |             |
|---------------------------------------------------------------------------------------|------------------|---------------------------------------------------------------------------------------|-------------|
|  | Attenuation Tank |  | Tunnel      |
|  | Storage Tank     |  | Interceptor |

**Wessex Water**  
YTL GROUP



**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  
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SL1 6PQ

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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](mailto: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 14<sup>th</sup> 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 14<sup>th</sup> 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/m<sup>2</sup>/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/m<sup>2</sup>/minute, which is a convenient rate to use. The BRE use a unit of m/sec, which is the value in l/m<sup>2</sup>/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 <sup>2</sup> /min  | BRE Units (m/sec)                      |
| SK01                                    | 2.2       | 1        | 0.048 (non-complaint)* | $8.05 \times 10^{-7}$ (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: 01635 800 950  
Email: [RJiagge@southerntesting.co.uk](mailto:RJiagge@southerntesting.co.uk)

## 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 |

|                                                                                                                     |  |  |  |                                        |  |                              |  |                             |  |                                 |  |
|---------------------------------------------------------------------------------------------------------------------|--|--|--|----------------------------------------|--|------------------------------|--|-----------------------------|--|---------------------------------|--|
|  <b>Southern Testing ST Consult</b> |  |  |  | <b>Start - End Date:</b><br>14/03/2022 |  | <b>Project ID:</b><br>JT0475 |  | <b>Machine Type:</b><br>JCB |  | <b>SK01</b><br><br>Sheet 1 of 1 |  |
| www.southerntesting.co.uk tel:01342 333100    www.stconsult.co.uk tel:01604 500020                                  |  |  |  |                                        |  |                              |  |                             |  |                                 |  |
| <b>Project Name:</b> Trowbridge                                                                                     |  |  |  | <b>Remarks:</b>                        |  | <b>Co-ordinates:</b>         |  | <b>Level (m AOD):</b>       |  | <b>Logger:</b><br>JB            |  |
| <b>Location:</b> Staverton House, 51a Marsh Lane, Trowbridge, BA14 6NX                                              |  |  |  |                                        |  |                              |  |                             |  |                                 |  |
| <b>Client:</b> Fidecia Care                                                                                         |  |  |  |                                        |  |                              |  |                             |  |                                 |  |

| Samples and Insitu Testing |      |         | Level<br>(m AOD) | Thickness<br>(m) | Legend                                                                            | Depth<br>(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. |   |
|                            |      |         |                  | (0.45)           |                                                                                   |                  | MADE GROUND<br>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.           |   |
|                            |      |         |                  | (1.00)           |                                                                                   | 0.70             | MADE GROUND<br>geotextile membrane (<2mm) @ 0.25m<br>Soft brown sandy CLAY. Sand is fine to coarse.                                                                                                                                                    |   |
|                            |      |         |                  | (0.50)           |  | 1.70             | Firm greyish brown CLAY.<br>KELLAWAYS FORMATION                                                                                                                                                                                                        | 2 |
|                            |      |         |                  |                  |                                                                                   | 2.20             | Pit terminated at 2.20m.                                                                                                                                                                                                                               |   |

|                          |      |                       |  |                       |  |
|--------------------------|------|-----------------------|--|-----------------------|--|
| <b>Pit Dimension (m)</b> |      | <b>Pit Stability:</b> |  | <b>Water Strikes:</b> |  |
| <b>Width:</b>            | 0.60 | Stable                |  | Slow ingress at 1.60m |  |
| <b>Length:</b>           | 1.80 |                       |  |                       |  |
| <b>Depth:</b>            | 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 <sup>2</sup> )                 |
| C                             | Road / Pavement Core                                   | IVN                            | Strength from Hand Vane ((kN/m <sup>2</sup> ) 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) |                                |                                                                      |

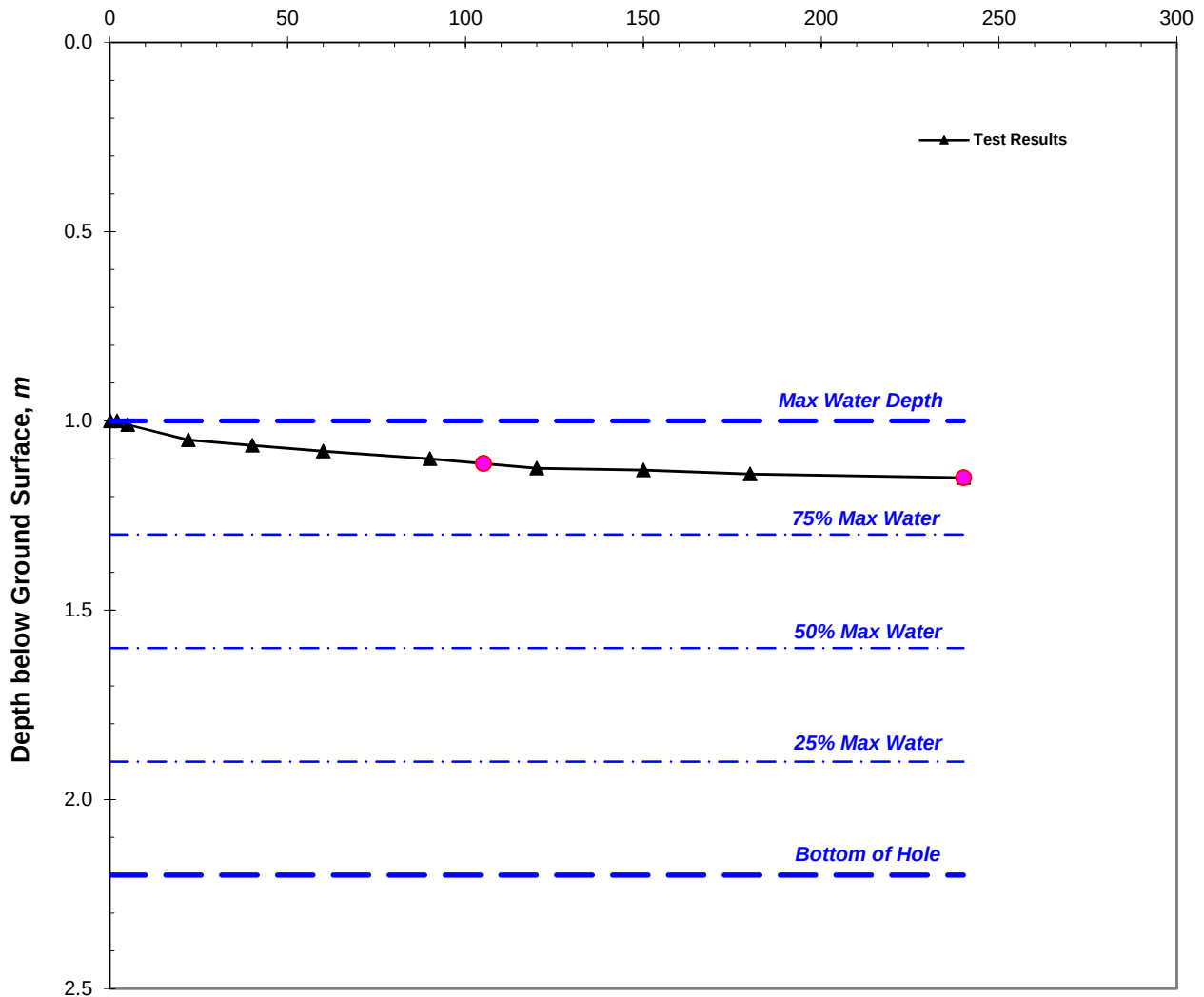
| Samples / Test Type |                              | Samples / Test Type |                                                         |
|---------------------|------------------------------|---------------------|---------------------------------------------------------|
| B                   | Bulk Sample                  | 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 <sup>2</sup> | 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 <sup>2</sup> /min      | <b>0.048</b>    |
| Voids Assumed for Granular Fill, % | 100%  | BRE Soil Infiltration Rate, m/sec            | <b>8.05E-07</b> |

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<br><i>m</i> | Soakage Rate for Each Test<br><i>litre/m<sup>2</sup>/min</i> | Soakage Rate for Each Hole<br><i>litre/m<sup>2</sup>/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<br><i>litre/m<sup>2</sup>/min</i>                                 | 8.05E-7<br><i>m/sec</i>        |                                                          |                                                 |



## Appendix E – MicroDrainage Calculations

|                                                                  |                     |                           |                                  |                         |                           |                       |                                                                                     |
|------------------------------------------------------------------|---------------------|---------------------------|----------------------------------|-------------------------|---------------------------|-----------------------|-------------------------------------------------------------------------------------|
| Cotswold Transport Planning                                      |                     |                           |                                  |                         |                           |                       | Page 1                                                                              |
| CTP House, Knapp Road<br>Cheltenham<br>Gloucestershire, GL50 3QQ |                     |                           | Staverton House<br>100 Year & CC |                         |                           |                       |  |
| Date 18/03/2025 14:50<br>File CELLULAR STORAGE.SRCX              |                     |                           | Designed by CF<br>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.                                  |                     |                           |                                  |                         |                           |                       |                                                                                     |
| Storm<br>Event                                                   | Max<br>Level<br>(m) | Max<br>Depth<br>(m)       | Max<br>Infiltration<br>(l/s)     | Max<br>Control<br>(l/s) | Max<br>Σ Outflow<br>(l/s) | Max<br>Volume<br>(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<br>Event                                                   | Rain<br>(mm/hr)     | Flooded<br>Volume<br>(m³) | Discharge<br>Volume<br>(m³)      | Time-Peak<br>(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<br>Cheltenham<br>Gloucestershire, GL50 3QQ | Staverton House<br>100 Year & CC |  |
| Date 18/03/2025 14:50<br>File CELLULAR STORAGE.SRCX              | Designed by CF<br>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 |

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|                                                                  |                                  |                                                                                     |
|------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------|
| Cotswold Transport Planning                                      |                                  | Page 4                                                                              |
| CTP House, Knapp Road<br>Cheltenham<br>Gloucestershire, GL50 3QQ | Staverton House<br>100 Year & CC |  |
| Date 18/03/2025 14:50<br>File CELLULAR STORAGE.SRCX              | Designed by CF<br>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 <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|
| 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        |           |            |

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| Cotswold Transport Planning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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-------|---------------|--------|-------|-----|-----|-----|------|-----|---------------|--------|-------|-----|-----|-----|------|-----|---------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|-----------------|--------|-------|-----|-----|-----|------|-----|------------------|--------|-------|-----|-----|-----|------|-----|---------------|--------|-------|-----|-----|-----|------|-----|-------------|--------------|---------------------|-----------------------|------------------|---------------|--------|-----|------|----|---------------|--------|-----|------|----|---------------|--------|-----|------|----|----------------|--------|-----|------|-----|----------------|--------|-----|------|-----|----------------|-------|-----|------|-----|----------------|-------|-----|------|-----|----------------|-------|-----|------|-----|----------------|-------|-----|------|-----|----------------|-------|-----|------|-----|----------------|-------|-----|-------|-----|-----------------|-------|-----|-------|------|-----------------|-------|-----|-------|------|-----------------|-------|-----|-------|------|-----------------|-------|-----|-------|------|-----------------|-------|-----|-------|------|-----------------|-------|-----|-------|------|-----------------|-------|-----|-------|------|------------------|-------|-----|-------|------|---------------|--------|-----|------|----|
| CTP House, Knapp Road<br>Cheltenham<br>Gloucestershire, GL50 3QQ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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|        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |   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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| <p style="text-align: center;"><u>Summary of Results for 10 year Return Period</u></p> <p style="text-align: center;">Half Drain Time : 698 minutes.</p> <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>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><br><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 (l/s) | Max Control (l/s) | Max Σ Outflow (l/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 (l/s)          | Max Control (l/s) | Max Σ Outflow (l/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                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 120 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 38.951        | 0.221               | 0.0                             | 0.8               | 0.8                 | 55.4            | O K                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 180 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 38.967        | 0.237               | 0.0                             | 0.8               | 0.8                 | 59.6            | O K                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 240 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 38.977        | 0.247               | 0.0                             | 0.8               | 0.8                 | 62.1            | O K                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                  |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |             |              |                     |                       |                  |               |        |     |      |    |               |        |     |      |    |               |        |     |      |    |                |        |     |      |     |                |        |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |       |     |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 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                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 1440 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 38.966        | 0.236               | 0.0                             | 0.8               | 0.8                 | 59.3            | O K                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 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                                                                                 |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 10080 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                  |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |             |              |                     |                       |                  |               |        |     |      |    |               |        |     |      |    |               |        |     |      |    |                |        |     |      |     |                |        |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |       |     |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 15 min Winter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| Storm Event                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 15 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 61.525        | 0.0                 | 30.9                            | 26                |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 30 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 39.911        | 0.0                 | 40.2                            | 41                |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 60 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 120 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 15.080        | 0.0                 | 60.8                            | 128               |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 180 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 11.167        | 0.0                 | 67.6                            | 188               |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 240 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 8.999         | 0.0                 | 72.6                            | 246               |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                  |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |             |              |                     |                       |                  |               |        |     |      |    |               |        |     |      |    |               |        |     |      |    |                |        |     |      |     |                |        |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |       |     |                 |       |     |       |      |                 |       |     |       |      |                 |    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| 360 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6.633         | 0.0                 | 80.4                            | 364               |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 480 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 600 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 720 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 960 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 1440 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 2160 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 2880 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| 4320 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 5760 min Summer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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  |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                  |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |             |              |                     |                       |                  |               |        |     |      |    |               |        |     |      |    |               |        |     |      |    |                |        |     |      |     |                |        |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |      |     |                |       |     |       |     |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 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              |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |
| 15 min Winter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 61.525        | 0.0                 | 30.9                            | 26                |                     |                 |                                                                                     |             |               |               |                        |                   |                     |                 |        |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |               |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |        |       |     |     |     |      |     |                 |    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| ©1982-2020 Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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   |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                 |       |     |       |      |                  |       |     |       |      |               |        |     |      |    |

|                                                                  |                     |                           |                              |                                 |                           |                       |                                                                                     |
|------------------------------------------------------------------|---------------------|---------------------------|------------------------------|---------------------------------|---------------------------|-----------------------|-------------------------------------------------------------------------------------|
| Cotswold Transport Planning                                      |                     |                           |                              |                                 |                           |                       | Page 2                                                                              |
| CTP House, Knapp Road<br>Cheltenham<br>Gloucestershire, GL50 3QQ |                     |                           |                              | Staverton House<br>10 Year      |                           |                       |  |
| Date 18/03/2025 14:50<br>File CELLULAR STORAGE.SRCX              |                     |                           |                              | Designed by CF<br>Checked by CG |                           |                       |                                                                                     |
| Innovyze                                                         |                     |                           |                              | Source Control 2020.1.3         |                           |                       |                                                                                     |
| <u>Summary of Results for 10 year Return Period</u>              |                     |                           |                              |                                 |                           |                       |                                                                                     |
| Storm<br>Event                                                   | Max<br>Level<br>(m) | Max<br>Depth<br>(m)       | Max<br>Infiltration<br>(l/s) | Max<br>Control<br>(l/s)         | Max<br>Σ Outflow<br>(l/s) | Max<br>Volume<br>(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<br>Event                                                   | Rain<br>(mm/hr)     | Flooded<br>Volume<br>(m³) | Discharge<br>Volume<br>(m³)  | Time-Peak<br>(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                            |                           |                       |                                                                                     |
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| Cotswold Transport Planning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 | Page 3                                                                              |                |             |               |     |                       |    |             |       |        |                   |             |       |            |        |                       |    |         |       |                      |       |               |     |                  |    |             |      |             |      |             |      |       |     |       |     |       |     |   |         |   |         |   |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------|----------------|-------------|---------------|-----|-----------------------|----|-------------|-------|--------|-------------------|-------------|-------|------------|--------|-----------------------|----|---------|-------|----------------------|-------|---------------|-----|------------------|----|-------------|------|-------------|------|-------------|------|-------|-----|-------|-----|-------|-----|---|---------|---|---------|---|----------|
| CTP House, Knapp Road<br>Cheltenham<br>Gloucestershire, GL50 3QQ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Staverton House<br>10 Year      |  |                |             |               |     |                       |    |             |       |        |                   |             |       |            |        |                       |    |         |       |                      |       |               |     |                  |    |             |      |             |      |             |      |       |     |       |     |       |     |   |         |   |         |   |          |
| Date 18/03/2025 14:50<br>File CELLULAR STORAGE.SRCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Designed by CF<br>Checked by CG |                                                                                     |                |             |               |     |                       |    |             |       |        |                   |             |       |            |        |                       |    |         |       |                      |       |               |     |                  |    |             |      |             |      |             |      |       |     |       |     |       |     |   |         |   |         |   |          |
| Innovyze                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                 | Source Control 2020.1.3                                                             |                |             |               |     |                       |    |             |       |        |                   |             |       |            |        |                       |    |         |       |                      |       |               |     |                  |    |             |      |             |      |             |      |       |     |       |     |       |     |   |         |   |         |   |          |
| <p style="text-align: center;"><u>Rainfall Details</u></p> <table> <tr> <td>Rainfall Model</td> <td>FSR</td> <td>Winter Storms</td> <td>Yes</td> </tr> <tr> <td>Return Period (years)</td> <td>10</td> <td>Cv (Summer)</td> <td>1.000</td> </tr> <tr> <td>Region</td> <td>England and Wales</td> <td>Cv (Winter)</td> <td>1.000</td> </tr> <tr> <td>M5-60 (mm)</td> <td>20.700</td> <td>Shortest Storm (mins)</td> <td>15</td> </tr> <tr> <td>Ratio R</td> <td>0.389</td> <td>Longest Storm (mins)</td> <td>10080</td> </tr> <tr> <td>Summer Storms</td> <td>Yes</td> <td>Climate Change %</td> <td>+0</td> </tr> </table> <p style="text-align: center;"><u>Time Area Diagram</u></p> <p style="text-align: center;">Total Area (ha) 0.202</p> <table> <thead> <tr> <th>Time (mins)</th> <th>Area</th> <th>Time (mins)</th> <th>Area</th> <th>Time (mins)</th> <th>Area</th> </tr> <tr> <th>From:</th> <th>To:</th> <th>From:</th> <th>To:</th> <th>From:</th> <th>To:</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4 0.067</td> <td>4</td> <td>8 0.067</td> <td>8</td> <td>12 0.068</td> </tr> </tbody> </table> |                                 |                                                                                     | 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 (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 |
| 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 (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<br>Cheltenham<br>Gloucestershire, GL50 3QQ | Staverton House<br>10 Year      |  |
| Date 18/03/2025 14:50<br>File CELLULAR STORAGE.SRCX              | Designed by CF<br>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 <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) | Depth (m) | Area (m <sup>2</sup> ) | Inf. Area (m <sup>2</sup> ) |
|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|
| 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        |           |            |

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## Appendix F – Drainage Strategy & Correspondence



**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
- Private Sewer

Proposed

- Surface Water Sewer
- Foul Water Sewer
- Attenuation Crates
- Application Boundary

Proposed attenuation crate system (Wavin Aquacell or similar approved) designed with to a depth of 1.0m at 95% porosity.  
2D Area - 275m<sup>2</sup>  
Storage volume provided - 261m<sup>3</sup>

Proposed new connection to Wessex Water asset, subject to confirmation of capacity, levels and S106 connection application.

Proposed indirect connection to Wessex Water asset MH8304. Wessex Water correspondence has confirmed this connection is acceptable, subject to confirmation of capacity, levels and S106 connection application.

Proposed connection to the private surface water sewer (MH8323). The proposed connection is covered by the agreement between the client and the Housing Association, Selwood Housing.

Proposed Hydro-brake Control Chamber restricting flows to 1.0/s

|     |          |                                     |    |      |      |
|-----|----------|-------------------------------------|----|------|------|
| P03 | 29/04/26 | Updated following WW Correspondence | RJ | CG   | CG   |
| 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: | P03   |



---

WW DEV RESP ST86SE/ 470 The Old Vicarage, 51 New Terrace, Staverton, Trowbridge, Wiltshire, BA14 6NX

---

From Planning Liaison <planning.liaison@wessexwater.co.uk>

Date Tue 24/03/2026 11:19 AM

To Ashley Jones <ashley@fideliahc.co.uk>

Cc Sian Markie <sianmarkie@fed3projects.com>; Rukhsar Zahid <rzahid@carless-adams.co.uk>

 1 attachment (7 MB)

24.0453 Drainage Technical Note & Appendices (2).pdf;

Dear Ashley,

I write in respect of the attached technical note & appendices as submitted in your pre development enquiry.

**Our Ref:** ST86SE/ 470

**Proposal:** 'Demolition of The Old Vicarage with replacement building and extension to Staverton House, providing 13 Bedrooms on Lower Ground Floor, 12 Bedrooms on Ground Floor, all with auxiliary space & together with the Existing Care Home would provide 46 bedrooms total and associated works.

### **Surface Water Drainage**

You have proposed surface water drainage from the site at a reduced rate of 1 l/s for all storm events up to and including the 1 in 100yr event plus 40% CC with a connection made to the existing surface water sewer at MH8323. **This discharge rate is agreed in principle**, however the surface water sewer is a private sewer at this point and not a Wessex Water Asset, therefore we are not able to agree a connection at this point, you will need to seek permission from the owner of the system at this point.

The network does become public at MH8304 approximately 20m North West of your proposed connection point, and we would be able to agree a connection at this point (subject to application and engineering approval) but this option will require you to lay a new section of surface water sewer through 3rd party land.

**Wessex Water accepts, in principle, surface water discharge at MH8304 at the proposed rate of 1l/s, subject to detailed design, formal application, and any required third-party agreements.**

Many thanks,

**Planning Liaison**



**Wessex Water**

Operations Centre, Claverton Down, Bath BA2 7WW

Email [planning.liaison@wessexwater.co.uk](mailto:planning.liaison@wessexwater.co.uk)

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This email is being sent to you on behalf of Wessex Water Services Limited, a company registered in England and Wales with number 02366648. The registered office is Wessex Water Operations Centre, Claverton Down Road, Claverton Down, Bath, BA2 7WW.

---

## Charlotte Granger

---

**From:** Ashley Jones <ashley@fideliahc.co.uk>  
**Sent:** 27 April 2026 09:22  
**To:** Rukhsar Zahid; Sian Markie  
**Subject:** Fwd: Staverton House, Drainage Connection Request

**Follow Up Flag:** Flag for follow up  
**Flag Status:** Flagged

Good morning Rukhsar, Sian,

See below the email from Selwood Housing.

Hopefully that is sufficient.

All the best  
Ashley

Ashley Jones  
Fidelia Healthcare

Begin forwarded message:

**From:** Robin Lawrence <Robin.Lawrence@selwoodhousing.com>  
**Date:** 27 April 2026 at 08:36:36 BST  
**To:** Ashley Jones <ashley@fideliahc.co.uk>  
**Subject:** RE: Staverton House, Drainage Connection Request

Morning Ashley,

Thank you for your enquiry regarding the indirect connection to manhole ref MH8304 via MH8323 which is located within our land outside property No.7 Littlebrook.

We, Selwood Housing, hereby approve your request to connect via MH8323 in relation to the proposed extension works to Staverton House and understand Wessex Water have already approved the proposals set out in the Rappor Drainage Strategy dated March 2025.

If we can be of any further assistance, please do not hesitate to contact myself, and we look forward to seeing the completion of the works.

Kind regards

*Robin*

Robin Lawrence  
Response surveyor  
Selwood Housing

Tel: 01225 715969  
Email: [Robin.Lawrence@Selwoodhousing.com](mailto:Robin.Lawrence@Selwoodhousing.com)  
Web: [www.selwoodhousing.com](http://www.selwoodhousing.com)



# Selwood

# H



Selwood Housing Group  
Bryer Ash Business Park

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- Selwood Devco Limited is a private limited company and registered in England and Wales, Registration No. 8987175

Registered office of all above entities: Bryer Ash Business Park, Bradford Road,  
Trowbridge, Wiltshire BA14 8RT  
Tel: +44(0)1225 715715  
Email: [info@selwoodhousing.com](mailto:info@selwoodhousing.com)

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## 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 |

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|             |                            |
|-------------|----------------------------|
| 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                        |

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