# ANNEX A

# Drainage and Surface Water Strategy

## Moors Barn, Standerwick

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# Executive Summary

This report has been compiled for the support of the development of 5 No. caravan pitches at land off Marsh Road in Standerwick [Grid Reference: ST8231650457] [Planning application number: 2021/1190/FUL]. The proposals are for 5 caravan pitches along with dayrooms, associated drives, gardens and infrastructure. This report is compliant with the requirements of the National Planning Policy Framework (NPPF) and associated Technical Guidance (March 2012), as well as CIRIA C753 The SuDS Manual, BRE Digest 365, Somerset Council and Regional Guidance[1][2].

This report demonstrates that the development will responsibly manage surface water runoff as a result of the change of use from agricultural land/greenfield to hardstanding associated with the proposed caravan pitches, this will be achieved by suitable flow control devices and attenuation, limiting post development discharge rates to greenfield runoff rates (QBAR[3]). The surface water shall discharge to the culverted watercourse passing underneath the site; which connects to the open watercourse to the north, this open watercourse being a tributary of the River Biss. The applicant is the riparian owner of both the culverted watercourse and the open section to the north. The on-site surface water drainage strategy is discussed further in **Section 3**.

Extant surface water control measures provide necessary protection and interception of overland flows associated with pluvial runoff. The management of existing surface water flow paths is addressed in **Section 4**.

The foul sewerage from the development will discharge to cesspools located to the northwest of each pitch. The cesspools have been designed in accordance with Approved Document H[4] and have been selected in compliance with the discharge hierarchy outlined in Section H1 of that document. The on-site foul water drainage strategy is discussed further in **Section 5**.

[1] West of England – Sustainable Drainage Developer Guide March 2015
[2] JBA Consulting – Mendip District Council Level 1 Strategic Flood Risk Assessment
[3] Susdrain – Glossary of Terms – QBAR.
[4] HM Government – The Building Regulation 2010 – Drainage and Waste Disposal – Approved Document H.

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# 1. Introduction

1.1. This report has been prepared to support a planning application for the construction of 5 No. caravan pitches off Marsh Road in Standerwick and demonstrates that through the use of appropriate surface and foul water discharge methods the development can be constructed without detrimentally effecting future occupiers or increasing flood risk downstream (see **Appendix A** for the proposed Drainage Layout).

1.2. The existing site currently houses agricultural buildings and green space related to the activities of the adjacent Moors Barn; no positively drained system is currently extant. Access is present from the southern Marsh Road.

| Category | Site Specific Information |
|---|---|
| **Site Area** | 0.55 Hectares |
| **Flood Zone** | Flood Zone 1 |
| **Vulnerability Classification** | Highly Vulnerable |
| **Critical Drainage Status** | Not within a Critical Drainage Areas |
| **Design Return Period** | 1:100-year event |
| **Climate Change Allowance** | 40% allowance |

**Table 1.1** – Site Specific Information

# 2. Background Information

## Site Location

2.1. The site is located on the south-eastern edge of Standerwick on the eastern side of the A36 enroute to Warminster. The site is located approximately two kilometres north-east of Frome and three kilometres west of Westbury, two kilometres north of Chapmanslade and approximately two kilometres south-east of Beckington. The site can be accessed from Marsh Road (B3099) to the south. The exact location can be found in **Figure 2.1**:

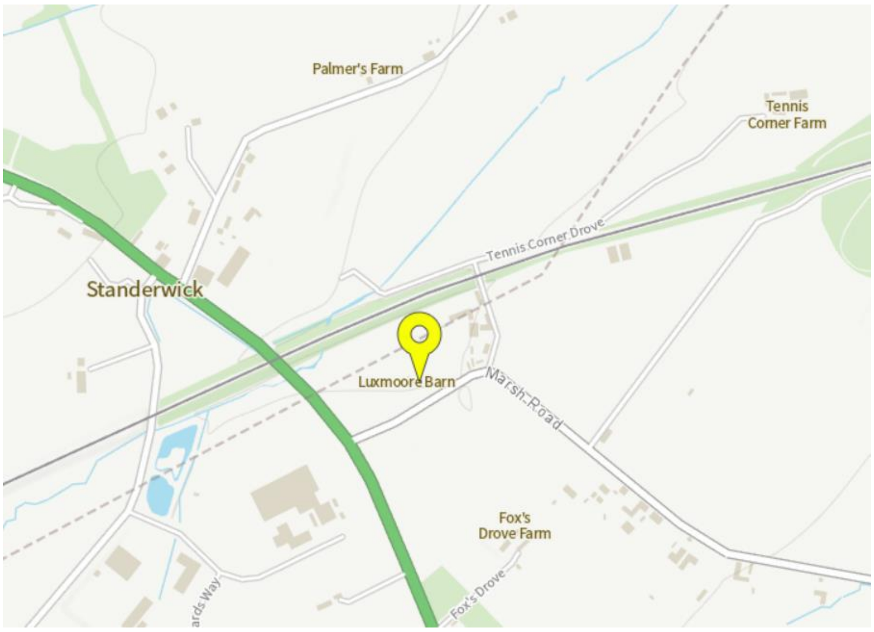


**Figure 2.1** – Site Location

2.2. Interrogation of local topographical information identifies an unnamed watercourse immediately North of the site. Levels information confirms that the ditch flows in an easterly direction. Inspection of OSTerrain50[5] Data shows a definite Hydraulic Gradient of the ditch network towards the River Biss[6] which discharges to the River Avon approximately one kilometre north-west of Trowbridge.

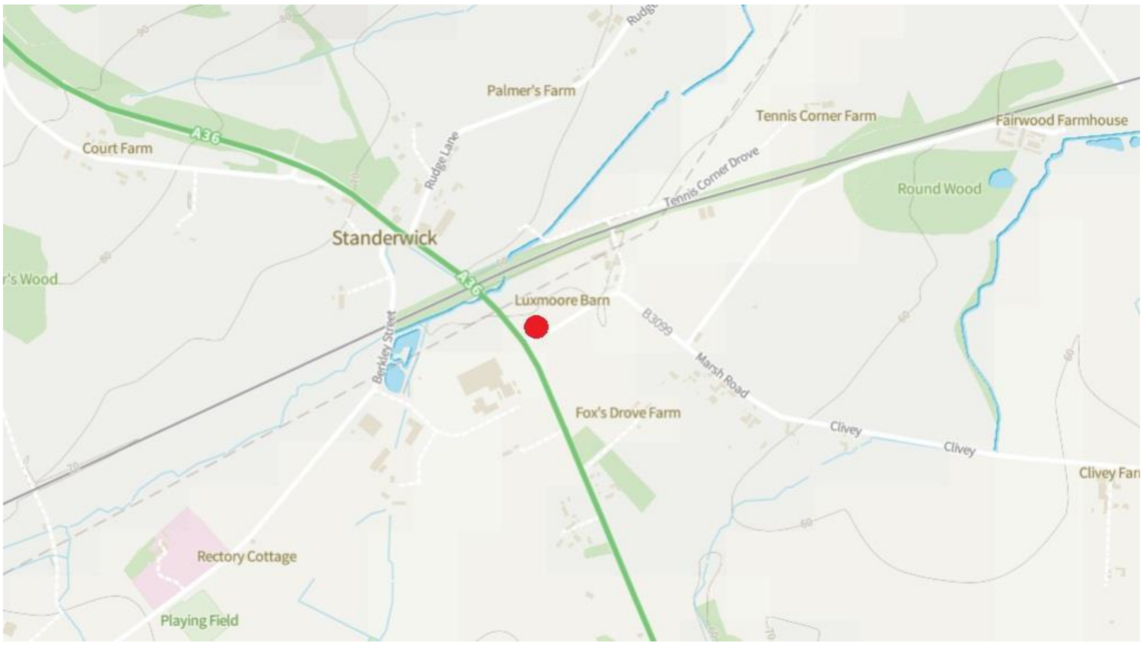


**Figure 2.2** – OSTerrain50 Contour Data
(*Contains OS data © Crown copyright and database right 2021*)

## Sources of Information

2.3. This study is based on the following information:

- Local Authority Flood Risk Maps (where available)
- EA Mapping
- British Geological Survey Bedrock and Superficial Geology Mapping
- British Geological Survey GeoIndex Onshore Borehole and Waterwell Mapping
- The Mendip District Council Stage 1 SFRA
- Wessex Water Sewer Records

## Site Description

2.4. The site is roughly rectangular in shape being approximately 38m wide (north to south) and 141m Long (east to west), the overall site area is approximately 0.55 Hectares in size when considering the areas outlined in the Thurdleigh Planning Consultancy Ltd Proposed layout plan [RL3] [see **Appendix B**].

2.5. The site currently constitutes greenfield/agricultural land associated with Moors Barn. The site is bordered to the north by agricultural land owned by the applicant and beyond this a National Rail rail-line, to the south lies Marsh Road and beyond this agricultural land, to the West the site is bordered by the A36 and beyond this a livestock auctioneers, to the east lies further agricultural land.

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[5] Ordnance Survey OSTerrain50 – Lidar Contoured Mapping.
[6] Wiltshire Wildlife Trust – The River Biss in Trowbridge (https://www.wiltshirewildlife.org/blog/the-river-biss-in-trowbridge-opening-green-space-for-wildlife-and-people)

2.6. As displayed in **Figure 2.3**, the site consists of predominately hardstanding with intermittent grassed areas. The site is bounded to the south by hedges, fencing is present to the north and western boundaries separating the site from adjacent agricultural land. To the east lies the access way to the site as well as additional caravans.


**Figure 2.3** – Aerial Reconnaissance Photography

## Geotechnical/Geological

2.7. BGS Mapping[7] indicates that the development is underlain by Superficial Deposits described as Clay, Silt, Sand and Gravel of unspecified depth, this is shown to be underlain by Sandy Mudstone of the Kellaways Formation as shown in **Figure 2.4**. Local BGS Borehole Records confirm the maps findings.

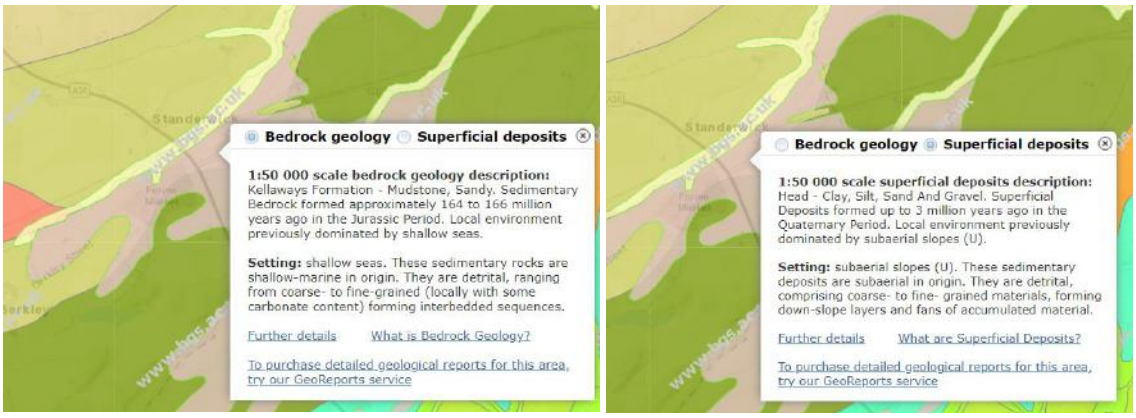



**Figure 2.4** – BGS Geological Mapping

[7] BGS Surface Geology – Geology of Britain Viewer

2.8. Soilscape mapping[8] ratifies the BGS classification describing the overlying strata as:

*"Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils… risks are associated with overland flow from compacted or poached fields."*

This compaction of the overlying soils causes a surface water flood risk, as identified in Government Long Term Flood Risk Mapping[9], this phenomenon of compacted ground through agricultural practices is described in more detail in DEFRA guidance[10].

2.9. Beyond a desktop study of the sites underlying geology an intrusive investigation was undertaken by Western Building Consultants on 19th May 2021[11]. The observations of this report corroborated BGS and Soilscape records as the excavated soil was described as predominantly clay. The implications of the underlying geology are considered in more detail in **Section 3**.

| Underlying Geology | Description |
|---|---|
| **Topsoil/Made Ground** | Clayey Topsoil or Superficial Made Ground to an anticipated depth of circa 0.3-0.4m. |
| **Superficial Deposits** | Silty, Sandy, Predominantly Clayey Head Deposits with coarse sand sized white crystals to a maximum depth of circa 3.8m. |
| **Kellaways Mudstone** | Silici-silty or Silici-sandy Grey, Stiff/Very Stiff Mudstone being the Underlying Bedrock. |

**Table 2.1** – Geological Stratum

# 3. Surface Water Drainage Strategy

3.1. The site currently comprises agricultural land/buildings for use in association with Moors Barn. No positive drainage system or connection to a surface water drainage network is currently in place. Excess runoff currently runs down the site from the south to the north, this runoff eventually enters the existing watercourse passing over the northern parcel of land.

3.2. This Surface Water Drainage Strategy has been prepared with due regard to the Surface Water Disposal Hierarchy as outlined in Approved Document H, the NPPF and associated Technical Guidance and Non-Statutory Technical Standards[12]. As well as this attention has been paid to the West of England Sustainable Drainage Developer Guide as well as EA and industry guidance on Surface Water Drainage Design. The Surface Water Drainage Hierarchy states that development should seek to dispose of surface water in the following order:

[8] Cranfield Soil and Agrifood Institute – Soilscapes Map.
[9] HM Government Long Term Flood Risk
[10] DEFRA – Remove Soil Compaction
[11] Western Building Consultants – 18/011 Soakaway Design
[12] DEFRA - Non-statutory technical standards for sustainable drainage systems

a) An adequate soakaway or some other adequate infiltration system; or, where that is not reasonably practicable,
b) A watercourse; or, where that is not reasonably practicable,
c) A sewer

## Soakaways

3.3. Testing conducted as part of the Western Building Consultants Soakaway Design Report revealed that favourable infiltration rates may be available at the development site. However following a review of surrounding BGS Borehole and Waterwell records, being an industry recognised method of analysing groundwater levels, the base of the proposed soakaways may be within 1m of the worst-case groundwater level. The results of the surrounding Borehole records have been tabulated in **Table 3.1**:

| BGS Borehole and Water Well Results | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Borehole Reference** | **ST84NW22** | **ST84NW15** | **ST84NW25** | **ST85SW28** | **ST85SW25** | **ST84NW14** | **ST85SE46** | **ST85SE49** |
| **Apparatus Type (Borehole [BH] Water Well [WW] Trial Pit [TP])** | WW | BH | BH | TP | TP | BH | BH | BH |
| **Distance from Development Site (km)** | 1.02 | 1.03 | 1.48 | 0.74 | 0.96 | 1.49 | 2.68 | 2.98 |
| **Approximate Height above Development Site** | N/A | +7m | N/A | +15m | +20m | +18m | +10m | +10m |
| **Depth to Groundwater (m)** | 3.4 | 2.0 | 36.0* | N/A | 3.8 | 3.4 | 3.1 | 4.5 |
| **Month of Measurement** | April | May | July | July | July | May | October | October |

**Assumed outlier or different methodology of testing.*

**Table 3.1** – Surrounding Borehole Records

3.4. The results of the Borehole records have good seasonal variation and are positioned in similar strata to the development site; therefore this data can be assumed to be reflective of the on-site conditions.

3.5. Any vertical contraction of the soakaways and subsequent expansion in plan area will conflict with spatial constraints as soakaways cannot be built within 5m of a building, road or area of unstable ground. Due to this an offsite disposal method has been selected.

## Watercourse

3.6. The next desirable receptor for surface water discharge is a watercourse. As mentioned previously in this report a tributary of the River Biss flows through the field to the north of the site, of which the applicant is a riparian owner. Additionally a 300mm diameter drain passes under the development parcel connecting the surface water interception ditch system to the south of the site to the open watercourse. As such discharge to this culverted watercourse would be possible and no other method of discharge need be investigated.

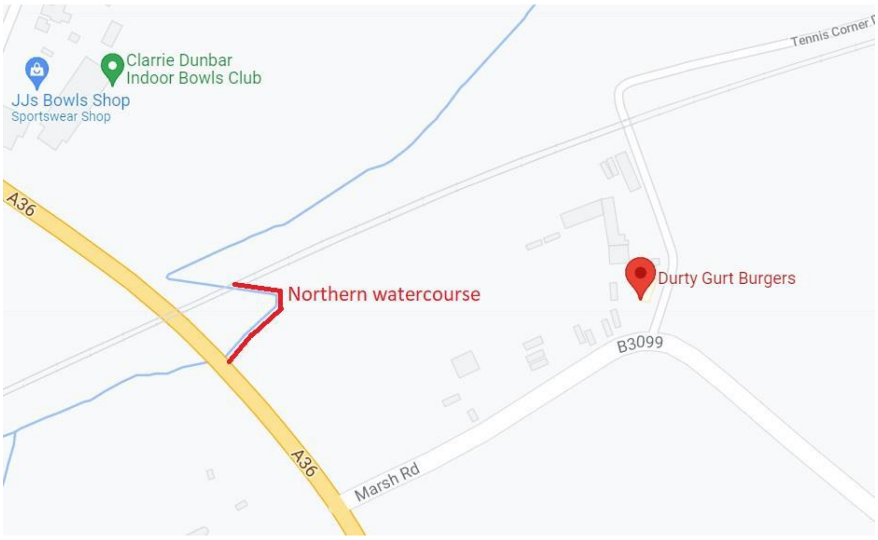



**Figure 3.1** – Northern Watercourse location

**Figure 3.2** – Northern Watercourse (Left). Southern Interception Ditch System (Right).

### *Greenfield Runoff Rates*

3.7. To ensure no flooding downstream, proposed discharge rates must not exceed predevelopment discharge rates as outlined in the DEFRA non-statutory technical standards Clause S2:

*"For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event."*

3.8. The existing site has been considered greenfield for the purposes of this assessment. To comply with government guidance proposed discharges shall be limited to QBar. Source Control[13] has been used to calculate the greenfield runoff rate using the ICP SUDS Module, which is appropriate for areas below 50Ha, where results are linearly interpolated using the ratio of the development size to 50ha. Greenfield runoff rates are presented in **Table 3.2**. For this analysis no allowance has been made for a partly urbanised catchment and the soil index has been left at 0.400, despite surface water flood mapping in the area indicating that soil coefficients are much higher. Greenfield runoff rate calculations can be found in **Appendix C**.

| **Return Period** | **QBAR (Mean annual)** | **Q1 (1 Year)** | **Q30 (30 Year)** | **Q100 (100 Year)** |
|---|---|---|---|---|
| **Greenfield Runoff Rate (l/s)** | 2.3 | 1.8 | 4.4 | 5.6 |

**Table 3.2** – Greenfield Runoff Rates

3.9. As outlined in CIRIA Susdrain guidance[14], where long term storage is not to be provided to attenuate discharge volumes so that they mimic 1-100 year 360 minute greenfield runoff events, the peak runoff rate should be limited to QBAR (the mean annual precipitation event).

### *Proposed Surface Water Strategy*

3.10. To reduce proposed discharge rates; a suitable form of attenuation and flow control device must be provided. An analysis of potential attenuation options has been provided in **Table 3.3**, including Sustainable Drainage System options (SuDS). As outlined in the NPPF, SuDS features are not required on non-major development sites, often owning to the size of the site. The proposed site is small in area with a limited amount of Public Open Space; therefore an attenuation option has been selected that can be incorporated giving consideration to topography, geological setting and site size, as well as maintenance practicality.

[13] Innovyze Source Control Hydraulic modelling package

[14] CIRIA/Susdrain Assessing attenuation storage volumes for SuDS (https://www.susdrain.org/files/resources/fact_sheets/03_14_fact_sheet_attenuation.pdf)

| Constraint | Topography | | Geological | | | Development | | Maintainability | Purchaser Desirability | Suitability |
|---|---|---|---|---|---|---|---|---|---|---|
| Characteristic | Slope | Outfall Design | Contaminated | Permeability | Groundwater | Area (Hectares) | Density | | | |
| Site Specific Result | Assumed 1:40 | Fair/Shallow | No | Yes | 2.0m | 0.55 | H | | | |
| **Recharging** | | | | | | | | | | |
| Infiltration Trench | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☒ | ☑ | ☑ | ☒ |
| Permeable Pavement | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |
| Soakaway | ☑ | ☑ | ☑ | ☑ | ☒ | ☑ | ☑ | ☑ | ☑ | ☒ |
| Infiltration Basin | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☒ | ☑ | ☑ | ☒ |
| Swale | ☑ | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☑ | ☑ | ☒ |
| **Recycling** | | | | | | | | | | |
| Rainwater Harvesting | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☒ |
| Green Roof | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☒ |
| **Discharging** | | | | | | | | | | |
| Filtration | ☑ | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☒ | ☒ | ☒ |
| Pond/Wetland | ☑ | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☑ | ☑ | ☒ |
| Detention Basin | ☑ | ☑ | ☑ | ☑ | ☑ | ☒ | ☒ | ☑ | ☑ | ☒ |
| Subsurface Storage | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☑ |

**Table 3.3** – Proposed attenuation methods

3.11. A Surface Water Drainage Strategy should be sought that utilises both shallow permeable surfacing that would allow slow discharge to ground and subsurface storage. Subsurface storage is typically oversized pipes, precast concrete structures or lined cellular storage features. Given the site density and constructability, a cellular storage option has been selected to provide the majority of the site's attenuation. The drives shall be constructed of permeable South Cerney Cotswold Gravel; as the depth of construction is relatively superficial groundwater will not present an issue here.

3.12. Hydro International Hydro-Brake Optimums have been selected to limit discharge rates. The Total Impermeable Area of the development is 665m$^2$ (see **Appendix D**), runoff from impermeable areas shall be conveyed using a traditional piped system.

3.13. An appropriate allowance for Climate Change should be allowed for in line with EA guidance[15]. The Climate Change Allowance guidance states that new development should consider both the Upper end and Central allowances and therefore a 40% allowance for climate change has been made for the 1:100 year event.

[15] Gov.uk – Climate change allowances

| Allowance | Total Potential change anticipated for the '2080s' (2070 to 2115) |
|---|---|
| Upper end | 40% |
| Central | 20% |

**Table 3.4** – Climate change adjustment

3.14. The Surface Water Drainage System has been modelled with the Network module of the MicroDrainage software suite[16], the detailed calculations can be found in **Appendix E**. A summary of the proposed drainage system is provided in **Table 3.5**. The results show that the sites surface water can be safely attenuated without causing flooding on-site, including for the 1:100 year event + Climate Change, or by increasing flood risk further downstream through sensible management of proposed discharge rates.

| Return Period | Critical Storm Duration (mins) | Maximum Surcharged Depth (m) | Combined Maximum Discharge Rate (l/s) | Status |
|---|---|---|---|---|
| 1 Year | 240 | 0.106 | 1.2 | SURCHARGED |
| 30 Year | 180 | 0.264 | 2.2 | SURCHARGED |
| 100 Year + 40% CC | 120 | 0.684 | 2.2 | SURCHARGED |

**Table 3.5** – Proposed Surface Water Calculations

# 4. Management of Existing Surface Water Flows

4.1. EA Long Term Mapping[17] demonstrates that the development site sits in an area at Low risk of Surface water flooding meaning that the development site has a chance of flooding between 0.1% and 1% annually. This mapping is based on national LiDAR (Light Detection and Ranging) datasets and utilises DDF (Depth Duration Frequency) curves available through the FEH (Flood Estimation Handbook)[18]. The model, however, does not allow for localised surface water drainage features and channels beyond the limit of detection. As can be seen in **Figure 3.2** a substantial drainage ditch, wetland area and headwall lie directly to the south of the site. This ditch system is specifically in place to mitigate the identified overland flows. A 300mm sewer is connected to this ditch and conveys the captured water under the development into the northern watercourse.

[16] Innovyze MicroDrainage Network Module
[17] Gov.uk – Check your long term flood risk
[18] Environment Agency - What is the Risk of Flooding from Surface Water map? August 2019


**Figure 4.1** – Extent of Surface water flooding, depth and velocity according to EA LIDAR mapping.

4.2. Within the hydraulic analysis of the sites surface water system, the system has been modelled with a surcharged outfall to ensure that collected runoff passing through the 300mm diameter culverted watercourse is properly accounted for. Detailed flood routing plans for pre-ditch and post-ditch flows can be found in **Appendix F**.

# 5. Foul Water Drainage Strategy

5.1. This Foul Water Drainage Strategy has been prepared with due regard to the Foul Water Disposal Hierarchy as outlined in Approved Document H. The Foul Water Drainage Hierarchy states that development should seek to dispose of foul water in the following order:

a) A public sewer; or, where that is not reasonably practicable,
b) A private sewer communicating with a public sewer; or, where that is not reasonably practicable,
c) Either a septic tank which has an appropriate form of secondary treatment or another wastewater treatment system; or, where that is not reasonably practicable,
d) A Cesspool.

## Public or Private Sewer

5.2. A review of Wessex Water mapping (See **Appendix G**) demonstrates that there are no public or private foul sewers within 150m of the development site. This distance has been selected based on the EA's General Binding Rules[19], where the reasonable distance to an adjacent sewer is equal to the number of properties on a development multiplied by 30m.

[19] EA - General binding rules for small sewage discharges (SSDs) with effect from January 2015 (https://www.gov.uk/government/publications/small-sewage-discharges-in-england-general-binding-rules/general-binding-rules-for-small-sewage-discharges-in-england)

## Septic Tank or Package Treatment Plant

5.3. Consideration has been given to Septic Tanks (STs) and Package Treatment Plants (PTPs) connected to a Secondary Treatment Measure such as a Drainage Field/Mound or Constructed Wetland as outlined in Approved Document H, however there are a number of constraints that would make this system unviable on this development.

5.4. Approved Document H places spatial requirements on the use of STs and PTPs. STs are to be 7m away from any habitable parts of dwellings, they should have a capacity of 2700 litres (2.7m3) for up to 4 users. The Secondary Treatment Measures also have their own spatial restrictions (15m for Drainage Fields or Mounds). PTPs are required to discharge at least 10m away from any building. The development is small in area, and there simply isn't enough space to accommodate these drainage solutions.

## Cesspools

5.5. Cesspools are watertight storage facilities for the housing of sewage. In the case of this development, given the spatial restrictions associated with secondary treatment measures, cesspools have been elected as only a 7m offset is required and this can be accommodated to the north of the dwellings, slightly downhill of the proposed dwellings and within 30m of the proposed vehicle access.

5.6. The proposed cesspools have been sized to take account of future occupation and emptying frequency, as presented in **Table 5.1**, complying with Provision 1.61 of approved document H. The cesspools will be fitted with a High Level Alarm (HLA) to ensure the capacity is not exceeded and that overflows do not occur. Emptying regimes will be dependent on the number of occupiers however emptying has been specified on a monthly basis in accordance with Appendix H2 A20-A22 of Approved Document H. The minimum emptying frequencies are based on current occupancy rates and assume a filling rate of 150 litres per person per day, this information is also shown in **Table 5.1**.

| Pitch Number | Pitch 1 | Pitch 2 | Pitch 3 | Pitch 4 | Pitch 5 |
|---|---|---|---|---|---|
| Occupancy Rate (persons) as per D&A[20]. | 2 | 6 | 6 | 4 | 4 |
| Cesspool capacity required (litres) | 18,000 | 45,200 | 45,200 | 31,600 | 31,600 |
| Cesspool capacity provided (litres) | 46,000* | 46,000[21] | 46,000 | 46,000* | 46,000* |
| Minimum emptying regime required based on proposed occupancy (weeks) | 21 | 7 | 7 | 10 | 10 |

**Additional capacity provided in case of increased occupancy.*

**Table 5.1** – Proposed Cesspool Capacities

5.7. A Foul Drainage layout can be found in **Appendix A**. A non-main foul drainage assessment has been completed and can be found in **Appendix H**.

[20] Thurdleigh Planning Consultancy Ltd - DESIGN AND ACCESS STATEMENT
[21] Clearwater Cesspool 46000 - https://www.ukseptictanks.co.uk/cesspools/domestic-cesspools/cesspool-46000

# 6. Conclusion

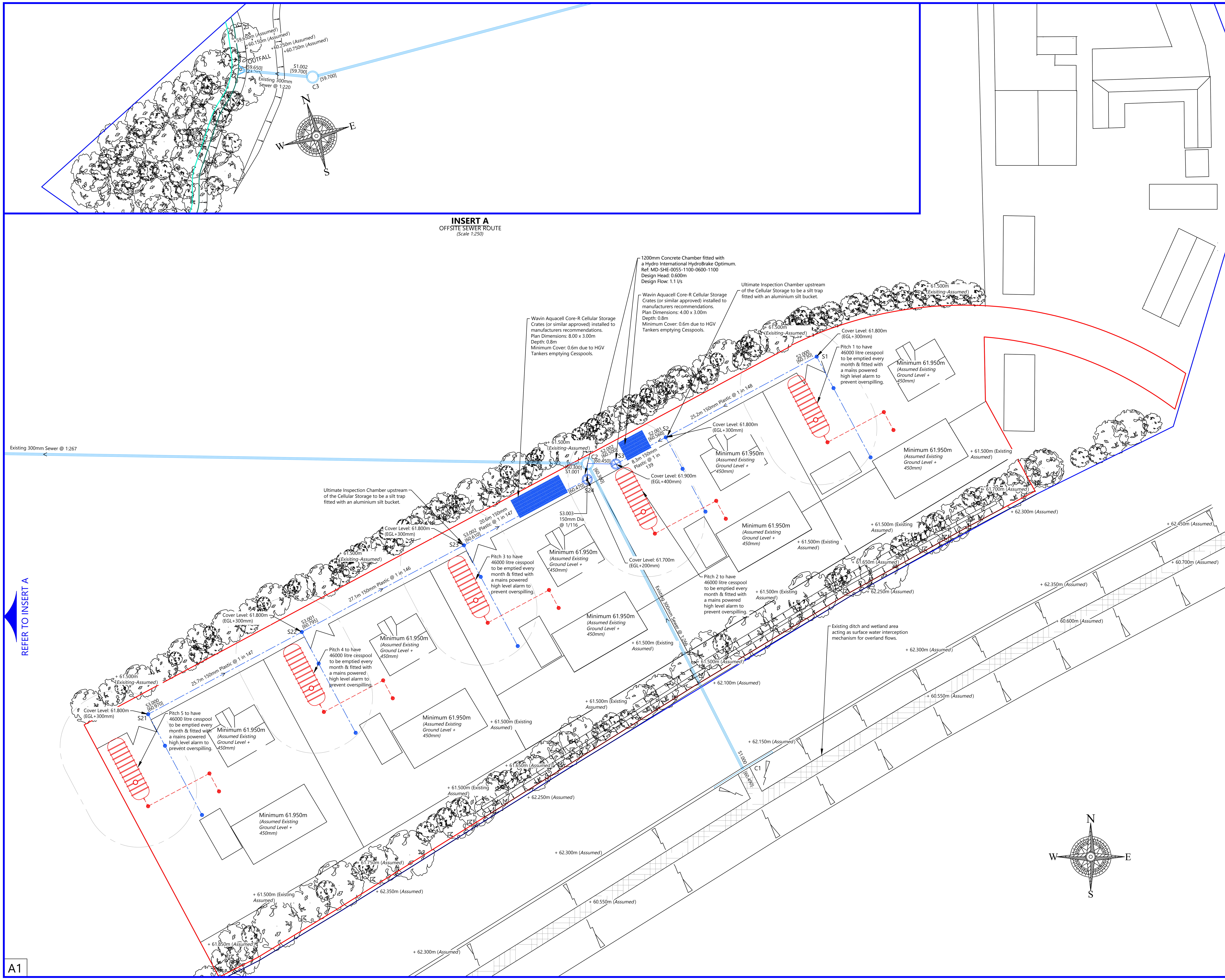
6.1. As can be seen in this report, the drainage proposals of the development site have been extensively considered and a drainage strategy has been compiled which:

a) Responsibly discharges surface water arisings through suitably attenuated flows to the existing culverted watercourse.

b) Suitably handles foul water arisings through the incorporation of suitably sized Cesspools in consideration of proposed and potential future occupation levels.

6.2. On the basis of the findings and recommendations of this report and its appendices; showing updated information as recommended by the Mendip District Council Land Drainage Team, it is requested that the Council review its objection to the proposals as the development can now proceed without either elevating flood risk to downstream receptors or presenting a flood risk to on-site dwellings.

# **Appendix A** Drainage Strategy Plan




All dimensions are to be checked on site prior to manufacture of prefabricated items. Any discrepancy or query to be reported and clarified before associated work proceeds. All construction to be in accordance with relevant Trade and Professional Standards and Guidelines, Statutory requirements and product manufacturers' specifications. This drawing must be read in conjunction with the relevant up to date associated specifications, drawings issued and details.



## General Notes

1. This drawing is for planning purposes only and cannot be relied upon as construction information. Detailed levels information will be required for construction drawings.
2. All levels are to an assumed adjacent datum based on local mapping information. Actual levels on-site will vary and will need further investigation. Slab and Spot levels shown on this layout are indicative and act as a minimum level in relation to adjacent spot levels.
3. All installed pipework and drainage infrastructure must be installed inline with the relevant Approved Document and British Standard to the satisfactions of the Building Control Officer and any other relevant inspector.

## Key

| | |
|---|---|
| | Proposed Surface Water Sewer |
| | Proposed Foul Water Sewer |
| | Existing Culverted Watercourse |
| | Proposed 450mm Plastic Inspection Chamber |
| | Proposed 1200mm Hydrobrake Chamber |
| [59.900] | Proposed Surface Water Level (Relative) |
| + 61.500m (*Assumed*) | Spot Level (Relative) |
| 61.850m | Proposed Slab Level (Relative) |
| | Proposed Cesspool |
| | Proposed Cellular Storage Crate |
| | Existing Indicative Watercourse Location |
| | Cesspool 7m offset requirement |
| | Site Boundary |
| | Applicant Ownership Extents |

## Drawing Reference Table

| | |
|---|---|
| RL3 | Thurdleigh Proposed Layout Plan |
| 1102 | Impermeable Areas |
| 1103 | Flood Routing Plan |
| 1104 | Drainage Details |

| REV. | REVISION DETAILS | DATE | INITIAL |
|---|---|---|---|
| 1.2 | Strategy updated following site visit. | 28.01.2022 | ZS |
| 1.1 | First Issue. | 30.12.2021 | ZS |

EnvirEn

Moors Barn, Standerwick

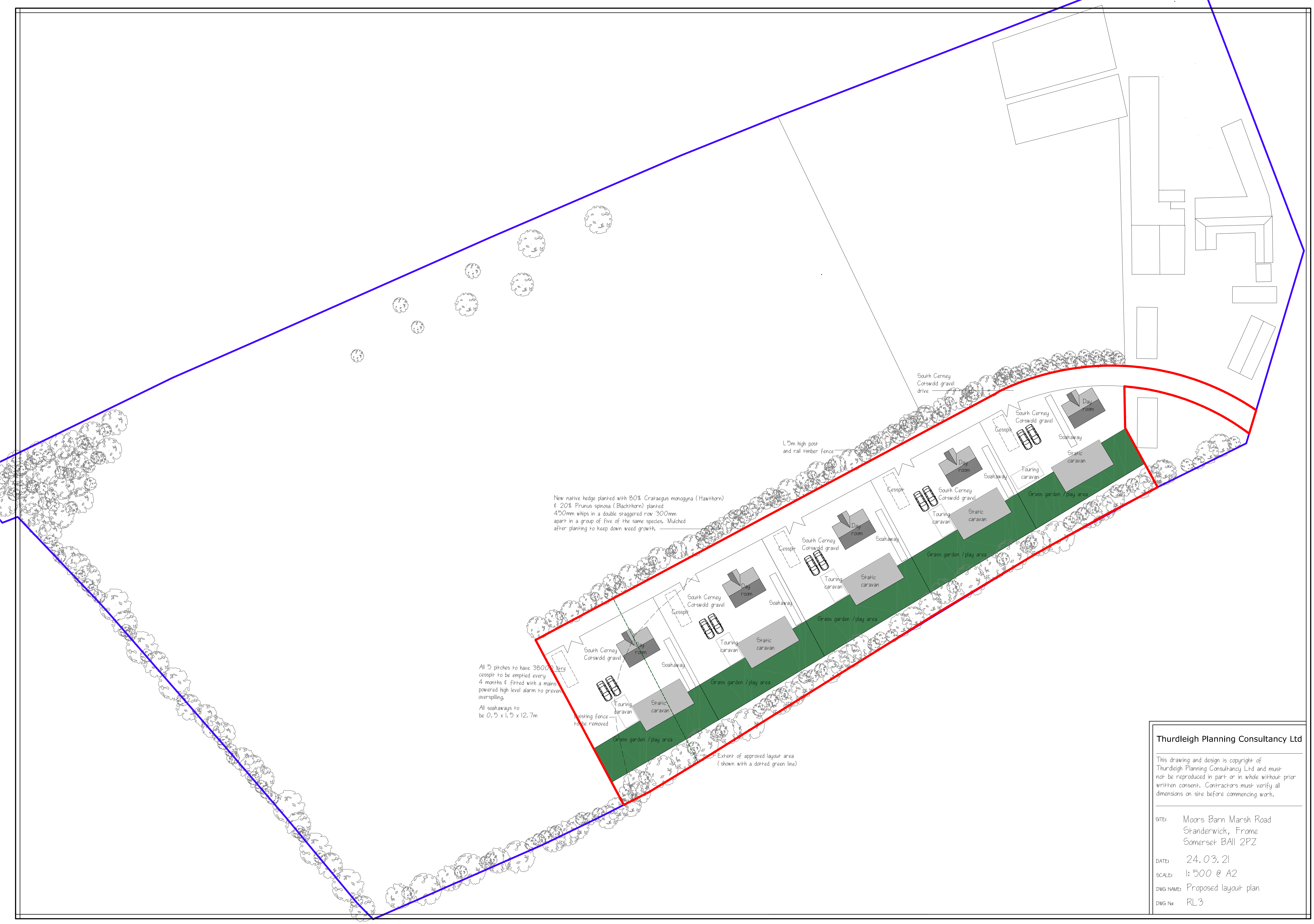
Drainage Strategy Plan

PLANNING

| | |
|---|---|
| 1:250 Drawing Scale | DS Drawn by |
| | 30.12.2021 First Issued |
| 382150-1101 Drawing No. | 1.2 Revision Letter |

A1

# Appendix B Planning Layout




Thurdleigh Planning Consultancy Ltd



SITE: Moors Barn Marsh Road
Standerwick, Frome
Somerset BA11 2PZ

DATE: 24.03.21

SCALE: 1:500 @ A2

DWG NAME: Proposed layout plan

DWG No: RL3

# Appendix C Greenfield Runoff Calculations

## ICP SUDS Mean Annual Flood

Input

| | | | | | |
|---|---|---|---|---|---|
| Return Period (years) | 1 | SAAR (mm) | 831 | Urban | 0.000 |
| Area (ha) | 0.555 | Soil | 0.400 | Region Number | Region 8 |

**Results l/s**

QBAR Rural 2.3
QBAR Urban 2.3

Q1 year 1.8

Q1 year 1.8
Q30 years 4.4
Q100 years 5.6

# Appendix D Impermeable Areas




## General Notes

1. This drawing is for planning purposes only and cannot be relied upon as construction information. Detailed levels information will be required for construction drawings.
2. All levels are to an assumed adjacent datum based on local mapping information. Actual levels on-site will vary and will need further investigation. Slab and Spot levels shown on this layout are indicative and act as a minimum level in relation to adjacent spot levels.
3. All installed pipework and drainage infrastructure must be installed inline with the relevant Approved Document and British Standard to the satisfactions of the Building Control Officer and any other relevant inspector.

## IMPERMEABLE AREAS

| Manhole Reference | Pipe Code | Impermeable Area ($m^2$) |
|---|---|---|
| S1 | 2.000 | 133 |
| S2 | 2.001 | 133 |
| S21 | 3.000 | 133 |
| S22 | 3.001 | 133 |
| S23 | 3.002 | 133 |
| **Total Impermeable Area** | | 665 |

## Drawing Reference Table

| | |
|---|---|
| RL3 | Thurdleigh Proposed Layout Plan |
| 1101 | Drainage Strategy Plan |
| 1103 | Flood Routing Plan |
| 1104 | Drainage Details |

| REV. | REVISION DETAILS | DATE | INITIAL |
|---|---|---|---|
| 1.2 | Strategy updated following site visit. | 28.01.2022 | ZS |
| 1.1 | First Issue. | 30.12.2021 | ZS |

EnvirEn

# Moors Barn, Standerwick

Impermeable Areas

PLANNING

DS
Drawn by

1:250
Drawing Scale

30.12.2021
First issued

382150-1102
Drawing No.

1.2
Revision Letter

# Appendix E Proposed Surface Water Drainage Calculations

## STORM SEWER DESIGN by the Modified Rational Method

### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

| | | | | | |
|---|---|---|---|---|---|
| Return Period (years) | 1 | Foul Sewage (l/s/ha) | 0.000 | Maximum Backdrop Height (m) | 1.500 |
| M5-60 (mm) | 19.900 | Volumetric Runoff Coeff. | 0.750 | Min Design Depth for Optimisation (m) | 1.200 |
| Ratio R | 0.353 | PIMP (%) | 100 | Min Vel for Auto Design only (m/s) | 1.00 |
| Maximum Rainfall (mm/hr) | 50 | Add Flow / Climate Change (%) | 0 | Min Slope for Optimisation (1:X) | 500 |
| Maximum Time of Concentration (mins) | 30 | Minimum Backdrop Height (m) | 0.200 | | |

Designed with Level Soffits

### Network Design Table for Storm

« - Indicates pipe capacity < flow

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 50.510 | 0.190 | 265.8 | 0.000 | 5.00 | 67.8 | 0.600 | o | 300 | Pipe/Conduit | |
| 2.000 | 25.226 | 0.170 | 148.4 | 0.013 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 2.001 | 8.334 | 0.060 | 138.9 | 0.014 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 2.002 | 4.181 | 0.100 | 41.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |

### Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 47.67 | 5.88 | 60.490 | 0.000 | 67.8 | 0.0 | 0.0 | 0.96 | 67.8 | 67.8 |
| 2.000 | 49.05 | 5.51 | 60.730 | 0.013 | 0.0 | 0.0 | 0.0 | 0.82 | 14.5 | 1.7 |
| 2.001 | 48.42 | 5.67 | 60.560 | 0.027 | 0.0 | 0.0 | 0.0 | 0.85 | 15.0 | 3.5 |
| 2.002 | 48.25 | 5.72 | 60.500 | 0.027 | 0.0 | 0.0 | 0.0 | 1.56 | 27.6 | 3.5 |

## Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3.000 | 25.681 | 0.175 | 146.7 | 0.013 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 3.001 | 27.078 | 0.185 | 146.4 | 0.013 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 3.002 | 20.626 | 0.140 | 147.3 | 0.014 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 3.003 | 2.328 | 0.020 | 116.4 | 0.000 | 0.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 1.001 | 160.363 | 0.600 | 267.3 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |
| 1.002 | 10.982 | 0.050 | 219.6 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit | |

## Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.000 | 49.02 | 5.52 | 60.970 | 0.013 | 0.0 | 0.0 | 0.0 | 0.83 | 14.6 | 1.7 |
| 3.001 | 47.01 | 6.06 | 60.795 | 0.026 | 0.0 | 0.0 | 0.0 | 0.83 | 14.6 | 3.3 |
| 3.002 | 45.60 | 6.48 | 60.610 | 0.040 | 0.0 | 0.0 | 0.0 | 0.83 | 14.6 | 4.9 |
| 3.003 | 45.47 | 6.52 | 60.470 | 0.040 | 0.0 | 0.0 | 0.0 | 0.93 | 16.4 | 4.9 |
| 1.001 | 38.10 | 9.31 | 60.300 | 0.067 | 67.8 | 0.0 | 0.0 | 0.96 | 67.6« | 74.7 |
| 1.002 | 37.73 | 9.49 | 59.700 | 0.067 | 67.8 | 0.0 | 0.0 | 1.06 | 74.7« | 74.7 |

## Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam.,L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C1 | 62.150 | 1.660 | Open Manhole | 1200 | 1.000 | 60.490 | 300 | | | | |
| S1 | 61.800 | 1.070 | Open Manhole | 450 | 2.000 | 60.730 | 150 | | | | |
| S2 | 61.800 | 1.240 | Open Manhole | 450 | 2.001 | 60.560 | 150 | 2.000 | 60.560 | 150 | |
| S3 | 61.900 | 1.400 | Open Manhole | 1200 | 2.002 | 60.500 | 150 | 2.001 | 60.500 | 150 | |
| S21 | 61.800 | 0.830 | Open Manhole | 450 | 3.000 | 60.970 | 150 | | | | |
| S22 | 61.800 | 1.005 | Open Manhole | 450 | 3.001 | 60.795 | 150 | 3.000 | 60.795 | 150 | |
| S23 | 61.800 | 1.190 | Open Manhole | 450 | 3.002 | 60.610 | 150 | 3.001 | 60.610 | 150 | |
| S24 | 61.700 | 1.230 | Open Manhole | 1200 | 3.003 | 60.470 | 150 | 3.002 | 60.470 | 150 | |
| C2 | 61.700 | 1.400 | Open Manhole | 1200 | 1.001 | 60.300 | 300 | 1.000 | 60.300 | 300 | |
| | | | | | | | | 2.002 | 60.400 | 150 | |
| | | | | | | | | 3.003 | 60.450 | 150 | |
| C3 | 60.750 | 1.050 | Open Manhole | 1200 | 1.002 | 59.700 | 300 | 1.001 | 59.700 | 300 | |
| OUTFALL | 60.150 | 0.500 | Open Manhole | 0 | | OUTFALL | | 1.002 | 59.650 | 300 | |

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| C1 | 452.624 | 294.918 | 452.624 | 294.918 | Required |  |
| S1 | 463.484 | 355.687 | 463.484 | 355.687 | Required |  |
| S2 | 441.239 | 343.791 | 441.239 | 343.791 | Required |  |
| S3 | 433.890 | 339.860 | 433.890 | 339.860 | Required |  |

## Manhole Schedules for Storm

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---|---|---|---|---|---|---|
| S21 | 364.958 | 302.996 | 364.958 | 302.996 | Required |  |
| S22 | 387.604 | 315.107 | 387.604 | 315.107 | Required |  |
| S23 | 411.492 | 327.882 | 411.492 | 327.882 | Required |  |
| S24 | 429.670 | 337.603 | 429.670 | 337.603 | Required |  |
| C2 | 429.709 | 339.931 | 429.709 | 339.931 | Required |  |
| C3 | 269.346 | 342.653 | 269.346 | 342.653 | Required |  |
| OUTFALL | 259.115 | 346.646 | | | No Entry |  |

## PIPELINE SCHEDULES for Storm

### Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| 1.000 | o | 300 | C1 | 62.150 | 60.490 | 1.360 | Open Manhole | 1200 |
| 2.000 | o | 150 | S1 | 61.800 | 60.730 | 0.920 | Open Manhole | 450 |
| 2.001 | o | 150 | S2 | 61.800 | 60.560 | 1.090 | Open Manhole | 450 |
| 2.002 | o | 150 | S3 | 61.900 | 60.500 | 1.250 | Open Manhole | 1200 |
| 3.000 | o | 150 | S21 | 61.800 | 60.970 | 0.680 | Open Manhole | 450 |
| 3.001 | o | 150 | S22 | 61.800 | 60.795 | 0.855 | Open Manhole | 450 |
| 3.002 | o | 150 | S23 | 61.800 | 60.610 | 1.040 | Open Manhole | 450 |
| 3.003 | o | 150 | S24 | 61.700 | 60.470 | 1.080 | Open Manhole | 1200 |
| 1.001 | o | 300 | C2 | 61.700 | 60.300 | 1.100 | Open Manhole | 1200 |
| 1.002 | o | 300 | C3 | 60.750 | 59.700 | 0.750 | Open Manhole | 1200 |

### Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 50.510 | 265.8 | C2 | 61.700 | 60.300 | 1.100 | Open Manhole | 1200 |
| 2.000 | 25.226 | 148.4 | S2 | 61.800 | 60.560 | 1.090 | Open Manhole | 450 |
| 2.001 | 8.334 | 138.9 | S3 | 61.900 | 60.500 | 1.250 | Open Manhole | 1200 |
| 2.002 | 4.181 | 41.8 | C2 | 61.700 | 60.400 | 1.150 | Open Manhole | 1200 |
| 3.000 | 25.681 | 146.7 | S22 | 61.800 | 60.795 | 0.855 | Open Manhole | 450 |
| 3.001 | 27.078 | 146.4 | S23 | 61.800 | 60.610 | 1.040 | Open Manhole | 450 |
| 3.002 | 20.626 | 147.3 | S24 | 61.700 | 60.470 | 1.080 | Open Manhole | 1200 |
| 3.003 | 2.328 | 116.4 | C2 | 61.700 | 60.450 | 1.100 | Open Manhole | 1200 |
| 1.001 | 160.363 | 267.3 | C3 | 60.750 | 59.700 | 0.750 | Open Manhole | 1200 |
| 1.002 | 10.982 | 219.6 | OUTFALL | 60.150 | 59.650 | 0.200 | Open Manhole | 0 |

## Free Flowing Outfall Details for Storm

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) |
|---|---|---|---|---|---|---|
| 1.002 | OUTFALL | 60.150 | 59.650 | 0.000 | 0 | 0 |

## Simulation Criteria for Storm

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

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

## Synthetic Rainfall Details

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Model | FSR | M5-60 (mm) | 19.900 | Cv (Summer) | 0.750 |
| Return Period (years) | 1 | Ratio R | 0.353 | Cv (Winter) | 0.840 |
| Region | England and Wales | Profile Type | Summer | Storm Duration (mins) | 30 |

## Online Controls for Storm

### Hydro-Brake® Optimum Manhole: S3, DS/PN: 2.002, Volume (m³): 1.7

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0055-1100-0600-1100 | Sump Available | Yes |
| Design Head (m) | 0.600 | Diameter (mm) | 55 |
| Design Flow (l/s) | 1.1 | Invert Level (m) | 60.500 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 75 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 0.600 | 1.1 | Kick-Flo® | 0.389 | 0.9 |
| Flush-Flo™ | 0.184 | 1.1 | Mean Flow over Head Range | - | 1.0 |

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

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 1.0 | 0.600 | 1.1 | 1.600 | 1.7 | 2.600 | 2.1 | 5.000 | 2.9 | 7.500 | 3.5 |
| 0.200 | 1.1 | 0.800 | 1.3 | 1.800 | 1.8 | 3.000 | 2.3 | 5.500 | 3.0 | 8.000 | 3.6 |
| 0.300 | 1.1 | 1.000 | 1.4 | 2.000 | 1.9 | 3.500 | 2.4 | 6.000 | 3.1 | 8.500 | 3.7 |
| 0.400 | 0.9 | 1.200 | 1.5 | 2.200 | 2.0 | 4.000 | 2.6 | 6.500 | 3.3 | 9.000 | 3.8 |
| 0.500 | 1.0 | 1.400 | 1.6 | 2.400 | 2.1 | 4.500 | 2.7 | 7.000 | 3.4 | 9.500 | 3.9 |

### Hydro-Brake® Optimum Manhole: S24, DS/PN: 3.003, Volume (m³): 1.7

| | | | |
|---|---|---|---|
| Unit Reference | MD-SHE-0055-1100-0600-1100 | Sump Available | Yes |
| Design Head (m) | 0.600 | Diameter (mm) | 55 |
| Design Flow (l/s) | 1.1 | Invert Level (m) | 60.470 |
| Flush-Flo™ | Calculated | Minimum Outlet Pipe Diameter (mm) | 75 |
| Objective | Minimise upstream storage | Suggested Manhole Diameter (mm) | 1200 |
| Application | Surface | | |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---|---|---|---|---|---|
| Design Point (Calculated) | 0.600 | 1.1 | Kick-Flo® | 0.389 | 0.9 |
| Flush-Flo™ | 0.184 | 1.1 | Mean Flow over Head Range | - | 1.0 |

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

Hydro-Brake® Optimum Manhole: S24, DS/PN: 3.003, Volume ($m^3$): 1.7

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.100 | 1.0 | 0.600 | 1.1 | 1.600 | 1.7 | 2.600 | 2.1 | 5.000 | 2.9 | 7.500 | 3.5 |
| 0.200 | 1.1 | 0.800 | 1.3 | 1.800 | 1.8 | 3.000 | 2.3 | 5.500 | 3.0 | 8.000 | 3.6 |
| 0.300 | 1.1 | 1.000 | 1.4 | 2.000 | 1.9 | 3.500 | 2.4 | 6.000 | 3.1 | 8.500 | 3.7 |
| 0.400 | 0.9 | 1.200 | 1.5 | 2.200 | 2.0 | 4.000 | 2.6 | 6.500 | 3.3 | 9.000 | 3.8 |
| 0.500 | 1.0 | 1.400 | 1.6 | 2.400 | 2.1 | 4.500 | 2.7 | 7.000 | 3.4 | 9.500 | 3.9 |

## Storage Structures for Storm

### Cellular Storage Manhole: S3, DS/PN: 2.002

Invert Level (m) 60.500 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 1.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 12.0 | 0.0 | 0.800 | 12.0 | 0.0 | 0.801 | 0.0 | 0.0 |

### Cellular Storage Manhole: S24, DS/PN: 3.003

Invert Level (m) 60.470 Infiltration Coefficient Side (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Base (m/hr) 0.00000 Safety Factor 1.0

| Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) | Depth (m) | Area (m²) | Inf. Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 24.0 | 0.0 | 0.800 | 24.0 | 0.0 | 0.801 | 0.0 | 0.0 |

## 1 year Return Period Summary of Critical Results by Maximum Inflow (Rank 1) for Storm

### Simulation Criteria

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

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

### Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.353 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep Fine DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

| PN | US/MH Name | US Label | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flow / Cap. | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | C1 | | 15 minute 1 year Summer I+0% | 62.150 | 60.843 | 0.053 | 1.06 | 67.8 | SURCHARGED |
| 2.000 | S1 | | 15 minute 1 year Winter I+0% | 61.800 | 60.765 | -0.115 | 0.12 | 1.7 | OK |
| 2.001 | S2 | | 15 minute 1 year Winter I+0% | 61.800 | 60.629 | -0.081 | 0.25 | 3.3 | OK |
| 2.002 | S3 | | 15 minute 1 year Winter I+0% | 61.900 | 60.629 | -0.021 | 0.01 | 0.1 | OK |
| 3.000 | S21 | | 15 minute 1 year Winter I+0% | 61.800 | 61.005 | -0.115 | 0.12 | 1.7 | OK |
| 3.001 | S22 | | 15 minute 1 year Winter I+0% | 61.800 | 60.843 | -0.102 | 0.22 | 3.1 | OK |
| 3.002 | S23 | | 15 minute 1 year Winter I+0% | 61.800 | 60.670 | -0.090 | 0.33 | 4.6 | OK |
| 3.003 | S24 | | 15 minute 1 year Winter I+0% | 61.700 | 60.613 | -0.007 | 0.00 | 0.0 | OK |
| 1.001 | C2 | | 240 minute 1 year Winter I+0% | 61.700 | 60.659 | 0.059 | 1.04 | 69.0 | SURCHARGED |
| 1.002 | C3 | | 240 minute 1 year Winter I+0% | 60.750 | 60.011 | 0.011 | 1.16 | 69.0 | SURCHARGED |

## 30 year Return Period Summary of Critical Results by Maximum Inflow (Rank 1) for Storm

### Simulation Criteria

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

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

### Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 19.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.353 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep Fine DVD Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

| PN | US/MH Name | US Label | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flow / Cap. | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | C1 | | 15 minute 30 year Summer I+0% | 62.150 | 60.865 | 0.075 | 1.06 | 67.8 | SURCHARGED |
| 2.000 | S1 | | 15 minute 30 year Winter I+0% | 61.800 | 60.787 | -0.093 | 0.30 | 4.1 | OK |
| 2.001 | S2 | | 15 minute 30 year Winter I+0% | 61.800 | 60.753 | 0.043 | 0.62 | 8.1 | SURCHARGED |
| 2.002 | S3 | | 15 minute 30 year Summer I+0% | 61.900 | 60.726 | 0.076 | 0.05 | 0.9 | SURCHARGED |
| 3.000 | S21 | | 15 minute 30 year Winter I+0% | 61.800 | 61.027 | -0.093 | 0.30 | 4.1 | OK |
| 3.001 | S22 | | 15 minute 30 year Winter I+0% | 61.800 | 60.881 | -0.064 | 0.60 | 8.4 | OK |
| 3.002 | S23 | | 15 minute 30 year Winter I+0% | 61.800 | 60.727 | -0.033 | 0.94 | 12.9 | OK |
| 3.003 | S24 | | 15 minute 30 year Winter I+0% | 61.700 | 60.704 | 0.084 | 0.05 | 0.5 | SURCHARGED |
| 1.001 | C2 | | 180 minute 30 year Winter I+0% | 61.700 | 60.680 | 0.080 | 1.05 | 70.0 | SURCHARGED |
| 1.002 | C3 | | 180 minute 30 year Winter I+0% | 60.750 | 60.013 | 0.013 | 1.18 | 70.0 | SURCHARGED |

## 100 year Return Period Summary of Critical Results by Maximum Inflow (Rank 1) for Storm

### Simulation Criteria

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

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

### Synthetic Rainfall Details

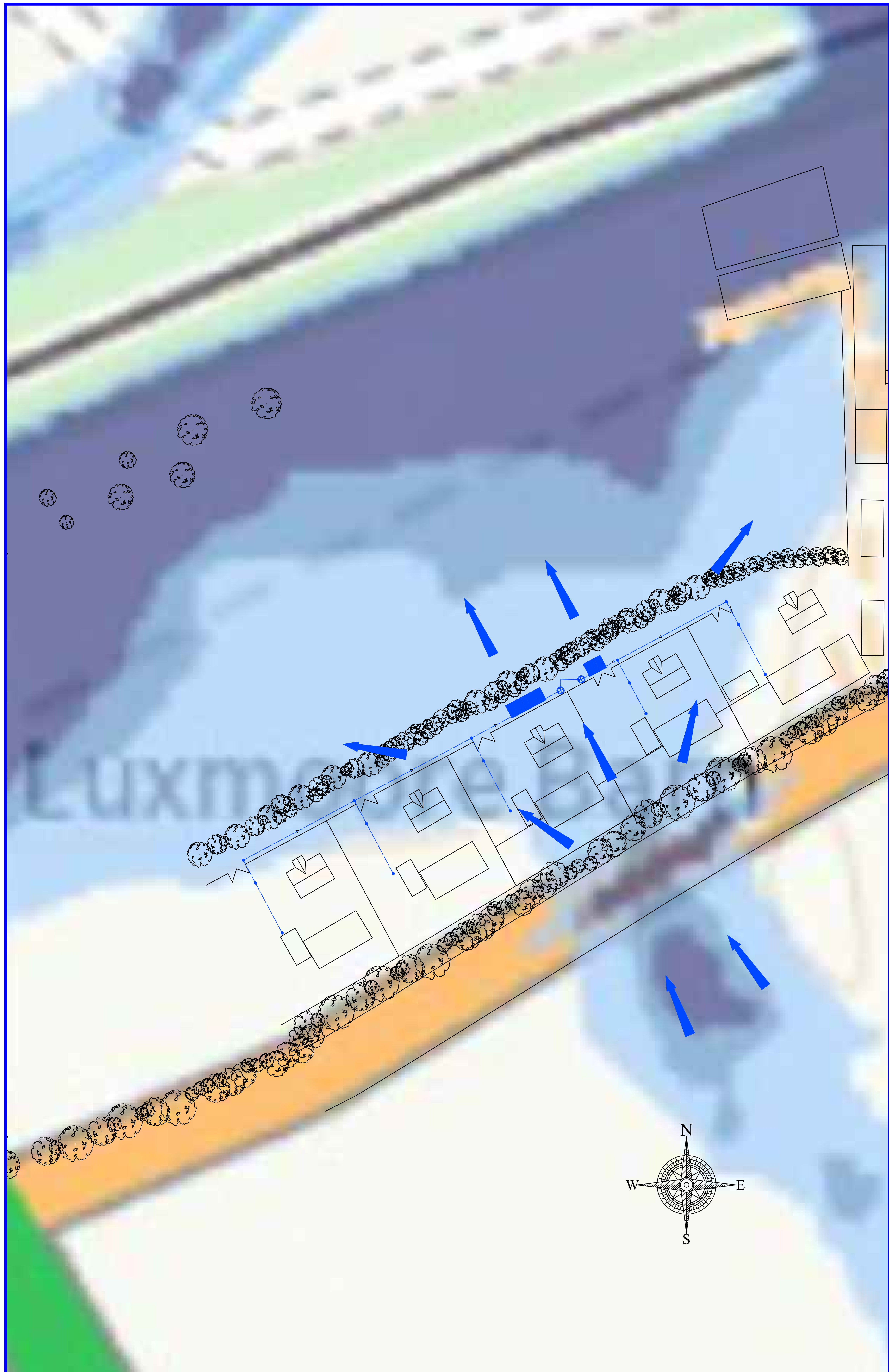
Rainfall Model FSR M5-60 (mm) 19.900 Cv (Summer) 0.750
Region England and Wales Ratio R 0.353 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 DTS Status OFF Inertia Status ON
Analysis Timestep Fine DVD Status ON

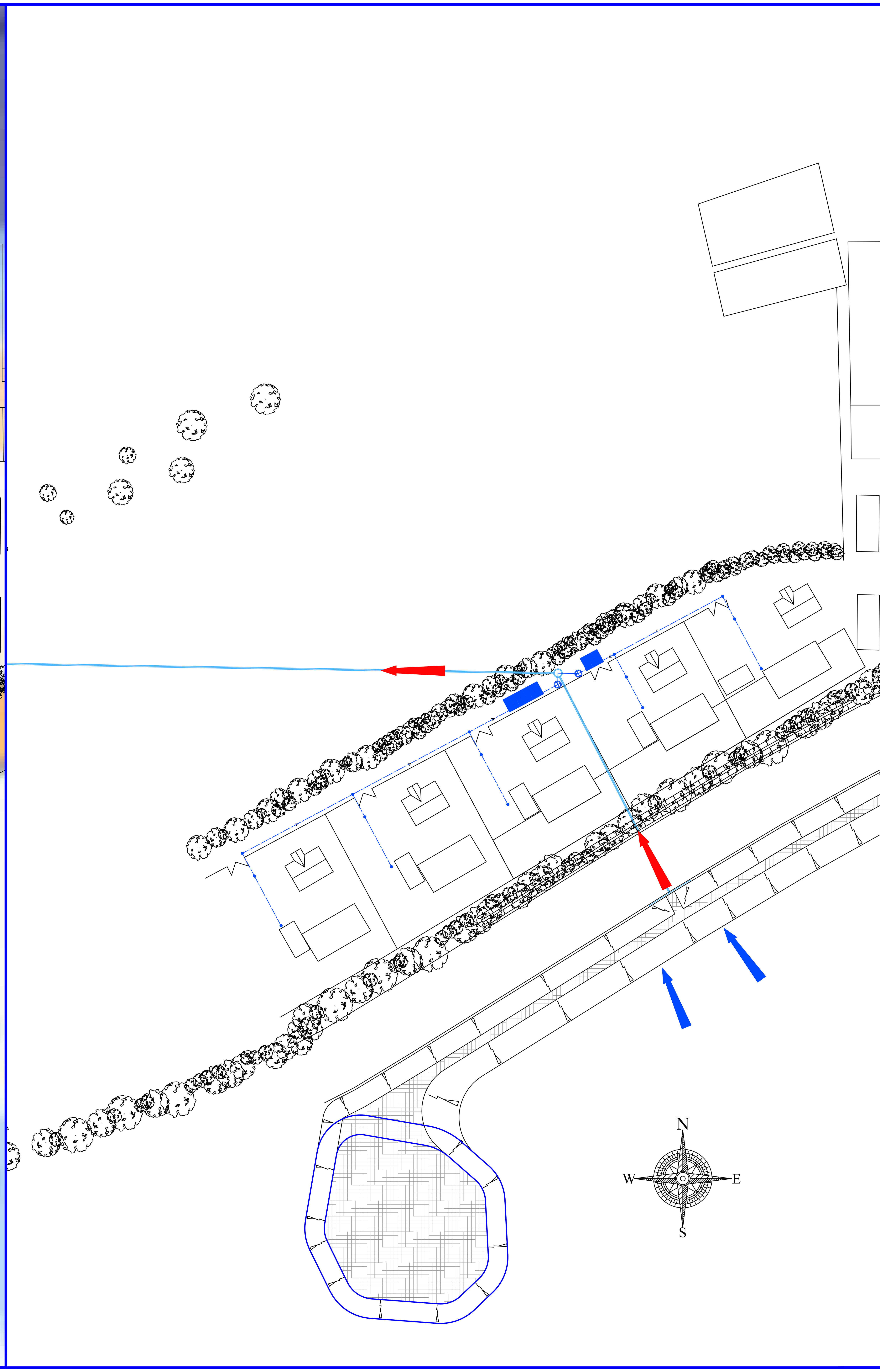
Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

| PN | US/MH Name | US Label | Event | US/CL (m) | Water Level (m) | Surcharged Depth (m) | Flow / Cap. | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | C1 | | 15 minute 100 year Summer I+40% | 62.150 | 60.891 | 0.101 | 1.06 | 67.8 | SURCHARGED |
| 2.000 | S1 | | 15 minute 100 year Winter I+40% | 61.800 | 60.980 | 0.100 | 0.52 | 7.1 | SURCHARGED |
| 2.001 | S2 | | 15 minute 100 year Winter I+40% | 61.800 | 60.975 | 0.265 | 1.05 | 13.8 | SURCHARGED |
| 2.002 | S3 | | 15 minute 100 year Winter I+40% | 61.900 | 60.971 | 0.321 | 0.06 | 1.1 | SURCHARGED |
| 3.000 | S21 | | 15 minute 100 year Winter I+40% | 61.800 | 61.195 | 0.075 | 0.51 | 7.1 | SURCHARGED |
| 3.001 | S22 | | 15 minute 100 year Winter I+40% | 61.800 | 61.153 | 0.208 | 0.92 | 12.8 | SURCHARGED |
| 3.002 | S23 | | 15 minute 100 year Winter I+40% | 61.800 | 60.989 | 0.229 | 1.41 | 19.4 | SURCHARGED |
| 3.003 | S24 | | 15 minute 100 year Winter I+40% | 61.700 | 60.871 | 0.251 | 0.10 | 1.1 | SURCHARGED |
| 1.001 | C2 | | 120 minute 100 year Winter I+40% | 61.700 | 60.681 | 0.081 | 1.06 | 70.0 | SURCHARGED |
| 1.002 | C3 | | 120 minute 100 year Winter I+40% | 60.750 | 60.013 | 0.013 | 1.18 | 70.0 | SURCHARGED |

# **Appendix F** Flood Routing Plan




**PLAN A**
PRE-DITCH OVERLAND FLOW ROUTE
*(Scale 1:500)*




**PLAN B**
FLOW ROUTES FOLLOWING DITCH INTRODUCTION
*(Scale 1:500)*

A1



## General Notes

1. This drawing is for planning purposes only and cannot be relied upon as construction information. Detailed levels information will be required for construction drawings.
2. All levels are to an assumed adjacent datum based on local mapping information. Actual levels on-site will vary and will need further investigation. Slab and Spot levels shown on this layout are indicative and act as a minimum level in relation to adjacent spot levels.
3. All installed pipework and drainage infrastructure must be installed inline with the relevant Approved Document and British Standard to the satisfactions of the Building Control Officer and any other relevant inspector.

## Key

Pre-Ditch Surface Water Flow Route

Post-Ditch Surface Water Flow Route (Culverted)

## Drawing Reference Table

| | |
|---|---|
| RL3 | Thurdleigh Proposed Layout Plan |
| 1101 | Drainage Strategy Plan |
| 1102 | Impermeable Areas |
| 1104 | Drainage Details |

| REV. | REVISION DETAILS | DATE | INITIAL |
|---|---|---|---|
| 1.2 | Strategy updated following site visit. | 28.01.2022 | ZS |
| 1.1 | First Issue. | 30.12.2021 | ZS |

EnvirEn

Moors Barn,
Standerwick

Flood Routing Plan

PLANNING

DS
Drawn by

1:500
Drawing Scale

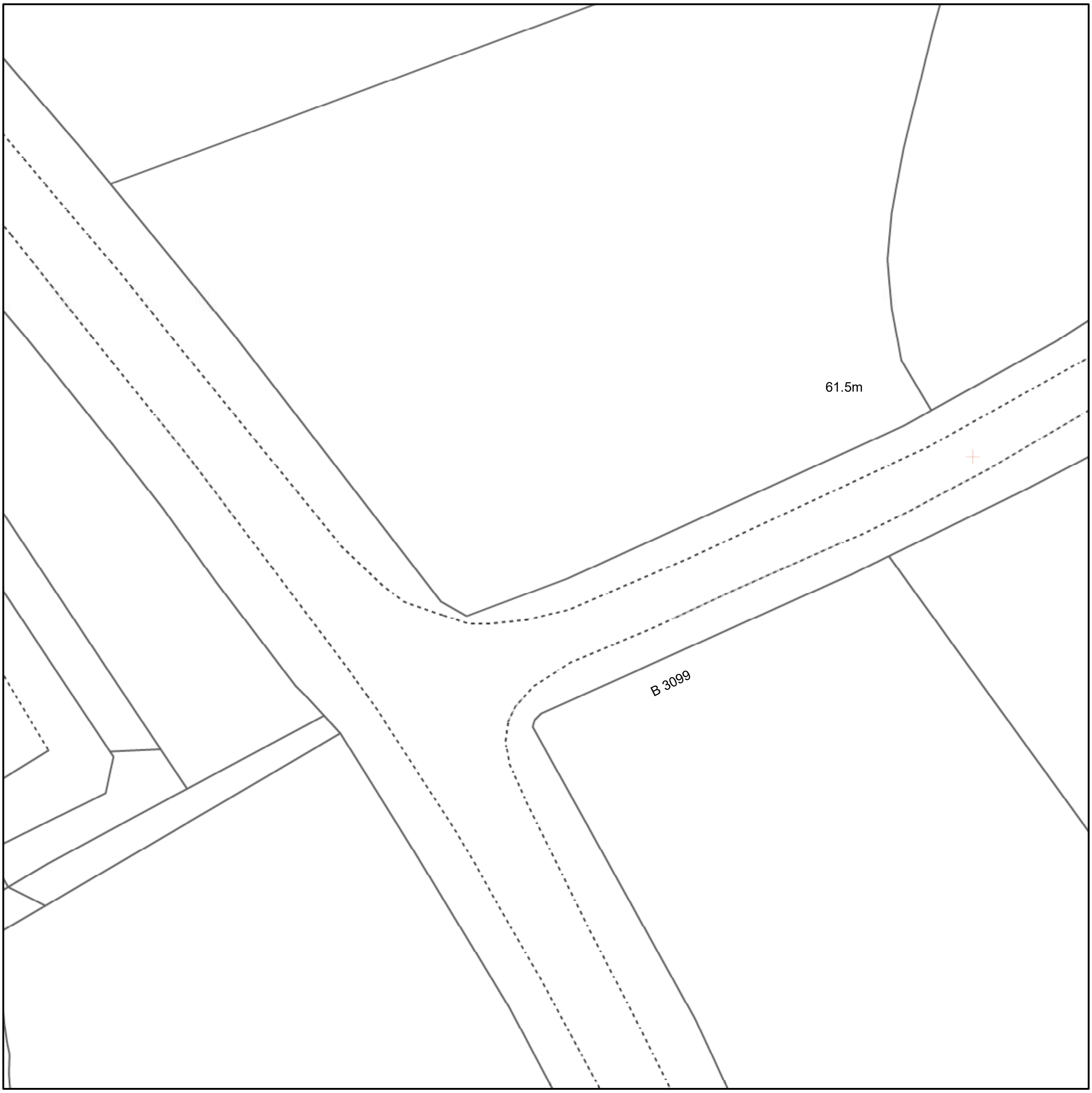
30.12.2021
First issued

382150-1103
Drawing No.

1.2
Revision Letter

# Appendix G Wessex Water Mapping

# Wessex Water Network Map






WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS | STRATEGIC | PUBLIC | PRIVATE | SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- Washout

OTHER WESSEX PIPES
- Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

OTHER STRUCTURES
- Chamber
- Attenuation Tank
- Tunnel
- Storage Tank
- Interceptor

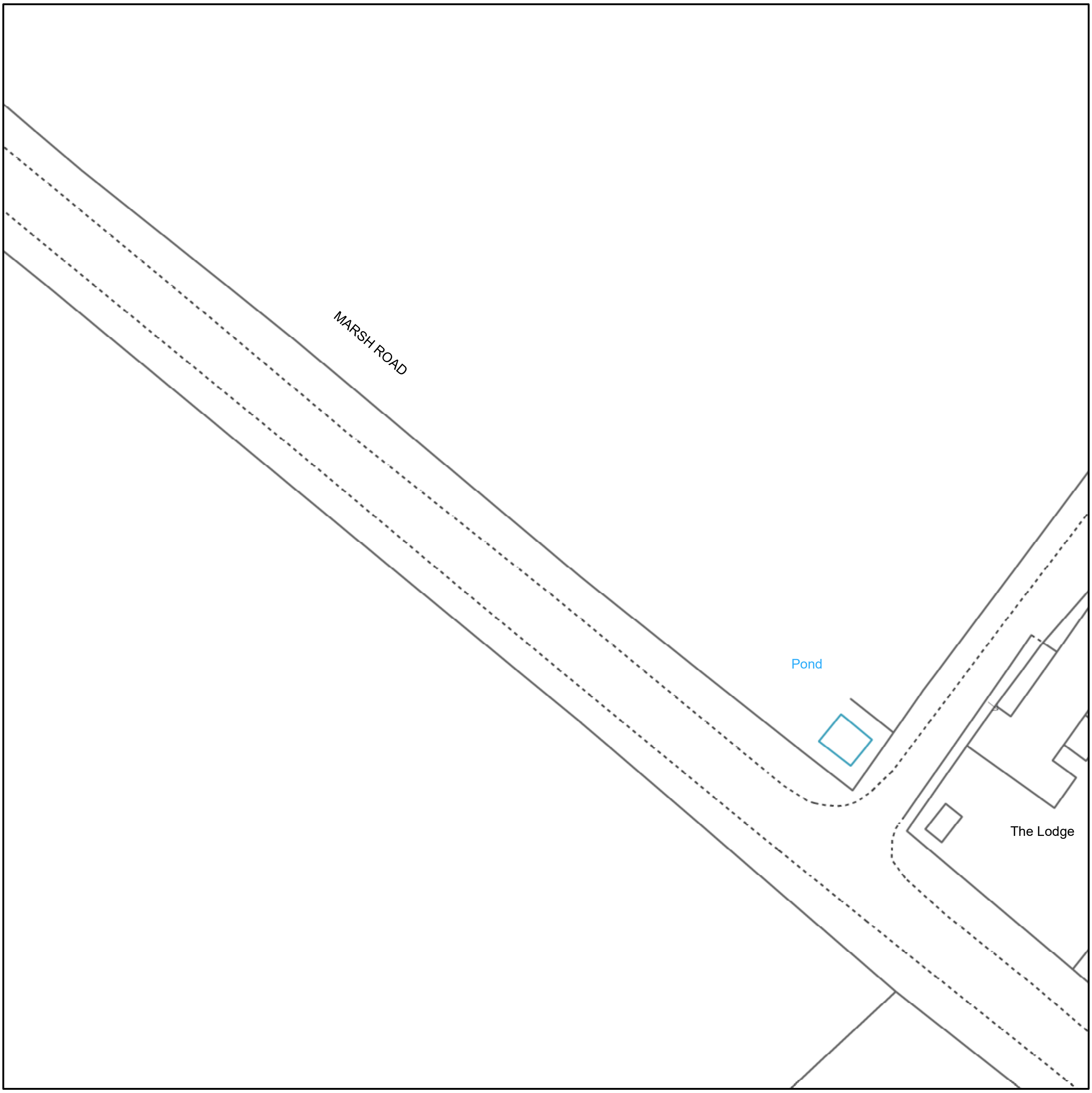
Wessex Water
YTL GROUP



**Date:** 29/12/2021
**Centre:** 382221, 150387
**Scale:** 1:625
(when printed at A4 size)

N W E S

# Wessex Water Network Map






WATER MAINS
Distribution
Washout
Raw Water
Abandoned
Private

FITTINGS
Hydrant
Other

SEWERS | STRATEGIC | PUBLIC | PRIVATE | SECTION 104
Foul
Surface
Combined
Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

STRUCTURES
Manhole - Foul
Manhole - Surface
Manhole - Combined
Inlet
Outfall
Lamphole
Bifurcation - Foul
Bifurcation - Surface
Bifurcation - Combined
Combined Sewage Overflow
Pumping Station - Surface
Pumping Stn - Foul/Combined
Gully
Vent Column
Rodding Eye
Catchpit
Flushing Chamber
Soakaway
Non Return Valve
Air Valve
Hatch Box
Washout

OTHER WESSEX PIPES
Rising Mains
EDM Effluent Disposal
Overflow
S Syphon

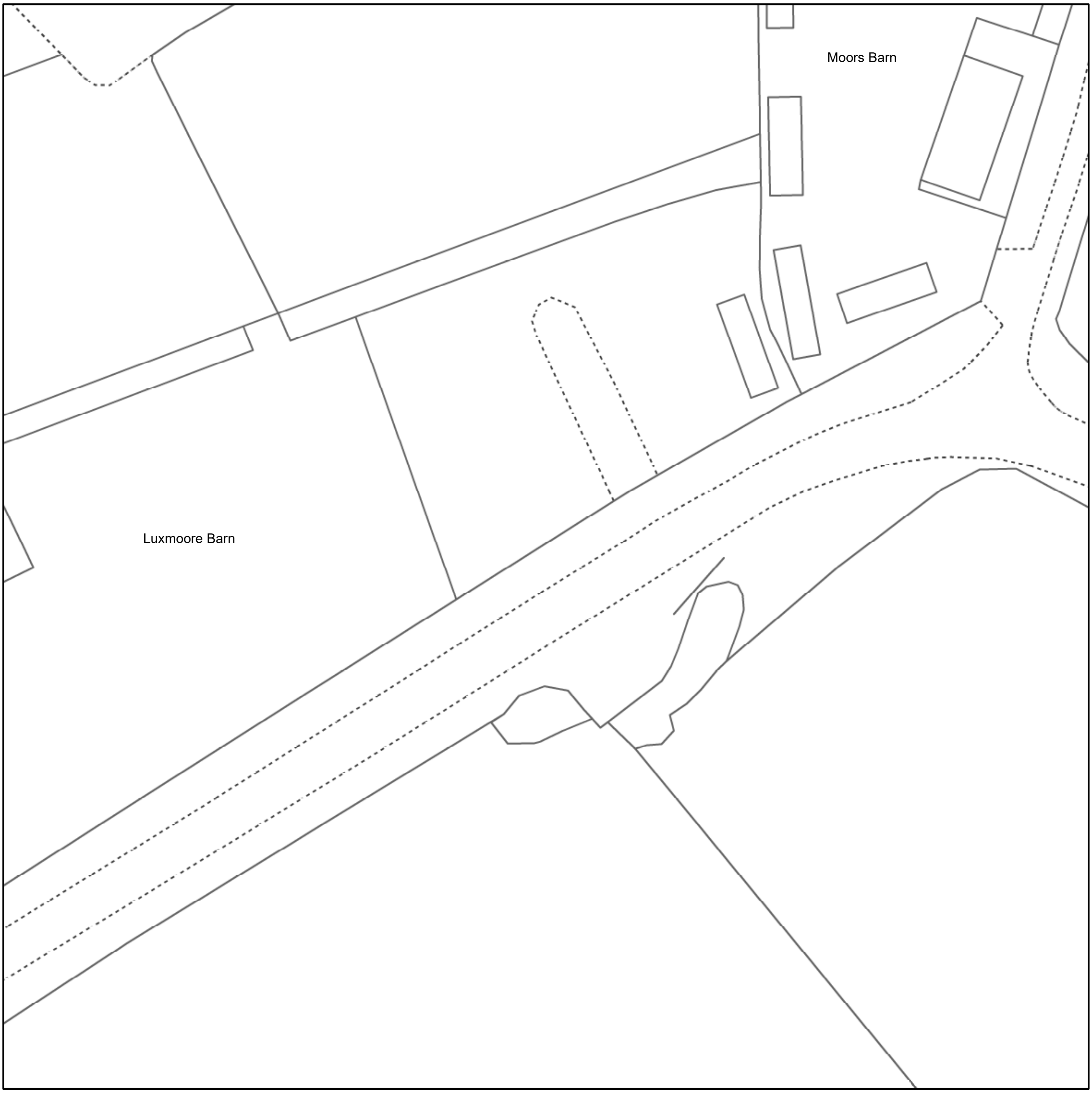
NON-WESSEX / UNKNOWN
Private Rising Mains
CW Culverted Watercourse
H Highway Drain
? Use Unknown
SU Status Unknown

OTHER STRUCTURES
Chamber
Attenuation Tank
Tunnel
Storage Tank
Interceptor



**Date:** 29/12/2021
**Centre:** 382520, 150398
**Scale:** 1:625
(when printed at A4 size)

# Wessex Water Network Map






WATER MAINS
- Distribution
- Washout
- Raw Water
- Abandoned
- Private

FITTINGS
- Hydrant
- Other

SEWERS | STRATEGIC | PUBLIC | PRIVATE | SECTION 104
- Foul
- Surface
- Combined
- Abandoned

Colours generally indicate the use of the sewer/drain (i.e Red - Foul, Dark Blue - Surface, Magenta - Combined/Dual Use, Light Green - Highway Drain, Mid Green - Overflow).
Some styles of line and symbol are shown on the key in sample/typical colours.

OTHER WESSEX PIPES
- Rising Mains
- EDM Effluent Disposal
- Overflow
- S Syphon

NON-WESSEX / UNKNOWN
- Private Rising Mains
- CW Culverted Watercourse
- H Highway Drain
- ? Use Unknown
- SU Status Unknown

STRUCTURES
- Manhole - Foul
- Manhole - Surface
- Manhole - Combined
- Inlet
- Outfall
- Lamphole
- Bifurcation - Foul
- Bifurcation - Surface
- Bifurcation - Combined
- Combined Sewage Overflow
- Pumping Station - Surface
- Pumping Stn - Foul/Combined
- Gully
- Vent Column
- Rodding Eye
- Catchpit
- Flushing Chamber
- Soakaway
- Non Return Valve
- Air Valve
- Hatch Box
- X Washout

OTHER STRUCTURES
- Chamber
- Attenuation Tank
- Tunnel
- Storage Tank
- Interceptor

Wessex Water
YTL GROUP



**Date:** 29/12/2021
**Centre:** 382357, 150459
**Scale:** 1:625
(when printed at A4 size)

N
W E
S

# **Appendix H** Non-Main Foul Drainage Assessment

# Foul Drainage Assessment Form (FDA)

**Please note: You should only use this form for planning related queries. You cannot use it to apply for an Environmental Permit but you may submit a copy of the information you have provided for planning purposes in support of your Environmental Permit application. Further information on how to apply for an environmental permit and general binding rules applicable to small discharges of domestic sewage effluent is available on the gov.uk website.**

| APPLICANT DETAILS |
|---|
| **Name** Zak Simmonds (Completed on behalf of Ryn Luxmoore) |
| **Address** 25 Bath Road, Cheltenham, Gloucestershire, GL53 7HG |
| **Telephone No** 07771330061 |
| **e-mail** technical@enviren.co.uk |

**We will use the information you provide on this form to establish whether non-mains drainage, either a new system or connection to an existing system, would be acceptable. It is important that you provide full and accurate information. Failure to do this will delay the processing of your application.**

**You must provide evidence that a connection to the public sewer is not feasible**.

Other than in very exceptional circumstances, we will not allow the use of non-mains drainage as part of your Planning or Building Regulation application unless you can prove that a connection to the public sewer is not feasible. We do not consider non-mains drainage systems to be environmentally acceptable in locations where it is feasible to connect to a public sewer. Please note that a lack of capacity in, or other operating problems with, the public sewer are not valid reasons to use a non-mains drainage system where it is otherwise feasible to connect to a public sewer.

Where connection to the public sewer is feasible, you may need to get the agreement of either the owners of any land through which the drainage will run or, if you intend to connect via an existing private drain, the owner of that private drain.

The National Planning Practice Guidance and Building Regulations Approved Document H give a hierarchy of drainage options that must be considered and discounted in the following order:

1 Connection to the public sewer
2 Package sewage treatment plant (which can be offered to the Sewerage Undertaker for adoption)
3 Septic Tank
4 If none of the above are feasible a cesspool

You must respond to all the following questions. If you wish to submit additional information please do so, marked clearly “Additional Information”. **In some cases you will be required to provide further information in order to demonstrate that any non-mains foul drainage system proposed is acceptable.**

| Feasibility of mains foul sewer connection | YES | NO |
|---|---|---|
| Have you provided a written explanation of why it is not feasible to connect to the public foul sewer with this form?<br>*This must include a scaled map showing the nearest public foul sewer connection point - check with your local sewerage undertaker.* | X | |
| Is the distance from your site to the closest connection point to the public foul sewer less than the number of properties to be built on the site multiplied by 30m? *(see Guidance Note 2)* | X | |
| Does your proposal form part of a phased development or planned development of a wider area?<br>*If YES, please provide further details including references of any planning permissions already granted.* | | X |

**Non-mains connection**

Please provide a plan with dimensions that clearly shows the location of the whole system in relation to the proposed development and the position of the key elements e.g. septic tank, drainage fields and points of discharge.

| **1. Existing system** | YES | NO |
|---|---|---|
| Do you intend to use an existing non-mains foul drainage system? | | X |
| If YES, does the system already have an Environmental Permit issued by the Environment Agency? *(In the case of a cesspool write N/A)*<br>If YES, please provide Environmental Permit reference number……………………… | - | |

| **2. Discharge** | YES | NO |
|---|---|---|
| Do you propose to use a package treatment plant? | | X |
| Do you propose to use a septic tank? | | X |
| Do you propose to use a cesspool? *If YES go to Q4* | X | |
| Have you considered having your system adopted by the sewerage undertaker? *(see Guidance Note 7).* | - | |
| Will all, or any part of, the discharge go to a drainage field or soakaway*? (see Guidance Note 3)* - this includes systems that combine a drainage field with a high level overflow to watercourse *If YES go to Q3.* | - | |
| Do you intend to use a system that discharges solely to watercourse? *(see Guidance Note 3) If YES go to Q9.* | - | |

| **3. Water abstraction** | YES | NO |
|---|---|---|
| Do you receive your water from the public mains supply? | X | |
| If not, where do you get your water supply from? | - | |

| **4. Cesspools** *(For methods other than cesspools write N/A)* | YES | NO |
|---|---|---|
| Have you provided written justification for the use of a cesspool in preference to more sustainable methods of foul drainage disposal? *(see Guidance Note 4)* | X | |

| **5. Drainage field design** *(For cesspools write N/A)* | YES | NO |
|---|---|---|
| Will the system discharge to a drainage field designed and constructed in accordance with British Standard BS6297:2007?<br>If not, why not? | N/A | |
| Will the discharge from the system be located in a Source Protection Zone 1 (SPZ1)? | N/A | |

| **6. Ground Conditions** *(For cesspools write N/A)* | **YES** | **NO** |
|---|---|---|
| 6a. Have you submitted a copy of the percolation test results with this form *(see Guidance Note 6)?*<br>6b. If NO please explain the justification for not undertaking or submitting these tests. | N/A | |
| 6c. Is any part of the system in land which is marshy, water logged or subject to flooding? | N/A | |
| 6d. Will the soakaway be located on artificially raised, made-up ground or ground likely to be contaminated? *If YES please provide details as additional information.* | N/A | |
| 6e. Have you submitted the results of a trial hole at the site to establish that the proposed drainage field will be above any standing groundwater *(see Guidance Note 6)?* | N/A | |

| **7. Available Land** | **YES** | **NO** |
|---|---|---|
| Is the application site plus any available area for a soakaway less than 0.025 hectares (250m$^2$)? | | X |

| **8. Siting of drainage field/soakaway discharge from a septic tank or package treatment plant or other secondary treatment.**<br>*You may need to make local enquiries to get a full answer to these questions*. | **YES** | **NO** |
|---|---|---|
| Will it be at least **10m** from a watercourse, permeable drain or land drain? | N/A | |
| Will it be at least **50m** from any point of abstraction from the ground for a drinking water supply (e.g. well, borehole or spring)? *This includes your own or a neighbour's supply.* | N/A | |
| Will the discharge be within a groundwater Source Protection Zone 1? *If yes, you will need to apply for an environmental permit* | N/A | |
| Are there any drainage fields/soakaways within **50m**? *This includes any foul drainage discharge system (other than the subject of this application) or surface water soakaway on either your own or a neighbour's property.* | N/A | |
| Will it be at least **15m** from any building? | N/A | |
| Will there be any water supply pipes or underground services within the disposal system, other than those required by the system? *(For cesspools write N/A)* | N/A | |
| Will there be any access roads, driveways or paved areas within the disposal area? *(For cesspools write N/A)* | N/A | |

| **9. Siting of treatment plant, septic tank or cesspool** | **YES** | **NO** |
|---|---|---|
| Is it at least **7m** from the habitable part of a building? | X | |
| Will there be vehicular access for emptying within **30m?** | X | |
| Can the plant, tank or cesspool be maintained or emptied without the contents being taken through a dwelling or place of work? | X | |

**10. Expected flow**

| | |
|---|---|
| Please estimate the total flow in litres per day *(see Guidance Note 5).* | 6 Persons = 900 litres<br>4 Persons = 600 litres |

| **11. General Binding Rules for Small Sewage Discharges** | **YES** | **NO** |
|---|---|---|
| Does the system meet the requirements of the General Binding Rules for small sewage discharges? | N/A | |

## 12. Maintenance

| How do you propose to maintain the system? |
|---|
| **Maintenance will be carried out by an external, private contractor. Emptying shall be undertaken on a monthly basis as recommended in approved document H, with minimum emptying frequencies specified in document 382150-SWDS – Drainage and Surface Water Strategy.** |

## 13. Declaration

I declare that the above information is factually correct.

| Name | Signature | Date |
|---|---|---|
| Zak Simmonds | | 31.12.2021 |

**GUIDANCE NOTES:**

1) This form is for use with *the National Planning Practice Guidance, British Standard BS6297:2007 and Building Regulations Approved Document H*. It is intended to help Local Planning Authorities establish basic information about your non-mains drainage system and decide whether you need to submit a more detailed site assessment. If a detailed site assessment is requested but not submitted, your planning application might be refused.

2) Where the distance from a site to the closest point of connection to the foul sewer is less than the number of properties that are proposed to be built on that site multiplied by 30m an Environmental Permit will be required and an applicant will need to demonstrate as part of any application for such a permit why connection to the public foul sewer is not feasible.

   Number of domestic properties served by the sewage treatment system **5** x 30 metres = Answer **150** metres

3) In addition to Planning Permission and Building Regulation approval **you may also require an Environmental Permit from the Environment Agency (EA). Please note that the granting of Planning Permission or Building Regulation approval does not guarantee the granting of an Environmental Permit. Upon receipt of a correctly filled in application form the EA will carry out an assessment. It can take up to 4 months before the Agency is in a position to decide whether to grant a permit or not**.

4) The use of cesspools is an option of last resort as set out in the non-mains drainage hierarchy of preference in Building Regulations Approved Document H. In principle, a properly constructed and maintained cesspool, being essentially a holding tank with no discharges, should not lead to environmental, amenity or public health problems. However, in practice, it is known that such problems occur as a result of frequent overflows due to poor maintenance, irregular emptying, lack of suitable vehicular access for emptying and even through inadequate capacity. In addition to this the requirement for frequent emptying is usually carried out by a contractor involving road transport with associated environmental costs. For these reasons, the use of cesspools will not normally be considered to be a long-term foul sewage disposal solution. In view of the environmental risks associated with their use, any proposal to use cesspools must be fully justified to the Local Planning Authority

5) Package treatment plants and septic tanks should be designed and sized according to the advice given in the current edition of Flows and Loads, published by British Water. Volumes for larger systems should be calculated based on expected flows arising from the development.

6) You should refer to Building Regulations Approved Document H2 with regard to the general requirements for construction of non mains sewerage systems. **Sections 1.33 to 1.38** deal with the test requirements for trial holes and percolation tests and for convenience the text of these sections is repeated below:

*1.33 A trial hole should be dug to determine the position of the standing groundwater table. The trial hole should be a minimum of 1m² in area and 2m deep, or a minimum of 1.5m below the invert of the proposed drainage field pipework. The ground water table should not rise to within 1m of the invert level of the proposed effluent distribution pipes. If the test is carried out in summer, the likely winter groundwater levels should be considered. A percolation test should then be carried out to assess the further suitability of the proposed area.*

*1.34 Percolation test method – A hole 300mm square should be excavated to a depth 300mm below the proposed invert level of the effluent distribution pipe. Where deep drains are necessary the hole should conform to this shape at the bottom, but may be enlarged above the 300mm level to enable safe excavation to be carried out. Where deep excavations are necessary a modified test procedure may be adopted using a 300mm earth auger. Bore the test hole vertically to the appropriate depth taking care to remove all loose debris.*

*1.35 Fill the 300mm square section of the hole to a depth of at least 300mm with water and allow it to seep away overnight.*

*1.36 Next day, refill the test section with water to a depth of at least 300mm and observe the time, in seconds, for the water to seep away from 75% full to 25% full level (i.e. a depth of 150mm). Divide this time by 150mm. The answer gives the average time in seconds (Vp) required for the water to drop 1mm.*

*1.37 The test should be carried out at least three times with at least two trial holes. The average figure from the tests should be taken. The test should not be carried out during abnormal weather conditions such as heavy rain, severe frost or drought.*

*1.38 Drainage field disposal should only be used when percolation tests indicate average values of $V_p$ of between 12 and 100 and the preliminary site assessment report and trial hole tests have been favourable. This minimum value ensures that untreated effluent cannot percolate too rapidly into groundwater. Where $V_p$ is outside these limits effective treatment is unlikely to take place in a drainage field. However, provided that an alternative form of secondary treatment is provided to treat the effluent from the septic tanks, it may still be possible to discharge the treated effluent to a soakaway.*

**N.B. When determining whether a discharge may be made under statutory General Binding Rules one of the requirements is that any drainage field must be designed and constructed in accordance with BS6297:2007. This specifies that the minimum percolation rate under that standard is 15s/mm and any discharge made to ground where the percolation rate is less than 15s/mm is subject to the granting of an Environmental Permit.**

7) Developers may requisition a sewer from the Sewerage Undertaker to connect their development to the public sewer. Should this not be feasible on the grounds of cost and practicability, on site treatment in the form of package plants and their associated sewers (if constructed to an acceptable standard) can be offered to the sewerage undertaker for adoption. This approach is in support of advice from the Government contained in the National Planning Practice Guidance Developers are urged to discuss their requirements with the Sewerage Undertaker at the earliest possible opportunity.

8) Glossary

**Package treatment plant**

A package treatment plant is a system which offers varying degrees of biological sewage treatment and involves the production of an effluent which can be disposed of to ground via a drainage field or direct to a watercourse. There are many varieties of package treatment plant but all involve settling the solids before and/or after a biological treatment stage and almost all use electricity. Package treatment plants usually treat sewage to a higher standard than septic tanks but are vulnerable in the event of power failures and require more regular servicing and maintenance to ensure that they work effectively. The type of system chosen should be appropriate to the type of development proposed and take account of variations in flow and periods of inactivity, for example where the system will serve holiday accommodation where occupation and maintenance may be more irregular.

**Septic tank**

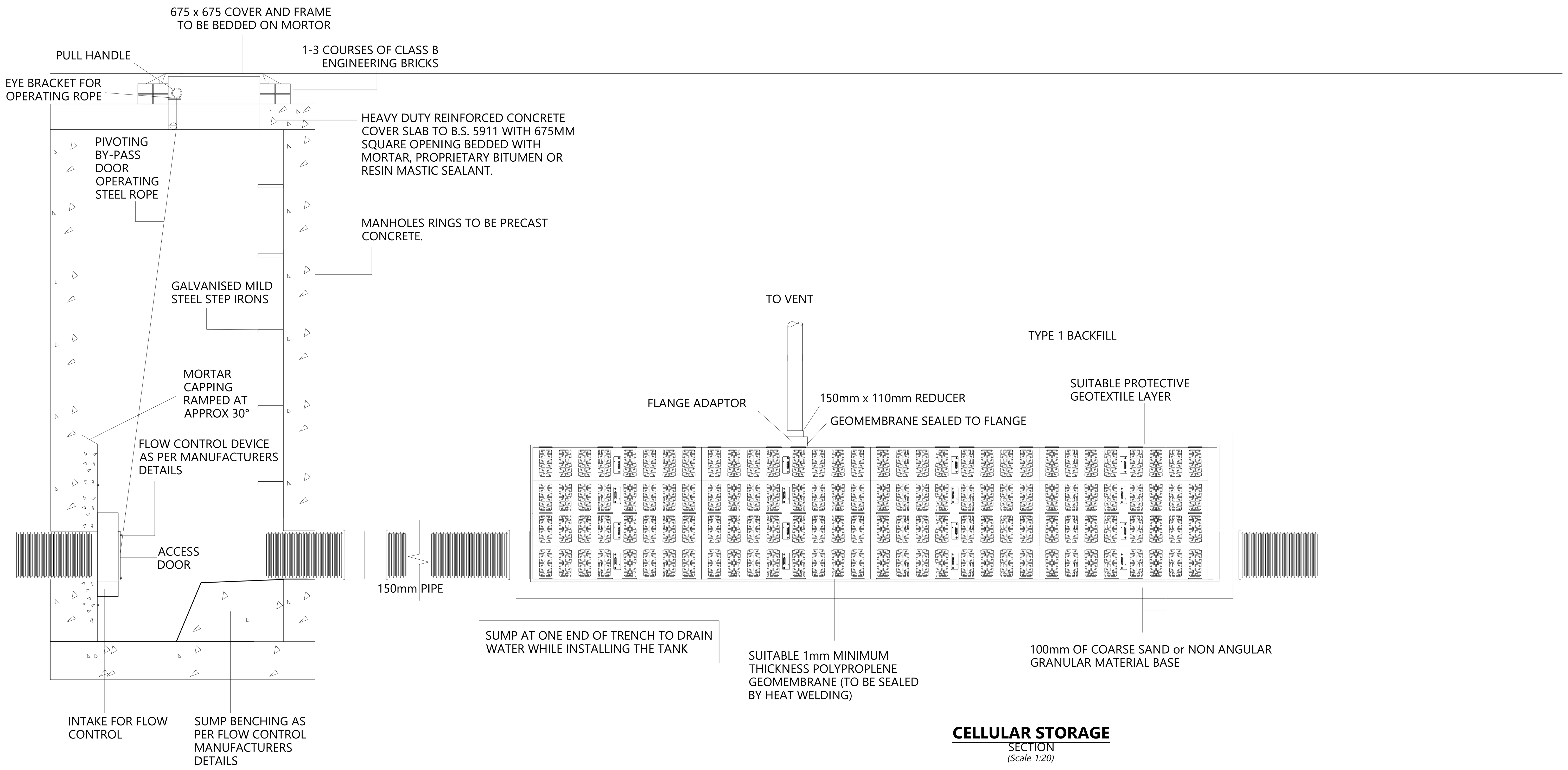
A septic tank is a two or three chamber system, which retains sewage from a property for sufficient time to allow the solids to form into sludge at the base of the tank, where it is partially broken down. The remaining liquid in the tank then drains from the tank by means of an outlet pipe.

Effluent from a septic tank is normally disposed of to ground via a drainage field and receives further treatment in the soils surrounding that drainage field, so that it does not generate a pollution risk to surface waters or groundwater resources (underground water). The most commonly used form of drainage field is a subsurface irrigation area, comprising a herringbone pattern of interconnecting dispersal pipes laid in shallow, shingle filled trenches. The dispersal pipes within the drainage field should be located at as shallow a depth as possible, usually within 1 metre of the ground surface. A septic tank typically needs to be desludged at least once a year in order to ensure that it continues to work effectively.

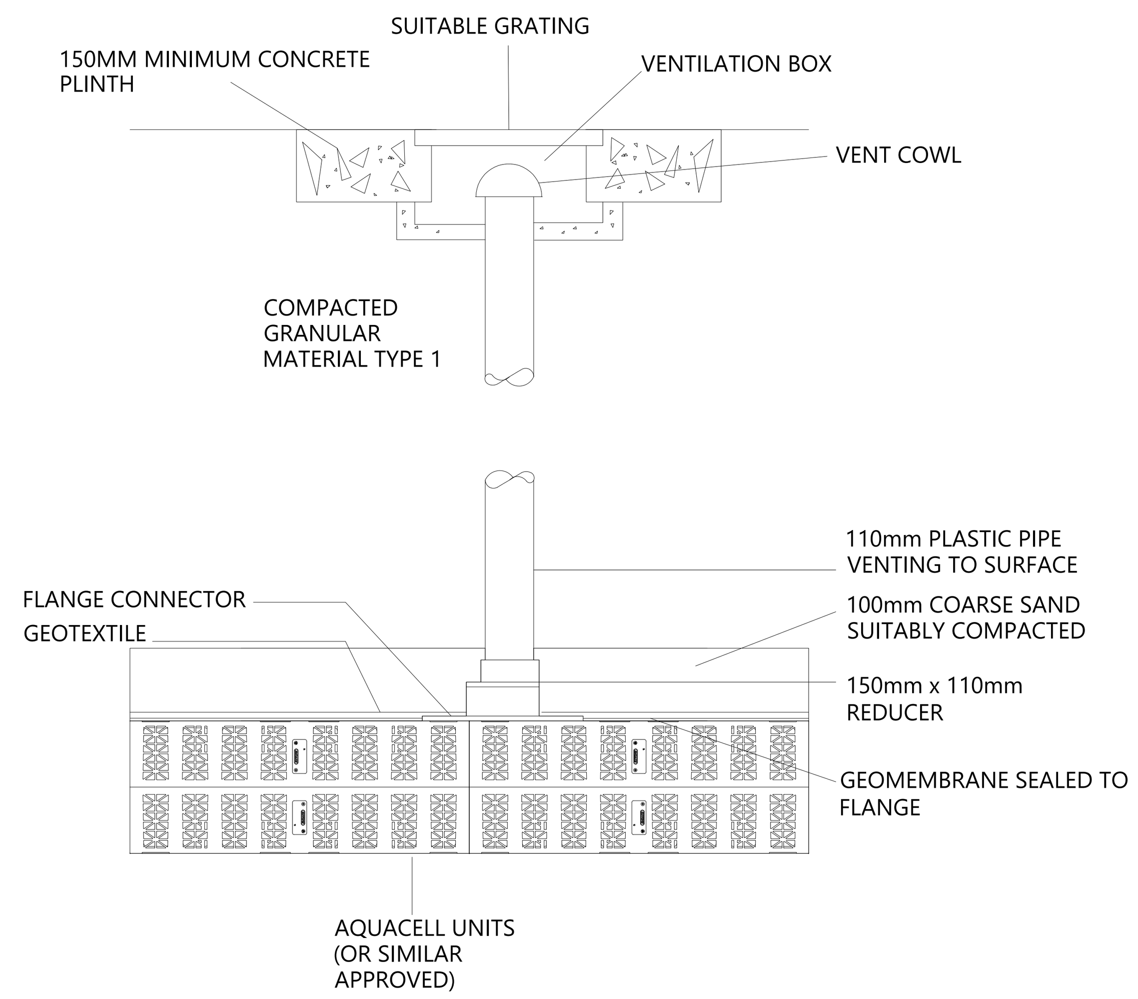
**Cesspool**

A cesspool is a covered watertight tank used for receiving and storing sewage and has no outlet. It relies on road transport for the removal of raw sewage and is therefore the least sustainable option for sewage disposal. It is essential that a cesspool is, and remains, impervious to the ingress of groundwater or surface water.

# Appendix I Preliminary Drainage Details

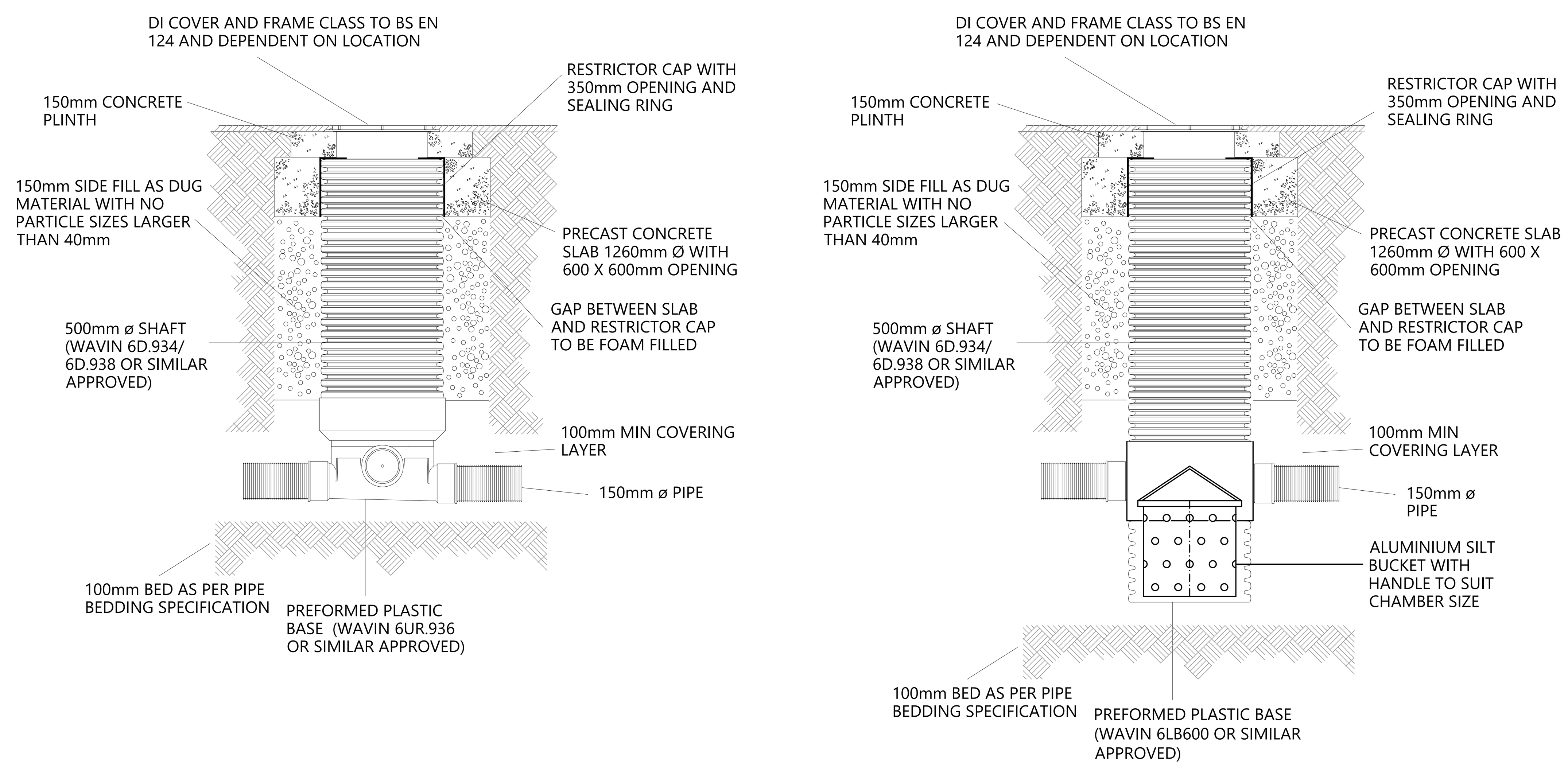



**CELLULAR STORAGE**
SECTION
*(Scale 1:20)*




NOTE: IT IS RECOMMENDED THAT ONE VENT PIPE, 110MM IN DIAMETER, IS PROVIDED PER 7,500 SQUARE METERS OF IMPERMEABLE CATCHMENT AREA ON A SITE.

**CELLULAR STORAGE VENT**
SECTION
*(Not to Scale)*




**INSPECTION CHAMBER AND SILT TRAP**
SECTION
*(1:20)*

A1

All dimensions are to be checked on site prior to manufacture of prefabricated items. Any discrepancy or query to be reported and clarified before associated work proceeds. All construction to be in accordance with relevant Trade and Professional Standards and Guidelines, Statutory requirements and product manufacturers' specifications. This drawing must be read in conjunction with the relevant up to date associated specifications, drawings issued and details.



**General Notes**

1. This drawing is for planning purposes only and cannot be relied upon as construction information. Detailed levels information will be required for construction drawings.
2. All levels are to an assumed adjacent datum based on local mapping information. Actual levels on-site will vary and will need further investigation. Slab and Spot levels shown on this layout are indicative and act as a minimum level in relation to adjacent spot levels.
3. All installed pipework and drainage infrastructure must be installed inline with the relevant Approved Document and British Standard to the satisfactions of the Building Control Officer and any other relevant inspector.

**Drawing Reference Table**

| | |
|---|---|
| RL3 | Thurdleigh Proposed Layout Plan |
| 1101 | Drainage Strategy Plan |
| 1102 | Impermeable Areas |
| 1103 | Flood Routing Plan |

| REV. | REVISION DETAILS | DATE | INITIAL |
|---|---|---|---|
| 1.2 | Strategy updated following site visit. | 28.01.2022 | ZS |
| 1.1 | First Issue. | 30.12.2021 | ZS |

EnvirEn

Moors Barn,
Standerwick

Preliminary Drainage Details

| | |
|---|---|
| PLANNING | DS<br>Drawn by |
| 1:250<br>Drawing Scale | 30.12.2021<br>First issued |
| 382150-1104<br>Drawing No. | 1.2<br>Revision Letter |