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# Drainage Strategy Report

PROPOSED HOUSING DEVELOPMENT, LAND NORTH OF STATION ROAD, DRIGG, CUMBRIA

22-C-16573

**Rev C**

**February 2025**

A L Daines & Partners LLP, Registered in England & Wales, Registration No. OC373173,
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# Contents

# 1. INTRODUCTION

A L Daines & Partners LLP (ALD) have been engaged by Sunshine Properties Ltd to undertake a Surface and Foul Water Drainage Strategy, in accordance with the National Planning Policy Framework (NPPF) [1] for the proposed housing development at Land north of Station Road, Drigg, Cumbria.

The purpose of this report is to provide a strategy to manage surface and foul water flows from the site, in support of the planning application, while fulfilling the requirements of the Local Planning Authority (LPA) and the Lead Local Flood Authority (LLFA).

# 2. PLANNING CONTEXT

## 2.1. PLANNING POLICY

NPPF footnote 55 states that "*a site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use*."

Paragraph 169 reads *"Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:*

*a) take account of advice from the lead local flood authority;*
*b) have appropriate proposed minimum operational standards;*
*c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and*
*d) where possible, provide multifunctional benefits."*

A major development, as per The Town and Country Planning Order 2015, is partly, but not wholly, categorised as development involving the provision of dwellinghouses where the number of dwellinghouses to be provided is 10 or more and a development carried out on a site having an area of 1 hectare or more.

The Cumbria Minerals and Local Waste Plan – Strategic Flood Risk Assessment (June 2018) references the same criteria for local planning policy.

The site is therefore not classed as a major development under the above criteria with the site hosting 9No dwellings and a total site area of 0.687 hectares.

## 2.2. PLANNING POLICY IN SITE CONTEXT

The site covers 0.687ha and covers existing greenfield agricultural land. According to the most recent Environment Agency (EA) flood risk maps, the site lies entirely within Flood Zone 1.

The NPPF site categorisation Table 1.1 puts a residential development of this nature within the 'Highly vulnerable' category. Developments in this category are acceptable within Flood Zone 1 and therefore the site-specific Flood Risk Assessment (FRA) need only be brief. The FRA statement is included within this report.

## 2.3. SITE INFORMATION

### 2.3.1. SITE PLAN

The proposed development is located to the north of a section of the B5344 between Station Road and Old Shore Road as shown on red line bordered plan in Figure 1.


*Figure 1: Aerial photo of site - Bing Maps*

The proposed layout of the development is shown on Calderpeel Architects site plan 24085 (PL) 010 in *Appendix A*.

### 2.3.2. SITE TOPOGRAPHY

The site generally runs from high ground on the northern boundary to the low point at the centre of the southern boundary adjacent to the B5344.

The eastern boundary of the site adjoins an unsurfaced rural single-track lane, while the northern and western boundaries adjoin open pastureland. The southern boundary adjoins the B5344 which runs approximately east-west.

### 2.3.3. EXISTING LAND USE

The existing site is agricultural open pastureland. The site is approximately 0.687ha in land area, all of which is currently greenfield.

### 2.3.4. DEVELOPMENT DESCRIPTION

The proposed development will see a new access formed off the north side of the B5344. This access will adjoin a spine road running north to south from which 9No proposed properties are served. The remaining land area is retained as landscaped gardens.

## 3. SURFACE WATER MANAGEMENT

The existing flow paths are likely north to south towards the low point on the site through the higher levels of strata, with a small strip of land area draining towards the eastern boundary due to a slight fall in level.

The proposed development drained areas are as follows:

- 0.268ha positively drained areas (incl. 10% urban creep)

The majority of the garden areas will retain existing flow paths (north to south generally).

A plan of the proposed and existing hardstanding areas, 22-C-16573/01, is given in *Appendix B*.

## 3.1. PERMEABILITY AND SOIL PROFILE

British Geological Survey (BGS) and Land Information Systems (LandIS) mapping services have been used determine the following land make-up:

Bedrock: Sellafield Member - Sandstone.

Superficial drift: Till, Devensian - Diamicton

Soil: Soilscape 6 – Freely draining slightly acid loamy soils.

This soilscape is similar to that observed during trial hole excavations which show a 250-300mm topsoil generally underlain by silty clay soils becoming denser with depth.

Excavations were carried out on 25 March 2022 in clear, dry conditions.

The trial holes were excavated to a minimum depth of 1.5m below ground level to enable percolation tests to proceed to determine the infiltration rate of the ground. These tests were carried out in accordance with the guidance document BRE 365 Soakaway Design.

The trial holes were filled to an average depth of 1m above the base level and monitored to record infiltration rates. After 6 hours, all pits showed low reduction in water levels and the tests were abandoned. No infiltration rate was able to be calculated.

Both BRE365 and The SuDS Manual indicate that each pit must drain to at least half depth within 24 hours to be suitable for consideration with an infiltration rate above $1x10^{-5}$ m/s. The tests did not achieve these thresholds and therefore infiltration should not be considered as a means of wastewater disposal on this site.

The percolation tests results are shown in *Appendix C* along with photos of the excavations.

## 3.2. CURRENT SURFACE WATER DRAINAGE PROVISION

Existing watercourses

No open watercourses are present within the boundary of the development site. The closest open watercourse is the river Irt approximately 500m southeast of the site.

Existing highway drains

The B5344 is positively drained via a 225mm pipe which runs down Old Shore Road and terminates at a culvert. This has been confirmed through correspondence with the local highways authority (Feb 2025). The local highways authority is working to clear the issues with this existing culvert. An extract from the correspondence has been included below for reference:

> *"Currently, as confirmed in your summary below, the overland excess SW will run off the field to the south and be collected in the road gully and drain down Old Shore Road into a watercourse. Excess water will tend to pond on this corner and eventually also flow down Old Shore Road.*
>
> *The LHA is aware of certain deficiencies with the existing SW drainage route on Old Shore Road and are taking action to resolve this.*
>
> *Therefore, the proposed SW drainage strategy should aim to do the same.'*
>
> *Email from LHA 20th February 2025*

Existing sewers

There are no existing United Utilities (UU) owned sewer systems present on or near the site. To the south of the site there are existing UU sewers within Wray Head residential development (approx. 135m from site) and further down Station Road (approx. 300m from site). These are both combined sewers.

The United Utilities sewer records are shown in *Appendix D*.

### 3.3. FLOOD RISK ASSESSMENT

As described earlier in the report, the current Environment Agency Flood Map for Planning shows the whole of the site within Flood Zone 1, as can be seen in the figure below.

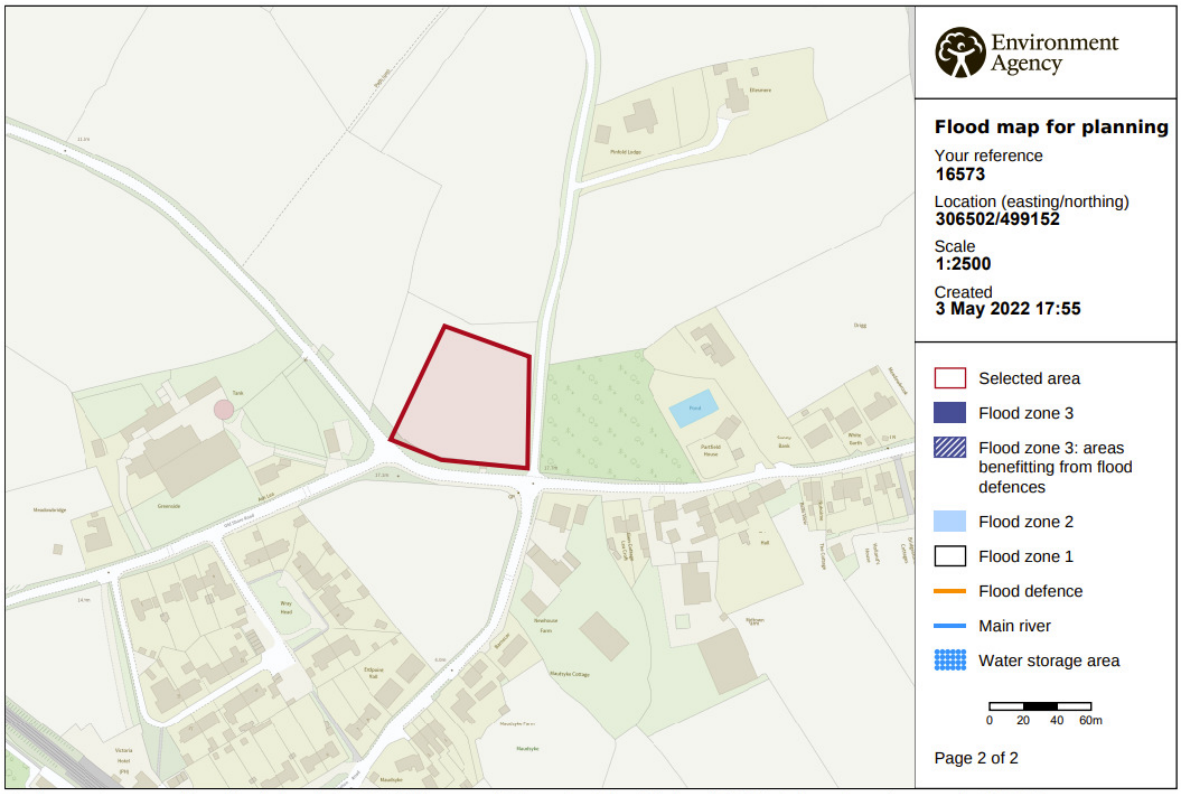




*Figure 2: Flood map for planning*

A full FRA is therefore not required, although the Environment Agency long term flood risk maps are included below to further inform this report.

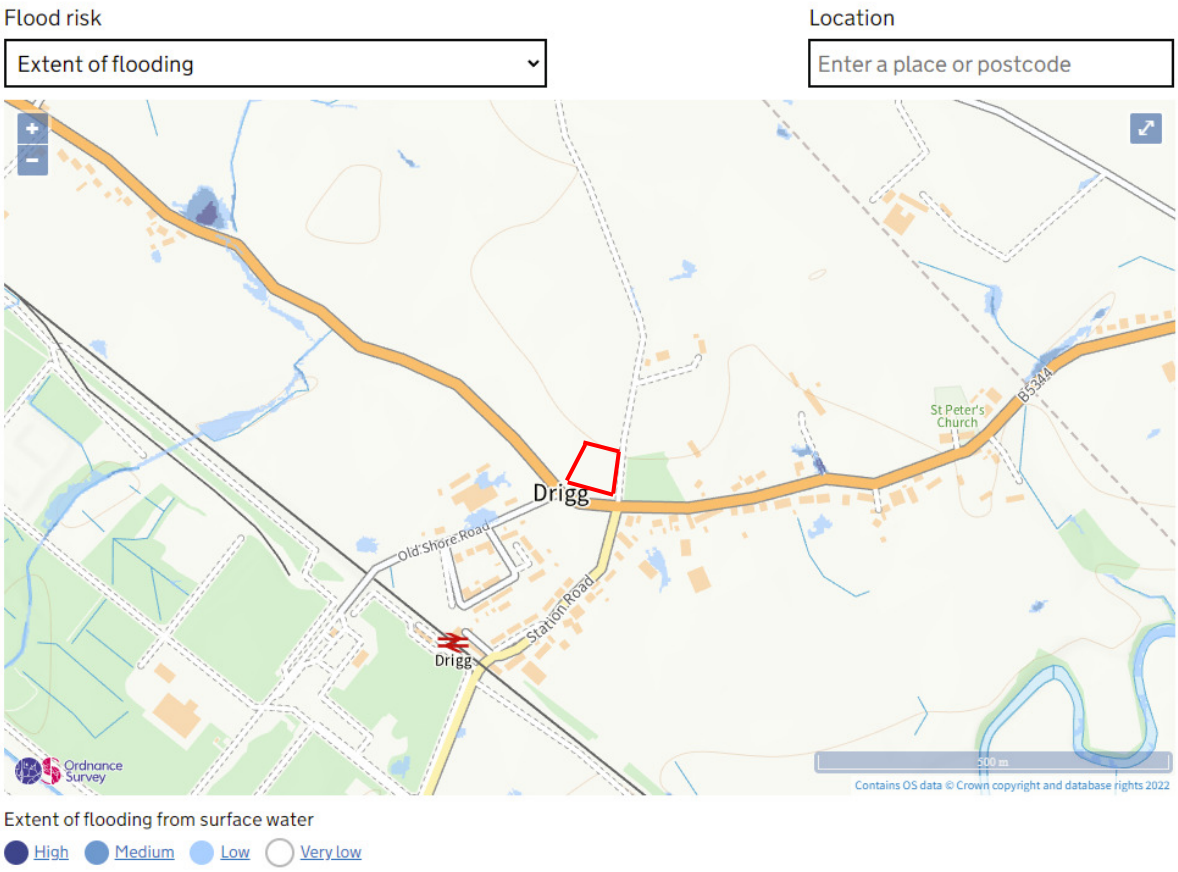



*Figure 3: EA long term surface water flood risk map*

The long-term surface water flood risk map shows no areas of flood risk within or near the site.

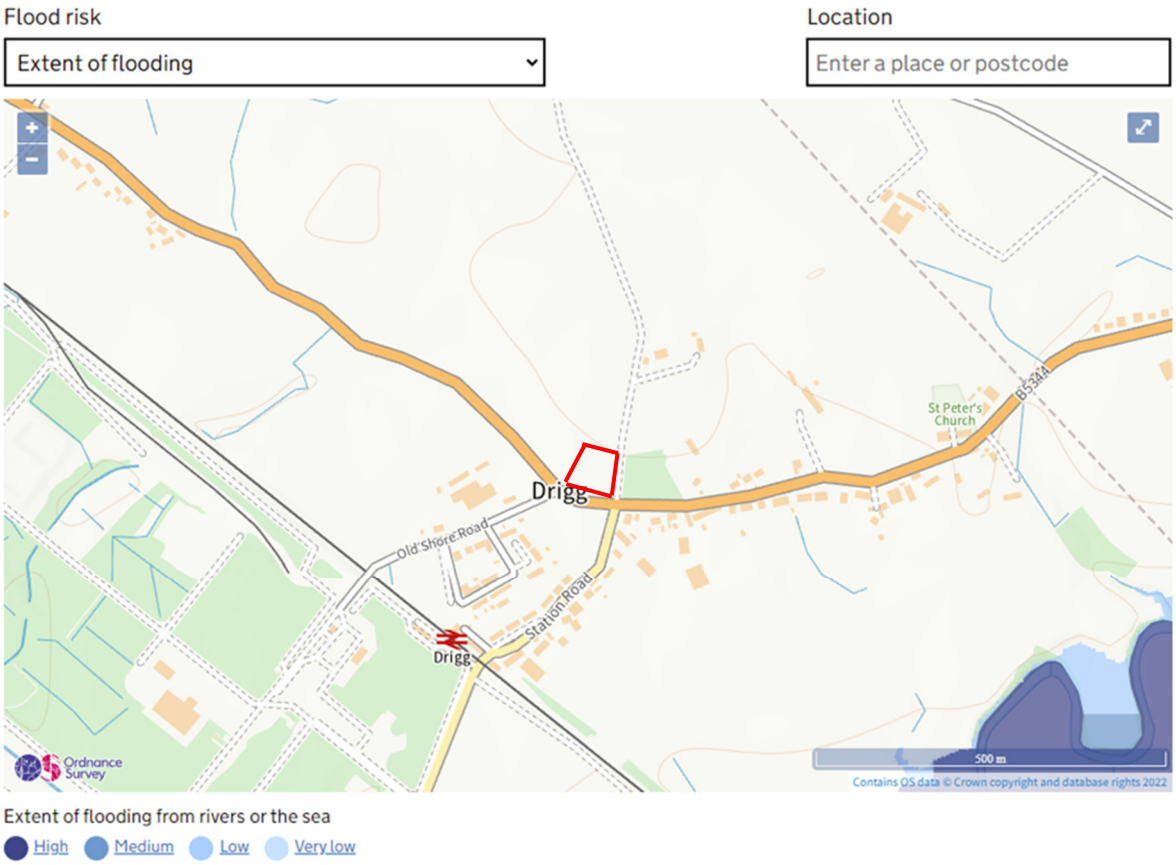



*Figure 4: EA long term river and seas flood risk map*

There is no perceived risk of flooding from rivers or seas within the site.


*Figure 5: EA long term reservoir flood risk map*

There is no perceived risk of flooding from reservoirs within the site.

From analysis of the above flood maps it is clear the existing flood risk to the site is very low and further flood risk assessment is not warranted.

## 3.4. SURFACE WATER DRAINAGE STRATEGY

The aim of the strategy is to provide a design which will avoid, reduce, and delay the discharge of surface water flows into public sewers and watercourses. This will aid in the protection of watercourses but will also ensure that no knock-on effects are seen beyond the site and that the risk of localised flooding and pollution within the site are reduced as far as possible.

To satisfy these criteria, surface water flows shall be subject to assessment via the hierarchy of drainage in accordance with the LASOO Non-Statutory Technical Standards for Sustainable Drainage: Practice Guidance. The hierarchy is as follows:

Hierarchy options:

1. Drain into the ground (infiltration).
2. To a surface water body.
3. To a surface water sewer, highway drain or another drainage system.
4. To a combined sewer.

The drainage strategy for the site is to be developed using the third level on the above hierarchy for the following reasons:

**1. Drain into the ground (infiltration) – proven not possible for site.**

The site has been shown through trial hole excavation and percolation tests to be unsuitable for site wide infiltration.

**Drain to a surface water body – proved not possible for site.**

It was previously suspected that a culverted watercourse was present along the southern site boundary. However, following site investigations this was an old pile of stones which has long stopped functioning as a soakaway – if indeed it ever had.

**To a surface water sewer, highway drain or another drainage system.**

As per section 3.2 the existing highway drain within the B5344 and Old Shore Road is a viable mode of discharge due to the existing field discharging into this system as confirmed by LHA.

**2. To a combined sewer.**

No surface water connection to the UU system is required.

## 3.5. SURFACE WATER PROPOSED DESIGN

It is proposed to utilise a combination of permeable paving and positive drainage to route the site flows to an attenuation basin/structure to the south end of the site prior to outfall to the existing culverted watercourse.

The greenfield run off calculations, via the ICP SuDS Mean Annual Flood method, for the site are summarised below and shown in *Appendix E*.

| Event | Q1 | Qbar | Q30 | Q100 |
|---|---|---|---|---|
| Site greenfield runoff | 4.1 | 4.7 | 8.0 | 9.8 |

In accordance with the earlier mentioned hierarchy of drainage full site infiltration is not feasible and as such the system will be designed to utilise storage-based SuDS components prior to outfall to the highway drainage system.

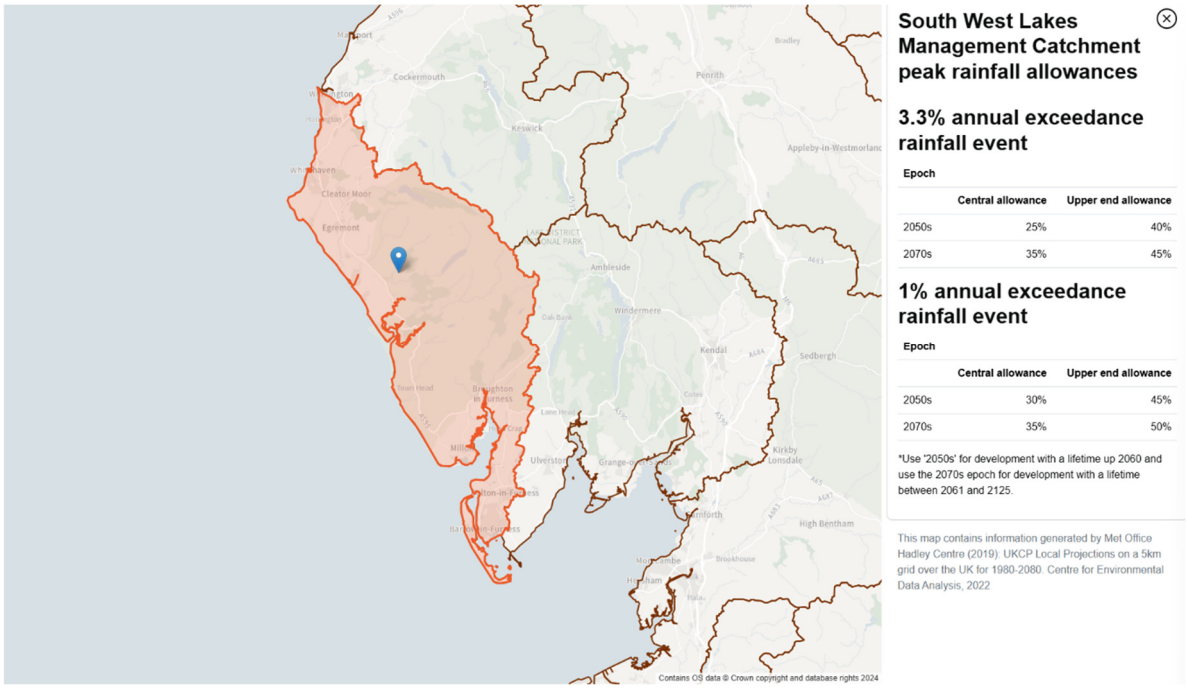
As per the LASOO guidance, the peak runoff rate from the development for the 1 in 1yr rainfall event and the 1 in 100yr rainfall event should not exceed the peak greenfield runoff for the same event.

The design is also required to prevent flooding to any part of the site for storms up to and including the 1:30yr rainfall event, while any exceedance for the 6 hour 1:100yr event should be controlled within the site and should not flood any properties or service areas.

In this case, it is proposed to restrict all flows off the site to a maximum of QBar, 4.7l/s for all storm events up to 1:100yr +50%.

Climate change

Environment Agency guidance issued in 2016 estimates that peak rainfall intensity will increase due to climate change over the next 100 years. There is therefore an allowance of 45% and 50% attributed to the 30yr and 100yr storm event calculations respectively in line with the Upper End estimate of rainfall increases for small and urban catchments.




Percentage impermeability (PIMP)

All impermeable area is modelled as 100% PIMP. This will allow for sufficient capacity for all hardstanding areas to be positively drained.

Volumetric Runoff Coefficient (Cv)

Industry standard Cv values vary for summer and winter and account for water volumes which do not enter the drainage system i.e., that is lost through infiltration, depression storage, evaporation, initial wetting etc. Standard values are 0.75 for summer and 0.84 for winter.

Given the site layout, it is foreseen that due to the poor infiltration rates available on the site, 80% of the land area will eventually discharge to the highway drainage system.

In accordance with section 24.8 of The SuDS Manual, the areas to be retained as grassed permeable space provide interception through evapotranspiration and storage within the soil which can be assumed to account for 75% of rainfall volumes. The remaining flows will be routed to the existing low point in the site to discharge as per the existing conditions.

Positive drainage will only be provided to route flows around plots and road structures.

The remainder of the drained network comprises a combination of permeable and impermeable hardstanding areas. The standard Cv values have been utilised here.

Surface water quality

The SuDS Manual provides best industry practice for assessing the pollutant potential of developments and providing mitigation methods to increase run off water quality through the use of SuDS components.

The simple index approach has been utilised here to assess the pollutant hazard indices and proposed treatment components. Note, this has been carried out in conjunction with the above SuDS component suitability assessment for the site and as such many features have already been discounted.

Table 26.2 from The SuDS Manual below outlines the pollution hazard indices for different land uses.

**TABLE 26.2 Pollution hazard indices for different land use classifications**

| Land use | Pollution hazard level | Total suspended solids (TSS) | Metals | Hydro-carbons |
|---|---|---|---|---|
| Residential roofs | Very low | 0.2 | 0.2 | 0.05 |
| Other roofs (typically commercial/ industrial roofs) | Low | 0.3 | 0.2 (up to 0.8 where there is potential for metals to leach from the roof) | 0.05 |
| Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day | Low | 0.5 | 0.4 | 0.4 |
| Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1] | Medium | 0.7 | 0.6 | 0.7 |
| Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1] | High | 0.8[2] | 0.8[2] | 0.9[2] |

*Figure 6: SuDS Manual Table 26.2 Pollution hazard indices*

This development is to be classed as a mix of 'Very low' and 'low' risk land uses due to the presence of residential roofs and individual property driveways and access roads.

This level of risk demands the following level of pollution control:

| Land use | Suspended solids | Metal | Hydrocarbons |
|---|---|---|---|
| Residential roofs | 0.2 | 0.2 | 0.05 |
| Parking/access road | 0.5 | 0.4 | 0.4 |

Table 26.3 from the SUDS Manual, shown below, details pollution mitigation indices for various SUDS components.

**TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters**

| | Mitigation indices[1] | | |
|---|---|---|---|
| Type of SuDS component | TSS | Metals | Hydrocarbons |
| Filter strip | 0.4 | 0.4 | 0.5 |
| Filter drain | 0.4[2] | 0.4 | 0.4 |
| Swale | 0.5 | 0.6 | 0.6 |
| Bioretention system | 0.8 | 0.8 | 0.8 |
| Permeable pavement | 0.7 | 0.6 | 0.7 |
| Detention basin | 0.5 | 0.5 | 0.6 |
| Pond[4] | 0.7[3] | 0.7 | 0.5 |
| Wetland | 0.8[3] | 0.8 | 0.8 |
| Proprietary treatment systems[5,6] | These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area. | | |

Figure 7 SuDS Manual Table 26.3 SuDS mitigation indicies

The highest risk element comes from the access roads and parking areas. As can be seen below, the proposed SPEL Stormceptor provides sufficient treatment for the higher risk elements and are therefore sufficient for those lower risk elements too.

| Land use | Suspended solids | Metal | Hydrocarbons |
|---|---|---|---|
| Access roads & roofs | 0.5 | 0.4 | 0.4 |
| SPEL Stormceptor (Proprietary system) | 0.5 | 0.4 | 0.4 |

| Land use | Suspended solids | Metal | Hydrocarbons |
|---|---|---|---|
| Parking to driveways | 0.5 | 0.4 | 0.4 |
| Permeable paving | 0.7 | 0.6 | 0.7 |

Surface water drainage proposals

Max site outflow: 4.7/s

Storage provision: Attenuation tanks and pipes, grassed areas, and detention basin

Treatment systems: Permeable paving for parking areas, & SPEL proprietary treatment plant for hardstanding areas.

SPEL ESR Bypass Treatment System technical data is given in *Appendix H*.

Storage requirements

Utilising the figures above, the system has been designed using Infodrainage software to store all storm flows up to a 6 hour 1:100yr +50%. The Infodrainage calculations are included within *Appendix G* for reference.

The proposed drainage arrangement proposals are shown on drawing 22-C-16573/02 in *Appendix F*.

## 4. FOUL WATER DRAINAGE STRATEGY

Foul water from the new development will be positively drained via a new private foul sewer along Station Road, Drigg to the existing combined UU system.

There are 9No. proposed houses, assuming 3No. inhabitants per dwelling and 150litres of water use per day.

The total flow rate from the development will be 0.047l/s.

A plan of the proposed foul water system is shown in *Appendix F* drawing 22-C-16573/02.

## 5. MANAGEMENT & MAINTENANCE

All separate surface and foul water drainage systems within the site are proposed to remain private and managed through a site management company.

The surface water system will discharge into the existing highway system in the B5344. The new connection manhole will form part of the highway as part of a S278 agreement, however the pipe between the site and this system will remain under private ownership.

The exact connection point in the highway will be confirmed during the S278 works design stage.

The proposed foul water pipe beyond the site boundary routed down Station Road is also to remain private and be subject to a S50 agreement with highways for a private drain under the highway. A Section 106 agreement with UU is also required to form the new connection at the bottom of Station Road.

All components shall be maintained in accordance with the relative requirements shown in the SuDS Manual. These intervals should be deemed as a minimum frequency and reference should also be made to the manufacturers and landscape designers guidance to ensure all components are maintained correctly.

Table 21.3 from the SuDS Manual for attenuation storage tanks has been included below for reference.

**TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks**

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

## 6. APPENDICES

Appendix A – Calderpeel Architects site plan 24085 (PL) 010.

Appendix B – Drained areas plan 22-C-16573/01.

Appendix C – Percolation test results and images.

Appendix D – United Utilities Sewer Records.

Appendix E – Proposed site greenfield run-off calculations.

Appendix F – Proposed drainage plan 22-C-16573/02.

Appendix G – Infodrainage calculations for SW system up to 100yr + 50% storm.

Appendix H – SPEL ESR Bypass Treatment Device technical data.

| REV | DESCRIPTION | DATE | DRAWN |
|---|---|---|---|
| - | - | 00.00.00 | - |

0 2 4 6 8 10 20m


## Area Schedule

| | | | |
|---|---|---|---|
| House type A | 1 storey | 3 Bed | 2 No. @ 1,255 sq.ft |
| House type B | 1 storey | 2 Bed | 2 No. @ 985 sq.ft |
| House type C | 1 storey | 3 Bed | 3 No. @ 1,350 sq.ft |
| House type D | 2 storeys | 4 Bed | 2 No. @ 1,930 sq.ft |

CHESHIRE
Market Court
20-24 Church St
Altrincham
WA14 4DW
0161 929 7622

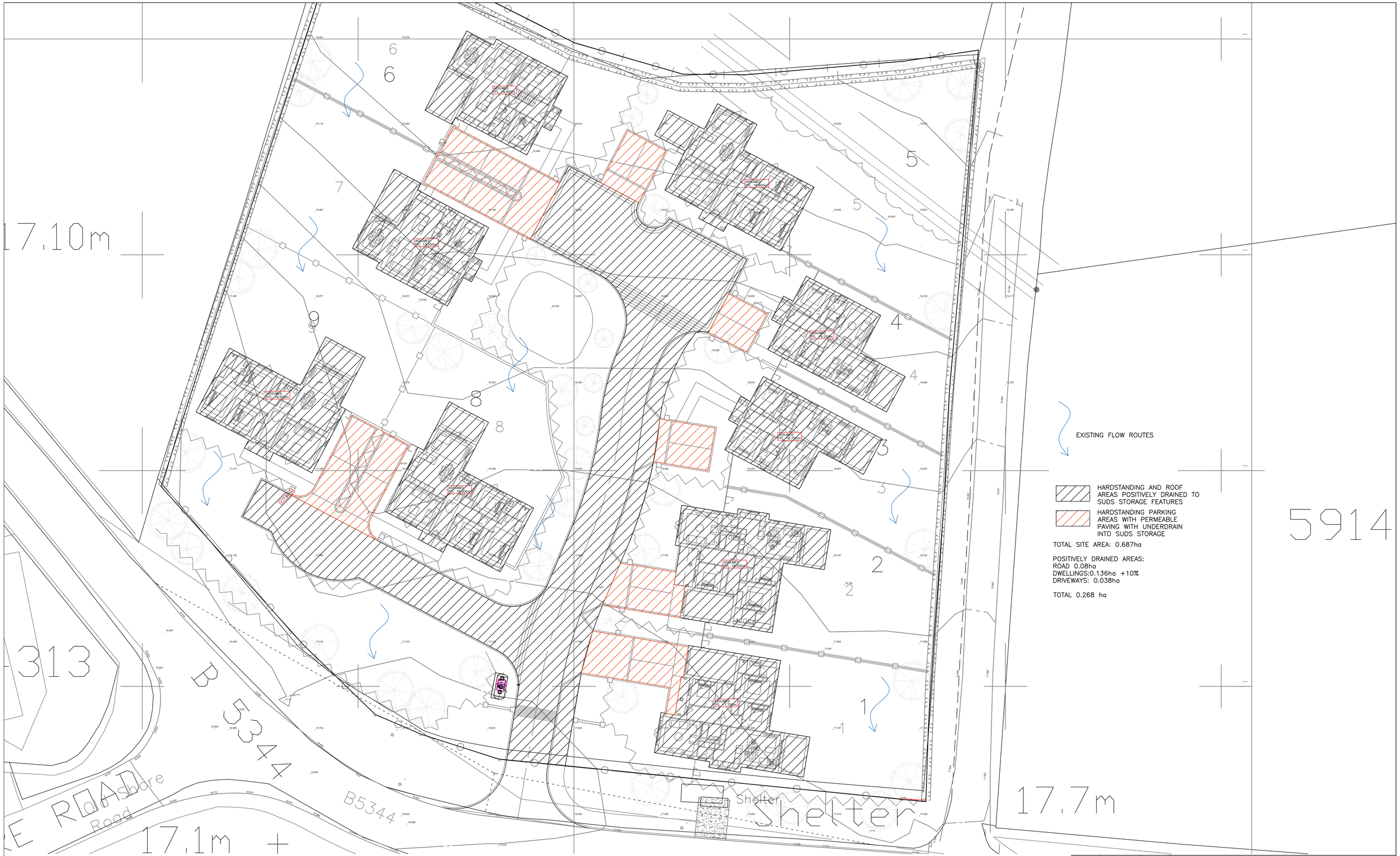
SHEFFIELD
Acero
1 Concourse Way
Sheffield
S1 2BJ
0114 212 9035

LAND TO THE NORTH OF STATION ROAD, DRIGG

SUNSHINE PROPERTIES WEST COAST LTD

PROPOSED SITE LAYOUT
DWG: 24085 (PL) 010 *
DATE: 30.09.24
SCALE: 1:200 @ A1 DRAWN: RM

CALDERPEEL
ARCHITECTS




| REV | DATE | AUTHOR | NOTES |
|---|---|---|---|
| B | 27/11/24 | SM | DRAINED AREAS AMENDED TO SUIT REVISED SITE PLAN |
| A | 27/09/24 | SM | DRAWING UPDATED |

DRAWING STATUS: PRELIMINARY

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CLIENT
SUNSHINE PROPERTIES LTD

TITLE
LAND TO NORTH STATION RD, DRIGG
DRAINED AREAS PLAN

| DRAWN | DATE | SCALE |
|---|---|---|
| SM | MAY 22 | 1:200 @A1 |

DRAWING NO. 22-C-16573/01 B

# Drigg Percolation Test – 25/03/22

Tests carried out during dry, sunny weather.

## TP 1

Hole excavated 2000mm x 1500 x 300. No groundwater was encountered during excavation.

| | Test 1 | Test 2 | Test 3 |
|---|---|---|---|
| Depth (mm) | Time (mins) | Time (mins) | Time (mins) |
| 1100 | 0 | | |
| 950 | 120 | | |
| | | | |
| 950 | 390 | | |
| $t_{p75-25}$ | N/A | N/A | N/A |

Test was abandoned after 6.5hours as no further movement in water level was visible.

## TP 2

Hole excavated 2000mm x 1500 x 300. No groundwater was encountered during excavation.

| | Test 1 | Test 2 | Test 3 |
|---|---|---|---|
| Depth (mm) | Time (mins) | Time (mins) | Time (mins) |
| 1000 | 0 | 0 | 0 |
| 250 | 2 | 2 | 2 |
| | | | |
| 250 | 120 | 240 | |
| $t_{p75-25}$ | 2 | 2 | 2 |

Upon filling on all three occasions water level very quickly dropped to 250mm above the base of the excavation. This was very different to performance of other excavations and therefore further investigation warranted. Upon investigation, an existing clay pipe was discovered to have been severed in the pit. This has been assumed to have caused the rapid loss of water from the excavation rather than good infiltration characteristics of the ground itself.

# TP 3

Hole excavated 2000mm x 1500 x 300. No groundwater was encountered during excavation.

| | Test 1 | Test 2 | Test 3 |
|---|---|---|---|
| Depth (mm) | Time (mins) | Time (mins) | Time (mins) |
| 1000 | 0 | | |
| 900 | 180 | | |
| | | | |
| 900 | 360 | | |
| $t_{p75-25}$ | N/A | N/A | N/A |

Test was abandoned after 6 hours as no further movement in water level was visible.

## TP 4

Hole excavated 2000mm x 1500 x 300. No groundwater was encountered during excavation.

| | Test 1 | Test 2 | Test 3 |
|---|---|---|---|
| Depth (mm) | Time (mins) | Time (mins) | Time (mins) |
| 1000 | 0 | | |
| 550 | 180 | | |
| 450 | 270 | | |
| 450 | 360 | | |
| $t_{p75-25}$ | N/A | N/A | N/A |

Test was abandoned after 6 hours as no further movement in water level was visible.

## TP 5

Hole excavated 2000mm x 1500 x 300. No groundwater was encountered during excavation.

| | Test 1 | Test 2 | Test 3 |
|---|---|---|---|
| Depth (mm) | Time (mins) | Time (mins) | Time (mins) |
| 1000 | 0 | | |
| 600 | 60 | | |
| | | | |
| 600 | 360 | | |
| $t_{p75-25}$ | N/A | N/A | N/A |

Test was abandoned after 6 hours as no further movement in water level was visible.

Water for the North West

**How to contact us:**

**United Utilities Water Limited**
**Property Searches**
**Haweswater House**
**Lingley Mere Business Park**
**Great Sankey**
**Warrington**
**WA5 3LP**

**Telephone: 0370 7510101**

**E-mail: propertysearches@uuplc.co.uk**

**A L Daines & Partners LLP**

**28**
**Castle Street,**
**Carlisle,**
**CA3 8TP**

**FAO:**

**Your Ref: 16573 Drigg**
**Our Ref: UUPS-ORD-382013**
**Date: 31/03/2022**

**Dear Sirs**

## Location: Land to north station road Drigg

I acknowledge with thanks your request dated 30/03/2022 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager



*United Utilities Water Limited*
*Registered In England & Wales No. 2366678*
*Registered Office Haweswater House, Lingley Mere Business Park,*
*Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP*

Water for the North West

# TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

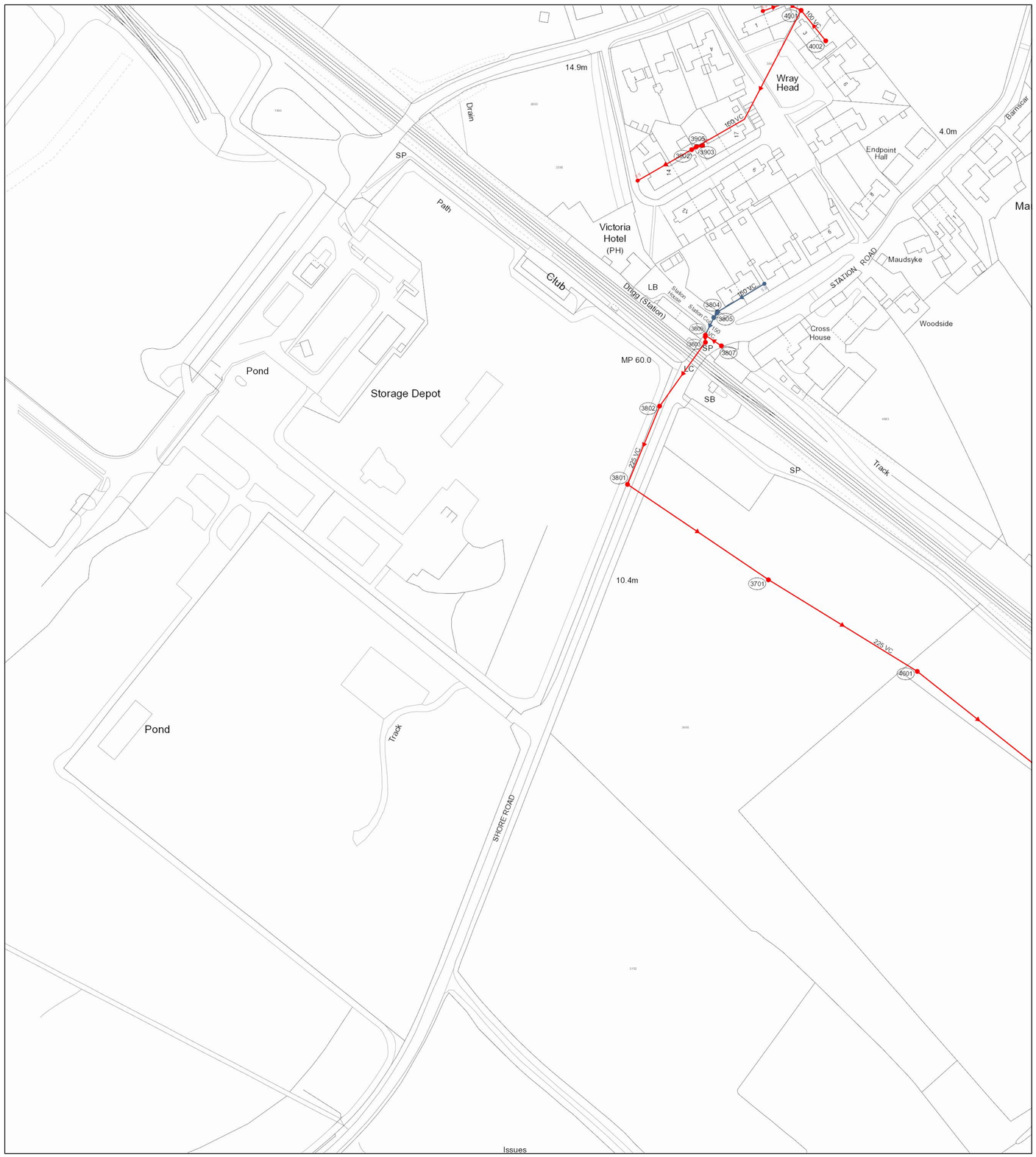
These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

**TERMS AND CONDITIONS:**

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



*United Utilities Water Limited*
*Registered In England & Wales No. 2366678*
*Registered Office Haweswater House, Lingley Mere Business Park,*
*Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP*




| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 3804 | | SW | | 150 | | | VC | 3.831175 | |
| 3802 | 11.85 | CO | 9.9 | 225 | | | VC | 46.93287 | 1 in 82 |
| 3803 | 12.54 | CO | 11.04 | 225 | | | VC | 43.42899 | 1 in 40 |
| 4601 | 9.68 | CO | 8.56 | 225 | | | VC | 86.77837 | 1 in 15 |
| 4601 | 9.68 | CO | 8.56 | 225 | | | VC | 86.77837 | 1 in 15 |
| 3805 | | SW | | 150 | | | VC | 10.8587 | |
| 3809 | 12.71 | CO | 11.51 | 150 | | | VC | 4 | 1 in 11 |
| 3801 | 11.27 | CO | 9.29 | 225 | | | VC | 94.3427 | 1 in 286 |
| 3701 | 10.9 | CO | 8.92 | 225 | | | VC | 96.81261 | 1 in 285 |
| 3807 | 12.76 | CO | 12.17 | 150 | | | VC | 10.83057 | 1 in 19 |
| 3902 | | CO | | 150 | | | VC | 34.43602 | |
| 3902 | | CO | | 150 | | | VC | 34.43602 | |
| 3001 | | CO | | 100 | | | VC | 9.552393 | |
| 4001 | | CO | | 150 | | | VC | 98.61514 | |
| 4001 | | CO | | 150 | | | VC | 98.61514 | |
| 4002 | | CO | | 100 | | | VC | 21.76924 | |
| 4002 | | CO | | 100 | | | VC | 21.76924 | |
| 3903 | | CO | | 150 | | | VC | 3.286679 | |
| 3903 | | CO | | 150 | | | VC | 3.286679 | |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

# LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

**All point assets follow the standard colour convention:**

**red - combined** **blue - surface water**
**brown - foul** **purple - overflow**

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

| | | | |
|---|---|---|---|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

**SEWER MATERIAL**

| | |
|---|---|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CC | Concrete Box Culverted |
| PSC | Plastic / Steel Composite |
| GRC | Glass Reinforecd Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

**Address or Site Reference:**

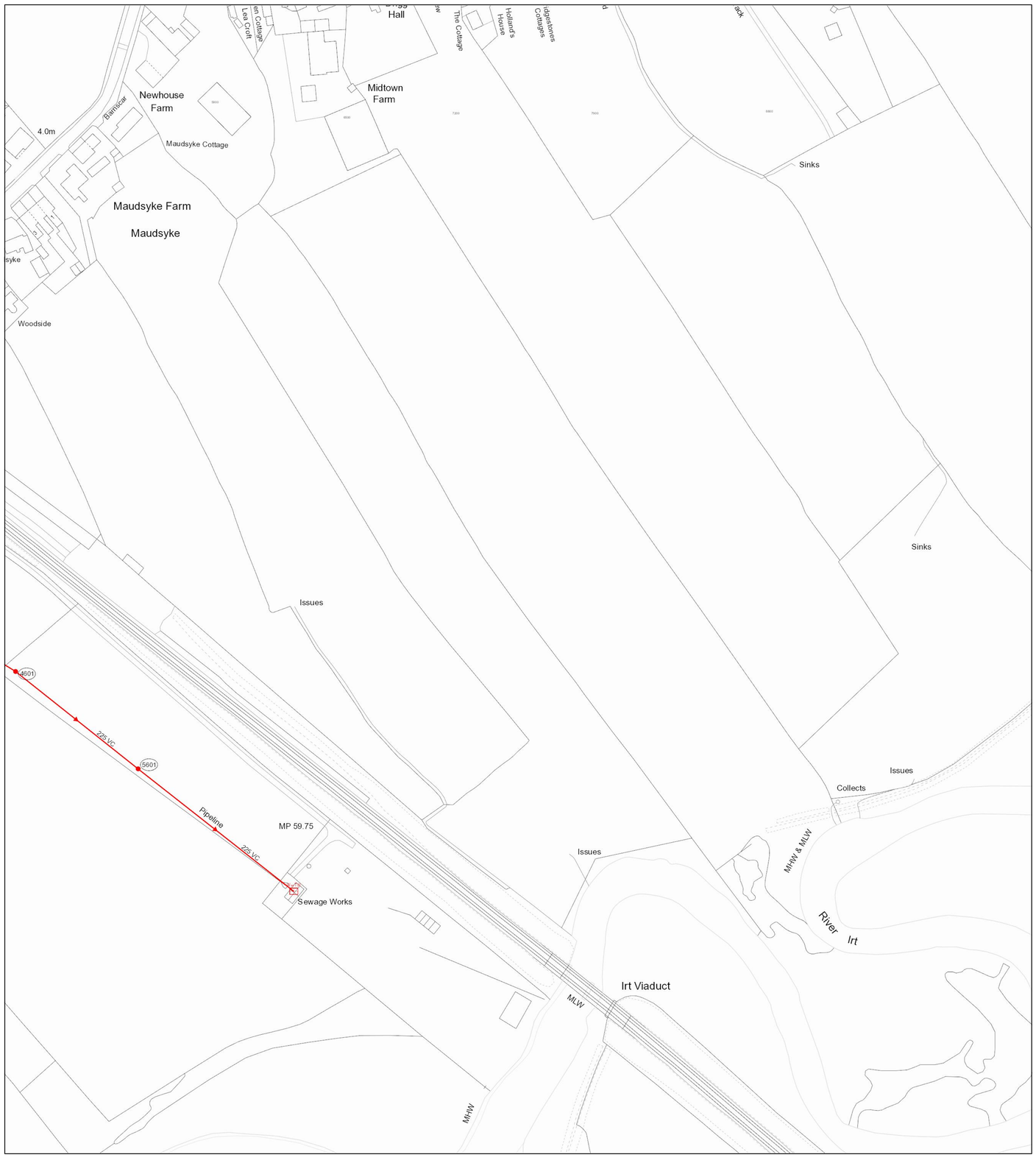
Land to north station road Drigg,

**OS sheet Number:** SD0698NW
**Scale:** 1:1250 **Date:** 31/03/2022
**Nodes:** 19
**Sheet:** 1 of 4

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
Water for the North West




| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 3701 | 10.9 | CO | 8.92 | 225 | | | VC | 96.81261 | 1 in 285 |
| 5601 | 8.78 | CO | 2.66 | 225 | | | VC | 109.9251 | |
| 4601 | 9.68 | CO | 8.56 | 225 | | | VC | 86.77837 | 1 in 15 |
| 4601 | 9.68 | CO | 8.56 | 225 | | | VC | 86.77837 | 1 in 15 |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

# LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

**All point assets follow the standard colour convention:**

red - combined  blue - surface water
brown - foul  purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

| | | | |
|---|---|---|---|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

**SEWER MATERIAL**

| | |
|---|---|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CC | Concrete Box Culverted |
| PSC | Plastic / Steel Composite |
| GRC | Glass Reinforecd Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

**Address or Site Reference:**

Land to north station road Drigg,

**OS sheet Number:** SD0698NE
**Scale:** 1:1250  **Date:** 31/03/2022
**Nodes:** 4
**Sheet:** 2 of 4

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
Water for the North West


The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.



| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 3903 | | CO | | 150 | | | VC | 3.286679 | |
| 3903 | | CO | | 150 | | | VC | 3.286679 | |
| 4002 | | CO | | 100 | | | VC | 21.76924 | |
| 4002 | | CO | | 100 | | | VC | 21.76924 | |
| 4001 | | CO | | 150 | | | VC | 98.61514 | |
| 4001 | | CO | | 150 | | | VC | 98.61514 | |
| 3001 | | CO | | 100 | | | VC | 9.552393 | |
| 3902 | | CO | | 150 | | | VC | 34.43602 | |
| 3902 | | CO | | 150 | | | VC | 34.43602 | |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

# LEGEND

| Abandoned | Foul | Surface Water | Combined | |
|---|---|---|---|---|
| | | | | Public Sewer |
| | | | | Private Sewer |
| | | | | Section 104 |
| | | | | Rising Main |
| | | | | Sludge Main |
| | | | | Overflow |
| | | | | Water Course |
| | | | | Highway Drain |

**All point assets follow the standard colour convention:**

**red - combined** **blue - surface water**
**brown - foul** **purple - overflow**

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

| | | | |
|---|---|---|---|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

**SEWER MATERIAL**

| | |
|---|---|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CC | Concrete Box Culverted |
| PSC | Plastic / Steel Composite |
| GRC | Glass Reinforecd Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

**Address or Site Reference:**

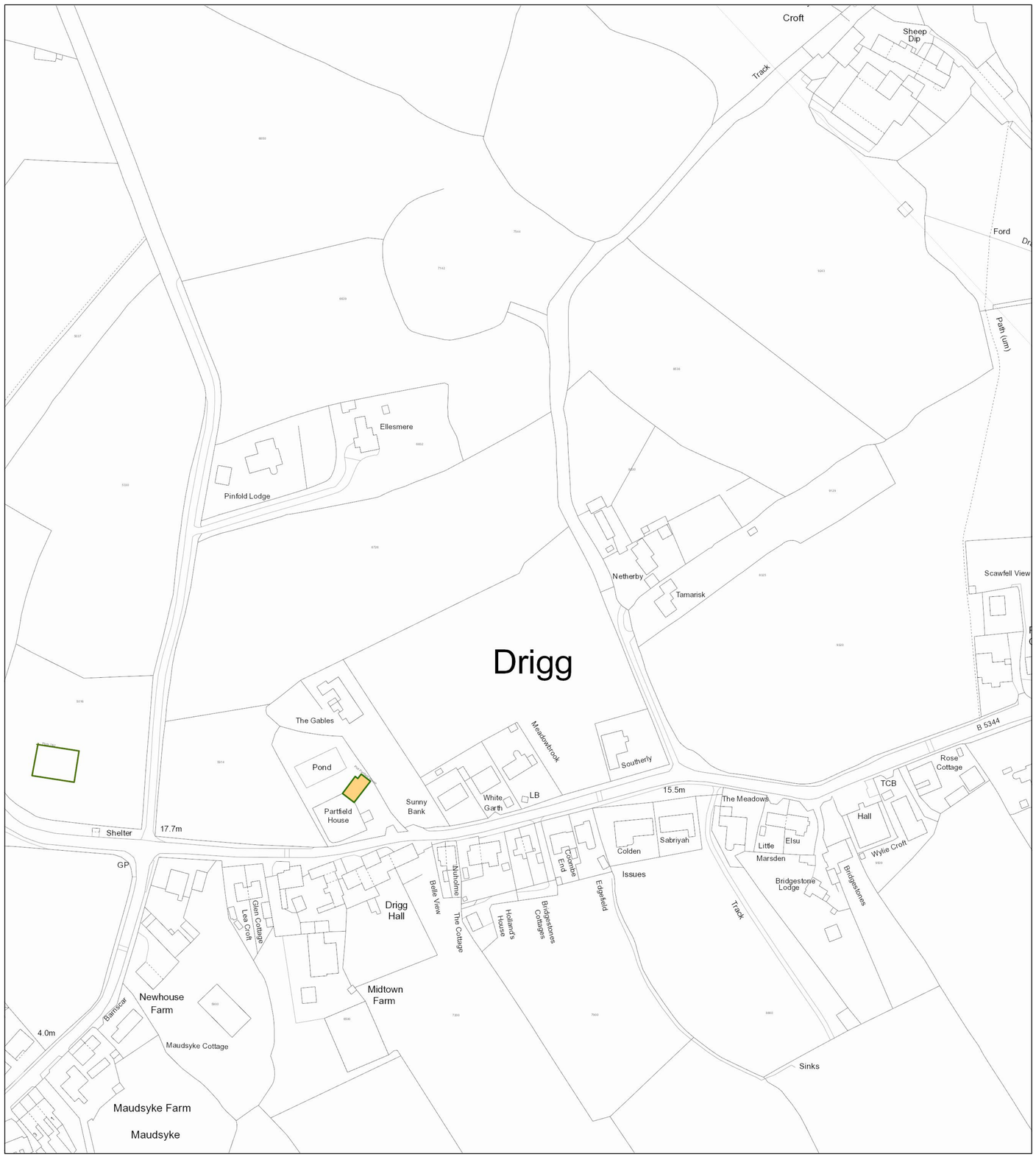
Land to north station road Drigg,

**OS sheet Number:** SD0699SW
**Scale:** 1:1250 **Date:** 31/03/2022
**Nodes:** 9
**Sheet:** 3 of 4

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
Water for the North West




The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.



| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|

# LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

**All point assets follow the standard colour convention:**

red - combined  blue - surface water
brown - foul  purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

| | | | |
|---|---|---|---|
| CI | Circular | TR | Trapezoidal |
| EG | Egg | AR | Arch |
| OV | Oval | BA | Barrel |
| FT | Flat Top | HO | HorseShoe |
| RE | Rectangular | UN | Unspecified |
| SQ | Square | | |

**SEWER MATERIAL**

| | |
|---|---|
| AC | Asbestos Cement |
| BR | Brick |
| PE | Polyethylene |
| RP | Reinforced Plastic Matrix |
| CO | Concrete |
| CSB | Concrete Segment Bolted |
| CSU | Concrete Segment Unbolted |
| CC | Concrete Box Culverted |
| PSC | Plastic / Steel Composite |
| GRC | Glass Reinforecd Plastic |
| DI | Ductile Iron |
| PVC | Polyvinyl Chloride |
| CI | Cast Iron |
| SI | Spun Iron |
| ST | Steel |
| VC | Vitrified Clay |
| PP | Polypropylene |
| PF | Pitch Fibre |
| MAC | Masonry, Coursed |
| MAR | Masonry, Random |
| U | Unspecified |

**Address or Site Reference:**

Land to north station road Drigg,

**OS sheet Number:** SD0699SE
**Scale:** 1:1250  **Date:** 31/03/2022
**Nodes:** 0
**Sheet:** 4 of 4

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
Water for the North West

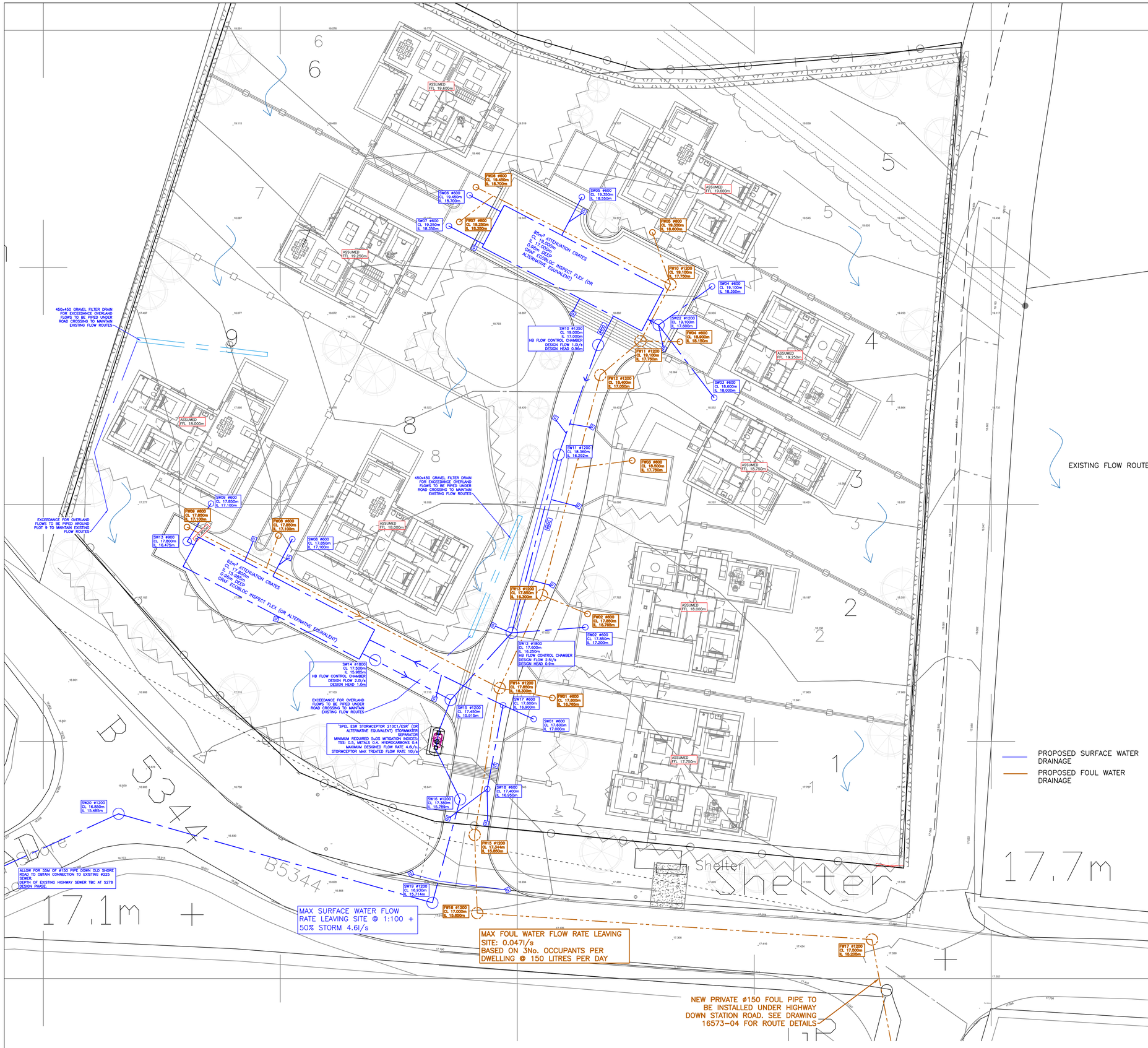
## ICP SUDS Mean Annual Flood

Input

| | | | |
|---|---|---|---|
| Return Period (years) | 100 | Soil | 0.450 |
| Area (ha) | 0.694 | Urban | 0.000 |
| SAAR (mm) | 1017 | Region Number | Region 10 |

**Results l/s**

| | |
|---|---|
| QBAR Rural | 4.7 |
| QBAR Urban | 4.7 |
| Q100 years | 9.8 |
| Q1 year | 4.1 |
| Q30 years | 8.0 |
| Q100 years | 9.8 |




| REV | DATE | AUTHOR | NOTES |
|---|---|---|---|
| D | 25/02/25 | SM | SW OUTFALL POSITION AMENDED FOLLOWING DISCUSSION WITH LOCAL HIGHWAY AGENCY |
| C | 18/11/24 | SM | LAYOUT AND OUTFALL AMENDED |

DRAWING STATUS: **PRELIMINARY**


A L DAINES & PARTNERS
CONSULTING CIVIL & STRUCTURAL ENGINEERS

28 Castle Street, Carlisle,
Cumbria CA3 8TP
TEL 01228 527428
EMAIL mail@aldaines.co.uk
WEB www.aldaines.co.uk


CLIENT
SUNSHINE PROPERTIES LTD

TITLE
LAND TO NORTH STATION RD, DRIGG
PROPOSED DRAINAGE PLAN

| DRAWN | DATE | SCALE |
|---|---|---|
| PA | JULY 22 | 1:200 @A1 |

DRAWING NO: 22-C-16573/02 D

BM 17.10m

Tank

Track

ALLOW FOR 55m OF ø150 PIPE DOWN OLD SHORE ROAD TO OBTAIN CONNECTION TO EXISTING ø225 SEWER. DEPTH OF EXISTING HIGHWAY SEWER TBC AT S278 DESIGN PHASE

NEW ø150 SURFACE WATER DRAIN CONNECTION INTO EXISTING ø225 HIGHWAY DRAINAGE IN OLD SHORE ROAD. EXACT CONNECTION POINT TO BE CONFIRMED AND AGREED WITH HIGHWAYS DURING S278 TECHNICAL APPROVAL PHASE
APPROX CL OF NEW MANHOLE: 16.000M
INVERT LEVEL: 15.118m

OLD SHORE ROAD

B 5344

4313

17.1m

17.7m

Shelter

PROPOSED SURFACE WATER DRAINAGE

PROPOSED FOUL WATER DRAINAGE

MAX SURFACE WATER FLOW RATE LEAVING SITE ● 1:100 + 50% STORM 4.6l/s

MAX FOUL WATER FLOW RATE LEAVING SITE: 0.047l/s
BASED ON 3No. OCCUPANTS PER DWELLING @ 150 LITRES PER DAY

NEW PRIVATE ø150 FOUL PIPE TO BE INSTALLED UNDER HIGHWAY DOWN STATION ROAD. SEE DRAWING 16573-04 FOR ROUTE DETAILS

GP

FW18 ø1200
CL 17.300m
IL 15.058m

FW19 ø1200
CL 17.200m
IL 14.897m

FW20 ø1200
CL 17.147m
IL 14.447m

FW21 ø1200
CL 17.250m
IL 14.295m

FW22 ø1200
CL 17.435m
IL 13.846m

FW23 ø1200
CL 17.000m
IL 13.409m

FW24 ø1200
CL 15.800m
IL 13.013m

FW25 ø1200
CL 14.200m
IL 12.587m

FW26 ø1200
CL 13.050m
IL 12.259m

CONNECTION TO EX. UU MANHOLE 3809
DIAMETER TBC
Ex. CL 12.750m
Ex. IL 11.510m

STATION ROAD, DRIGG

STATION ROAD

Lea Croft

3803

Wray Head

4900

Sheep Pens

Newhouse Farm

5914

| REV | DATE | AUTHOR | NOTES |
|---|---|---|---|
| D | 25/02/25 | SM | SW DRAINAGE OUTFALL ROUTE AMENDED FOLLOWING CONSULATION WITH LHA |
| C | 18/11/24 | SM | OUTFALL AMENDED TO FW ONLY |

DRAWING STATUS: PRELIMINARY

A L DAINES & PARTNERS
CONSULTING CIVIL & STRUCTURAL ENGINEERS
28 Castle Street, Carlisle, Cumbria CA3 8TP
TEL 01228 527428
EMAIL mail@aldaines.co.uk
WEB www.aldaines.co.uk

CLIENT: SUNSHINE PROPERTIES LTD

TITLE: LAND TO NORTH OF STATION ROAD, DRIGG
PROPOSED DRAINAGE OUTFALL PLAN

DRAWN SM | DATE SEPT 24 | SCALE 1:500 @A1

DRAWING NO. 22-C-16573/04 | D

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Stormwater Controls<br>Storm Phase: Phase | Company Address: | | |

**Cellular Storage**

Type : Cellular Storage

## Dimensions

| | |
|---|---|
| Exceedance Level (m) | 19.000 |
| Depth (m) | 0.960 |
| Base Level (m) | 17.000 |
| Number of Crates Long | 24 |
| Number of Crates Wide | 6 |
| Number of Crates High | 3 |
| Porosity (%) | 95 |
| Crate Length (m) | 0.8 |
| Crate Width (m) | 0.8 |
| Crate Height (m) | 0.32 |
| Total Volume (m³) | 85.090 |

## Inlets

### Inlet

| | |
|---|---|
| Inlet Type | Point Inflow |
| Incoming Item(s) | Catchment Area (9)<br>Pipe<br>Pipe (1)<br>Pipe (2) |
| Bypass Destination | (None) |
| Capacity Type | No Restriction |

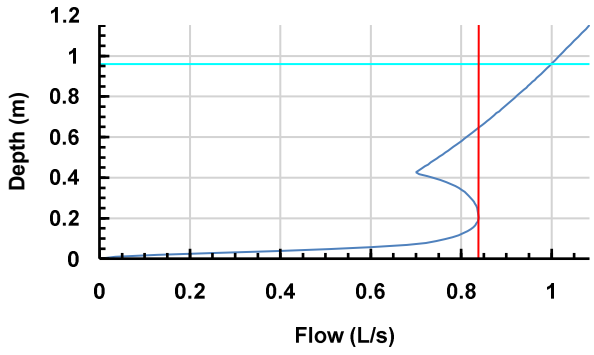
## Outlets

### Outlet

| | |
|---|---|
| Outgoing Connection | Pipe (3) |
| Outlet Type | Hydro-Brake® |

| | |
|---|---|
| Invert Level (m) | 17.000 |
| Design Depth (m) | 0.960 |
| Design Flow (L/s) | 1.0 |
| Objective | Minimise Upstream Storage Requirements |
| Application | Surface Water Only |
| Sump Available | ☑ |

| | |
|---|---|
| Unit Reference | SHE-0047-1000-0960-1000 |



**Cellular Storage (1)**

Type : Cellular Storage

## Dimensions

| | |
|---|---|
| Exceedance Level (m) | 17.500 |
| Depth (m) | 0.960 |
| Base Level (m) | 15.985 |
| Number of Crates Long | 26 |
| Number of Crates Wide | 4 |
| Number of Crates High | 3 |
| Porosity (%) | 95 |
| Crate Length (m) | 0.8 |
| Crate Width (m) | 0.8 |
| Crate Height (m) | 0.32 |
| Total Volume (m³) | 61.258 |

## Inlets

### Inlet

| | |
|---|---|
| Inlet Type | Point Inflow |
| Incoming Item(s) | Pipe (9)<br>Pipe (12)<br>Catchment Area (6) |
| Bypass Destination | (None) |
| Capacity Type | No Restriction |

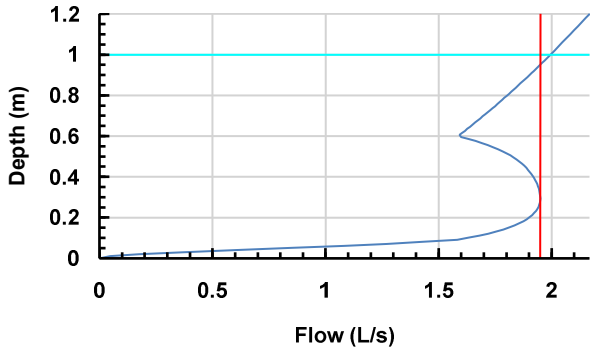
### Inlet (1)

| | |
|---|---|
| Inlet Type | Point Inflow |
| Incoming Item(s) | Catchment Area (13)<br>Catchment Area (14) |
| Bypass Destination | (None) |
| Capacity Type | No Restriction |

## Outlets

### Outlet

| | |
|---|---|
| Outgoing Connection | Pipe (10) |
| Outlet Type | Hydro-Brake® |
| Invert Level (m) | 15.985 |
| Design Depth (m) | 1.000 |
| Design Flow (L/s) | 2.0 |
| Objective | Minimise Upstream Storage Requirements |
| Application | Surface Water Only |
| Sump Available | ☑ |
| Unit Reference | SHE-0067-2000-1000-2000 |



| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Inflow Summary<br>Storm Phase: Phase | Company Address: | | |

| Inflow Label | Connected To | Flow (L/s) | Runoff Method | Area (ha) | Percentage Impervious (%) | Urban Creep (%) | Adjusted Percentage Impervious (%) | Area Analysed (ha) |
|---|---|---|---|---|---|---|---|---|
| Catchment Area | SW06 | | Time of Concentration | 0.014 | 100 | 10 | 110 | 0.015 |
| Catchment Area (1) | SW05 | | Time of Concentration | 0.016 | 100 | 10 | 110 | 0.018 |
| Catchment Area (2) | SW22 | | Time of Concentration | 0.013 | 100 | 10 | 110 | 0.014 |
| Catchment Area (3) | SW22 | | Time of Concentration | 0.013 | 100 | 10 | 110 | 0.014 |
| Catchment Area (4) | SW06 | | Time of Concentration | 0.014 | 100 | 10 | 110 | 0.015 |
| Catchment Area (5) | SW12 | | Time of Concentration | 0.019 | 100 | 10 | 110 | 0.020 |
| Catchment Area (6) | Cellular Storage (1) | | Time of Concentration | 0.019 | 100 | 10 | 110 | 0.021 |
| Catchment Area (7) | SW13 | | Time of Concentration | 0.017 | 100 | 10 | 110 | 0.018 |
| Catchment Area (8) | SW08 | | Time of Concentration | 0.016 | 100 | 10 | 110 | 0.018 |
| Catchment Area (9) | Cellular Storage | | Time of Concentration | 0.039 | 100 | 0 | 100 | 0.039 |
| Catchment Area (10) | SW13 | | Time of Concentration | 0.026 | 100 | 0 | 100 | 0.026 |
| Catchment Area (11) | SW11 | | Time of Concentration | 0.015 | 100 | 0 | 100 | 0.015 |
| Catchment Area (12) | SW12 | | Time of Concentration | 0.013 | 100 | 0 | 100 | 0.013 |
| Catchment Area (13) | Cellular Storage (1) | | Time of Concentration | 0.017 | 100 | 0 | 100 | 0.017 |
| Catchment Area (14) | Cellular Storage (1) | | Time of Concentration | 0.004 | 100 | 0 | 100 | 0.004 |
| **TOTAL** | | **0.0** | | **0.254** | | | | **0.268** |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Network Design Criteria<br>Storm Phase: Phase | Company Address: | | |

## Flow Options

| | |
|---|---|
| Peak Flow Calculation | (UK) Modified Rational Method |
| Min. Time of Entry (mins) | 5 |
| Max. Travel Time (mins) | 30 |

## FSR

Type: FSR

| | |
|---|---|
| Return Period (years) | 30.0 |
| Region | England And Wales |
| M5-60 (mm) | 17.0 |
| Ratio R | 0.300 |

## Pipe Options

| | |
|---|---|
| Lock Slope Options | None |
| Design Options | Minimise Pipe Diameter |
| Design Level | Level Soffits |
| Min. Cover Depth (m) | 1.200 |
| Min. Slope (1:X) | 400.00 |
| Max. Slope (1:X) | 5.00 |
| Min. Velocity (m/s) | 1.0 |
| Max. Velocity (m/s) | 3.0 |
| Use Flow Restriction | ☐ |
| Reduce Channel Depths | ☐ |

## Pipe Size Library

### Default

| | |
|---|---|
| Add. Increment (mm) | 75 |
| Max. Diameter (mm) | 0 |

| Diameter (mm) | Min. Slope (1:X) | Max. Slope (1:X) |
|---|---|---|
| 100 | 0.00 | 0.00 |
| 150 | 0.00 | 0.00 |

## Manhole Options

| | |
|---|---|
| Apply Offset | ☐ |

## Manhole Size Library

### Default

### Diameter / Width

| Connection (mm) | Diameter / Length (m) | Width (m) |
|---|---|---|
| 0 | 1.200 | 0.000 |
| 375 | 1.350 | 0.000 |
| 500 | 1.500 | 0.000 |
| 750 | 1.800 | 0.000 |

### Additional Sizing

| | |
|---|---|
| Connection (mm) | 900 |
| Diameter / Length (m) | 0.900 |
| Width (m) | 0.000 |

### Depth

| Depth (m) | Diameter / Length (m) | Width (m) |
|---|---|---|
| 0.000 | 1.050 | 0.000 |
| 1.500 | 1.200 | 0.000 |

### Access

| Depth (m) | Ladder Protrusion (mm) |
|---|---|
| 0.000 | 130 |
| 3.000 | 230 |

### Benching Requirements

| | |
|---|---|
| Landing Width (mm) | 500 |
| Benching Width (mm) | 225 |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Outfall Details<br>Storm Phase: Phase | Company Address: | | |

## Outfalls

| Outfall | Outfall Type | Gated | Fixed Surcharged Level (m) | Level Curve |
|---|---|---|---|---|
| SW19 | Free Discharge | | | |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Title:<br>Rainfall Analysis Criteria | Company Address: | | |

| | |
|---|---|
| Runoff Type | Dynamic |
| Output Interval (mins) | 5 |
| Time Step | Shortest |
| Urban Creep | Use Catchment Values |
| Junction Flood Risk Margin (mm) | 300 |
| Prefill Manhole Sumps | ☐ |
| Perform No Discharge Analysis | ☐ |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Inflows Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume ($m^3$) |
|---|---|---|---|---|
| Catchment Area | FSR: 1 years: +0 %: 15 mins: Winter | 0.01 | 1.9 | 0.858 |
| Catchment Area (1) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 2.2 | 1.026 |
| Catchment Area (2) | FSR: 1 years: +0 %: 15 mins: Winter | 0.01 | 1.7 | 0.789 |
| Catchment Area (3) | FSR: 1 years: +0 %: 15 mins: Winter | 0.01 | 1.7 | 0.789 |
| Catchment Area (4) | FSR: 1 years: +0 %: 15 mins: Winter | 0.01 | 1.9 | 0.876 |
| Catchment Area (5) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 2.5 | 1.155 |
| Catchment Area (6) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 2.5 | 1.179 |
| Catchment Area (7) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 2.3 | 1.044 |
| Catchment Area (8) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 2.2 | 1.011 |
| Catchment Area (9) | FSR: 1 years: +0 %: 15 mins: Winter | 0.04 | 4.7 | 2.196 |
| Catchment Area (10) | FSR: 1 years: +0 %: 15 mins: Winter | 0.03 | 3.2 | 1.470 |
| Catchment Area (11) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 1.8 | 0.852 |
| Catchment Area (12) | FSR: 1 years: +0 %: 15 mins: Winter | 0.01 | 1.6 | 0.738 |
| Catchment Area (13) | FSR: 1 years: +0 %: 15 mins: Winter | 0.02 | 2.1 | 0.963 |
| Catchment Area (14) | FSR: 1 years: +0 %: 15 mins: Winter | 0.00 | 0.5 | 0.219 |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Inflows Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume ($m^3$) |
|---|---|---|---|---|
| Catchment Area | FSR: 2 years: +0 %: 15 mins: Winter | 0.01 | 2.4 | 1.113 |
| Catchment Area (1) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 2.9 | 1.323 |
| Catchment Area (2) | FSR: 2 years: +0 %: 15 mins: Winter | 0.01 | 2.2 | 1.017 |
| Catchment Area (3) | FSR: 2 years: +0 %: 15 mins: Winter | 0.01 | 2.2 | 1.023 |
| Catchment Area (4) | FSR: 2 years: +0 %: 15 mins: Winter | 0.01 | 2.4 | 1.131 |
| Catchment Area (5) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 3.2 | 1.494 |
| Catchment Area (6) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 3.3 | 1.524 |
| Catchment Area (7) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 2.9 | 1.353 |
| Catchment Area (8) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 2.8 | 1.305 |
| Catchment Area (9) | FSR: 2 years: +0 %: 15 mins: Winter | 0.04 | 6.1 | 2.844 |
| Catchment Area (10) | FSR: 2 years: +0 %: 15 mins: Winter | 0.03 | 4.1 | 1.899 |
| Catchment Area (11) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 2.4 | 1.098 |
| Catchment Area (12) | FSR: 2 years: +0 %: 15 mins: Winter | 0.01 | 2.1 | 0.957 |
| Catchment Area (13) | FSR: 2 years: +0 %: 15 mins: Winter | 0.02 | 2.7 | 1.251 |
| Catchment Area (14) | FSR: 2 years: +0 %: 15 mins: Winter | 0.00 | 0.6 | 0.279 |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Inflows Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume ($m^3$) |
|---|---|---|---|---|
| Catchment Area | FSR: 30 years: +45 %: 15 mins: Winter | 0.01 | 6.5 | 3.030 |
| Catchment Area (1) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 7.8 | 3.612 |
| Catchment Area (2) | FSR: 30 years: +45 %: 15 mins: Winter | 0.01 | 6.0 | 2.778 |
| Catchment Area (3) | FSR: 30 years: +45 %: 15 mins: Winter | 0.01 | 6.0 | 2.781 |
| Catchment Area (4) | FSR: 30 years: +45 %: 15 mins: Winter | 0.01 | 6.7 | 3.087 |
| Catchment Area (5) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 8.8 | 4.080 |
| Catchment Area (6) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 9.0 | 4.149 |
| Catchment Area (7) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 8.0 | 3.684 |
| Catchment Area (8) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 7.7 | 3.561 |
| Catchment Area (9) | FSR: 30 years: +45 %: 15 mins: Winter | 0.04 | 16.7 | 7.749 |
| Catchment Area (10) | FSR: 30 years: +45 %: 15 mins: Winter | 0.03 | 11.2 | 5.178 |
| Catchment Area (11) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 6.5 | 3.000 |
| Catchment Area (12) | FSR: 30 years: +45 %: 15 mins: Winter | 0.01 | 5.6 | 2.607 |
| Catchment Area (13) | FSR: 30 years: +45 %: 15 mins: Winter | 0.02 | 7.4 | 3.411 |
| Catchment Area (14) | FSR: 30 years: +45 %: 15 mins: Winter | 0.00 | 1.7 | 0.771 |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Inflows Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Inflow**

| Inflow | Storm Event | Inflow Area (ha) | Max. Inflow (L/s) | Total Inflow Volume ($m^3$) |
|---|---|---|---|---|
| Catchment Area | FSR: 100 years: +50 %: 15 mins: Winter | 0.01 | 8.7 | 4.026 |
| Catchment Area (1) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 10.4 | 4.800 |
| Catchment Area (2) | FSR: 100 years: +50 %: 15 mins: Winter | 0.01 | 8.0 | 3.690 |
| Catchment Area (3) | FSR: 100 years: +50 %: 15 mins: Winter | 0.01 | 8.0 | 3.699 |
| Catchment Area (4) | FSR: 100 years: +50 %: 15 mins: Winter | 0.01 | 8.9 | 4.101 |
| Catchment Area (5) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 11.7 | 5.421 |
| Catchment Area (6) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 11.9 | 5.514 |
| Catchment Area (7) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 10.6 | 4.899 |
| Catchment Area (8) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 10.2 | 4.731 |
| Catchment Area (9) | FSR: 100 years: +50 %: 15 mins: Winter | 0.04 | 22.3 | 10.299 |
| Catchment Area (10) | FSR: 100 years: +50 %: 15 mins: Winter | 0.03 | 14.9 | 6.879 |
| Catchment Area (11) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 8.6 | 3.990 |
| Catchment Area (12) | FSR: 100 years: +50 %: 15 mins: Winter | 0.01 | 7.5 | 3.465 |
| Catchment Area (13) | FSR: 100 years: +50 %: 15 mins: Winter | 0.02 | 9.8 | 4.530 |
| Catchment Area (14) | FSR: 100 years: +50 %: 15 mins: Winter | 0.00 | 2.2 | 1.026 |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Junctions Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SW06 | FSR: 1 years: +0 %: 15 mins: Winter | 19.300 | 17.950 | 18.002 | 0.052 | 3.8 | 0.058 | 0.000 | 3.5 | 1.733 | OK |
| SW05 | FSR: 1 years: +0 %: 15 mins: Winter | 19.300 | 17.950 | 17.981 | 0.031 | 2.2 | 0.035 | 0.000 | 2.1 | 1.025 | OK |
| SW22 | FSR: 1 years: +0 %: 15 mins: Winter | 19.100 | 17.600 | 17.834 | 0.234 | 3.4 | 0.265 | 0.000 | 3.1 | 1.356 | Surcharged |
| SW10 | FSR: 1 years: +0 %: 360 mins: Winter | 19.000 | 16.450 | 16.480 | 0.030 | 0.8 | 0.042 | 0.000 | 0.8 | 22.434 | OK |
| SW11 | FSR: 1 years: +0 %: 30 mins: Winter | 18.000 | 16.292 | 16.420 | 0.128 | 1.6 | 0.145 | 0.000 | 1.4 | 9.533 | OK |
| SW12 | FSR: 1 years: +0 %: 30 mins: Winter | 17.600 | 16.250 | 16.420 | 0.170 | 3.4 | 0.243 | 0.000 | 2.3 | 12.103 | Surcharged |
| SW13 | FSR: 1 years: +0 %: 15 mins: Winter | 17.850 | 16.650 | 16.682 | 0.032 | 5.4 | 0.037 | 0.000 | 5.4 | 2.518 | OK |
| SW08 | FSR: 1 years: +0 %: 15 mins: Winter | 17.850 | 16.650 | 16.669 | 0.019 | 2.2 | 0.022 | 0.000 | 2.2 | 1.013 | OK |
| SW15 | FSR: 1 years: +0 %: 120 mins: Winter | 17.450 | 15.915 | 15.962 | 0.047 | 3.8 | 0.053 | 0.000 | 3.8 | 34.718 | OK |
| SW16 | FSR: 1 years: +0 %: 120 mins: Winter | 17.380 | 15.789 | 15.839 | 0.050 | 3.8 | 0.057 | 0.000 | 3.8 | 34.713 | OK |
| SW19 | FSR: 1 years: +0 %: 120 mins: Winter | 16.930 | 15.714 | 15.762 | 0.048 | 3.8 | 0.000 | 0.000 | 3.8 | 34.713 | OK |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Junctions Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SW06 | FSR: 2 years: +0 %: 15 mins: Winter | 19.300 | 17.950 | 18.011 | 0.061 | 4.8 | 0.069 | 0.000 | 4.6 | 2.243 | OK |
| SW05 | FSR: 2 years: +0 %: 15 mins: Winter | 19.300 | 17.950 | 17.985 | 0.035 | 2.9 | 0.040 | 0.000 | 2.8 | 1.322 | OK |
| SW22 | FSR: 2 years: +0 %: 15 mins: Winter | 19.100 | 17.600 | 17.864 | 0.264 | 4.4 | 0.299 | 0.000 | 4.0 | 2.016 | Surcharged |
| SW10 | FSR: 2 years: +0 %: 240 mins: Winter | 19.000 | 16.450 | 16.480 | 0.030 | 0.8 | 0.043 | 0.000 | 0.8 | 23.864 | OK |
| SW11 | FSR: 2 years: +0 %: 60 mins: Winter | 18.000 | 16.292 | 16.472 | 0.180 | 1.9 | 0.203 | 0.000 | 1.5 | 16.384 | OK |
| SW12 | FSR: 2 years: +0 %: 60 mins: Winter | 17.600 | 16.250 | 16.471 | 0.221 | 3.5 | 0.317 | 0.000 | 2.5 | 20.730 | Surcharged |
| SW13 | FSR: 2 years: +0 %: 15 mins: Winter | 17.850 | 16.650 | 16.687 | 0.037 | 7.0 | 0.042 | 0.000 | 6.9 | 3.256 | OK |
| SW08 | FSR: 2 years: +0 %: 15 mins: Winter | 17.850 | 16.650 | 16.672 | 0.022 | 2.8 | 0.024 | 0.000 | 2.8 | 1.307 | OK |
| SW15 | FSR: 2 years: +0 %: 120 mins: Winter | 17.450 | 15.915 | 15.964 | 0.049 | 4.1 | 0.056 | 0.000 | 4.1 | 43.821 | OK |
| SW16 | FSR: 2 years: +0 %: 120 mins: Winter | 17.380 | 15.789 | 15.842 | 0.053 | 4.1 | 0.060 | 0.000 | 4.1 | 43.817 | OK |
| SW19 | FSR: 2 years: +0 %: 120 mins: Winter | 16.930 | 15.714 | 15.764 | 0.050 | 4.1 | 0.000 | 0.000 | 4.1 | 43.817 | OK |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Junctions Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SW06 | FSR: 30 years: +45 %: 15 mins: Winter | 19.300 | 17.950 | 18.312 | 0.362 | 13.2 | 0.409 | 0.000 | 10.5 | 6.116 | Surcharged |
| SW05 | FSR: 30 years: +45 %: 15 mins: Winter | 19.300 | 17.950 | 18.016 | 0.066 | 7.8 | 0.074 | 0.000 | 7.6 | 3.611 | OK |
| SW22 | FSR: 30 years: +45 %: 15 mins: Winter | 19.100 | 17.600 | 18.166 | 0.566 | 12.0 | 0.640 | 0.000 | 10.2 | 5.469 | Surcharged |
| SW10 | FSR: 30 years: +45 %: 120 mins: Winter | 19.000 | 16.450 | 16.953 | 0.503 | 1.0 | 0.720 | 0.000 | 1.0 | 51.436 | Surcharged |
| SW11 | FSR: 30 years: +45 %: 120 mins: Winter | 18.000 | 16.292 | 16.953 | 0.661 | 2.6 | 0.747 | 0.000 | 1.8 | 58.475 | OK |
| SW12 | FSR: 30 years: +45 %: 120 mins: Winter | 17.600 | 16.250 | 16.953 | 0.703 | 5.3 | 1.006 | 0.000 | 2.5 | 73.770 | Surcharged |
| SW13 | FSR: 30 years: +45 %: 15 mins: Winter | 17.850 | 16.650 | 16.713 | 0.063 | 19.2 | 0.071 | 0.000 | 19.0 | 8.854 | OK |
| SW08 | FSR: 30 years: +45 %: 15 mins: Winter | 17.850 | 16.650 | 16.684 | 0.034 | 7.7 | 0.039 | 0.000 | 7.7 | 3.559 | OK |
| SW15 | FSR: 30 years: +45 %: 60 mins: Summer | 17.450 | 15.915 | 15.966 | 0.051 | 4.4 | 0.058 | 0.000 | 4.4 | 84.791 | OK |
| SW16 | FSR: 30 years: +45 %: 60 mins: Summer | 17.380 | 15.789 | 15.844 | 0.055 | 4.4 | 0.062 | 0.000 | 4.4 | 84.786 | OK |
| SW19 | FSR: 30 years: +45 %: 60 mins: Summer | 16.930 | 15.714 | 15.765 | 0.051 | 4.4 | 0.000 | 0.000 | 4.4 | 84.786 | OK |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Junctions Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Depth**

| Junction | Storm Event | Cover Level (m) | Invert Level (m) | Max. Level (m) | Max. Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SW06 | FSR: 100 years: +50 %: 15 mins: Winter | 19.300 | 17.950 | 18.581 | 0.631 | 17.6 | 0.714 | 0.000 | 13.6 | 8.126 | Surcharged |
| SW05 | FSR: 100 years: +50 %: 360 mins: Winter | 19.300 | 17.950 | 18.103 | 0.153 | 1.8 | 0.173 | 0.000 | 1.8 | 15.680 | Surcharged |
| SW22 | FSR: 100 years: +50 %: 15 mins: Winter | 19.100 | 17.600 | 18.354 | 0.754 | 16.0 | 0.853 | 0.000 | 13.2 | 7.166 | Surcharged |
| SW10 | FSR: 100 years: +50 %: 180 mins: Winter | 19.000 | 16.450 | 17.583 | 1.133 | 1.0 | 1.621 | 0.000 | 1.4 | 65.564 | Surcharged |
| SW11 | FSR: 100 years: +50 %: 180 mins: Winter | 18.000 | 16.292 | 17.582 | 1.290 | 3.0 | 1.459 | 0.000 | 2.0 | 76.805 | Surcharged |
| SW12 | FSR: 100 years: +50 %: 180 mins: Winter | 17.600 | 16.250 | 17.582 | 1.332 | 5.5 | 1.906 | 0.000 | 2.7 | 99.872 | Flood Risk |
| SW13 | FSR: 100 years: +50 %: 240 mins: Winter | 17.850 | 16.650 | 16.938 | 0.288 | 6.0 | 0.325 | 0.000 | 6.0 | 34.394 | Surcharged |
| SW08 | FSR: 100 years: +50 %: 240 mins: Winter | 17.850 | 16.650 | 16.937 | 0.287 | 2.4 | 0.325 | 0.000 | 2.4 | 13.828 | Surcharged |
| SW15 | FSR: 100 years: +50 %: 240 mins: Winter | 17.450 | 15.915 | 15.967 | 0.052 | 4.5 | 0.059 | 0.000 | 4.5 | 182.467 | OK |
| SW16 | FSR: 100 years: +50 %: 240 mins: Winter | 17.380 | 15.789 | 15.845 | 0.056 | 4.5 | 0.063 | 0.000 | 4.5 | 182.424 | OK |
| SW19 | FSR: 100 years: +50 %: 240 mins: Winter | 16.930 | 15.714 | 15.766 | 0.052 | 4.5 | 0.000 | 0.000 | 4.5 | 182.424 | OK |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Stormwater Controls Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Stormwater Control | Storm Event | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Percentage Available (%) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellular Storage | FSR: 1 years: +0 %: 360 mins: Winter | 17.160 | 17.160 | 0.160 | 0.160 | 2.7 | 13.983 | 0.000 | 0.000 | 0.8 | 22.505 | 83.567 | OK |
| Cellular Storage (1) | FSR: 1 years: +0 %: 180 mins: Winter | 16.132 | 16.132 | 0.147 | 0.147 | 3.7 | 9.274 | 0.000 | 0.000 | 1.6 | 15.849 | 84.861 | OK |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Stormwater Controls Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Stormwater Control | Storm Event | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Percentage Available (%) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellular Storage | FSR: 2 years: +0 %: 360 mins: Winter | 17.205 | 17.205 | 0.205 | 0.205 | 3.3 | 17.928 | 0.000 | 0.000 | 0.8 | 27.684 | 78.930 | OK |
| Cellular Storage (1) | FSR: 2 years: +0 %: 180 mins: Winter | 16.171 | 16.171 | 0.186 | 0.186 | 4.6 | 11.767 | 0.000 | 0.000 | 1.7 | 19.752 | 80.790 | OK |

**FSR: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Stormwater Control | Storm Event | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Percentage Available (%) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellular Storage | FSR: 30 years: +45 %: 360 mins: Winter | 17.693 | 17.693 | 0.693 | 0.693 | 8.7 | 60.682 | 0.000 | 0.000 | 0.8 | 62.351 | 28.685 | OK |
| Cellular Storage (1) | FSR: 30 years: +45 %: 240 mins: Winter | 16.649 | 16.649 | 0.664 | 0.664 | 10.4 | 42.005 | 0.000 | 0.000 | 1.9 | 59.094 | 31.430 | OK |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Stormwater Controls Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Avg. Depth**

| Stormwater Control | Storm Event | Max. US Level (m) | Max. DS Level (m) | Max. US Depth (m) | Max. DS Depth (m) | Max. Inflow (L/s) | Max. Resident Volume (m³) | Max. Flooded Volume (m³) | Total Lost Volume (m³) | Max. Outflow (L/s) | Total Discharge Volume (m³) | Percentage Available (%) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cellular Storage | FSR: 100 years: +50 %: 360 mins: Winter | 18.103 | 18.103 | 1.103 | 1.103 | 11.7 | 84.218 | 0.000 | 0.000 | 1.0 | 66.470 | 1.025 | OK |
| Cellular Storage (1) | FSR: 100 years: +50 %: 240 mins: Winter | 16.937 | 16.937 | 0.952 | 0.952 | 14.0 | 60.216 | 0.000 | 0.000 | 1.9 | 80.009 | 1.700 | OK |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Connections Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 1 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe | FSR: 1 years: +0 %: 15 mins: Winter | Pipe | SW06 | Cellular Storage | 19.300 | 18.002 | 0.050 | 1.733 | 0.9 | 0.49 | 3.5 | OK |
| Pipe (1) | FSR: 1 years: +0 %: 15 mins: Winter | Pipe | SW05 | Cellular Storage | 19.300 | 17.981 | 0.030 | 1.025 | 1.1 | 0.18 | 2.1 | OK |
| Pipe (2) | FSR: 1 years: +0 %: 15 mins: Winter | Pipe | SW22 | Cellular Storage | 19.100 | 17.834 | 0.100 | 0.000 | 0.4 | 0.53 | 3.1 | Surcharged |
| Pipe (3) | FSR: 1 years: +0 %: 360 mins: Winter | Pipe | Cellular Storage | SW10 | 19.000 | 17.160 | 0.020 | 22.441 | 0.3 | 0 | 0.8 | OK |
| Pipe (4) | FSR: 1 years: +0 %: 360 mins: Winter | Pipe | SW10 | SW11 | 19.000 | 16.480 | 0.027 | 22.434 | 0.4 | 0.08 | 0.8 | OK |
| Pipe (5) | FSR: 1 years: +0 %: 15 mins: Winter | Pipe | SW11 | SW12 | 18.000 | 16.408 | 0.136 | 6.947 | 0.1 | 0 | 1.4 | OK |
| Pipe (6) | FSR: 1 years: +0 %: 30 mins: Winter | Pipe | SW12 | SW15 | 17.600 | 16.420 | 0.035 | 12.102 | 0.8 | 0.06 | 2.3 | Surcharged |
| Pipe (7) | FSR: 1 years: +0 %: 120 mins: Winter | Pipe | SW15 | SW16 | 17.450 | 15.962 | 0.049 | 34.718 | 0.8 | 0.2 | 3.8 | OK |
| Outfall pipe | FSR: 1 years: +0 %: 120 mins: Winter | Pipe | SW16 | SW19 | 17.380 | 15.839 | 0.049 | 34.713 | 0.8 | 0.22 | 3.8 | OK |
| Pipe (9) | FSR: 1 years: +0 %: 15 mins: Winter | Pipe | SW13 | Cellular Storage (1) | 17.850 | 16.682 | 0.049 | 2.518 | 1.8 | 0.1 | 5.4 | OK |
| Pipe (12) | FSR: 1 years: +0 %: 15 mins: Winter | Pipe | SW08 | Cellular Storage (1) | 17.850 | 16.669 | 0.045 | 1.013 | 1.3 | 0.03 | 2.2 | OK |
| Pipe (10) | FSR: 1 years: +0 %: 180 mins: Winter | Pipe | Cellular Storage (1) | SW15 | 17.500 | 16.132 | 0.045 | 15.844 | 0.4 | 0.18 | 1.6 | OK |

| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
|---|---|---|---|
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Connections Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe | FSR: 2 years: +0 %: 15 mins: Winter | Pipe | SW06 | Cellular Storage | 19.300 | 18.011 | 0.059 | 2.243 | 0.9 | 0.63 | 4.6 | OK |
| Pipe (1) | FSR: 2 years: +0 %: 15 mins: Winter | Pipe | SW05 | Cellular Storage | 19.300 | 17.985 | 0.034 | 1.322 | 1.2 | 0.24 | 2.8 | OK |
| Pipe (2) | FSR: 2 years: +0 %: 15 mins: Winter | Pipe | SW22 | Cellular Storage | 19.100 | 17.864 | 0.100 | 0.000 | 0.5 | 0.67 | 4.0 | Surcharged |
| Pipe (3) | FSR: 2 years: +0 %: 360 mins: Winter | Pipe | Cellular Storage | SW10 | 19.000 | 17.205 | 0.020 | 27.495 | 0.3 | 0 | 0.8 | OK |
| Pipe (4) | FSR: 2 years: +0 %: 240 mins: Winter | Pipe | SW10 | SW11 | 19.000 | 16.480 | 0.027 | 23.864 | 0.4 | 0.08 | 0.8 | OK |
| Pipe (5) | FSR: 2 years: +0 %: 15 mins: Winter | Pipe | SW11 | SW12 | 18.000 | 16.449 | 0.178 | 9.104 | 0.1 | 0 | 1.6 | OK |
| Pipe (6) | FSR: 2 years: +0 %: 60 mins: Winter | Pipe | SW12 | SW15 | 17.600 | 16.471 | 0.037 | 20.728 | 0.8 | 0.06 | 2.5 | Surcharged |
| Pipe (7) | FSR: 2 years: +0 %: 120 mins: Winter | Pipe | SW15 | SW16 | 17.450 | 15.964 | 0.051 | 43.821 | 0.8 | 0.22 | 4.1 | OK |
| Outfall pipe | FSR: 2 years: +0 %: 120 mins: Winter | Pipe | SW16 | SW19 | 17.380 | 15.842 | 0.051 | 43.817 | 0.8 | 0.24 | 4.1 | OK |
| Pipe (9) | FSR: 2 years: +0 %: 15 mins: Winter | Pipe | SW13 | Cellular Storage (1) | 17.850 | 16.687 | 0.061 | 3.256 | 1.9 | 0.13 | 6.9 | OK |
| Pipe (12) | FSR: 2 years: +0 %: 15 mins: Winter | Pipe | SW08 | Cellular Storage (1) | 17.850 | 16.672 | 0.058 | 1.307 | 1.3 | 0.04 | 2.8 | OK |
| Pipe (10) | FSR: 2 years: +0 %: 180 mins: Winter | Pipe | Cellular Storage (1) | SW15 | 17.500 | 16.171 | 0.047 | 19.747 | 0.4 | 0.2 | 1.7 | Surcharged |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Connections Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 30 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe | FSR: 30 years: +45 %: 15 mins: Winter | Pipe | SW06 | Cellular Storage | 19.300 | 18.312 | 0.100 | 6.116 | 1.3 | 1.46 | 10.5 | Surcharged |
| Pipe (1) | FSR: 30 years: +45 %: 15 mins: Winter | Pipe | SW05 | Cellular Storage | 19.300 | 18.016 | 0.062 | 3.611 | 1.5 | 0.65 | 7.6 | OK |
| Pipe (2) | FSR: 30 years: +45 %: 15 mins: Winter | Pipe | SW22 | Cellular Storage | 19.100 | 18.166 | 0.100 | 0.000 | 1.3 | 1.73 | 10.2 | Surcharged |
| Pipe (3) | FSR: 30 years: +45 %: 360 mins: Winter | Pipe | Cellular Storage | SW10 | 19.000 | 17.693 | 0.179 | 62.339 | 0.3 | 0 | 0.8 | Surcharged |
| Pipe (4) | FSR: 30 years: +45 %: 360 mins: Winter | Pipe | SW10 | SW11 | 19.000 | 16.799 | 0.150 | 62.248 | 0.4 | 0.11 | 1.1 | Surcharged |
| Pipe (5) | FSR: 30 years: +45 %: 360 mins: Winter | Pipe | SW11 | SW12 | 18.000 | 16.798 | 0.527 | 71.893 | 0.1 | 0 | 1.8 | OK |
| Pipe (6) | FSR: 30 years: +45 %: 15 mins: Summer | Pipe | SW12 | SW15 | 17.600 | 16.673 | 0.038 | 28.717 | 0.8 | 0.06 | 2.5 | Surcharged |
| Pipe (7) | FSR: 30 years: +45 %: 60 mins: Summer | Pipe | SW15 | SW16 | 17.450 | 15.966 | 0.053 | 84.791 | 0.8 | 0.23 | 4.4 | OK |
| Outfall pipe | FSR: 30 years: +45 %: 60 mins: Summer | Pipe | SW16 | SW19 | 17.380 | 15.844 | 0.053 | 84.786 | 0.8 | 0.25 | 4.4 | OK |
| Pipe (9) | FSR: 30 years: +45 %: 15 mins: Winter | Pipe | SW13 | Cellular Storage (1) | 17.850 | 16.713 | 0.150 | 8.854 | 2.0 | 0.36 | 19.0 | OK |
| Pipe (12) | FSR: 30 years: +45 %: 15 mins: Winter | Pipe | SW08 | Cellular Storage (1) | 17.850 | 16.684 | 0.150 | 3.559 | 1.2 | 0.12 | 7.7 | OK |
| Pipe (10) | FSR: 30 years: +45 %: 30 mins: Summer | Pipe | Cellular Storage (1) | SW15 | 17.500 | 16.348 | 0.049 | 25.128 | 0.4 | 0.21 | 1.9 | Surcharged |

| | | | |
|---|---|---|---|
| 16573 Land at Station Road, Drigg:<br>Surface water system calculation | Date:<br>27/11/2024 | | |
| | Designed by:<br>SM | Checked by: | Approved By: |
| Report Details:<br>Type: Connections Summary<br>Storm Phase: Phase | Company Address: | | |

**FSR: 100 years: Increase Rainfall (%): +50: Critical Storm Per Item: Rank By: Max. Flow**

| Connection | Storm Event | Connection Type | From | To | Upstream Cover Level (m) | Max. US Water Level (m) | Max. Flow Depth (m) | Discharge Volume (m³) | Max. Velocity (m/s) | Flow / Capacity | Max. Flow (L/s) | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pipe | FSR: 100 years: +50 %: 15 mins: Winter | Pipe | SW06 | Cellular Storage | 19.300 | 18.581 | 0.100 | 8.126 | 1.7 | 1.88 | 13.6 | Surcharged |
| Pipe (1) | FSR: 100 years: +50 %: 15 mins: Winter | Pipe | SW05 | Cellular Storage | 19.300 | 18.033 | 0.077 | 4.799 | 1.6 | 0.86 | 10.1 | OK |
| Pipe (2) | FSR: 100 years: +50 %: 15 mins: Winter | Pipe | SW22 | Cellular Storage | 19.100 | 18.354 | 0.100 | 0.000 | 1.7 | 2.25 | 13.2 | Surcharged |
| Pipe (3) | FSR: 100 years: +50 %: 120 mins: Winter | Pipe | Cellular Storage | SW10 | 19.000 | 17.766 | 0.450 | 64.374 | 0.3 | 0 | 1.1 | Surcharged |
| Pipe (4) | FSR: 100 years: +50 %: 120 mins: Winter | Pipe | SW10 | SW11 | 19.000 | 17.567 | 0.150 | 64.291 | 0.4 | 0.15 | 1.5 | Surcharged |
| Pipe (5) | FSR: 100 years: +50 %: 120 mins: Winter | Pipe | SW11 | SW12 | 18.000 | 17.566 | 0.900 | 73.617 | 0.1 | 0 | 2.1 | Surcharged |
| Pipe (6) | FSR: 100 years: +50 %: 120 mins: Winter | Pipe | SW12 | SW15 | 17.600 | 17.566 | 0.039 | 94.281 | 0.7 | 0.07 | 2.7 | Flood Risk |
| Pipe (7) | FSR: 100 years: +50 %: 240 mins: Winter | Pipe | SW15 | SW16 | 17.450 | 15.967 | 0.054 | 182.467 | 0.8 | 0.24 | 4.5 | OK |
| Outfall pipe | FSR: 100 years: +50 %: 240 mins: Winter | Pipe | SW16 | SW19 | 17.380 | 15.845 | 0.054 | 182.424 | 0.8 | 0.26 | 4.5 | OK |
| Pipe (9) | FSR: 100 years: +50 %: 15 mins: Winter | Pipe | SW13 | Cellular Storage (1) | 17.850 | 16.724 | 0.150 | 11.763 | 2.0 | 0.48 | 25.5 | OK |
| Pipe (12) | FSR: 100 years: +50 %: 15 mins: Winter | Pipe | SW08 | Cellular Storage (1) | 17.850 | 16.689 | 0.150 | 4.727 | 1.1 | 0.16 | 10.2 | OK |
| Pipe (10) | FSR: 100 years: +50 %: 15 mins: Winter | Pipe | Cellular Storage (1) | SW15 | 17.500 | 16.398 | 0.049 | 27.312 | 0.4 | 0.21 | 1.9 | Surcharged |

# SPEL ESR Bypass

## Treatment System

### Overview

The SPEL ESR Bypass Treatment System treats flows up to and including the 1 in 1 year return events (27mm/h) in line with guidence from the CIRIA SuDS Manual (C753).

The SPEL ESR Bypass System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also certified to the British and European Standard BS EN 858 by HR Wallingford.

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals. It's a highly efficient, single unit, water quality SuDS component.

### Product Range

**200 Series**
(1.2m internal diameter):
Treated Flow Rate: 10-15 l/s
Catchment Area: 1,333m$^2$ - 2,000m$^2$

**300 Series**
(1.8m internal diameter):
Treated Flow Rate: 20-50 l/s
Catchment Area: 2,665m$^2$ - 6,665m$^2$

**400 Series**
(2.6m internal diameter):
Treated Flow Rate: 60-160 l/s
Catchment Area: 8,000m$^2$ - 21,333m$^2$

**500 Series**
(3.5m internal diameter):
Treated Flow Rate: 180-250 l/s
Catchment Area: 24,000m$^2$ - 33,333m$^2$

**600 Series**
(4m internal diameter):
Treated Flow Rate: 300-700 l/s
Catchment Area: 40,000m$^2$ - 93,333m$^2$

### Applications

The ESR Bypass Treatment System will treat up to the 1 in 1 year storm event for surface water run-off to a Pollution Hazard Index of 'Medium'. This covers surfaces such as:

Roofs

Private and public car parks

Residential roads and drives

Low and medium use roads

Commercial yards and delivery areas

The ESR Bypass Treatment System can be used as part of a treatment train to achieve a 'High' Mitigation Index. (See other SPEL SuDS treatment systems).

### Shell Design

Designed with reference to BS EN 13121. All tank shells carry the SPEL 25 Year Warranty and life expectancy in excess of 50 years.

### Shell Specifications

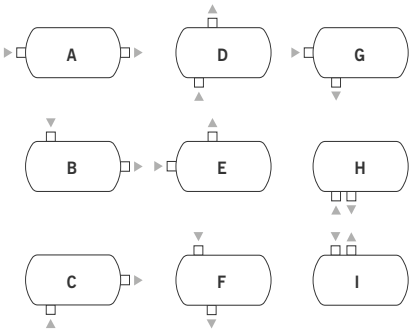
Different tank shell specifications are available dependent upon tank invert levels, ground conditions and ground water levels. (See Section 7)

### Inlet/Outlet Connections

160/225/300mm diameter PVCU socket/spigot.

450, 600, 750, 900 and 1200mm diameter GRP spigot available, for connecting to site pipework via Flex-Seal/Band-Seal or similar flexible couplings.

The nine inlet/outlet options below are available to assist with design and installation.



# SPEL ESR Bypass Treatment System

## Stormwater Treatment System

The SPEL ESR Bypass Treatment System is fully certified to meet the CIRIA SuDS Mitigation Index. It has been tested by WRc to the British Water Code of Practice for Manufactured Treatment Devices. This unit is also certified to the British and European Standard BS EN 858.

SPEL's ESR range is a total treatment system removing Hydrocarbons, Total Suspended Solids (TSS) and Metals. It's a highly efficient, single unit, water quality SuDS component.

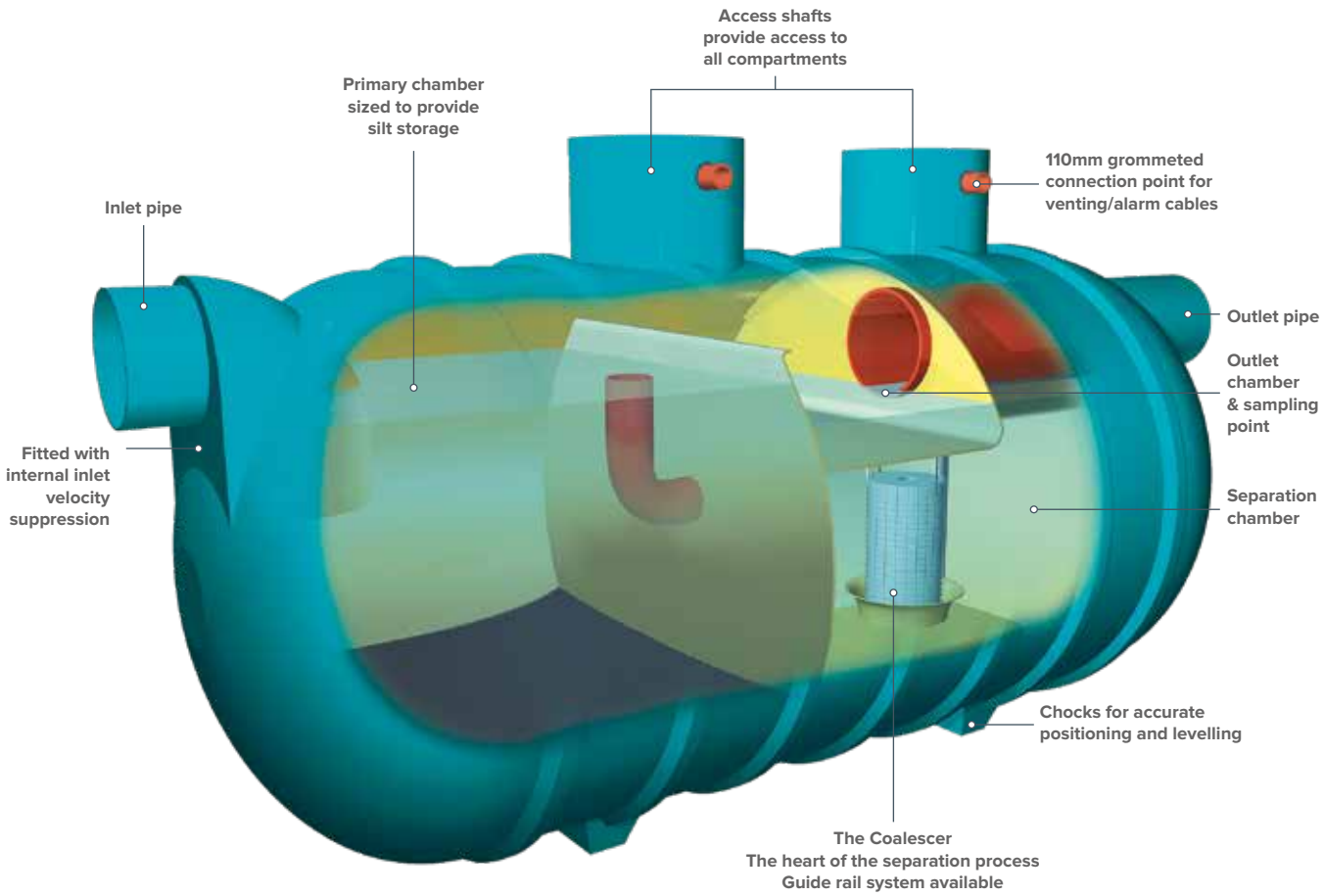
The coalescer inserts are easy to clean and simple to replace but rarely require replacing. The unique 'insert' format ensures that this unit can be extracted complete every time, compared to other systems where 'wrap around' style units allow the foam to slip off, requiring confined space entry to retrieve.

**SPEL ESR Bypass Treatment System**
Certified Mitigation Index

| | |
|---|---|
| TSS | 0.8 |
| Metals | 0.6 |
| Hydrocarbons | 0.9* |

**H R Wallingford test results to BS EN 858*

## The total treatment solution for SuDS



# SPEL ESR Bypass Treatment System

## Testing and Certification

Research and development is at the heart of what we do at SPEL, our passion as Zero Pollution Ambassadors is to be at the cutting edge of clean surface water technology.

Months of rigorous testing has resulted in the SPEL ESR Range.

### Surface Water Treatment Device Performance Declaration

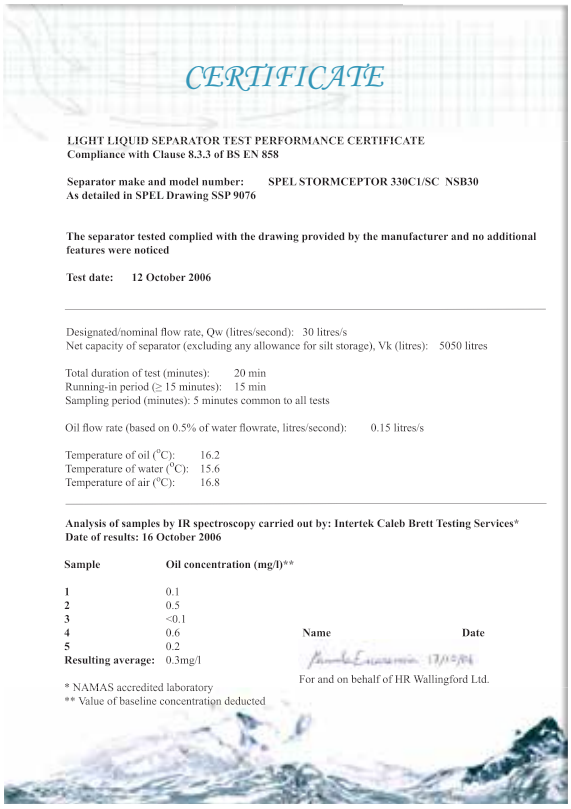
**Testing carried out according to British Water Code of Practice**

| Product Details | Description |
|---|---|
| Manufacturer | SPEL Products |
| Treatment Device Name/Model | Stormceptor Type 210 C1/SC |
| General description | Class 1 By-pass Separator with Silt Capacity |
| Envisaged application | Treatment of Surface Water Run-off |
| Pollutant(s) captured | Suspended Solids |

| Test | Value | Unit |
|---|---|---|
| Treatment device capacity | 3200 | litres |
| Sediment Storage capacity | 1000 | litres |
| Treatment Flow rate | 10 | l/s |
| Connected Area | 1,333 | m² |
| Pollution retention flow rate | 10 | l/s |

| Parameter | Value | Unit |
|---|---|---|
| Maximum capacity flow rate | 100 | l/s |
| Device head loss (at treatment flowrate) | 0.15 | m |
| Device head loss (at maximum capacity treatment flowrate) | - | m |
| **TSS capture and retention efficiency** (Milisil W4 test sediment) | **82** | **%** |
| Zinc capture efficiency (if tested) | Not tested for dissolved metals | % |
| Zinc retention efficiency (if tested) | Not tested for dissolved metals | % |
| Copper capture efficiency (if tested) | Not tested for dissolved metals | % |
| Copper retention efficiency (if tested) | Not tested for dissolved metals | % |
| Dissolved Metals reduction | 0.0 | % |
| Particulate metals reduction* | 61.5* | % |
| Total Metals reduction* | 61.5* | % |
| Total Metals Mitigation Index | 0.615* | - |

* Extrapolated value in accordance with British Water How to Guide: Applying the CIRIA The SuDS Manual (C753) Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Version 7, Section 4.3, (2021- under pre-publication review).



CERTIFICATE

LIGHT LIQUID SEPARATOR TEST PERFORMANCE CERTIFICATE
Compliance with Clause 8.3.3 of BS EN 858

Separator make and model number: SPEL STORMCEPTOR 330C1/SC NSB30
As detailed in SPEL Drawing SSP 9076

The separator tested complied with the drawing provided by the manufacturer and no additional features were noticed

Test date: 12 October 2006

Designated/nominal flow rate, Qw (litres/second): 30 litres/s
Net capacity of separator (excluding any allowance for silt storage), Vk (litres): 5050 litres

Total duration of test (minutes): 20 min
Running-in period (≥ 15 minutes): 15 min
Sampling period (minutes): 5 minutes common to all tests

Oil flow rate (based on 0.5% of water flowrate, litres/second): 0.15 litres/s

Temperature of oil (°C): 16.2
Temperature of water (°C): 15.6
Temperature of air (°C): 16.8

Analysis of samples by IR spectroscopy carried out by: Intertek Caleb Brett Testing Services*
Date of results: 16 October 2006

| Sample | Oil concentration (mg/l)** |
|---|---|
| 1 | 0.1 |
| 2 | 0.5 |
| 3 | <0.1 |
| 4 | 0.6 |
| 5 | 0.2 |
| Resulting average: | 0.3mg/l |

Name Date

For and on behalf of HR Wallingford Ltd.

* NAMAS accredited laboratory
** Value of baseline concentration deducted

SPEL's Head of Technical Development alongside the WRc testing officer.

# SPEL ESR Bypass Treatment System

## Specification Chart

As directed by the SuDS Manual, treatment trains should be sized according to the **connectible area**, see column 5 below.

| Model | Series | Treated Flow Rate | Maximum Flow | Connectible/ Catchment area ($m^2$)* | Oil Storage (litres) | Silt Capacity (litres) | Tank Length (mm) | Internal Diameter (mm) | Inlet Invert (mm) | Base to Inlet (mm) | Base to Outlet (mm) | Optimum in/out pipe diameter** (mm) | Number of Access Shafts (dia. mm) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | L | | A | B | C | | 600 | 750 | 900 | 1200 |
| 210C1/ESR | 200 | 10 | 100 | **1,333** | 150 | 1,000 | 2,920 | 1,220 | 550 | 1,350 | 1,300 | 300 | - | 1 | - | - |
| 212C1/ESR | 200 | 12 | 120 | **1,600** | 180 | 1200 | 3,570 | 1,220 | 550 | 1,350 | 1,300 | 300 | - | 1 | - | - |
| 215C1/ESR | 200 | 15 | 150 | **2,000** | 225 | 1,500 | 4,237 | 1,220 | 550 | 1,350 | 1,300 | 300 | - | 1 | - | - |
| 320C1/ESR | 300 | 20 | 200 | **2,665** | 300 | 2,000 | 3,200 | 1,800 | 700 | 1,450 | 1,350 | 450 | 2 | - | - | - |
| 325C1/ESR | 300 | 25 | 250 | **3,333** | 375 | 2,500 | 3,535 | 1,800 | 700 | 1,450 | 1,350 | 450 | 2 | - | - | - |
| 330C1/ESR | 300 | 30 | 300 | **4,000** | 450 | 3,000 | 4,420 | 1,800 | 700 | 1,450 | 1,350 | 450 | - | 1 | 1 | - |
| 340C1/ESR | 300 | 40 | 400 | **5,333** | 600 | 4,000 | 5,760 | 1,800 | 740 | 1,410 | 1,310 | 450 | 1 | 1 | - | - |
| 345C1/ESR | 300 | 45 | 450 | **6,000** | 675 | 4,500 | 6,563 | 1,800 | 740 | 1,410 | 1,310 | 450 | 1 | 1 | - | - |
| 350/C1/ESR | 300 | 50 | 500 | **6,665** | 750 | 5,000 | 7,060 | 1,800 | 740 | 1,410 | 1,310 | 450 | 1 | 1 | - | - |
| 460C1/ESR | 400 | 60 | 600 | **8,000** | 900 | 6,000 | 4,400 | 2,600 | 950 | 2,100 | 2,000 | 600 | - | 1 | 1 | - |
| 470C1/ESR | 400 | 70 | 700 | **9,333** | 1,050 | 7,000 | 5,250 | 2,600 | 950 | 2,100 | 2,000 | 600 | - | 1 | 1 | - |
| 480C1/ESR | 400 | 80 | 800 | **10,665** | 1,200 | 8,000 | 6,170 | 2,600 | 950 | 2,100 | 2,000 | 600 | - | 1 | 1 | - |
| 4100C1/ESR | 400 | 100 | 1,000 | **13,333** | 1,500 | 10,000 | 7,400 | 2,600 | 1,100 | 1,950 | 1,850 | 750 | - | 1 | 1 | - |
| 4125C1/ESR | 400 | 125 | 1,250 | **16,665** | 1,875 | 12,500 | 9,000 | 2,600 | 1,100 | 1,950 | 1,850 | 750 | - | 1 | 1 | - |
| 4150C1/ESR | 400 | 150 | 1,500 | **20,000** | 2,250 | 15,000 | 9,930 | 2,600 | 1,100 | 1,950 | 1,850 | 750 | - | - | 2 | - |
| 4160C1/ESR | 400 | 160 | 1,600 | **21,333** | 2,400 | 16,000 | 11,830 | 2,600 | 1,250 | 1,950 | 1,850 | 750 | - | 1 | 2 | - |
| 5180C1/ESR | 500 | 180 | 1,800 | **24,000** | 2,700 | 18,000 | 7,472 | 3,500 | 1,185 | 2,690 | 2,550 | 900 | - | 1 | 2 | - |
| 5200C1/ESR | 500 | 200 | 2,000 | **26,665** | 3,000 | 20,000 | 8,530 | 3,500 | 1,185 | 2,425 | 2,325 | 1,200 | 1 | 1 | 2 | - |
| 5250C1/ESR | 500 | 250 | 2,500 | **33,333** | 3,750 | 25,000 | 10,040 | 3,500 | 1,185 | 2,425 | 2,325 | 1,200 | 2 | 1 | 2 | - |
| 6300C1/ESR | 600 | 300 | 3,000 | **40,000** | 4,500 | 30,000 | 10,310 | 4,000 | 1,325 | 2,850 | 2,675 | 1,200 | 1 | 1 | 2 | - |
| 6350C1/ESR | 600 | 350 | 3,500 | **46,665** | 5,250 | 35,000 | 11,499 | 4,000 | 1,325 | 2,850 | 2,675 | 1,200 | - | 2 | 3 | - |
| 6400C1/ESR | 600 | 400 | 4,000 | **53,333** | 6,000 | 40,000 | 12,690 | 4,000 | 1,325 | 2,850 | 2,675 | 1,200 | - | 2 | 3 | - |
| 6500C1/ESR | 600 | 500 | 5,000 | **66,665** | 7,500 | 50,000 | 15,880 | 4,000 | 1,325 | 2,850 | 2,675 | 1,200 | - | 2 | 4 | - |
| 6600C1/ESR | 600 | 600 | 6,000 | **80,000** | 9,000 | 60,000 | 18,256 | 4,000 | 1,325 | 2,850 | 2,675 | 1,200 | 2 | 1 | 4 | - |
| 6700C1/ESR | 600 | 700 | 7,000 | **93,333** | 10,500 | 70,000 | 22,250 | 4,000 | 2,850 | 2,850 | 2,675 | 1,200 | - | 2 | 5 | - |

***These connectible/catchment areas are based on the SuDS Manual requirement for bypass devices to treat the 1 in 1 year storm event (27mm).***

***SPEL ESR Bypass Treatment Systems are designed for a maximum flow (NS/NSB) but can be fitted with larger than the recommended maximum connection size IN/OUT or with the addition of adapters providing the maximum flow (NS/NSB) cannot be exceeded or any increase in the operating level in the SPEL Separator to cause the captured pollutants to escape into the vent connections or through access shaft connections. Any overriding of the above criteria could jeopardise performance to the European Standard BS EN 858-1.*

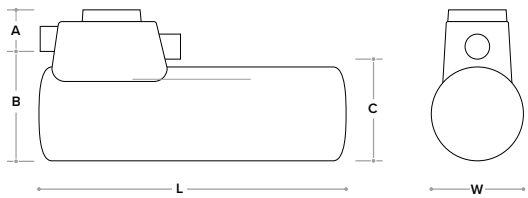
### Shell Specification

The 'standard' specification is normally adequate for most installations but Heavy, Extra Heavy, Special, Extra Special, Ultra and Ultra Plus specifications are available depending upon the burial depth and water table level, in winter. The concern is when the system is emptied completely and remains empty for a period of time.

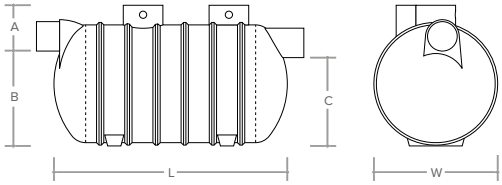
*For more information and to see burial depth charts see Section 7.*

**200 Series ESR** – Inside diameter 1200mm, outside diameter 1225mm.
**300 Series ESR** – Inside diameter 1800mm, outside diameter 1875mm.
**400 Series ESR** – Inside diameter 2600mm, outside diameter 2700mm.
**500 Series ESR** – Inside diameter 3500mm, outside diameter 3650mm.
**600 Series ESR** – Inside diameter 4000mm, outside diameter 4150mm.

### 200 series




### 300/400/500 & 600 series



# SPEL ESR Bypass Treatment System

## Components and Accessories

### SPEL Coalescer Guide Rail Systems

To facilitate easy insertion of coalescer units, the optional SPEL guide rail system manufactured in stainless steel can be incorporated into SPEL ESR Bypass Treatment Systems.

Brackets fixed to the top and bottom of the coalescer unit simply engage with the stainless steel guide rail which is fixed to the top of the stub access shaft. The coalescer unit is then lowered in the normal way, being guided at the correct angle into the conical base.

Lifting chains are available for the larger coalescer units and where extension shafts are fitted.

Extension guide rails can be incorporated into SPEL extension shafts to suit.

### SPEL Coalescer Lifting, Locating and Locking system (3L)

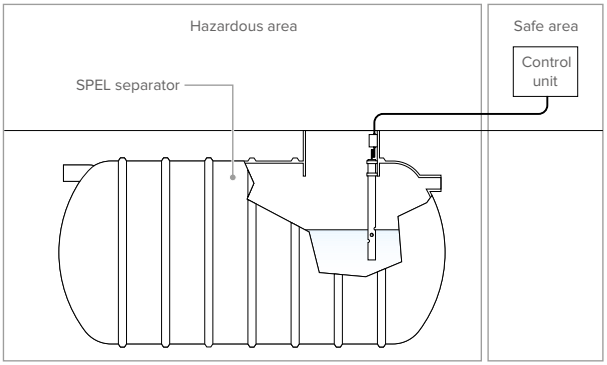
Where SPEL ESR Systems can be subjected to surcharging and/or tidal outfall, then the SPEL 3L system should be included.

The SPEL Lifting, Locating and Locking system is manufactured in stainless steel and replaces the standard coalescer unit handle.

The locating/locking handle ensures the coalescer unit is seated and locked in its correct position.

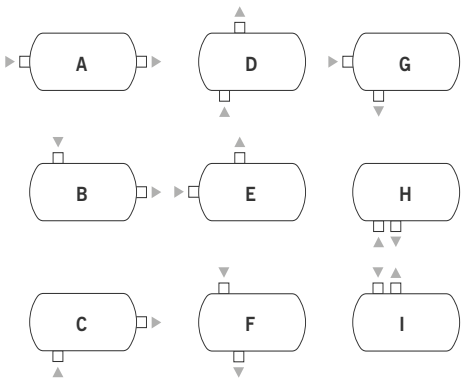
### SPEL Automatic Monitoring Alarms

SPEL offer a range of alarms, for full details refer to the SPEL Data Manual Section 8.




Left:
Lifting, locating and locking system with guide rail system.

Right:
The SPEL coalescer unit with lifting chain.




### SPEL ESR Range Inlet/Outlet Orientation

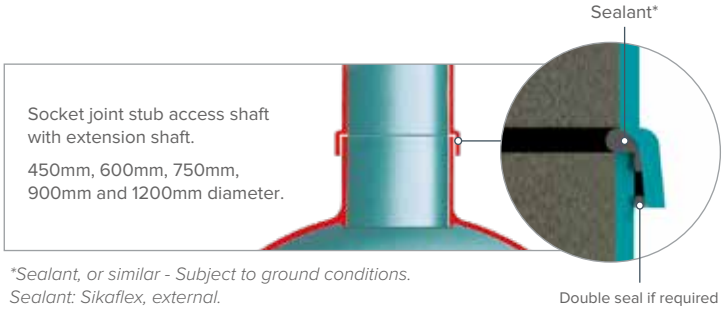
Dependent upon model and diameter of connections, these nine different orientations are available. However on the larger models it is important to check with our technical department.

# SPEL ESR Bypass Treatment System

## Components and Accessories

### SPEL extension access shafts

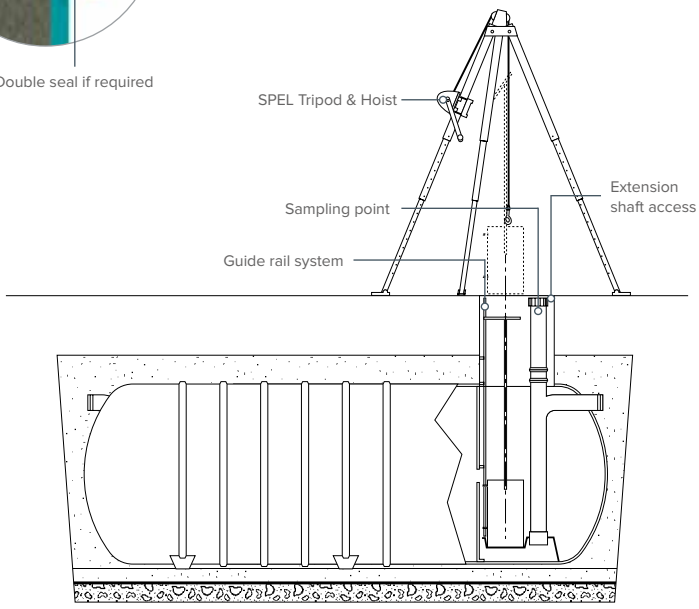
Extension access shafts are available for deep invert applications.




**Sealant, or similar - Subject to ground conditions.*
*Sealant: Sikaflex, external.*

### SPEL tripod and hoist

Where surface water run-off has a high silt content the coalescer units can become filled, making them heavy to lift out. In order to facilitate easy withdrawal of coalescer units the SPEL tripod and hoist is recommended.




A SPEL P400 1CSC undergoing a routine service.