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Drainage Strategy Report

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

22-C-16573

Rev C

February 2025

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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 9 No 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: Sellafeld 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 1×10^{-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.

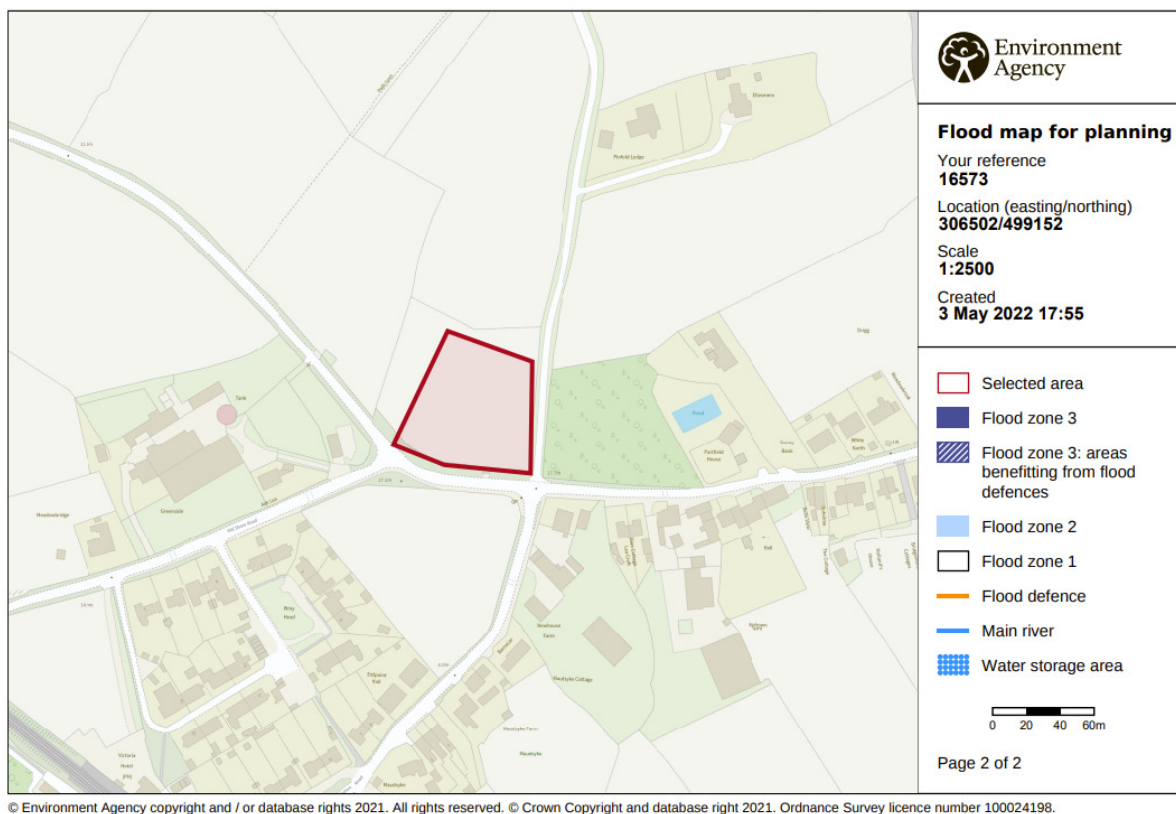


Figure 2: Flood map for planning

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

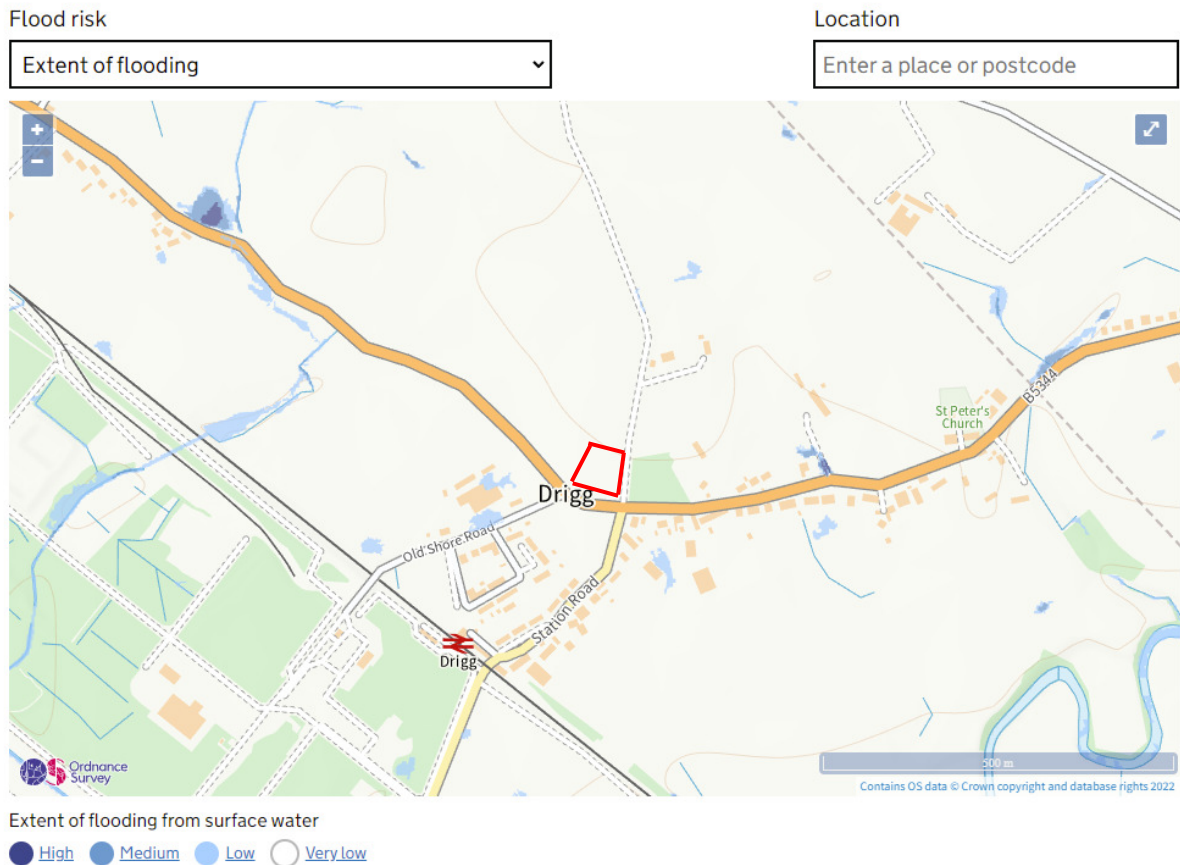


Figure 3: EA long term surface water flood risk map

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

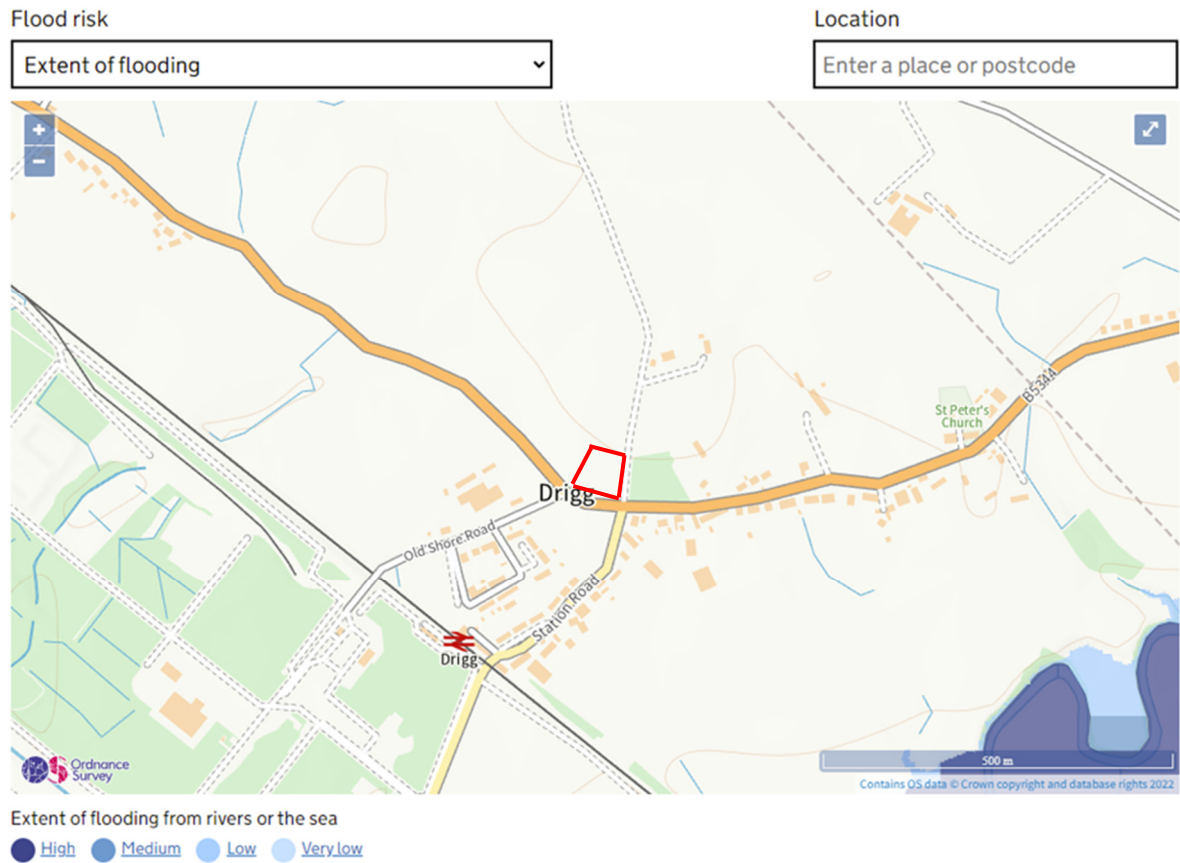
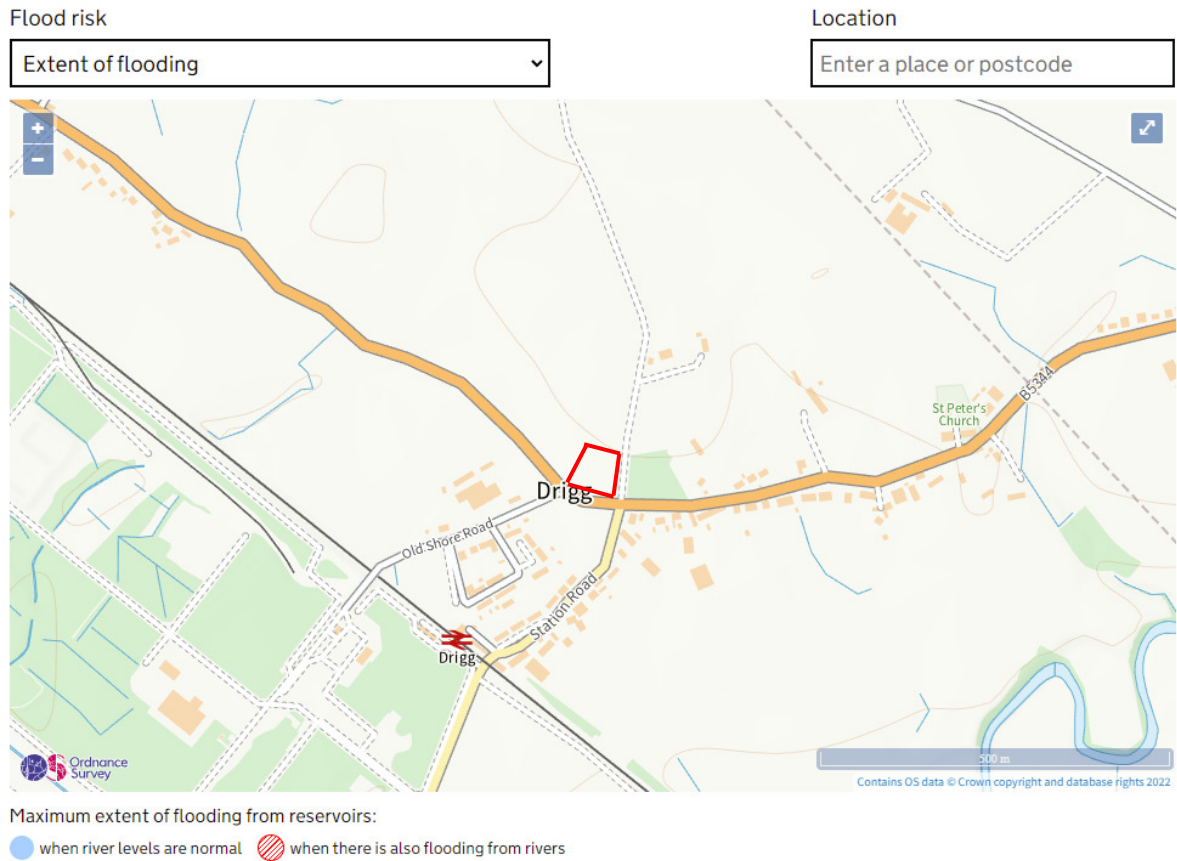


Figure 4: EA long term river and seas flood risk map

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



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.

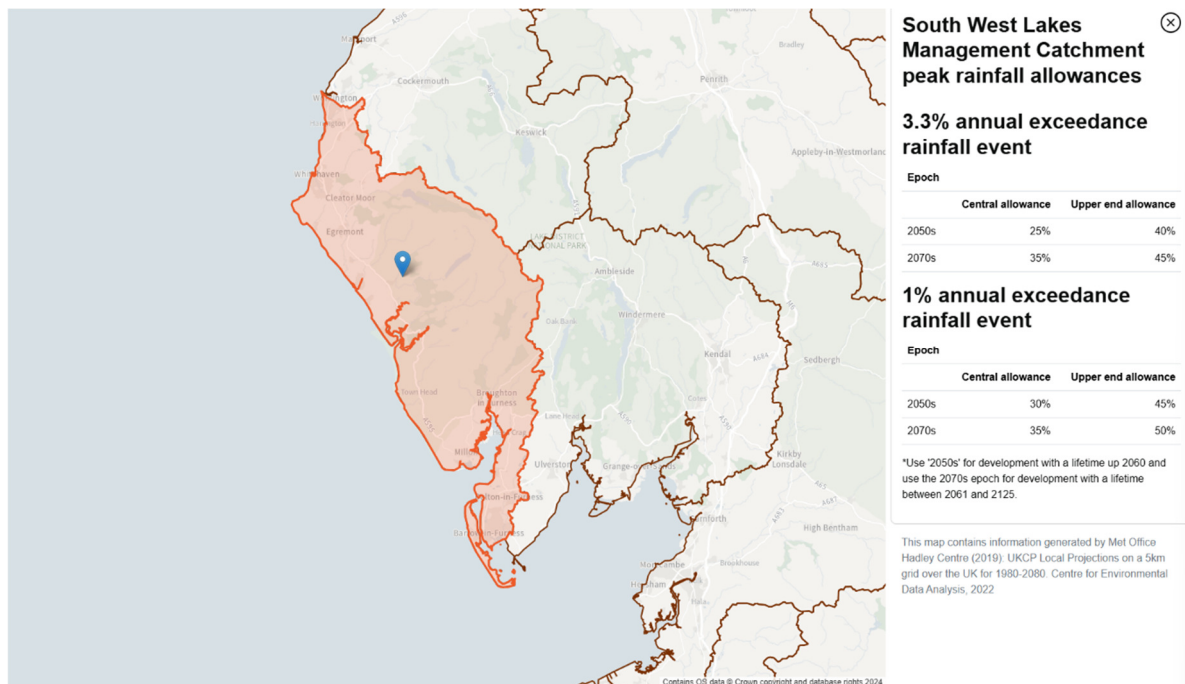
As per the LASOO guidance, the peak runoff rate from the development for the 1 in 1yr rainfall event and the 1 in 100yr rainfall event should not exceed the peak greenfield runoff for the same event.

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.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydrocarbons
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				
Type of SuDS component	Mitigation indices ¹			
	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 indices

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.



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



B	27/11/24	SM	DRAINED AREAS AMENDED TO SUIT REVISED SITE PLAN
A	27/09/24	SM	DRAWING UPDATED
REV	DATE	AUTHOR	NOTES
DRAWING STATUS		PRELIMINARY	
AD 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	
		DRAINED AREAS PLAN	
		DRAWN SM	DATE MAY 22 SCALE 1:200 @A1
DRAWING NO. 22-C-I6573/01			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.

A L Daines & Partners LLP

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FAO:

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

**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,



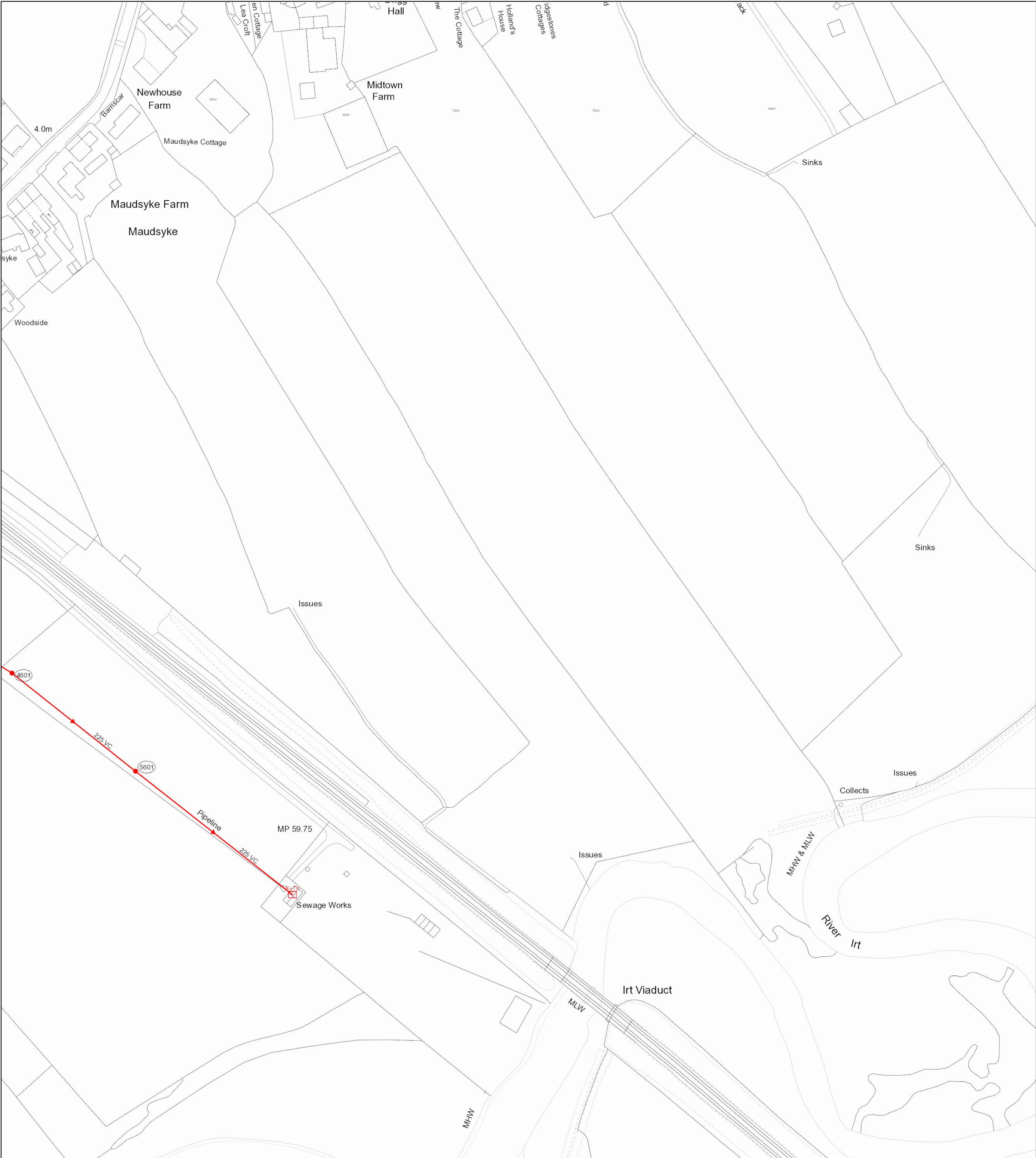
Karen McCormack
Property Searches Manager

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.



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.

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Reho	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
3701	10.9	CO	8.92	225			VC	99.97261	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

Reho	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

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

SW

CO

OV

Foul

Surface Water

Combined

Overflow

SEWER SHAPE

CI

EG

OV

FT

RE

SQ

Circular

Egg

Oval

Flat Top

Rectangular

Square

TR

AR

BA

HO

UN

Trapezoidal

Arch

Barrel

HorseShoe

Unspecified

SEWER MATERIAL

AC

BR

PE

RP

CO

CSB

CSU

CC

PSC

GRC

DI

PVC

CI

SI

ST

VC

PP

PF

MAC

MAR

U

Asbestos Cement

Brick

Polyethylene

Reinforced Plastic Matrix

Concrete

Concrete Segment Bolted

Concrete Segment Unbolted

Concrete Box Culvert

Plastic / Steel Composite

Glass Reinforced Plastic

Ductile Iron

Polyvinyl Chloride

Cast Iron

Spun Iron

Steel

Vitrified Clay

Polypropylene

Pitch Fibre

Masonry, Coursed

Masonry, Random

Unspecified

Address or Site Reference:

Land to north station road Drigg,

OS sheet Number:

SD0698NE

Scale: 1:1250

Date: 31/03/2022

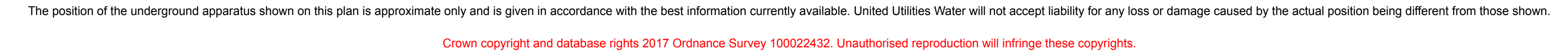
Nodes: 4

Sheet: 2 of 4

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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





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.

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Reho Cover Func Invert Size x Size y Shape Mat Length Grad

Reho Cover Func Invert Size x Size y Shape Mat Length Grad

LEGEND

Abandoned	Foul	Surface Water	Combined	Public Sewer
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----
-----	-----	-----	-----	-----

All point assets follow the standard colour convention:
red - combined
blue - surface water
brown - foul
purple - overflow

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

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 Reinforced 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 SD0699SE
Number:
Scale: 1:1250 Date: 31/03/2022
Nodes: 0
Sheet: 4 of 4
Printed by: Property Searches

A L Daines & Partners		Page 1
28 Castle Street Carlisle CA3 8TP	Land at Drigg Greenfield run off calc	
Date 01/05/2022 File	Designed by SM Checked by	
Micro Drainage Source Control 2020.1.3		

ICP SUDS Mean Annual Flood

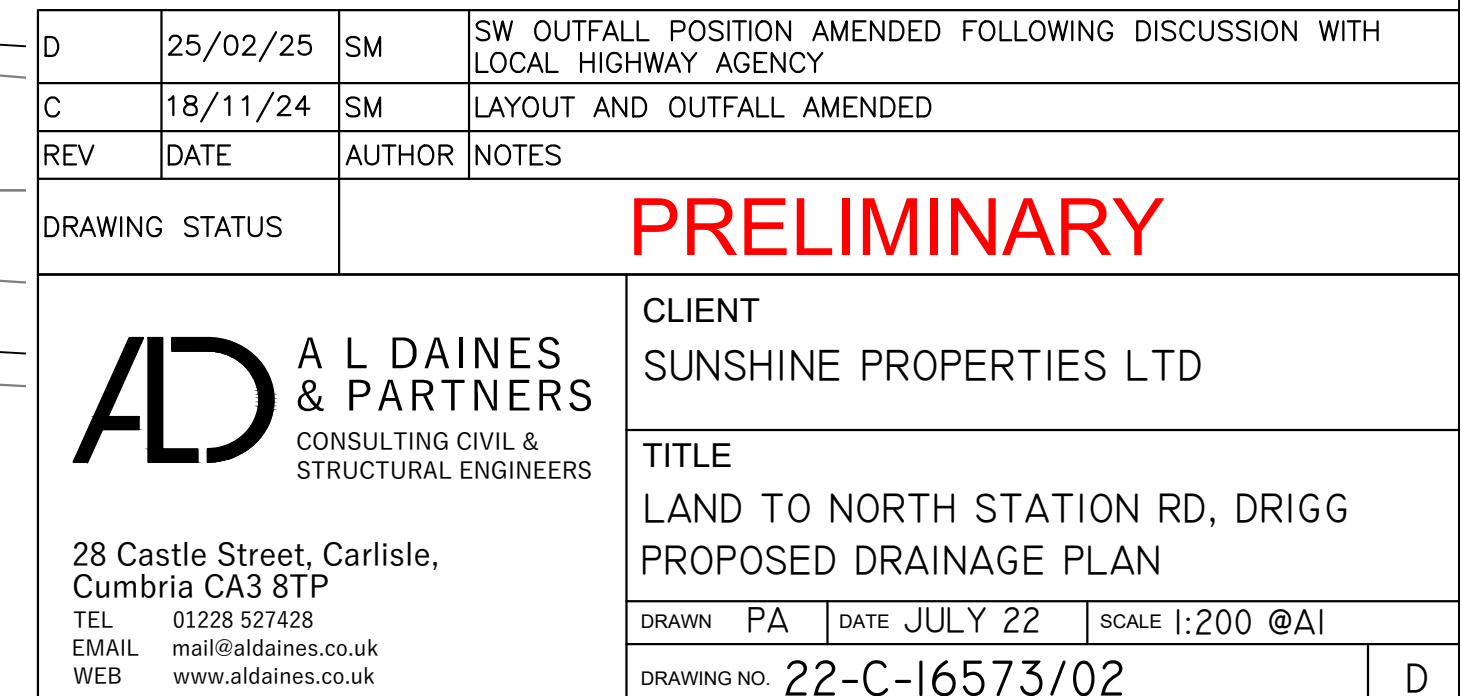
Input

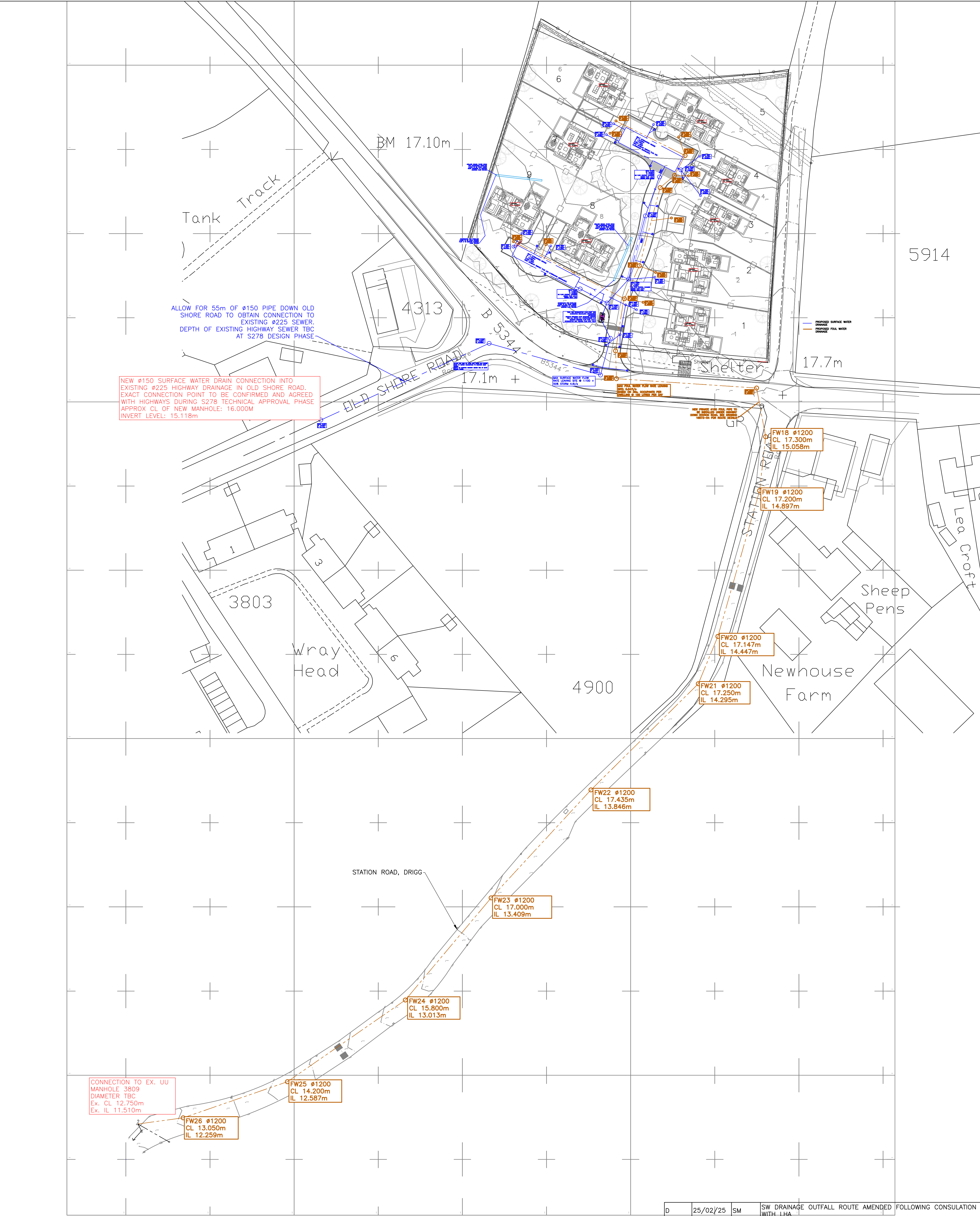
Return Period (years)	100	Soil	0.450
Area (ha)	0.694	Urban	0.000
SAAR (mm)	1017	Region Number	Region 10

Results 1/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

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D	25/02/25	SM	SW DRAINAGE OUTFALL ROUTE AMENDED WITH LHA	FOLLOWING CONSULTATION
C	18/11/24	SM	OUTFALL AMENDED TO FW ONLY	
REV	DATE	AUTHOR	NOTES	
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 @AI	
DRAWING NO. 22-C-16573/04				D

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



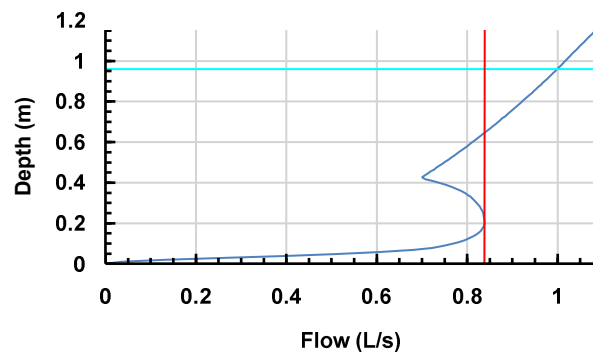
 Cellular Storage

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)
	Pipe
	Pipe (1)
	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



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



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) Pipe (12) Catchment Area (6)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)	
Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (13) Catchment Area (14)
Bypass Destination	(None)
Capacity Type	No Restriction

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

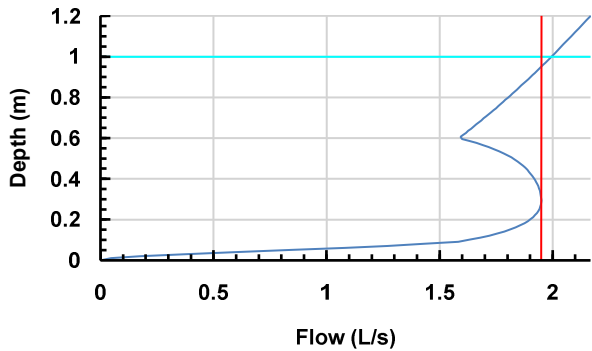


Outlets

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: Surface water system calculation		Date: 27/11/2024		
		Designed by: SM	Checked by:	
Report Details: Type: Inflow Summary 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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Network Design Criteria 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

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



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: Surface water system calculation	Date: 27/11/2024			
	Designed by: SM	Checked by:	Approved By:	
Report Details: Type: Outfall Details 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: Surface water system calculation	Date: 27/11/2024			
	Designed by: SM	Checked by:	Approved By:	
Report Title: 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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Inflows Summary 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 (m³)
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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Inflows Summary 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 (m³)
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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Inflows Summary 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 (m³)
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: Surface water system calculation		Date: 27/11/2024			
		Designed by: SM	Checked by:		Approved By:
Report Details: Type: Inflows Summary 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 (m³)
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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Junctions Summary 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	19.30 0	17.95 0	18.002	0.052	3.8	0.058	0.000	3.5	1.733	OK
SW05	FSR: 1 years: +0 %: 15 mins: Winter	19.30 0	17.95 0	17.981	0.031	2.2	0.035	0.000	2.1	1.025	OK
SW22	FSR: 1 years: +0 %: 15 mins: Winter	19.10 0	17.60 0	17.834	0.234	3.4	0.265	0.000	3.1	1.356	Surcharged
SW10	FSR: 1 years: +0 %: 360 mins: Winter	19.00 0	16.45 0	16.480	0.030	0.8	0.042	0.000	0.8	22.434	OK
SW11	FSR: 1 years: +0 %: 30 mins: Winter	18.00 0	16.29 2	16.420	0.128	1.6	0.145	0.000	1.4	9.533	OK
SW12	FSR: 1 years: +0 %: 30 mins: Winter	17.60 0	16.25 0	16.420	0.170	3.4	0.243	0.000	2.3	12.103	Surcharged
SW13	FSR: 1 years: +0 %: 15 mins: Winter	17.85 0	16.65 0	16.682	0.032	5.4	0.037	0.000	5.4	2.518	OK
SW08	FSR: 1 years: +0 %: 15 mins: Winter	17.85 0	16.65 0	16.669	0.019	2.2	0.022	0.000	2.2	1.013	OK
SW15	FSR: 1 years: +0 %: 120 mins: Winter	17.45 0	15.91 5	15.962	0.047	3.8	0.053	0.000	3.8	34.718	OK
SW16	FSR: 1 years: +0 %: 120 mins: Winter	17.38 0	15.78 9	15.839	0.050	3.8	0.057	0.000	3.8	34.713	OK
SW19	FSR: 1 years: +0 %: 120 mins: Winter	16.93 0	15.71 4	15.762	0.048	3.8	0.000	0.000	3.8	34.713	OK

16573 Land at Station Road, Drigg: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Junctions Summary 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	19.30 0	17.95 0	18.011	0.061	4.8	0.069	0.000	4.6	2.243	OK
SW05	FSR: 2 years: +0 %: 15 mins: Winter	19.30 0	17.95 0	17.985	0.035	2.9	0.040	0.000	2.8	1.322	OK
SW22	FSR: 2 years: +0 %: 15 mins: Winter	19.10 0	17.60 0	17.864	0.264	4.4	0.299	0.000	4.0	2.016	Surcharged
SW10	FSR: 2 years: +0 %: 240 mins: Winter	19.00 0	16.45 0	16.480	0.030	0.8	0.043	0.000	0.8	23.864	OK
SW11	FSR: 2 years: +0 %: 60 mins: Winter	18.00 0	16.29 2	16.472	0.180	1.9	0.203	0.000	1.5	16.384	OK
SW12	FSR: 2 years: +0 %: 60 mins: Winter	17.60 0	16.25 0	16.471	0.221	3.5	0.317	0.000	2.5	20.730	Surcharged
SW13	FSR: 2 years: +0 %: 15 mins: Winter	17.85 0	16.65 0	16.687	0.037	7.0	0.042	0.000	6.9	3.256	OK
SW08	FSR: 2 years: +0 %: 15 mins: Winter	17.85 0	16.65 0	16.672	0.022	2.8	0.024	0.000	2.8	1.307	OK
SW15	FSR: 2 years: +0 %: 120 mins: Winter	17.45 0	15.91 5	15.964	0.049	4.1	0.056	0.000	4.1	43.821	OK
SW16	FSR: 2 years: +0 %: 120 mins: Winter	17.38 0	15.78 9	15.842	0.053	4.1	0.060	0.000	4.1	43.817	OK
SW19	FSR: 2 years: +0 %: 120 mins: Winter	16.93 0	15.71 4	15.764	0.050	4.1	0.000	0.000	4.1	43.817	OK

16573 Land at Station Road, Drigg: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Junctions Summary 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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Junctions Summary 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: Surface water system calculation		Date: 27/11/2024			
		Designed by: SM	Checked by:		Approved By:
Report Details: Type: Stormwater Controls Summary 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. Residant 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: Surface water system calculation		Date: 27/11/2024			
		Designed by: SM	Checked by:		Approved By:
Report Details: Type: Stormwater Controls Summary 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. Residant 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

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



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. Residant 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: Surface water system calculation	Date: 27/11/2024			
	Designed by: SM	Checked by:	Approved By:	
Report Details: Type: Stormwater Controls Summary 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. Residant 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: Surface water system calculation		Date: 27/11/2024			
		Designed by: SM	Checked by:		Approved By:
Report Details: Type: Connections Summary 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: Surface water system calculation		Date: 27/11/2024			
		Designed by: SM	Checked by:		Approved By:
Report Details: Type: Connections Summary 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: Surface water system calculation		Date: 27/11/2024			
		Designed by: SM	Checked by:		Approved By:
Report Details: Type: Connections Summary 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: Surface water system calculation	Date: 27/11/2024		
	Designed by: SM	Checked by:	Approved By:
Report Details: Type: Connections Summary 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 guidance 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: 1,333m² - 2,000m²

300 Series

(1.8m internal diameter):
Treated Flow Rate: 20-50 l/s
Catchment Area: 2,665m² - 6,665m²

400 Series

(2.6m internal diameter):
Treated Flow Rate: 60-160 l/s
Catchment Area: 8,000m² - 21,333m²

500 Series

(3.5m internal diameter):
Treated Flow Rate: 180-250 l/s
Catchment Area: 24,000m² - 33,333m²

600 Series

(4m internal diameter):
Treated Flow Rate: 300-700 l/s
Catchment Area: 40,000m² - 93,333m²

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

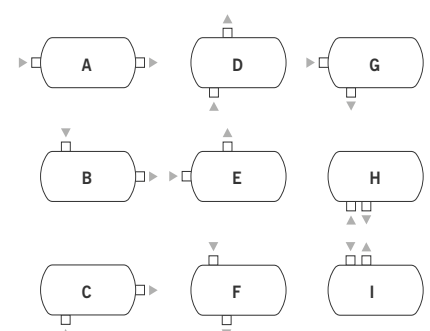
Different tank shell specifications are available dependent upon tank invert levels, ground conditions and ground water levels. (See Section 7)

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

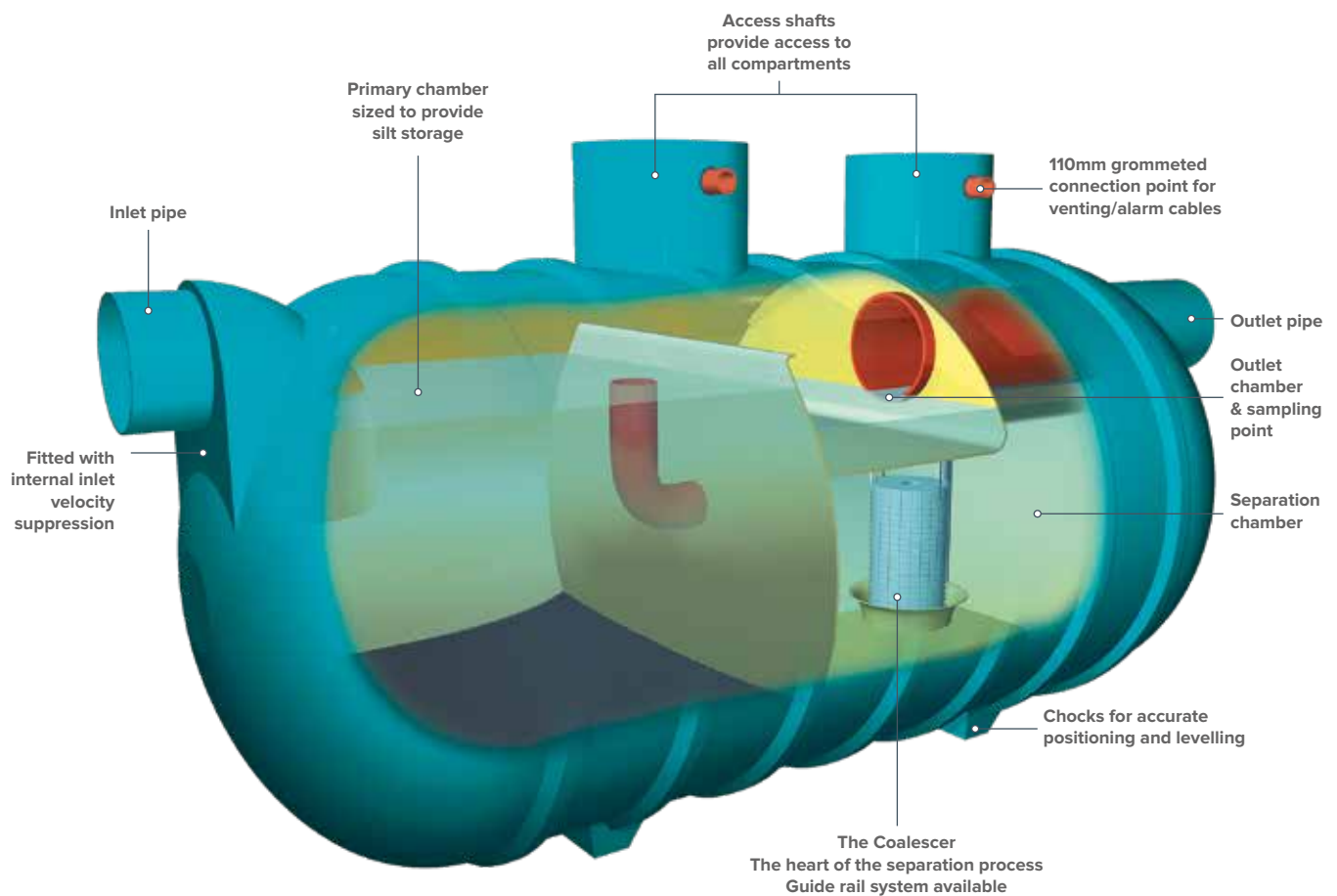
TSS	0.8
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Metals	0.6
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Hydrocarbons	0.9*
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**H R Wallingford test results to BS EN 858*

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

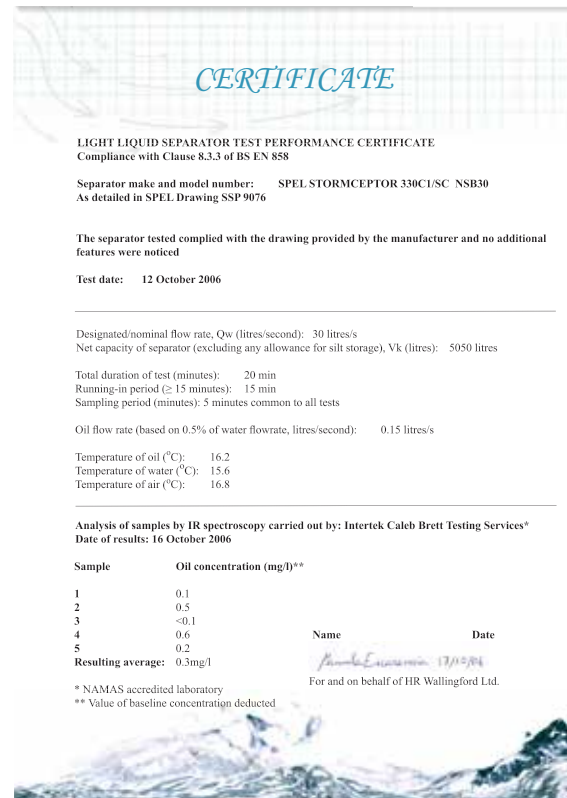
Testing carried out according to British Water Code of Practice

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	m ²
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)**	Name	Date
1	0.1		
2	0.5		
3	<0.1		
4	0.6		
5	0.2		
Resulting average: 0.3mg/l			

* NAMAS accredited laboratory
** Value of baseline concentration deducted

For and on behalf of HR Wallingford Ltd.



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)			
													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	1,200	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	-	-
350C1/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.

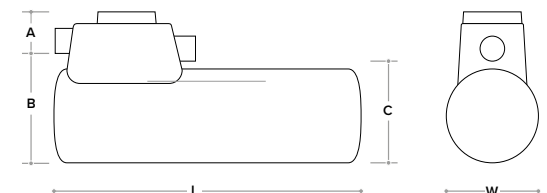
300 Series ESR – Inside diameter 1800mm, outside diameter 1875mm.

400 Series ESR – Inside diameter 2600mm, outside diameter 2700mm.

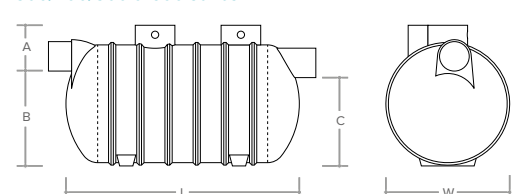
500 Series ESR – Inside diameter 3500mm, outside diameter 3650mm.

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)

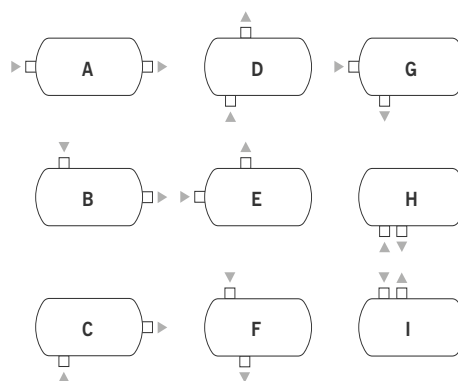
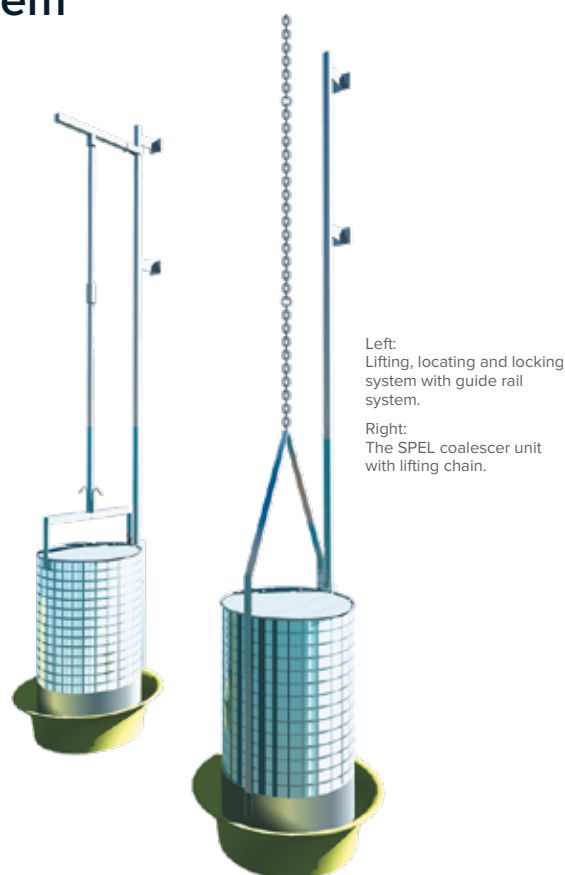
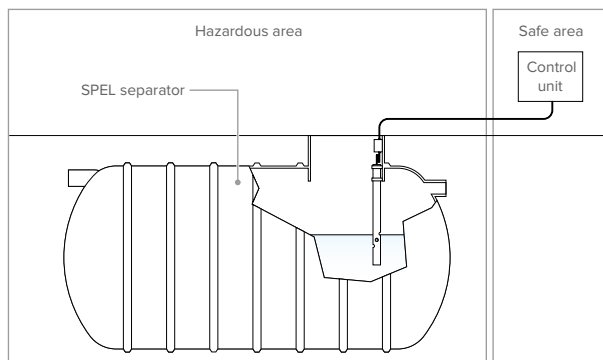
Where SPEL ESR Systems can be subjected to surcharging and/or tidal outfall, then the SPEL 3L system should be included.

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.



SPEL ESR Range Inlet/Outlet Orientation

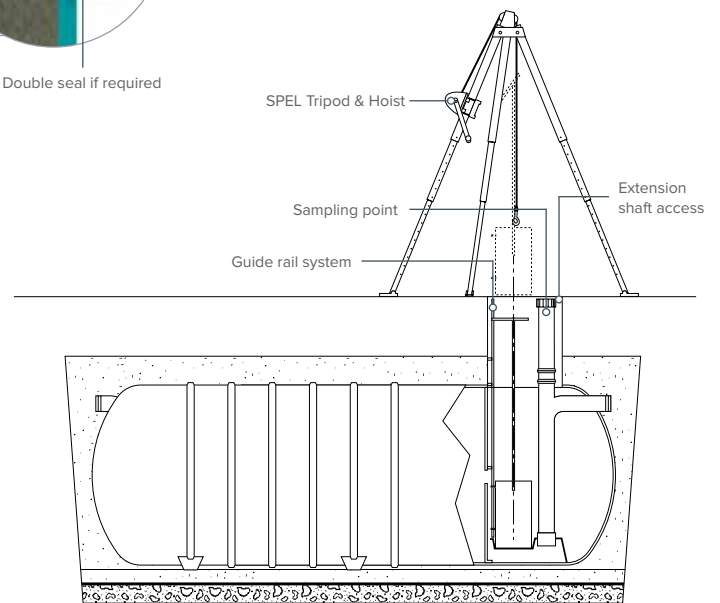
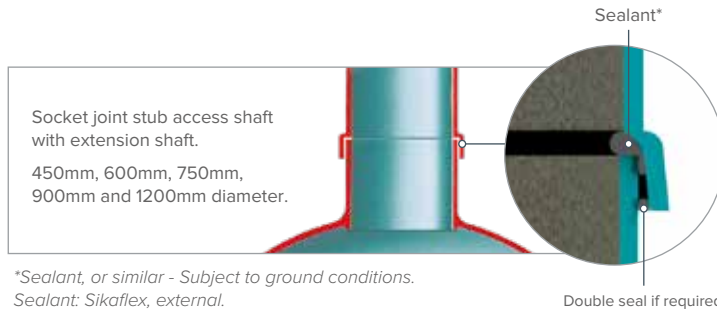
Dependent upon model and diameter of connections, these nine different orientations are available. However on the larger models it is important to check with our technical department.

SPEL ESR Bypass Treatment System

Components and Accessories

SPEL extension access shafts

Extension access shafts are available for deep invert applications.



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.

