Our Reference: 2025-040

Flood Risk and Drainage Solutions Ltd
144 New Lane
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Lancashire
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Date: 13/06/25

Proposed Drainage Strategy to Support the Development of Holiday Lodges at Land off Whalley Road, Hurst Green

Introduction

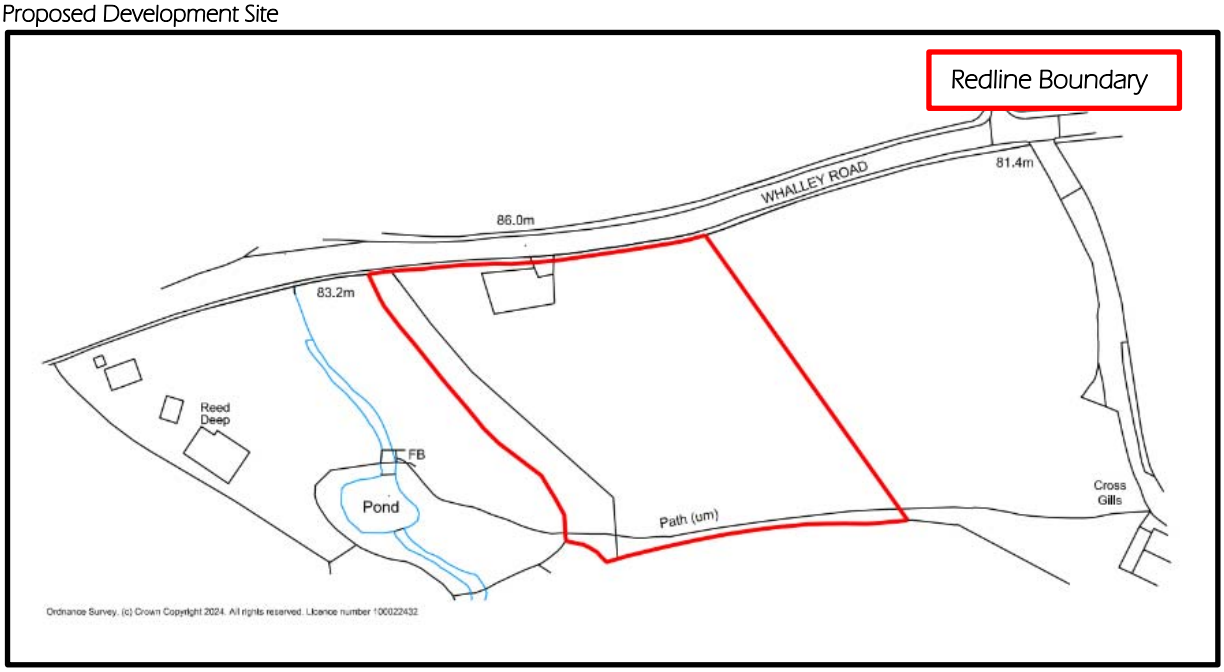
Flood Risk and Drainage Solutions Ltd have been commissioned by Zara Moon Architecture to provide a Proposed Drainage Strategy to support the development of holiday lodges at Land off Whalley Road in Hurst Green.

Existing Site

The existing site comprises of undeveloped green space which falls from north to south with a range of over 5m.

The nearest formal watercourse is located approximately 30m over the west boundary.

Proposed Development Site



Development Proposals

Development proposals comprise of demolition of the erection of 4No holiday lodges with access road to each unit.

Existing Drainage

The site is not currently drained and due to its location there are no public sewers within the vicinity.

Hierarchy of Surface Water Disposal

The hierarchy for disposal of surface water from new developments is outlined within the Building Regulations Approved Document H and specifies the following methods in order of preference:

- Infiltration via soakaway or other suitable infiltration device
- Discharge to watercourse
- Discharge to public surface water sewer
- Discharge to public combined sewer

Infiltration

Soilscape Maps identifies that the underlying ground is considered to be Slowly permeable seasonally wet acid loamy and clayey soils and therefore not suitable for the use of soakaways.

Furthermore, the site is steep and could have potential for water to emerge at ground level after existing the soakaway.

Watercourse

Due to the fact that infiltration methods are unsuitable, it is recommended that surface water from the site is directed to the watercourse over the west boundary.

Greenfield Runoff Rate

Greenfield runoff rates have been calculated using the IH124 Method for the total drained area of 0.113 Hectares.

- QBar = 0.93l/s

Restricted Discharge Rates

As the site is relatively small, it can be seen that the equivalent greenfield runoff rate is extremely low. It is not practical for a surface water discharge to be restricted to such a low rate due to the increased potential for blockage of the flow control device.

On this basis, it is recommended that the discharge rate from proposed development will be restricted to a maximum of 2l/s. This is considered to be 'as close as reasonably practicable' to the equivalent greenfield runoff rate from the site, and therefore accords with Standard S3 of the 'non-statutory technical standards for sustainable drainage systems'.

Proposed Surface Water Drainage Strategy

Surface water flows from the roof area and access road will be collected via a network of rainwater downpipes and gullies before being discharged to the watercourse at the west of the site of the site.

Flows to be restricted via a vortex flow control chamber to no more than 1.8.1l/s during the 1 in 100 year + 50% climate change event with an addition of 10% urban creep, flows in excess of this to be attenuated within a geo-cellular attenuation tank located at the south west of the site.

Flow Control

- *Hydrobrake or similar*
- *Chamber 1200mm Dia*
- *Discharge = 2l/s*
- *Head = 2.200m*

Attenuation Tank

- *Area = 49m²*
- *Crate Depth = 1.600m*
- *Volume = 74.5m³*

Proposed Surface Water Discharge Rates

The proposed surface water drainage strategy has been modelled using FLOW Software for the 1 year, 30 year + 40% climate change and 100 year + 50% climate change + 10% urban creep the results are tabulated below for reference.

Proposed Discharge Rates

Return Period	Discharge Rates l/s
1 Year	1.2
30 Year + 40% Climate Change + 10% Urban Creep	1.5
100 Year + 50% Climate Change + 10% Urban Creep	1.8

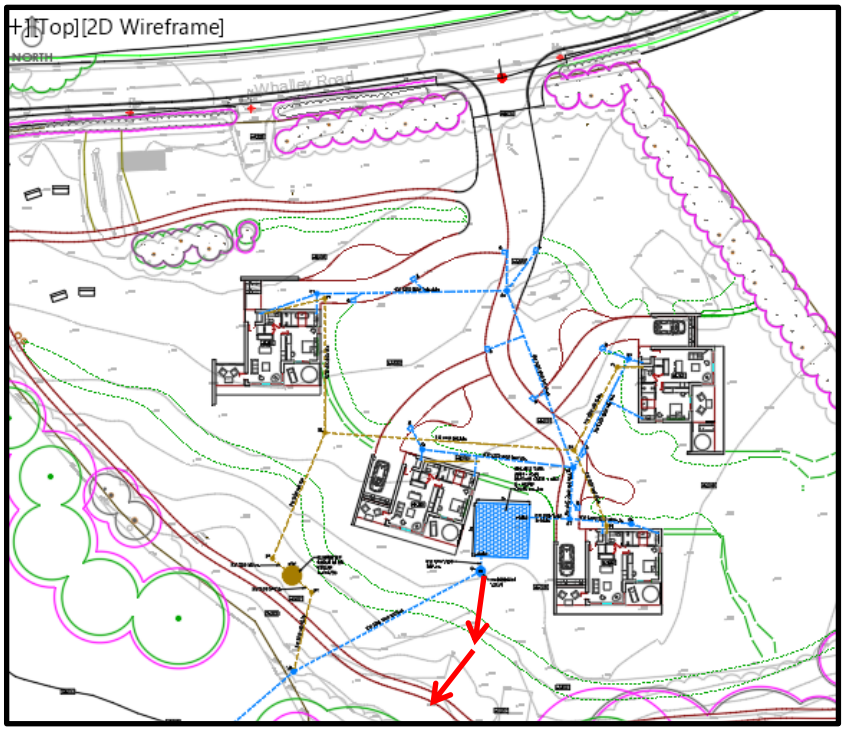
Normal Conditions Exceedance Route

During normal conditions the drainage network can accommodate flows below ground during all events up to and including the 1 in 100 year + 50% + 10% urban creep climate change event with no surface flooding.

Exceedance Routes System Failure

In the unlikely event of total system failure, flows are expected to follow topography west into the watercourse resulting in a low risk to the development and surround properties. And therefore, the risk of flooding the proposed development and surrounding properties is considered to be low.

Exceedance Routes



Foul Drainage

Following development foul will pass through a Package Treatment Plant before discharging clean effluent into the watercourse via a single outfall, providing a betterment compared to the existing situation.

Package Treatment Plant

- *Klargester Biodisc BC 18 Person Package Treatment Plant or Similar*

Management/Maintenance

Following development, the drainage network serving the site will remain private, the land owner/developer will be responsible for the management and maintenance of the drainage network.

CIRIA Guidance for typical requirement for maintaining attenuation tanks is provided below.

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

We trust that the above is acceptable and look forward to hearing from you in due course; however, should you have any queries, please do not hesitate to contact me.

Yours Sincerely,

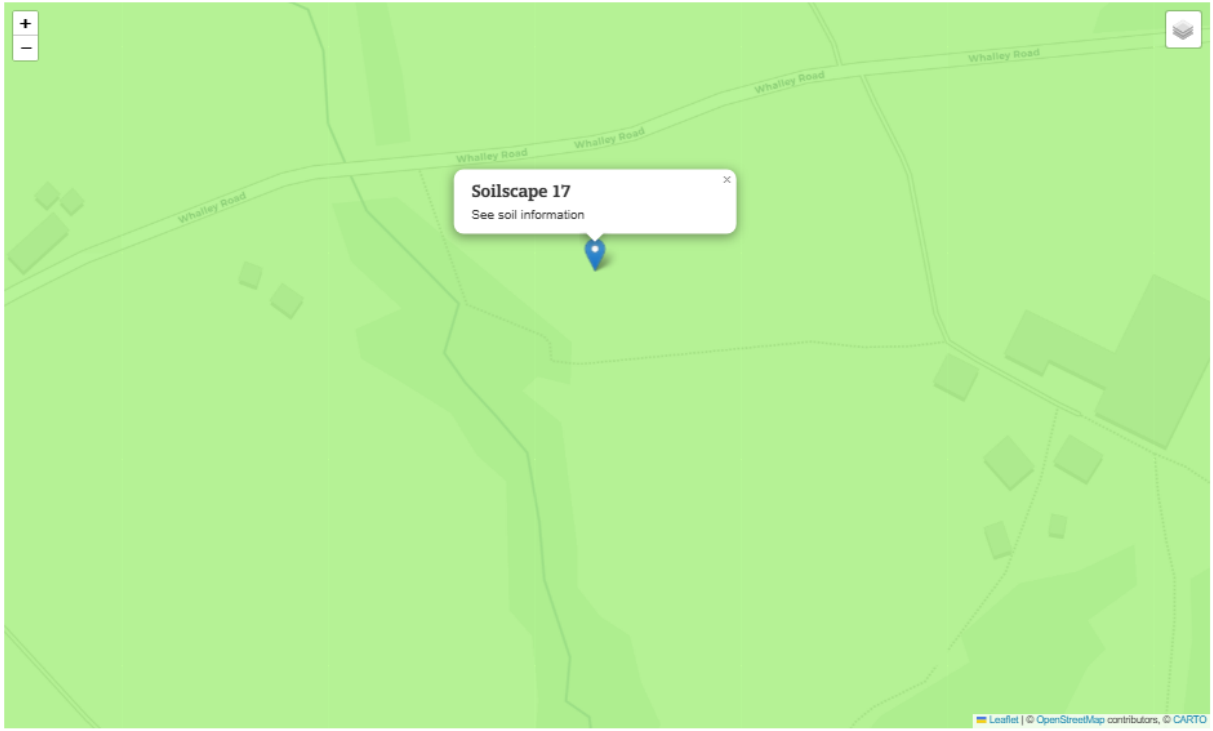
Chris Vose BSc

Managing Director
Flood Risk and Drainage Solutions Ltd

Attachments

- Soilscape Map
- Proposed Drainage Design Layout Drawing
- Typical Drainage Details
- Modelled Calculation Report

Soilscape Map



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Soil Information

Soilscape 17:

Slowly permeable seasonally wet acid loamy and clayey soils

Texture:
Loamy and clayey

Coverage:
England: 7.0%,**Wales:** 15.1%,**England & Wales:**8.2%

Drainage:
Impeded drainage

Fertility:
Low

Landcover:
Grassland with some arable and forestry

Habitats:
Seasonally wet pastures and woodlands

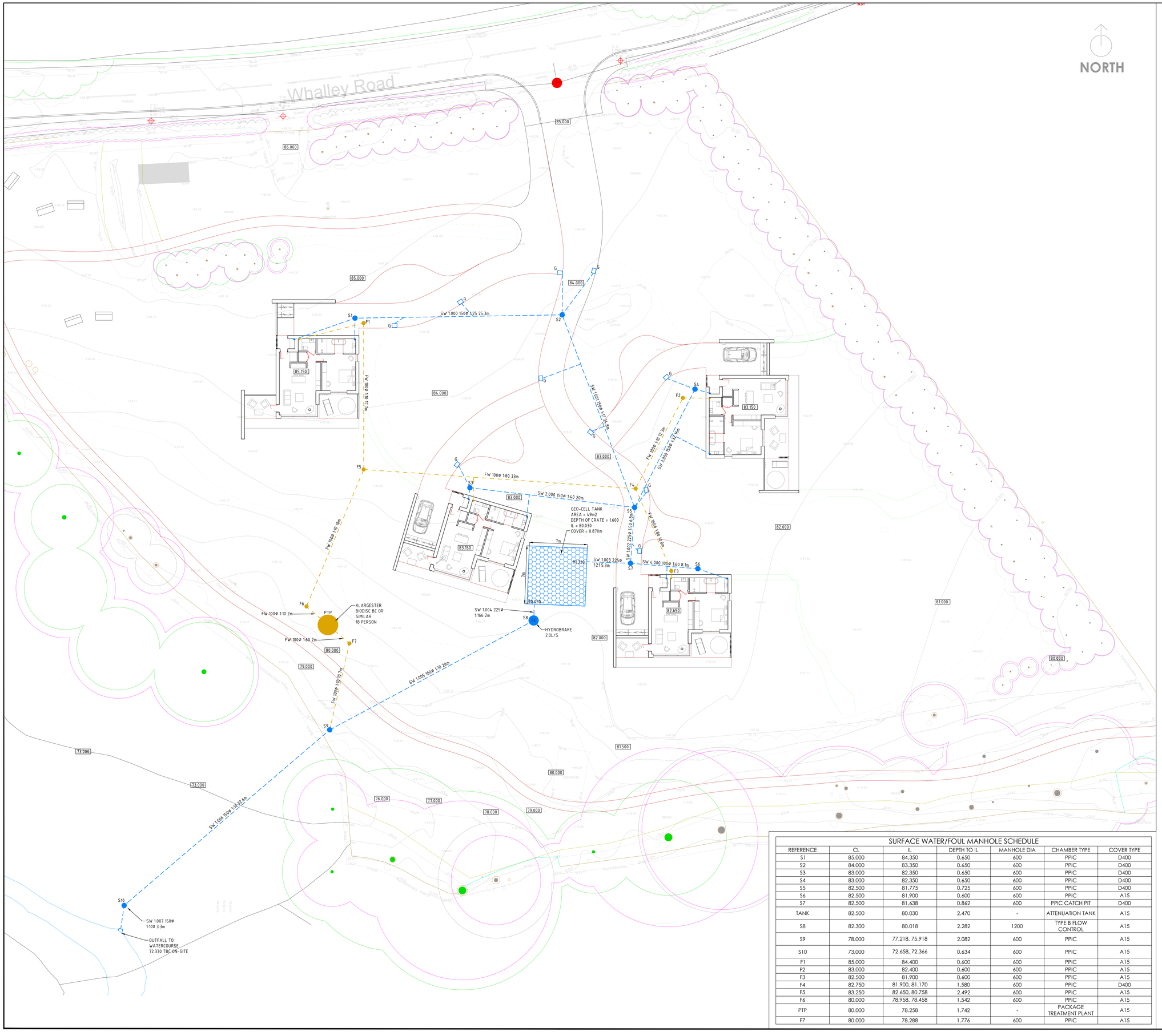
Carbon:
Medium

Drains to:
Stream network

Water protection:
Main risks are associated with overland flow from compacted or poached fields. Organic slurry, dirty water, fertiliser, pathogens and fine sediment can all move in suspension or solution with overland flow or drain water

General cropping:
Mostly suited to grass production for dairying or beef; some cereal production often for feed. Timeliness of stocking and fieldwork is important, and wet ground conditions should be avoided at the beginning and end of the growing season to prevent damage to soil structure. Land is tile drained and periodic moling or subsoiling will assist drainage

Proposed Drainage Design Layout Drawing



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KEY

- SW 1.000 — PROPOSED SURFACE WATER DRAIN
- FW 1.000 — PROPOSED FOUL DRAIN
- PROPOSED SURFACE WATER OUTFALL
- S1 — PROPOSED SURFACE WATER MANHOLE
- F1 — PROPOSED FOUL MANHOLE
- G — PROPOSED SURFACE WATER GULLY
- ATTENUATION TANK

SURFACE WATER ATTENUATION

GEO-CELLULAR ONLINE TANK
AREA = 49m2
DEPTH OF CRATE = 1.600m
CL = 82.500
IL = 80.030
COVER = 0.870m
CRATES TO BE SUITABLE FOR TRAFFICKED AREAS

FLOW CONTROL DETAILS

HYDROBRAKE OR SIMILAR
CHAMBER 1200Ø
DESIGN DEPTH = 2.200m
FLOW = 2L/S
REF = SHE-0056-2000-2200-2000
CHAMBER DETAILS TO BE SPECIFIED BY MANUFACTURE

PACKAGE TREATMENT PLANT

KLARGESTER BC 18 PERSON OR SIMILAR
BOD kg/d = 1.08

PROPOSED DISCHARGE RATES

1 IN 1 YEAR = 1.2L/S
1 IN 30 YEAR + 40% CLIMATE CHANGE + 10% URBAN CREEP = 1.5L/S
1 IN 100 YEAR+ 50% CLIMATE CHANGE + 10% URBAN CREEP = 2.0L/S

SURFACE WATER/FOUL MANHOLE SCHEDULE

REFERENCE	CL	IL	DEPTH TO IL	MANHOLE DIA	CHAMBER TYPE	COVER TYPE
S1	85.000	84.350	0.650	600	PPIC	D400
S2	84.000	83.350	0.650	600	PPIC	D400
S3	83.000	82.350	0.650	600	PPIC	D400
S4	83.000	82.350	0.650	600	PPIC	D400
S5	82.500	81.775	0.725	600	PPIC	D400
S6	82.500	81.900	0.600	600	PPIC	A15
S7	82.500	81.638	0.862	600	PPIC CATCH PIT	D400
TANK	82.500	80.030	2.470	-	ATTENUATION TANK	A15
S8	82.300	80.018	2.282	1200	TYPE B FLOW CONTROL	A15
S9	78.000	77.218, 75.918	2.082	600	PPIC	A15
S10	73.000	72.658, 72.366	0.634	600	PPIC	A15
F1	85.000	84.400	0.600	600	PPIC	A15
F2	83.000	82.400	0.600	600	PPIC	A15
F3	82.500	81.900	0.600	600	PPIC	A15
F4	82.750	81.900, 81.170	1.580	600	PPIC	D400
F5	83.250	82.650, 80.758	2.492	600	PPIC	A15
F6	80.000	78.958, 78.458	1.542	600	PPIC	A15
PTP	80.000	78.258	1.742	-	PACKAGE TREATMENT PLANT	A15
F7	80.000	78.288	1.776	600	PPIC	A15

REVISION	COMMENT	DATE	BY

FLOOD RISK AND DRAINAGE SOLUTIONS LTD
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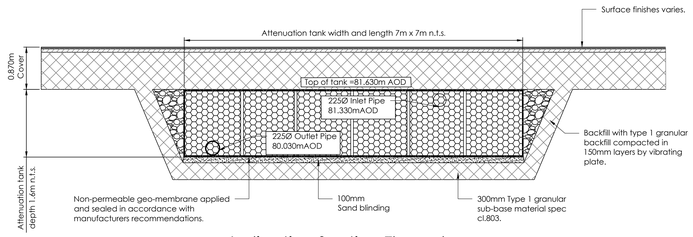
TEL: 07961477330

CLIENT: ZARA MOON ARCHITECTS	DATE: 13/06/2025
	STATUS:
PROJECT: LAND OFF WHALLEY ROAD	DRAWN BY: CV
	SCALE: 1:150
DRAWING TITLE: PROPOSED SURFACE WATER AND FOUL LAYOUT	SIZE: A0
DRAWING REFERENCE: 2025-040-01	REVISION:

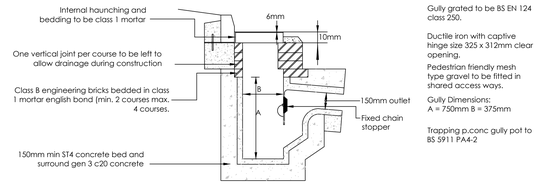
Typical Drainage Details



Indicative Section Through Attenuation Tank Not to Scale

Installation Method:

- Specialist supplier to prepare and submit appropriate layouts, schedules and details to enable fully compliant installation of geo-cellular units
- Excavate
- Install sub-base
- Install impermeable geomembrane (in accordance with manufacturers recommendations)
- Install crate units + connections (in accordance with manufacturers recommendations)
- Install inspection chambers as required
- Install crate end plates
- Cover sides & top with geotextile membrane (note: care taken not to rip, tear or puncture membrane
- Seal membrane
- Lateral backfilling
- Cover & backfill



Gully grated to be BS EN 124 class 250.

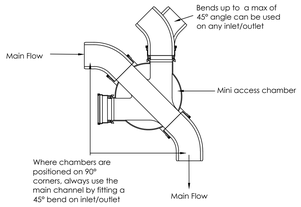
Ductile iron with captive hinge size 325 x 312mm clear opening.

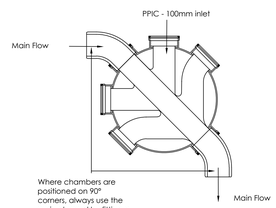
Pedestrian friendly mesh type gravel to be fitted in shared access ways.

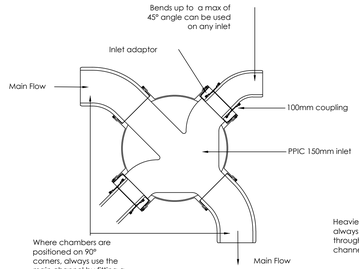
Gully Dimensions:
A = 750mm B = 375mm

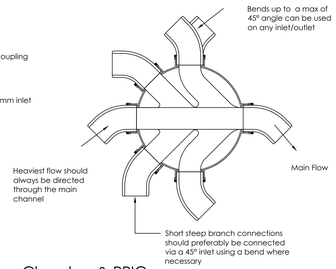
Trapping p.conc gully pot to BS 5911 PA4-2

Pre-Cast Concrete Road Gully (1:20)

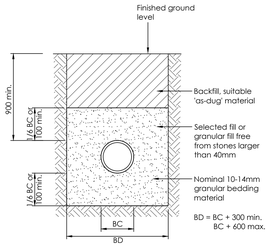






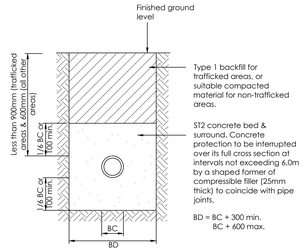


Mini Access Chamber & PPIC Installation Details Scale 1:10



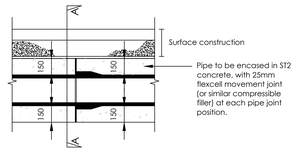
Typical Trench Detail Scale 1:10

NOTE: To be used where cover depth:
- >0.6m fields & gardens
- >0.9m lightly trafficked areas e.g. light roads & drives



Shallow Trench Detail Scale 1:10

NOTE: To be used where cover depth:
- <0.6m fields & gardens
- <0.9m lightly trafficked areas e.g. light roads & drives



Joints for Concrete Encased Pipes Scale 1:10

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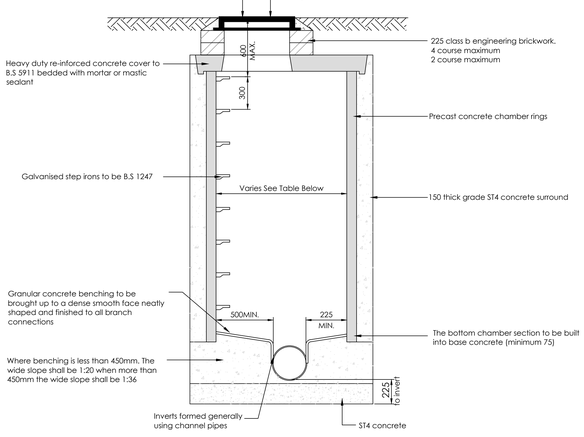
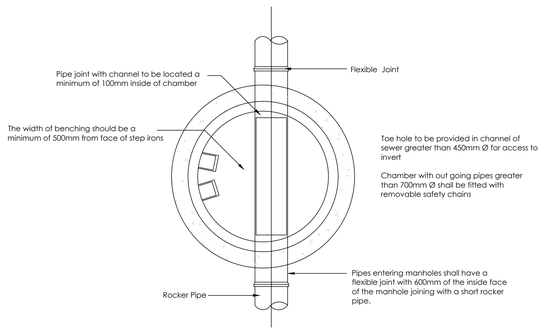
Extract from Table A2 WIS 4-08-02

Processed granular bedding & sidefill materials for flexible pipes

Pipe nominal bore (mm) (see note D)	Nominal Maximum particle size (mm)	Materials specified in British Standards (see note A)
100	10	10mm nominal single size
Over 100 to 150	15	10 or 14mm nominal single size or 14mm to 5mm graded
Over 150 to 300	20	10-14mm or 20mm nominal single size or 14-5mm graded or 20-5mm graded
Over 300 to 500	20	14 or 20mm nominal single size or 14-5mm graded or 20-5mm graded
Over 500	40	14 or 20mm or 40mm nominal single size or 14-5mm graded or 20-5mm graded or 40-5mm graded

Notes:
- A. Processed granular materials to include aggregates and air cooled blast furnace slag to BS EN 12620:220 + A1:2008; and lightweight aggregates to BS EN 13101:2002.
- B. -
- C. For the purpose of this table, PE pipe of 630mm OD can be regarded as having nominal bores of over 550mm, irrespective of wall thickness.
- D. Nominal bore is used in preference to DN because of the different nominal size classifications for flexible pipes.



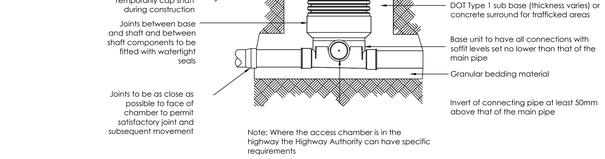


Typical Manhole Detail - Type B Scale 1:20

(1.35m - 3m Deep with Step Irons)

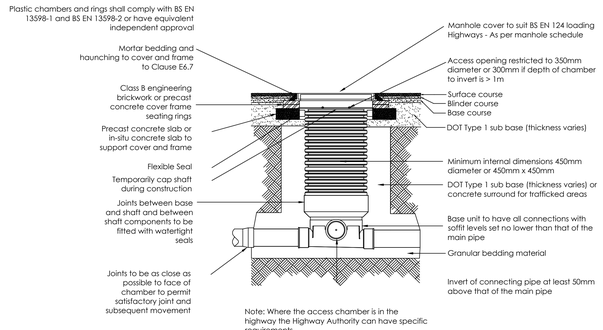
Notes:
Double width step rungs to be Type D Class 1 complying to BS EN 13101:2002 spaced at 250mm centers, cast in vertical alignment.

Manhole covers shall/must have a clear opening of 600mm and shall be Class D400 to BS EN 124 with 150mm deep frames in highways.



Note: Where the access chamber is in the highway the Highway Authority can have specific requirements

Typical Inspection Chamber Max. 3m Deep Non Entry Scale 1:20



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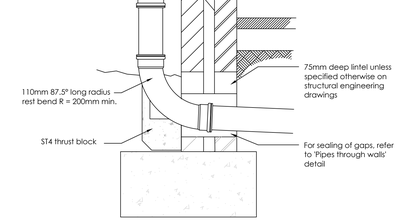
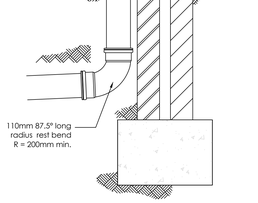


Internal SVP/Stub Stack Connection Through External Wall to Drain Scale 1:10



External RWP to Drain Scale 1:10

Minimum Recommended Trench Widths for Structured Wall Pipes in Poor Ground Conditions.

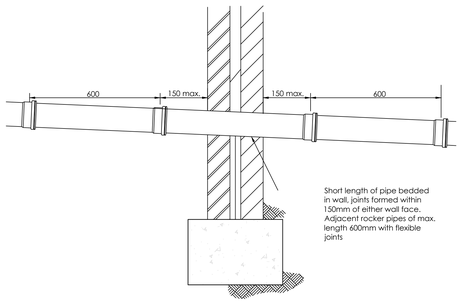
Native soil modulus between 3 & 4 MPA
Typical soil Classifications: Very loose gravel, loose sand, medium dense clayey silty sand, firm clay

Nominal pipe diameter (mm)	150	225	300	375	450	525	600	750	900
Minimum trench width (mm)*	450	525	600	750	900	1050	1200	1500	1800

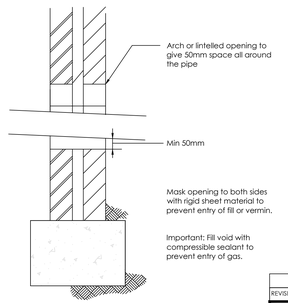
* A vertical trench face has been assumed to allow a modulus of 7MPA to be achieved for the pipe bedding and sidefill material.

Other assumed values:
Depth of cover = 6m (max)
Traffic loading = main road
Pipe stiffness = SN8

Note: Where the native soil modulus is below 3MPA or the depth of cover exceeds 6m, guidance should be sought from the pipe manufacturer regarding structural design and installation details.



Pipes Through Walls (a) Scale 1:10



Pipes Through Walls (b) Scale 1:10

SURFACE WATER ATTENUATION

GEO-CELLULAR ONLINE TANK
AREA = 49m2
DEPTH OF CRATE = 1.600m
CL = 82.500
IL = 80.030
COVER = 0.870m
CRATES TO BE SUITABLE FOR TRAFFICKED AREAS

FLOW CONTROL DETAILS

HYDROBRAKE OR SIMILAR
CHAMBER 1200Ø
DESIGN DEPTH = 2.200m
FLOW = 2L/S
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PACKAGE TREATMENT PLANT

KLARGESTER BC 18 PERSON OR SIMILAR
BOD kg/d = 1.08

PROPOSED DISCHARGE RATES

1 IN 1 YEAR = 1.2L/S
1 IN 30 YEAR + 40% CLIMATE CHANGE + 10% URBAN CREEP = 1.5L/S
1 IN 100 YEAR+ 50% CLIMATE CHANGE + 10% URBAN CREEP = 2.0L/S

REVISION	COMMENT	DATE	BY

FLOOD RISK AND DRAINAGE SOLUTIONS LTD
144 New Lane, Oswaldtwistle, Lancashire, BB5 3QW
WWW.FLOODRISK-DRAINAGE.CO.UK
TEL: 07961477330

CLIENT: ZARA MOON ARCHITECTS	DATE: 13/06/2025
PROJECT: LAND OFF WHALLEY ROAD	STATUS:
DRAWING TITLE: TYPICAL DRAINAGE DETAILS AND MANHOLE SCHEDULE	DRAWN BY: CV
DRAWING REFERENCE: 2025-040-02	SCALE: 1:125
	SIZE: A1
	REVISION:

Modelled Calculation Report

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	0.500
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Depth (m)	Notes
✓	S1	0.025	4.00	85.000	Manhole	Adoptable	600	0.650	
✓	S2	0.022	4.00	84.000	Manhole	Adoptable	600	0.650	
✓	S3	0.021	4.00	83.000	Manhole	Adoptable	600	0.650	
✓	S4	0.023	4.00	83.000	Manhole	Adoptable	600	0.650	
✓	S5	0.007	4.00	82.500	Manhole	Adoptable	600	0.725	
✓	S6	0.015	4.00	82.500	Manhole	Adoptable	600	0.600	
✓	S7	0.000		82.500	Manhole	Adoptable	600	0.862	
✓	TANK			82.500	Manhole	Adoptable	450	2.470	
✓	S8			82.300	Manhole	Adoptable	1200	2.282	Auto-design is off
✓	S9			78.000	Manhole	Adoptable	600	2.082	Auto-design is off
✓	S10			73.000	Manhole	Adoptable	600	0.634	Auto-design is off
✓	OUT			73.000	Manhole	Adoptable	1	0.667	

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	25.300	25.3	150	Circular	85.000	84.350	0.500	84.000	83.350	0.500
1.001	24.800	16.5	150	Circular	84.000	83.350	0.500	82.500	81.850	0.500
2.000	20.000	40.0	150	Circular	83.000	82.350	0.500	82.500	81.850	0.500
3.000	16.000	32.0	150	Circular	83.000	82.350	0.500	82.500	81.850	0.500
1.002	6.800	49.6	225	Circular	82.500	81.775	0.500	82.500	81.638	0.637
4.000	8.100	59.1	100	Circular	82.500	81.900	0.500	82.500	81.763	0.637
1.003	5.300	20.5	225	Circular	82.500	81.638	0.637	82.500	81.380	0.895
1.004	2.000	166.7	225	Circular	82.500	80.030	2.245	82.300	80.018	2.057
1.005	28.000	10.0	100	Circular	82.300	80.018	2.182	78.000	77.218	0.682
1.006	32.600	10.0	150	Circular	78.000	75.918	1.932	73.000	72.658	0.192

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	600	Manhole	Adoptable	S2	600	Manhole	Adoptable
1.001	S2	600	Manhole	Adoptable	S5	600	Manhole	Adoptable
2.000	S3	600	Manhole	Adoptable	S5	600	Manhole	Adoptable
3.000	S4	600	Manhole	Adoptable	S5	600	Manhole	Adoptable
1.002	S5	600	Manhole	Adoptable	S7	600	Manhole	Adoptable
4.000	S6	600	Manhole	Adoptable	S7	600	Manhole	Adoptable
1.003	S7	600	Manhole	Adoptable	TANK	450	Manhole	Adoptable
1.004	TANK	450	Manhole	Adoptable	S8	1200	Manhole	Adoptable
1.005	S8	1200	Manhole	Adoptable	S9	600	Manhole	Adoptable
1.006	S9	600	Manhole	Adoptable	S10	600	Manhole	Adoptable

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Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.007	3.300	100.0	150	Circular	73.000	72.366	0.484	73.000	72.333	0.517

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.007	S10	600	Manhole	Adoptable	OUT	1	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
S1	85.000	0.650	600	Manhole	Adoptable	0	1.000	84.350	150	Circular
S2	84.000	0.650	600	Manhole	Adoptable	1	1.000	83.350	150	Circular
						0	1.001	83.350	150	Circular
S3	83.000	0.650	600	Manhole	Adoptable	0	2.000	82.350	150	Circular
S4	83.000	0.650	600	Manhole	Adoptable	0	3.000	82.350	150	Circular
S5	82.500	0.725	600	Manhole	Adoptable	1	3.000	81.850	150	Circular
						2	2.000	81.850	150	Circular
						3	1.001	81.850	150	Circular
						0	1.002	81.775	225	Circular
S6	82.500	0.600	600	Manhole	Adoptable	0	4.000	81.900	100	Circular
S7	82.500	0.862	600	Manhole	Adoptable	1	4.000	81.763	100	Circular
						2	1.002	81.638	225	Circular
						0	1.003	81.638	225	Circular
TANK	82.500	2.470	450	Manhole	Adoptable	1	1.003	81.380	225	Circular
						0	1.004	80.030	225	Circular
S8	82.300	2.282	1200	Manhole	Adoptable	1	1.004	80.018	225	Circular
						0	1.005	80.018	100	Circular
S9	78.000	2.082	600	Manhole	Adoptable	1	1.005	77.218	100	Circular
						0	1.006	75.918	150	Circular

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Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
S10	73.000	0.634	600	Manhole	Adoptable	1	1.006	72.658	150	Circular
						0	1.007	72.366	150	Circular
OUT	73.000	0.667	1	Manhole	Adoptable	1	1.007	72.333	150	Circular

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
Rainfall Events	Singular	Skip Steady State	x
FSR Region	England and Wales	Drain Down Time (mins)	240
M5-60 (mm)	20.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.300	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	40	10	0
100	50	10	0

Node S8 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	80.018	Product Number	CTL-SHE-0056-2000-2200-2000
Design Depth (m)	2.200	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	80.030
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	49.0	0.0	1.600	49.0	0.0	1.601	0.0	0.0

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Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	84.381	0.031	3.4	0.0330	0.0000	OK
15 minute winter	S2	10	83.389	0.039	6.4	0.0378	0.0000	OK
15 minute winter	S3	10	82.382	0.032	2.8	0.0301	0.0000	OK
15 minute winter	S4	10	82.382	0.032	3.1	0.0321	0.0000	OK
15 minute winter	S5	10	81.846	0.071	13.2	0.0336	0.0000	OK
15 minute summer	S6	10	81.936	0.036	2.0	0.0280	0.0000	OK
15 minute winter	S7	10	81.699	0.061	15.2	0.0173	0.0000	OK
180 minute winter	TANK	136	80.248	0.218	4.5	10.1763	0.0000	OK
180 minute winter	S8	136	80.248	0.230	1.3	0.2599	0.0000	SURCHARGED
180 minute winter	S9	136	75.934	0.016	1.2	0.0044	0.0000	OK
180 minute winter	S10	136	72.395	0.029	1.2	0.0081	0.0000	OK
180 minute winter	OUT	136	72.360	0.027	1.2	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	3.4	1.079	0.096	0.0803	
15 minute winter	S2	1.001	S5	6.4	1.758	0.145	0.0901	
15 minute winter	S3	2.000	S5	2.8	1.011	0.099	0.0553	
15 minute winter	S4	3.000	S5	3.1	1.125	0.098	0.0441	
15 minute winter	S5	1.002	S7	13.2	1.362	0.178	0.0658	
15 minute winter	S6	4.000	S7	2.0	0.818	0.254	0.0198	
15 minute winter	S7	1.003	TANK	15.2	1.872	0.131	0.0429	
15 minute winter	TANK	1.004	S8	1.4	0.378	0.036	0.0462	
180 minute winter	S8	Hydro-Brake®	S9	1.2				
180 minute winter	S9	1.006	S10	1.2	1.303	0.022	0.0313	
180 minute winter	S10	1.007	OUT	1.2	0.559	0.070	0.0074	18.4

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Results for 30 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	84.412	0.062	12.8	0.0703	0.0000	OK
15 minute winter	S2	10	83.430	0.080	24.0	0.0825	0.0000	OK
15 minute winter	S3	10	82.414	0.064	10.7	0.0636	0.0000	OK
15 minute winter	S4	10	82.414	0.064	11.8	0.0674	0.0000	OK
15 minute summer	S5	10	81.938	0.163	50.1	0.0808	0.0000	OK
15 minute winter	S6	10	81.992	0.092	7.7	0.0764	0.0000	OK
15 minute winter	S7	10	81.779	0.141	57.7	0.0398	0.0000	OK
480 minute winter	TANK	408	81.176	1.146	7.6	53.5162	0.0000	SURCHARGED
480 minute winter	S8	408	81.176	1.158	1.5	1.3093	0.0000	SURCHARGED
480 minute winter	S9	408	75.935	0.017	1.5	0.0048	0.0000	OK
480 minute winter	S10	408	72.397	0.031	1.5	0.0089	0.0000	OK
480 minute winter	OUT	408	72.362	0.029	1.5	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	12.8	1.551	0.360	0.2089	
15 minute winter	S2	1.001	S5	24.0	2.393	0.546	0.2526	
15 minute winter	S3	2.000	S5	10.7	1.338	0.379	0.1794	
15 minute winter	S4	3.000	S5	11.8	1.476	0.374	0.1429	
15 minute summer	S5	1.002	S7	50.1	1.758	0.677	0.1936	
15 minute winter	S6	4.000	S7	7.6	1.085	0.968	0.0600	
15 minute winter	S7	1.003	TANK	57.7	2.519	0.501	0.1214	
15 minute winter	TANK	1.004	S8	2.8	0.442	0.070	0.0795	
480 minute winter	S8	Hydro-Brake®	S9	1.5				
480 minute winter	S9	1.006	S10	1.5	1.375	0.026	0.0354	
480 minute winter	S10	1.007	OUT	1.5	0.587	0.084	0.0084	52.8

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Results for 100 year +50% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	84.425	0.075	17.7	0.0845	0.0000	OK
15 minute winter	S2	10	83.448	0.098	33.3	0.1002	0.0000	OK
15 minute winter	S3	10	82.427	0.077	14.9	0.0770	0.0000	OK
15 minute winter	S4	10	82.426	0.076	16.3	0.0811	0.0000	OK
480 minute winter	S5	392	82.107	0.332	8.9	0.1643	0.0000	SURCHARGED
15 minute winter	S6	10	82.138	0.238	10.6	0.1979	0.0000	SURCHARGED
480 minute winter	S7	392	82.107	0.469	10.3	0.1327	0.0000	SURCHARGED
480 minute winter	TANK	392	82.107	2.077	10.3	74.8335	0.0000	SURCHARGED
480 minute winter	S8	392	82.107	2.089	3.0	2.3621	0.0000	FLOOD RISK
480 minute winter	S9	392	75.937	0.019	2.0	0.0055	0.0000	OK
480 minute winter	S10	392	72.402	0.036	2.0	0.0102	0.0000	OK
480 minute winter	OUT	392	72.367	0.034	2.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	17.7	1.693	0.498	0.2646	
15 minute winter	S2	1.001	S5	33.3	2.359	0.757	0.3687	
15 minute winter	S3	2.000	S5	14.9	1.345	0.528	0.2677	
15 minute winter	S4	3.000	S5	16.3	1.489	0.517	0.2130	
15 minute winter	S5	1.002	S7	68.7	1.817	0.929	0.2509	
15 minute winter	S6	4.000	S7	10.2	1.298	1.288	0.0627	
15 minute winter	S7	1.003	TANK	78.5	2.645	0.681	0.1562	
15 minute summer	TANK	1.004	S8	3.1	0.488	0.077	0.0795	
480 minute winter	S8	Hydro-Brake®	S9	2.0				
480 minute winter	S9	1.006	S10	2.0	1.492	0.035	0.0427	
480 minute winter	S10	1.007	OUT	2.0	0.631	0.110	0.0102	63.0

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