

DRAINAGE STRATEGY

Document Reference: 477 – R2

PROPOSED RESIDENTIAL DEVELOPMENT OF
WESTMINSTER ROAD, MOSS, WREXHAM

MÔN CIVILS
LIMITED

August 2025
Revision P01

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1.0 Introduction

This report presents a comprehensive drainage strategy addressing both surface water runoff and foul effluent management resulting from the proposed renovation of the existing Mona Inn coach house located Westminster Road, Lodge, Broughton, Summerhill, Moss, Wrexham, Wales, LL11 6DH. The strategy outlines measures to effectively manage surface water flows and foul effluent disposal to ensure compliance with relevant environmental and planning regulations.

To provide a clear understanding of the site's layout and boundaries, an illustrative site plan is included in **Appendix A**. Additionally, precise geographical coordinates for the development are detailed in **Table 1**, offering accurate locational reference points for the proposed modifications.

Table 1. Existing Site Details

OS Grid Reference:	SJ 30855 52963
Easting (X)	330855
Northing: (Y)	352963
What3Words:	wiped.survey.laminated
Site Area:	1,456.840m^2 - (1.45 Ha)

1.1 Proposed Development

The proposed development involves the construction of 3 residential properties and a new length of private access road, in addition to parking and Garden spaces. The proposed site layout is contained within **Appendix B**.

1.2 Scope of Report

This report aims to provide a suitable drainage strategy for the discharge of surface water and foul effluent generated by the proposed development. For surface water, The Flood and Water Management Act 2010 (Schedule 3) came into effect in Wales on 7 January 2019, requiring all new developments which exceed 100m^2 or more than one property must include Sustainable Drainage Systems (SuDS) and the design of such systems must be approved by the SuDS approval Body (SAB). Any proposed surface water system or SuDS feature which accommodates more the one property must be adopted by the SAB.

The design of the foul drainage system has been developed in accordance with the requirements of Approved Document H of the Building Regulations 2010 (as amended), which sets out the criteria for the design, layout, and discharge of foul water drainage systems. As the proposed foul system is intended to a accommodate a single caravan within the site boundary, it does not fall under the definition of a lateral drain or public sewer and therefore is not subject to sewer adoption. The design ensures that foul flows are conveyed via a gravity system where practicable, with appropriate pipe gradients, ventilation, and access for maintenance as required under Section H1 of the regulations.

Accordingly, this report justifies the design of the proposed foul and surface water drainage systems and demonstrates how the scheme complies with the standards and best practices outlined in Approved Document H of the Building Regulations 2010 and the criteria set out the Welsh Government Statutory SuDS standard for Wales 2019.

1.3 Existing Nearby Drainage

As indicated on the DCWW apparatus Maps contained within **Appendix C** there is a 300mm diameter combined sewer located within the highway fronting the site. An onsite survey has identified that the run is 4.2m – 3.60m flowing in a southerly direction. An onsite investigation has identified a drainage system within the site which appears to discharge into an onsite buried septic tank within the site.

1.4 Site Hydrology

The site is a brownfield development, with an existing drainage system within the site as indicated above, therefore surface water run-off from the developed areas of the site would have conveyed into this network, its ultimate point of discharge is unknown, however assumed to be to a soakaway. The topography of the site and surrounding area fall towards the East, therefore all surface water run-off is expected to flow over the surface and onto the highway located to the east or infiltrate at source into the ground. The existing above ground flood routing indicating this, is contained within **Appendix D**.

2.0 Surface Water Design

2.1 Surface water runoff destination

In accordance with the SuDS Manual 2015 and the Statutory standards for sustainable drainage systems for Wales, surface water should be managed and discharged from a new development in line with the following hierarchy:

Priority level 1: Re-use of water;
Priority level 2: Infiltration into ground;
Priority level 3: Discharge to a water body;
Priority level 4: Discharge to a surface water run-off drain;
Priority level 5: Discharge to a combined surface water and foul drain.

Priority 1: Surface water reuse cannot be considered as the sole method of surface water disposal as it must be considered to be full during a rainfall event, in addition to this the site in not deemed to be located within an area susceptible to drought. However, attempts must be made to reduce overall site run-off and allow the occupants the ability to re-use surface water run-off. Therefore, it is proposed to have a single above ground water butt for each of the properties, for collection and external recreational re-use, such as watering plants and flows or filling paddling pools during summer months.

Priority 2: Porosity testing has been undertaken on the 5th of August 2025. The result of the testing deemed the site is suitable for the use of surface water infiltration systems. The results of the infiltration testing are contained within a separate infiltration report which can be made available upon request.

The report concludes that an infiltration rate of **7.37×10^{-4} m/s (2.6536 m/hr)** should be used for the design of soakaways.

2.2 Surface Water Storage Requirements

The proposed calculated storage volumes for the infiltration system are based upon the proposed hardstanding catchment areas as well as the rainfall parameters for the site being:

M5-60^{min} - 18.0mm
r - 0.32

The design of the surface water drainage network seeks to utilise a large soakaway located beneath the public open space area, with raingardens located adjacent to rainwater down pipes in order to provided biodiversity and water quality enhancements. The private parking area is to also act as a blanket soakaway with its design being a porous surface, however due to the slow rate of infiltration within this area of the site, the parking area hasn't been designed as the final discharge location just a infiltration feature within the management train. The proposed soakaway catchment areas are illustrated within **Appendix E** and summarised within **Table 2** below. An additional 10% allowance is to be added to the total effective area to account for Urban Creep as required in the statutory SuDS Standards for Wales 2018.

Table 2. Soakaway Catchment Areas.

Surface	**Total Area**
Plot 1	137.022 m²
Plot 2	156.581 m²
Plot 3	125.949 m²
Road	263.280 m²
Total	682.832 m²
Total + 10% Urban Creep	**751.115 m²**

Hydraulic model Calculations have been undertaken using a Wallingford procedure which indicate the required soakaway size and required volume of storage for the site during the 1:1-year return period, 1:30-year return period and the 1:100-year return period for a range of durations between 15 and 2880 minutes. An additional allowance of 50% is included for all return periods to account for increase in rainfall to account for climate change. A copy of the calculations is contained within **Appendix F.**

A copy of the drainage layout indicating the onsite proposed surface water drainage network, and the position of the proposed surface water drainage features listed above is provided within **Appendix G**.

2.3 Drainage System Maintenance

The statutory SuDS guidance for Wales 2018 document requires maintenance of the design drainage system to be considered for all elements of the surface water drainage network therefore tables for each element of the design have been complied to reflect this.

As this development falls within the requirement of SAB as outlined within **Section 1.1** of this report, any part of the system that accommodates more than one property (sewer) or accommodating one property laid in third party land (lateral sewer) must be adopted and maintained by the SAB and the developer must pay an upfront fee to the SAB for the ongoing maintenance of the system. As the site is within a single ownership and no part of the site is to be sold off separately there is no requirement for SAB adoption.

The client should ensure maintenance of the drainage system should be undertaken in accordance with the schedule shown in **Table 3 – 6** which have been derived in strict accordance with the SuDS Manual 2015 and from a risk-assessed approach during the design stage. These schedules are not exhaustive and should be reassessed at regular intervals to determine if any additional maintenance requirements are required to preserve the performance and condition of the site drainage system.

Provided preventive maintenance measures are undertaken in accordance with the frequencies recommended in **Table 3 - 6**, the need for corrective maintenance should rarely arise.

Maintenance activities should be detailed in the Principal Contractor's Health and Safety Plan and Risk Assessments and should be updated on a regular basis to ensure the continued performance and long-term condition of the drainage system.

Table 3. Operation and maintenance requirements for chambers & pipes.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect using CCTV drain surveys to ensure they are in good condition and operating as designed.	Every 5 years (or as required)
	Inspect chambers to ensure they are in good condition and that accumulation of sediment, debris etc. is not preventing them from operating as designed.	Annually
Regular Maintenance	Remove any accumulation of silt, sediment, leaves, debris etc.	Bi-annually
Occasional Maintenance	High-pressure water jet for removal of silt builds up and avoid blockages, particularly at bends or changes in direction.	As Required.
Corrective Maintenance	High-pressure water jet to remove blockages.	As Required.

Table 4. Operation and maintenance requirements for porous pavements.

Maintenance Schedule	Required Action		Typical Frequency
Monitoring	Initial inspection		Every 5 years (or as required)
	Inspect for evidence of poor operation and/or weed growth and take appropriate action if required.		Annually
	Inspect silt accumulation rates and establish appropriate brushing frequencies.		Annually
Regular Maintenance	Brushing and vacuuming over whole surface, (standard cosmetic sweep over whole surface).	Annually after autumn leaf fall, or reduce frequency as required based on site-specific observations of clogging or manufacturers recommendations – pay close attenuation to areas where water runs onto porous areas from adjacent impervious areas as this is most likely to collect the most sediments.	
Occasional Maintenance	Removal of weeds or management using glyphospate applied directly into weeds by an applicator rather than spraying.		As Required.
	Stabilise and mow contributing and adjacent areas.		As Required.
Corrective Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised within 50mm of the level of the paving.		As Required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material.		As Required.
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to clogging)	

Table 5. Operation and maintenance requirements for soakaways in line with table 13.1 of the CIRIA C753 'The SuDS Manual 2015.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly for first year, then annually.
	Check soakaway to ensure soakaway is emptying.	Annually
Regular Maintenance	Cleaning of gutters and gullies to reduce debris entering the drainage system and soakaway.	6 monthly
Occasional Maintenance	Removal of sedimentation build up within silt trap of chambers either side of proposed soakaway.	As Required.
Corrective Maintenance	Reconstruct soakaway and replace or clean granular fill material if performance deteriorates.	As Required.
	Replacement of clogged geotextile, will require soakaway to be reconstructed.	As Required.

Table 6. Operation and maintenance requirements for bioretention systems (SuDS Planter) in line with table 18.3 of the CIRIA C753 'The SuDS Manual'

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect infiltration surfaces for and ponding or displaced splash stones and/or soil.	Six Monthly.
	Check operation of under drains	Annually
	Inspect overflow pipe for blockages.	Six Monthly.
Regular Maintenance	Removal of litter and debris and weeds	Annually.
	Replace any plants, to maintain planting density.	As Required.
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required.	or as required
Corrective Maintenance	Remove and replace filter medium and vegetation above.	As Required.

2.4 Water Quality

Under the Statutory SuDS guidance, it is also required to ensure the water quality is not affected because of the hardstanding surfaces and the risk of contamination associated with their use. Green SuDS features such as swales and bioretention systems etc. help to improve the quality of water whilst flows through the network.

As noted within Table 26.2 of SuDS Manual 2015 residential development with low traffic roads are classed as having a low – very low pollution hazard level, therefore there is little risk, although consideration must be given as the risk increases during lower probability storms.

The level of contaminates expected from this type of development are listed within **Table 7**, and the levels of treatment provided by each type of system is noted within **Table 8**.

Table 7. Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Soils (PMI_{TSS})	*Hydrocarbons* (PMI_{HM})	*Heavy Metals* (PMI_{PAH})
Residential Roofs	Very Low	0.2	0.5	0.2
Low Traffic Roads / Residential Car Parks	Low	0.5	0.4	0.4

The features that have been included within the design of the drainage network within the site have been made bold within **Table 8** below.

Table 8. Pollution Mitigation Indices

SuDS Component	Pollution Mitigation Indices		
	Total Suspended Soils (PMI_{TSS})	**Heavy Metals (PMI_{PAH})**	**Hydrocarbons (PMI_{HM})**
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Granular Soakaway	**0.4**	**0.4**	**0.4**
Swale	0.5	0.6	0.6
Bioretention System	**0.8**	**0.8**	**0.8**
Porous Paving	**0.7**	**0.6**	**0.7**
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.5	0.5
Wet Land	0.8	0.8	0.8
Proprietary Treatment Systems	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.		

3.0 Foul Drainage Design

Design of the foul sewer included within the proposal has been carried out in accordance with Approved Document H of the Building Regulations 2010 and other best practice documents, such as the 'Sewers for Adoption' 7th edition. In accordance with Approved Document H, the preference in terms of discharging foul effluent should be considered in line with the below hierarchy:

Priority level 1: Discharge to foul only public sewer;
Priority level 2: Discharge to combined public sewer;
Priority level 3: Discharge to ground via a septic tank;
Priority level 4: Discharge to a watercourse via a treatment plant;

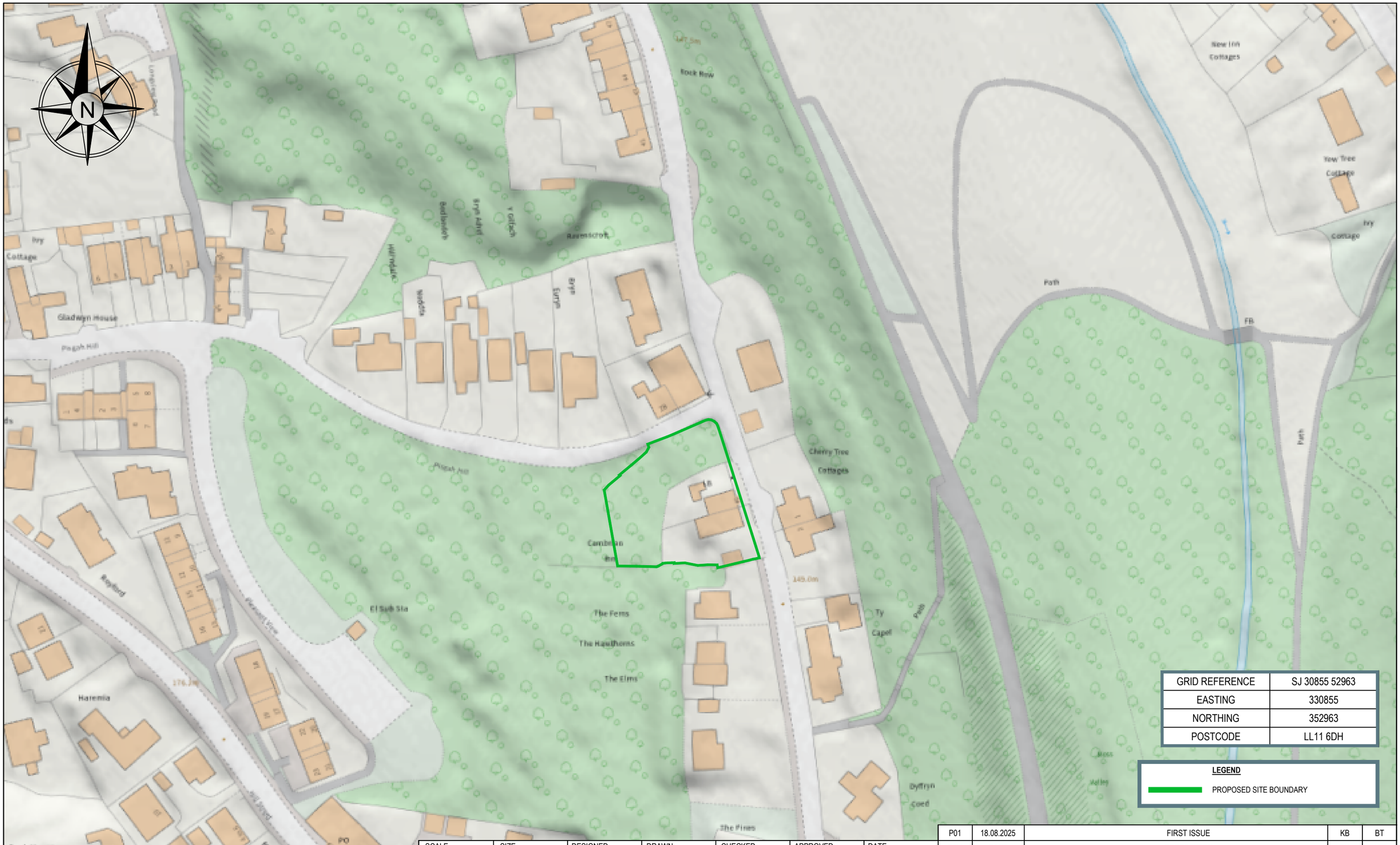
As indicated on the DCWW map contained within **Appendix C**, there is a 300mm combined sewerage network within the highway at the front of the site, therefore it is proposed to communicate flows from the site to this.

As the proposal includes 3 properties the proposal will involve the construction of new lengths of 'sewers' which therefore requires adoption under section 104 of the Waters Industries Act 1991, it should be noted that no adoptable foul drainage is to be laid without the legal agreement in place.

A section 106 application will also be required for the physical connection to the sewer, a connection should not be sought without this in place.

APPENDICES

APPENDIX A
Site Location Plan



GRID REFERENCE	SJ 30855 52963
EASTING	330855
NORTHING	352963
POSTCODE	LL11 6DH

LEGEND

PROPOSED SITE BOUNDARY

REV	DATE	DESCRIPTION	BY	APP
P01	18.08.2025	FIRST ISSUE	KB	BT

SCALE:	SIZE:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
NTS	A3	B.Thorne	K.Blackwell	K.Blackwell	B.Thorne	AUGUST 2025

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PROJECT: WESTMINSTER ROAD, MOSS, WREXHAM

TITLE: SITE LOCATION PLAN

STATUS:	PROJECT No:	DRAWING No:	REV:
S2	477	**001**	P01

APPENDIX B
Proposed Site Layout

Landscaping Proposals

Turfed or Seeded Grass Areas

Permeable paving to driveways and parking and turning areas.

Paths around buildings and patio areas to be concrete permeable paving slabs to approval.

Tree Planting
Native tree planting to be 3.0m to 3.6m tall and to be sited a min. 6m from any buildings.
***BC** - Bird Cherry. **WC** - Wild Cherry. **SB** - Silver Birch. **R** - Rowan. **DP** - Denbigh Plum.*

Existing trees to be retained.

150.00 *Proposed finished external ground levels.*

All planting, seeding, turfing, fencing, walling or other treatment comprised in the approved details of lanscaping shall be carried out in the first planting and seeding seasons following the completion of the development.
Any trees or plants which, within a period of five years of the development, die, are removed or seriously damaged or diseased, shall be replaced in the next planting season with others of similar size and species.

All existing trees and hedgerows shown to be retained to be protected during the course of development by the erection of a timber chestnut paling fence to the perimeter of the crown of the tree. The fence is to be kept in place to the completion of the building works.

Intermediate fences between plots to rear of properties to be concrete post and vertical boarded timber panel fence. 1.80m high (indicated sf. on plan).

Timber post and wire fence to rear boundary - max. 1.20m high.

Existing stone wall to roadside boundary.

Existing tree to be retained.

2.4m x 25m visibility sightlines to access off Pisgah Hill.

2.4m x 25m visibility sightlines to new vehicular access.

New stone boundary wall to road frontage boundary - max. 0.9m high.

Existing dwellings to be demolished.

2.4m x 25m visibility sightlines to new vehicular access.

2.0m wide footpath to site frontage.

Existing stone wall to boundary.

Existing trees to be retained.

PISGAH HILL

WESTMINSTER ROAD

PARKING & TURNING AREA (Permeable Paving)

F.F.L. - 150.40

F.F.L. - 150.15

F.F.L. - 149.90

Patio

Rear Garden

sf.

REMAINS OF STONE WALL

Willow

Hawthorn

© COPYRIGHT. ALL DIMENSIONS TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORKS.

MATISCHOK & ROSS architectural services

Birch House, Hen Lon Parcwr, Ruthin, Denbighshire, LL15 1NA
t 01824 705 222 f 01824 707 171
e mail@matischokross.co.uk w www.matischokross.co.uk

project title: *Land at 38/40 Westminster Road, Moss, Wrexham.*		
drawing title: *Proposed Site Layout Plan.*		
project no. *1066*	drawing no. *1*	revision
date *19/05/2025*	scale *1:250 @ A3*	drawn by *S R*

APPENDIX C
DCWW Apparatus Maps

Dŵr Cymru
Welsh Water

38/40 Westminster Road, Moss, Wrexham, LL11 6DG

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement (S 104)
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former 524 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases, pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF) . It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best Information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

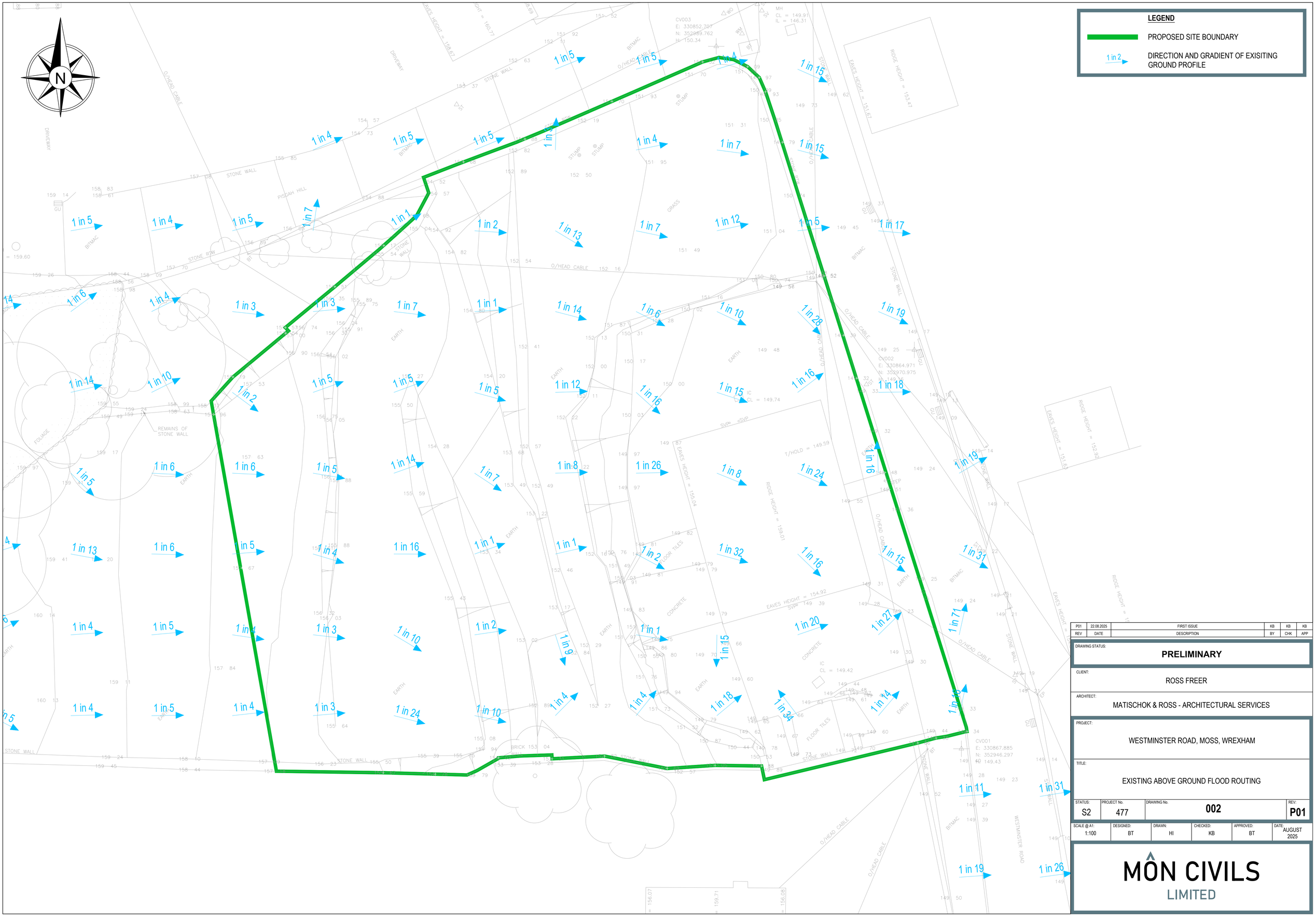
Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref:	330859,352960
Map scale:	1:1000
Printed by:	Jay Kobeissi
Printed on:	22 Aug 2025

APPENDIX D
Existing Above Ground Flood Routing



REV	DATE	DESCRIPTION	BY	CHK	APP
P01	22.08.2025	FIRST ISSUE	KB	KB	KB

DRAWING STATUS: **PRELIMINARY**

CLIENT: ROSS FREER

ARCHITECT: MATISCHOK & ROSS - ARCHITECTURAL SERVICES

PROJECT: WESTMINSTER ROAD, MOSS, WREXHAM

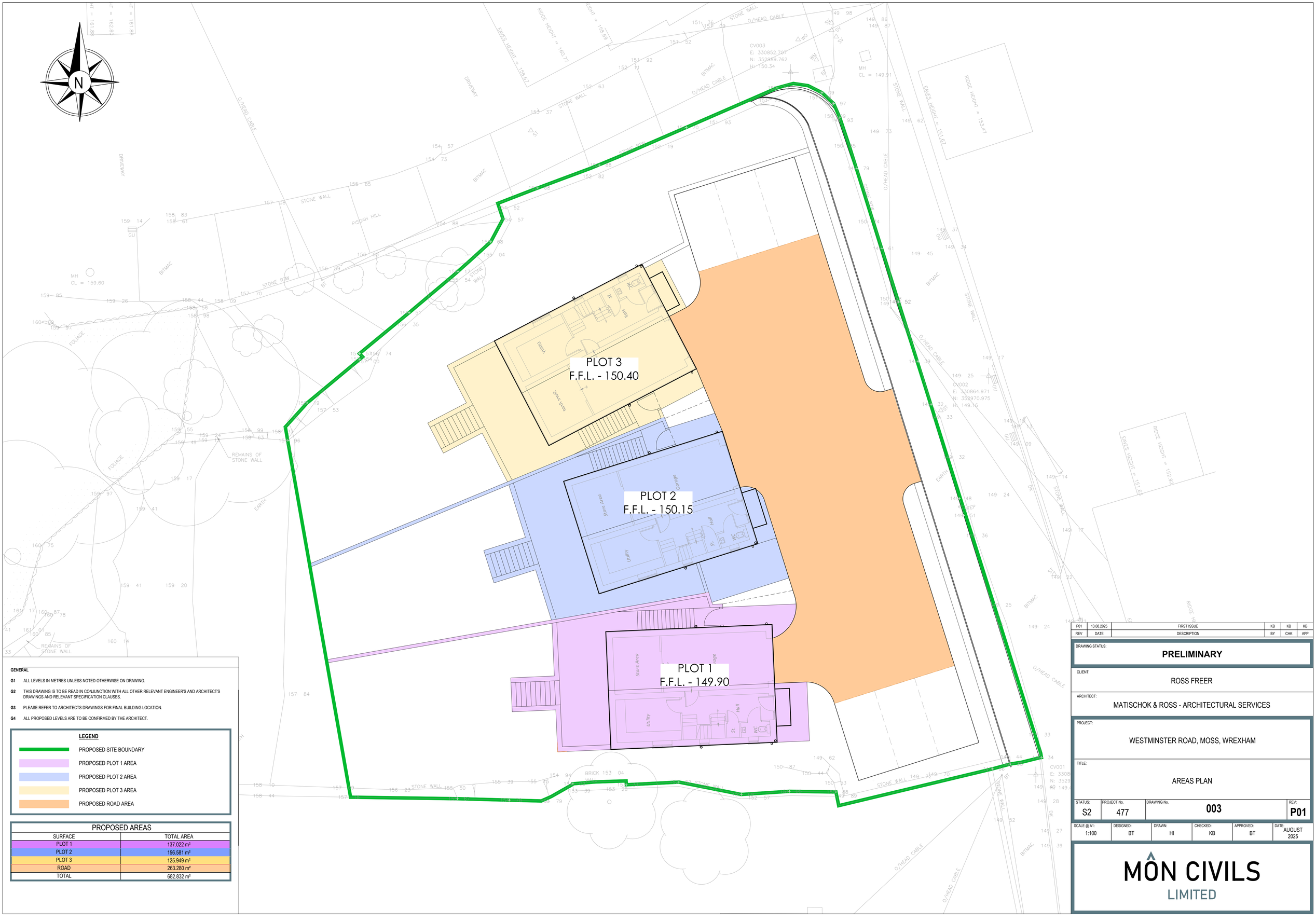
TITLE: EXISTING ABOVE GROUND FLOOD ROUTING

STATUS:	PROJECT No.	DRAWING No.	REV:
S2	477	002	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:100	BT	HI	KB	BT	AUGUST 2025

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APPENDIX E
Proposed Soakaway Catchment Plan



GENERAL

G1 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G2 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G3 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G4 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITECT.

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED PLOT 1 AREA
- PROPOSED PLOT 2 AREA
- PROPOSED PLOT 3 AREA
- PROPOSED ROAD AREA

PROPOSED AREAS	
SURFACE	TOTAL AREA
PLOT 1	137.022 m²
PLOT 2	156.581 m²
PLOT 3	125.949 m²
ROAD	263.280 m²
TOTAL	682.832 m²

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	13.08.2025	FIRST ISSUE	KB	KB	KB

DRAWING STATUS: **PRELIMINARY**

CLIENT: ROSS FREER

ARCHITECT: MATISCHOK & ROSS - ARCHITECTURAL SERVICES

PROJECT: WESTMINSTER ROAD, MOSS, WREXHAM

TITLE: AREAS PLAN

STATUS:	PROJECT No.	DRAWING No.	REV:
S2	477	003	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:100	BT	HI	KB	BT	AUGUST 2025

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APPENDIX F
Hydraulic Model Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	50	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.320	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE1	0.003	5.00	152.592	100	330840.844	352953.599	0.400
S8			152.592	320	330840.761	352955.489	0.447
S7			152.600	320	330843.042	352955.588	0.513
S6	0.005	5.00	149.750	320	330847.338	352955.776	1.100
S5	0.001	5.00	149.791	320	330853.165	352956.030	1.287
RE2	0.004	5.00	150.863	100	330851.354	352946.700	0.796
S2			150.007	320	330855.067	352946.863	0.869
S3			149.721	320	330854.930	352950.020	1.373
S4			149.602		330859.587	352951.134	1.374

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE1	S8	1.892	0.600	152.192	152.145	0.047	40.3	100	5.03	50.0
1.001	S8	S7	2.283	0.600	152.145	152.087	0.058	39.4	100	5.06	50.0
1.002	S7	S6	4.300	0.600	152.087	148.650	3.437	1.3	100	5.07	50.0
1.003	S6	S5	5.833	0.600	148.650	148.504	0.146	40.0	100	5.15	50.0
1.004	S5	S3	6.264	0.600	148.504	148.348	0.156	40.2	100	5.23	50.0
2.000	RE2	S2	3.717	0.600	150.067	149.138	0.929	4.0	100	5.02	50.0
2.001	S2	S3	3.160	0.600	149.138	148.348	0.790	4.0	100	5.03	50.0
1.005	S3	S4	4.789	0.600	148.348	148.228	0.120	39.9	100	5.30	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.219	9.6	0.5	0.300	0.347	0.003	0.0	16	0.649
1.001	1.233	9.7	0.5	0.347	0.413	0.003	0.0	16	0.656
1.002	6.973	54.8	0.5	0.413	1.000	0.003	0.0	7	2.253
1.003	1.223	9.6	1.5	1.000	1.187	0.008	0.0	27	0.893
1.004	1.220	9.6	1.7	1.187	1.273	0.008	0.0	29	0.920
2.000	3.894	30.6	0.8	0.696	0.769	0.004	0.0	11	1.669
2.001	3.894	30.6	0.8	0.769	1.273	0.004	0.0	11	1.669
1.005	1.224	9.6	2.5	1.273	1.274	0.012	0.0	35	1.028

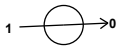
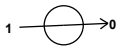
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Pipeline Schedule

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)
1.000	1.892	40.3	100	Circular	152.592	152.192	0.300	152.592	152.145	0.347
1.001	2.283	39.4	100	Circular	152.592	152.145	0.347	152.600	152.087	0.413
1.002	4.300	1.3	100	Circular	152.600	152.087	0.413	149.750	148.650	1.000
1.003	5.833	40.0	100	Circular	149.750	148.650	1.000	149.791	148.504	1.187
1.004	6.264	40.2	100	Circular	149.791	148.504	1.187	149.721	148.348	1.273
2.000	3.717	4.0	100	Circular	150.863	150.067	0.696	150.007	149.138	0.769
2.001	3.160	4.0	100	Circular	150.007	149.138	0.769	149.721	148.348	1.273
1.005	4.789	39.9	100	Circular	149.721	148.348	1.273	149.602	148.228	1.274

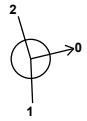
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE1	100	Manhole	Adoptable	S8	320	Manhole	Adoptable
1.001	S8	320	Manhole	Adoptable	S7	320	Manhole	Adoptable
1.002	S7	320	Manhole	Adoptable	S6	320	Manhole	Adoptable
1.003	S6	320	Manhole	Adoptable	S5	320	Manhole	Adoptable
1.004	S5	320	Manhole	Adoptable	S3	320	Manhole	Adoptable
2.000	RE2	100	Manhole	Adoptable	S2	320	Manhole	Adoptable
2.001	S2	320	Manhole	Adoptable	S3	320	Manhole	Adoptable
1.005	S3	320	Manhole	Adoptable	S4		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE1	330840.844	352953.599	152.592	0.400	100				
						0	1.000	152.192	100
S8	330840.761	352955.489	152.592	0.447	320	1	1.000	152.145	100
									
						0	1.001	152.145	100
S7	330843.042	352955.588	152.600	0.513	320	1	1.001	152.087	100
									
						0	1.002	152.087	100
S6	330847.338	352955.776	149.750	1.100	320	1	1.002	148.650	100
									
						0	1.003	148.650	100
S5	330853.165	352956.030	149.791	1.287	320	1	1.003	148.504	100
									
						0	1.004	148.504	100
RE2	330851.354	352946.700	150.863	0.796	100				
						0	2.000	150.067	100
S2	330855.067	352946.863	150.007	0.869	320	1	2.000	149.138	100
									
						0	2.001	149.138	100

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S3	330854.930	352950.020	149.721	1.373	320		1	2.001	148.348	100
							2	1.004	148.348	100
							0	1.005	148.348	100
S4	330859.587	352951.134	149.602	1.374			1	1.005	148.228	100

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)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.320	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Node S4 Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	2.65360	Invert Level (m)	148.228	Pit Length (m)	2.000
Side Inf Coefficient (m/hr)	2.65360	Time to half empty (mins)	4	Depth (m)	0.500
Safety Factor	2.0	Ring Diameter (m)	1.200	Inf Depth (m)	
Porosity	0.35	Pit Width (m)	2.000	Number Required	1

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Results for 1 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 summer	RE1	10	152.208	0.016	0.5	0.0025	0.0000	OK
15 minute summer	S8	11	152.164	0.019	0.5	0.0015	0.0000	OK
15 minute summer	S7	11	152.093	0.006	0.5	0.0005	0.0000	OK
15 minute winter	S6	10	148.677	0.027	1.5	0.0049	0.0000	OK
15 minute winter	S5	11	148.531	0.027	1.6	0.0025	0.0000	OK
15 minute summer	RE2	10	150.078	0.011	0.7	0.0012	0.0000	OK
15 minute summer	S2	10	149.149	0.010	0.7	0.0008	0.0000	OK
15 minute winter	S3	11	148.381	0.033	2.2	0.0026	0.0000	OK
15 minute winter	S4	13	148.317	0.089	2.3	0.1895	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	RE1	1.000	S8	0.5	0.563	0.052	0.0017
15 minute summer	S8	1.001	S7	0.5	0.909	0.052	0.0014
15 minute summer	S7	1.002	S6	0.5	0.619	0.009	0.0040
15 minute winter	S6	1.003	S5	1.5	0.843	0.152	0.0101
15 minute winter	S5	1.004	S3	1.5	0.777	0.161	0.0125
15 minute summer	RE2	2.000	S2	0.7	1.580	0.023	0.0016
15 minute summer	S2	2.001	S3	0.7	0.712	0.023	0.0042
15 minute winter	S3	1.005	S4	2.3	0.915	0.235	0.0221
15 minute winter	S4	Infiltration		1.7			

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Results for 30 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	RE1	11	152.218	0.026	1.2	0.0039	0.0000	OK
15 minute winter	S8	11	152.174	0.029	1.2	0.0023	0.0000	OK
15 minute winter	S7	11	152.096	0.009	1.2	0.0007	0.0000	OK
15 minute winter	S6	10	148.695	0.045	3.6	0.0081	0.0000	OK
15 minute winter	S5	14	148.591	0.086	3.8	0.0080	0.0000	OK
15 minute winter	RE2	10	150.084	0.017	1.8	0.0019	0.0000	OK
15 minute winter	S2	10	149.154	0.016	1.8	0.0013	0.0000	OK
15 minute winter	S3	14	148.585	0.237	5.6	0.0189	0.0000	SURCHARGED
15 minute winter	S4	14	148.574	0.346	4.4	0.7383	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE1	1.000	S8	1.2	0.684	0.125	0.0033
15 minute winter	S8	1.001	S7	1.2	1.138	0.124	0.0026
15 minute winter	S7	1.002	S6	1.2	0.768	0.022	0.0081
15 minute winter	S6	1.003	S5	3.5	1.056	0.369	0.0269
15 minute winter	S5	1.004	S3	3.8	0.919	0.399	0.0470
15 minute winter	RE2	2.000	S2	1.8	2.075	0.059	0.0032
15 minute winter	S2	2.001	S3	1.8	1.208	0.058	0.0137
15 minute winter	S3	1.005	S4	4.4	0.971	0.453	0.0375
15 minute winter	S4	Infiltration		2.5			

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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	RE1	10	152.223	0.031	1.6	0.0046	0.0000	OK
15 minute winter	S8	10	152.179	0.034	1.6	0.0027	0.0000	OK
15 minute winter	S7	11	152.097	0.010	1.6	0.0008	0.0000	OK
30 minute winter	S6	23	148.726	0.076	3.8	0.0137	0.0000	OK
30 minute winter	S5	23	148.721	0.217	4.3	0.0201	0.0000	SURCHARGED
15 minute winter	RE2	10	150.087	0.019	2.3	0.0022	0.0000	OK
15 minute winter	S2	10	149.157	0.018	2.3	0.0015	0.0000	OK
30 minute winter	S3	23	148.711	0.362	5.4	0.0290	0.0000	SURCHARGED
30 minute winter	S4	24	148.697	0.469	4.3	1.0014	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE1	1.000	S8	1.6	0.725	0.165	0.0041
15 minute winter	S8	1.001	S7	1.6	1.211	0.160	0.0032
15 minute winter	S7	1.002	S6	1.5	0.812	0.028	0.0112
30 minute winter	S6	1.003	S5	3.9	1.045	0.401	0.0414
30 minute winter	S5	1.004	S3	3.6	0.905	0.378	0.0490
15 minute winter	RE2	2.000	S2	2.3	2.223	0.075	0.0038
15 minute winter	S2	2.001	S3	2.3	1.036	0.075	0.0139
30 minute winter	S3	1.005	S4	4.3	0.971	0.448	0.0375
30 minute winter	S4	Infiltration		2.9			

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	50	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.320	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE3	0.004	5.00	152.792	100	330838.627	352962.922	0.400
S14			152.792	320	330838.080	352964.659	0.446
S13			152.800	320	330840.257	352965.346	0.511
S12	0.005	5.00	150.000	320	330844.300	352966.621	1.100
S11	0.000	5.00	149.937	460	330849.906	352968.388	1.135
ACO2		5.00	149.848		330852.606	352958.471	0.324
RWP1	0.004	5.00	149.994		330850.431	352960.433	1.300
S10	0.001	5.00	149.878	460	330852.237	352960.997	1.205
S9			149.605		330856.621	352961.603	1.006

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE3	S14	1.822	0.600	152.392	152.346	0.046	39.6	100	5.02	50.0
1.001	S14	S13	2.283	0.600	152.346	152.289	0.057	40.1	100	5.06	50.0
1.002	S13	S12	4.240	0.600	152.289	148.900	3.389	1.3	100	5.07	50.0
1.003	S12	S11	5.878	0.600	148.900	148.802	0.098	60.0	100	5.16	50.0
1.004	S11	S10	7.750	0.600	148.802	148.673	0.129	60.1	100	5.29	50.0
2.000	ACO2	S10	2.552	0.600	149.524	148.673	0.851	3.0	100	5.01	50.0
3.000	RWP1	S10	1.892	0.600	148.694	148.673	0.021	90.1	100	5.04	50.0
1.005	S10	S9	4.425	0.600	148.673	148.599	0.074	59.8	100	5.37	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.229	9.6	0.8	0.300	0.346	0.004	0.0	19	0.732
1.001	1.222	9.6	0.8	0.346	0.411	0.004	0.0	20	0.746
1.002	6.973	54.8	0.8	0.411	1.000	0.004	0.0	8	2.413
1.003	0.996	7.8	1.8	1.000	1.035	0.009	0.0	32	0.806
1.004	0.995	7.8	1.9	1.035	1.105	0.009	0.0	33	0.816
2.000	4.499	35.3	0.0	0.224	1.105	0.000	0.0	0	0.000
3.000	0.810	6.4	0.8	1.200	1.105	0.004	0.0	24	0.550
1.005	0.998	7.8	2.9	1.105	0.906	0.014	0.0	42	0.920

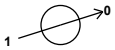
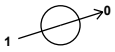
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Pipeline Schedule

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)
1.000	1.822	39.6	100	Circular	152.792	152.392	0.300	152.792	152.346	0.346
1.001	2.283	40.1	100	Circular	152.792	152.346	0.346	152.800	152.289	0.411
1.002	4.240	1.3	100	Circular	152.800	152.289	0.411	150.000	148.900	1.000
1.003	5.878	60.0	100	Circular	150.000	148.900	1.000	149.937	148.802	1.035
1.004	7.750	60.1	100	Circular	149.937	148.802	1.035	149.878	148.673	1.105
2.000	2.552	3.0	100	Circular	149.848	149.524	0.224	149.878	148.673	1.105
3.000	1.892	90.1	100	Circular	149.994	148.694	1.200	149.878	148.673	1.105
1.005	4.425	59.8	100	Circular	149.878	148.673	1.105	149.605	148.599	0.906

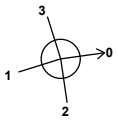
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE3	100	Manhole	Adoptable	S14	320	Manhole	Adoptable
1.001	S14	320	Manhole	Adoptable	S13	320	Manhole	Adoptable
1.002	S13	320	Manhole	Adoptable	S12	320	Manhole	Adoptable
1.003	S12	320	Manhole	Adoptable	S11	460	Manhole	Adoptable
1.004	S11	460	Manhole	Adoptable	S10	460	Manhole	Adoptable
2.000	ACO2		Junction		S10	460	Manhole	Adoptable
3.000	RWP1		Junction		S10	460	Manhole	Adoptable
1.005	S10	460	Manhole	Adoptable	S9		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE3	330838.627	352962.922	152.792	0.400	100	 0	1.000	152.392	100
S14	330838.080	352964.659	152.792	0.446	320	1  0	1.000	152.346	100
							1.001	152.346	100
S13	330840.257	352965.346	152.800	0.511	320	1  0	1.001	152.289	100
							1.002	152.289	100
S12	330844.300	352966.621	150.000	1.100	320	1  0	1.002	148.900	100
							1.003	148.900	100
S11	330849.906	352968.388	149.937	1.135	460	1  0	1.003	148.802	100
							1.004	148.802	100
ACO2	330852.606	352958.471	149.848	0.324		 0	2.000	149.524	100
RWP1	330850.431	352960.433	149.994	1.300		 0	3.000	148.694	100

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S10	330852.237	352960.997	149.878	1.205	460		1	3.000	148.673	100
							2	2.000	148.673	100
							3	1.004	148.673	100
							0	1.005	148.673	100
S9	330856.621	352961.603	149.605	1.006			1	1.005	148.599	100

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)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.320	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Node S9 Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	2.65360	Invert Level (m)	148.599	Pit Length (m)	2.000
Side Inf Coefficient (m/hr)	2.65360	Time to half empty (mins)	4	Depth (m)	0.500
Safety Factor	2.0	Ring Diameter (m)	1.200	Inf Depth (m)	
Porosity	0.35	Pit Width (m)	2.000	Number Required	1

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Results for 1 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	RE3	10	152.413	0.021	0.8	0.0046	0.0000	OK
15 minute winter	S14	11	152.369	0.023	0.8	0.0018	0.0000	OK
15 minute winter	S13	11	152.296	0.007	0.8	0.0006	0.0000	OK
15 minute winter	S12	11	148.933	0.033	1.7	0.0058	0.0000	OK
15 minute winter	S11	11	148.835	0.033	1.8	0.0057	0.0000	OK
15 minute summer	ACO2	1	149.524	0.000	0.0	0.0000	0.0000	OK
15 minute winter	RWP1	13	148.717	0.023	0.7	0.0015	0.0000	OK
15 minute winter	S10	13	148.715	0.042	2.7	0.0079	0.0000	OK
15 minute winter	S9	13	148.717	0.118	2.7	0.2511	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE3	1.000	S14	0.8	0.621	0.080	0.0023
15 minute winter	S14	1.001	S13	0.8	1.009	0.078	0.0018
15 minute winter	S13	1.002	S12	0.8	0.678	0.014	0.0053
15 minute winter	S12	1.003	S11	1.7	0.753	0.213	0.0130
15 minute winter	S11	1.004	S10	1.8	0.682	0.225	0.0202
15 minute summer	ACO2	2.000	S10	0.0	0.000	0.000	0.0037
15 minute winter	RWP1	3.000	S10	0.7	0.394	0.110	0.0042
15 minute winter	S10	1.005	S9	2.7	0.854	0.341	0.0242
15 minute winter	S9	Infiltration		1.8			

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Results for 30 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	RE3	10	152.426	0.034	1.9	0.0076	0.0000	OK
15 minute winter	S14	10	152.384	0.038	1.9	0.0030	0.0000	OK
15 minute winter	S13	10	152.300	0.011	1.9	0.0009	0.0000	OK
15 minute winter	S12	14	148.965	0.065	4.1	0.0115	0.0000	OK
15 minute winter	S11	14	148.961	0.159	4.5	0.0277	0.0000	SURCHARGED
15 minute summer	ACO2	1	149.524	0.000	0.0	0.0000	0.0000	OK
15 minute winter	RWP1	15	148.952	0.258	1.8	0.0165	0.0000	SURCHARGED
15 minute winter	S10	15	148.952	0.278	5.4	0.0529	0.0000	SURCHARGED
15 minute winter	S9	15	148.943	0.344	4.3	0.7338	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE3	1.000	S14	1.9	0.749	0.195	0.0046
15 minute winter	S14	1.001	S13	1.9	1.256	0.193	0.0036
15 minute winter	S13	1.002	S12	1.8	0.843	0.034	0.0121
15 minute winter	S12	1.003	S11	4.3	0.929	0.545	0.0388
15 minute winter	S11	1.004	S10	3.8	0.736	0.490	0.0606
15 minute summer	ACO2	2.000	S10	0.0	0.000	0.000	0.0100
15 minute winter	RWP1	3.000	S10	1.2	0.391	0.196	0.0148
15 minute winter	S10	1.005	S9	4.3	0.908	0.547	0.0346
15 minute winter	S9	Infiltration		2.5			

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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	RE3	10	152.431	0.039	2.4	0.0088	0.0000	OK
15 minute winter	S14	10	152.389	0.043	2.4	0.0035	0.0000	OK
15 minute winter	S13	10	152.302	0.013	2.4	0.0010	0.0000	OK
30 minute winter	S12	23	149.094	0.194	4.3	0.0344	0.0000	SURCHARGED
30 minute winter	S11	24	149.085	0.283	4.4	0.0493	0.0000	SURCHARGED
15 minute summer	ACO2	1	149.524	0.000	0.0	0.0000	0.0000	OK
30 minute winter	RWP1	24	149.075	0.381	1.8	0.0244	0.0000	SURCHARGED
30 minute winter	S10	24	149.075	0.402	4.8	0.0764	0.0000	SURCHARGED
30 minute winter	S9	24	149.063	0.464	3.9	0.9897	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE3	1.000	S14	2.4	0.785	0.247	0.0055
15 minute winter	S14	1.001	S13	2.4	1.325	0.246	0.0043
15 minute winter	S13	1.002	S12	2.4	0.839	0.043	0.0178
30 minute winter	S12	1.003	S11	4.2	0.910	0.540	0.0460
30 minute winter	S11	1.004	S10	3.5	0.713	0.442	0.0606
15 minute summer	ACO2	2.000	S10	0.0	0.000	0.000	0.0100
30 minute winter	RWP1	3.000	S10	1.2	0.378	0.184	0.0148
30 minute winter	S10	1.005	S9	3.9	0.848	0.504	0.0346
30 minute winter	S9	Infiltration		2.8			

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	50	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	1.000
Ratio-R	0.320	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
RE4	0.003	5.00	153.035	100	330836.266	352967.582	0.462
S20			153.035	320	330837.340	352965.518	0.928
S19			153.050	320	330839.681	352966.737	1.471
S18	0.005	5.00	150.250	320	330843.192	352968.565	0.649
S17			150.111	460	330849.013	352971.595	0.675
RE5	0.004	5.00	150.307	100	330845.107	352979.097	0.784
ACO1		5.00	150.250		330846.108	352972.908	0.778
S16			150.214	460	330847.856	352973.817	0.840
S15			150.022		330851.627	352975.780	1.300

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	RE4	S20	2.327	0.600	152.573	152.107	0.466	5.0	100	5.01	50.0
1.001	S20	S19	2.640	0.600	152.107	151.579	0.528	5.0	100	5.02	50.0
1.002	S19	S18	3.958	0.600	151.579	149.601	1.978	2.0	100	5.04	50.0
1.003	S18	S17	6.562	0.600	149.601	149.436	0.165	39.8	100	5.12	50.0
1.004	S17	S16	2.506	0.600	149.436	149.374	0.062	40.4	100	5.16	50.0
2.000	RE5	S16	5.953	0.600	149.523	149.374	0.149	40.0	100	5.08	50.0
3.000	ACO1	S16	1.970	0.600	149.472	149.374	0.098	20.1	100	5.02	50.0
1.005	S16	S15	4.251	0.600	149.374	148.722	0.652	6.5	100	5.18	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.484	27.4	0.5	0.362	0.828	0.003	0.0	10	1.352
1.001	3.482	27.3	0.5	0.828	1.371	0.003	0.0	10	1.351
1.002	5.511	43.3	0.5	1.371	0.549	0.003	0.0	8	1.905
1.003	1.226	9.6	1.5	0.549	0.575	0.007	0.0	27	0.895
1.004	1.216	9.6	1.5	0.575	0.740	0.007	0.0	27	0.888
2.000	1.223	9.6	0.8	0.684	0.740	0.004	0.0	20	0.747
3.000	1.730	13.6	0.0	0.678	0.740	0.000	0.0	0	0.000
1.005	3.047	23.9	2.4	0.740	1.200	0.012	0.0	21	1.954

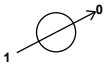
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Pipeline Schedule

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)
1.000	2.327	5.0	100	Circular	153.035	152.573	0.362	153.035	152.107	0.828
1.001	2.640	5.0	100	Circular	153.035	152.107	0.828	153.050	151.579	1.371
1.002	3.958	2.0	100	Circular	153.050	151.579	1.371	150.250	149.601	0.549
1.003	6.562	39.8	100	Circular	150.250	149.601	0.549	150.111	149.436	0.575
1.004	2.506	40.4	100	Circular	150.111	149.436	0.575	150.214	149.374	0.740
2.000	5.953	40.0	100	Circular	150.307	149.523	0.684	150.214	149.374	0.740
3.000	1.970	20.1	100	Circular	150.250	149.472	0.678	150.214	149.374	0.740
1.005	4.251	6.5	100	Circular	150.214	149.374	0.740	150.022	148.722	1.200

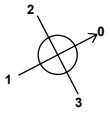
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RE4	100	Manhole	Adoptable	S20	320	Manhole	Adoptable
1.001	S20	320	Manhole	Adoptable	S19	320	Manhole	Adoptable
1.002	S19	320	Manhole	Adoptable	S18	320	Manhole	Adoptable
1.003	S18	320	Manhole	Adoptable	S17	460	Manhole	Adoptable
1.004	S17	460	Manhole	Adoptable	S16	460	Manhole	Adoptable
2.000	RE5	100	Manhole	Adoptable	S16	460	Manhole	Adoptable
3.000	ACO1		Junction		S16	460	Manhole	Adoptable
1.005	S16	460	Manhole	Adoptable	S15		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RE4	330836.266	352967.582	153.035	0.462	100	 0	1.000	152.573	100
S20	330837.340	352965.518	153.035	0.928	320	 1 0	1.000 1.001	152.107 152.107	100 100
S19	330839.681	352966.737	153.050	1.471	320	 1 0	1.001 1.002	151.579 151.579	100 100
S18	330843.192	352968.565	150.250	0.649	320	 1 0	1.002 1.003	149.601 149.601	100 100
S17	330849.013	352971.595	150.111	0.675	460	 1 0	1.003 1.004	149.436 149.436	100 100
RE5	330845.107	352979.097	150.307	0.784	100	 0	2.000	149.523	100
ACO1	330846.108	352972.908	150.250	0.778		 0	3.000	149.472	100

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections		Link	IL (m)	Dia (mm)
S16	330847.856	352973.817	150.214	0.840	460		1	3.000	149.374	100
							2	2.000	149.374	100
							3	1.004	149.374	100
							0	1.005	149.374	100
S15	330851.627	352975.780	150.022	1.300			1	1.005	148.722	100

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)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.320	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Node S15 Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	2.65360	Invert Level (m)	148.722	Pit Length (m)	2.000
Side Inf Coefficient (m/hr)	2.65360	Time to half empty (mins)	4	Depth (m)	0.500
Safety Factor	2.0	Ring Diameter (m)	1.200	Inf Depth (m)	
Porosity	0.35	Pit Width (m)	2.000	Number Required	1

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Results for 1 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	RE4	10	152.583	0.010	0.5	0.0013	0.0000	OK
15 minute winter	S20	10	152.117	0.010	0.5	0.0008	0.0000	OK
15 minute summer	S19	11	151.586	0.007	0.5	0.0006	0.0000	OK
15 minute winter	S18	10	149.627	0.026	1.4	0.0064	0.0000	OK
15 minute winter	S17	11	149.465	0.029	1.4	0.0048	0.0000	OK
15 minute winter	RE5	10	149.543	0.020	0.8	0.0025	0.0000	OK
15 minute summer	ACO1	1	149.472	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S16	11	149.395	0.021	2.2	0.0034	0.0000	OK
15 minute winter	S15	13	148.804	0.082	2.2	0.1745	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE4	1.000	S20	0.5	1.254	0.018	0.0009
15 minute winter	S20	1.001	S19	0.5	1.496	0.018	0.0009
15 minute summer	S19	1.002	S18	0.5	0.597	0.012	0.0037
15 minute winter	S18	1.003	S17	1.4	0.804	0.145	0.0115
15 minute winter	S17	1.004	S16	1.4	0.936	0.147	0.0038
15 minute winter	RE5	2.000	S16	0.8	0.711	0.083	0.0067
15 minute summer	ACO1	3.000	S16	0.0	0.000	0.000	0.0011
15 minute winter	S16	1.005	S15	2.2	1.427	0.092	0.0165
15 minute winter	S15	Infiltration		1.7			

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Results for 30 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	RE4	10	152.588	0.015	1.2	0.0020	0.0000	OK
15 minute winter	S20	10	152.123	0.016	1.2	0.0013	0.0000	OK
15 minute winter	S19	10	151.590	0.011	1.2	0.0009	0.0000	OK
15 minute winter	S18	10	149.644	0.043	3.5	0.0106	0.0000	OK
15 minute winter	S17	10	149.484	0.048	3.5	0.0079	0.0000	OK
15 minute winter	RE5	10	149.555	0.032	2.0	0.0040	0.0000	OK
15 minute summer	ACO1	1	149.472	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S16	10	149.406	0.032	5.4	0.0054	0.0000	OK
15 minute winter	S15	14	149.162	0.440	5.4	0.9396	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE4	1.000	S20	1.2	1.596	0.044	0.0018
15 minute winter	S20	1.001	S19	1.2	1.914	0.044	0.0017
15 minute winter	S19	1.002	S18	1.2	0.716	0.028	0.0074
15 minute winter	S18	1.003	S17	3.5	1.000	0.360	0.0227
15 minute winter	S17	1.004	S16	3.4	1.171	0.358	0.0073
15 minute winter	RE5	2.000	S16	2.0	0.910	0.206	0.0130
15 minute summer	ACO1	3.000	S16	0.0	0.000	0.000	0.0021
15 minute winter	S16	1.005	S15	5.4	1.706	0.224	0.0213
15 minute winter	S15	Infiltration		2.8			

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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	RE4	10	152.590	0.017	1.6	0.0023	0.0000	OK
15 minute winter	S20	10	152.125	0.018	1.6	0.0015	0.0000	OK
15 minute winter	S19	10	151.592	0.013	1.6	0.0010	0.0000	OK
15 minute winter	S18	10	149.651	0.050	4.5	0.0123	0.0000	OK
15 minute winter	S17	10	149.492	0.056	4.4	0.0092	0.0000	OK
15 minute winter	RE5	10	149.559	0.036	2.5	0.0045	0.0000	OK
15 minute summer	ACO1	1	149.472	0.000	0.0	0.0000	0.0000	OK
15 minute winter	S16	14	149.464	0.090	6.9	0.0150	0.0000	OK
15 minute winter	S15	14	149.453	0.731	6.7	1.0686	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	RE4	1.000	S20	1.6	1.718	0.058	0.0022
15 minute winter	S20	1.001	S19	1.6	2.067	0.058	0.0020
15 minute winter	S19	1.002	S18	1.6	0.743	0.036	0.0090
15 minute winter	S18	1.003	S17	4.4	1.054	0.460	0.0276
15 minute winter	S17	1.004	S16	4.4	1.240	0.461	0.0121
15 minute winter	RE5	2.000	S16	2.5	0.954	0.259	0.0262
15 minute summer	ACO1	3.000	S16	0.0	0.000	0.000	0.0029
15 minute winter	S16	1.005	S15	6.7	1.558	0.282	0.0325
15 minute winter	S15	Infiltration		2.9			

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Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	50	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.320	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Easting (m)	Northing (m)	Depth (m)
ACO	0.026	5.00	149.434	330859.025	352969.822	0.650
S20			149.690	330855.150	352971.150	1.316

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	ACO	S20	4.096	0.600	148.784	148.374	0.410	10.0	150	5.02	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.206	56.7	5.4	0.500	1.166	0.026	0.0	31	2.036

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	4.096	10.0	150	Circular	149.434	148.784	0.500	149.690	148.374	1.166

Link	US Node	Node Type	DS Node	Node Type
1.000	ACO	Junction	S20	Junction

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Connections	Link	IL (m)	Dia (mm)
ACO	330859.025	352969.822	149.434	0.650	0	1.000	148.784	150
S20	330855.150	352971.150	149.690	1.316	1	1.000	148.374	150

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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)	18.000	Additional Storage (m³/ha)	20.0
Ratio-R	0.320	Starting Level (m)	
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

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

Node S20 Lined Soakaway Storage Structure

Base Inf Coefficient (m/hr)	2.65360	Invert Level (m)	148.374	Pit Length (m)	3.000
Side Inf Coefficient (m/hr)	2.65360	Time to half empty (mins)	5	Depth (m)	0.500
Safety Factor	2.0	Ring Diameter (m)	1.800	Inf Depth (m)	
Porosity	0.35	Pit Width (m)	3.000	Number Required	1

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Results for 1 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	ACO	10	148.814	0.030	5.1	0.0271	0.0000	OK
15 minute winter	S20	12	148.467	0.093	5.1	0.4454	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	ACO	1.000	S20	5.1	1.531	0.090	0.0278
15 minute winter	S20	Infiltration		3.7			

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Results for 30 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	ACO	15	148.857	0.073	12.5	0.0649	0.0000	OK
15 minute winter	S20	14	148.866	0.492	12.5	2.3624	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	ACO	1.000	S20	12.5	1.858	0.220	0.0534
15 minute winter	S20	Infiltration		5.5			

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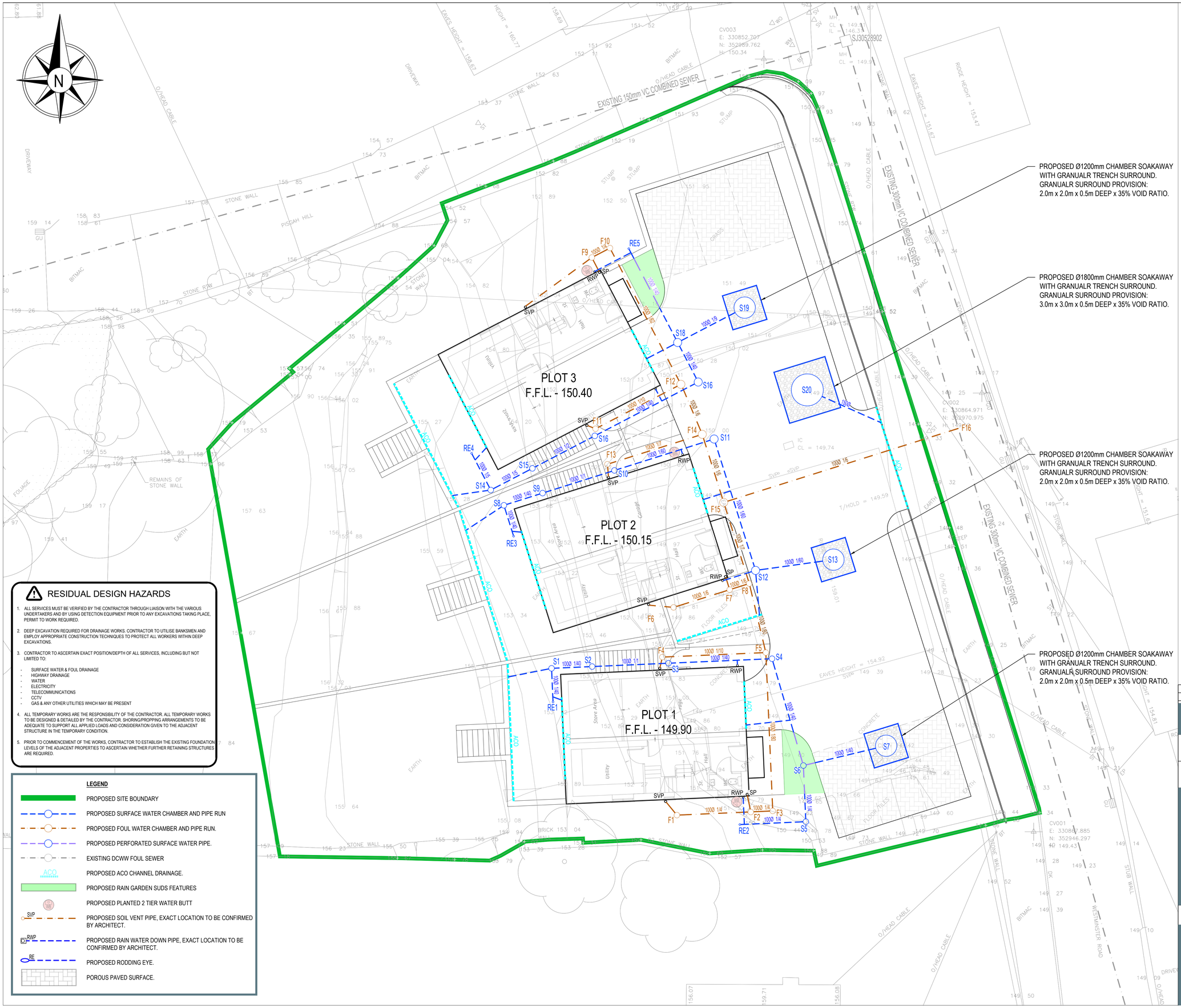
Results for 100 year +50% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	ACO	14	149.434	0.650	16.1	0.6078	0.0000	FLOOD RISK
30 minute winter	S20	24	149.541	1.167	12.7	2.4044	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute winter	ACO	1.000	S20	15.6	1.914	0.275	0.0721
30 minute winter	S20	Infiltration		5.5			

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APPENDIX G
Proposed Site Drainage Layout



RESIDUAL DESIGN HAZARDS

1. ALL SERVICES MUST BE VERIFIED BY THE CONTRACTOR THROUGH LIAISON WITH THE VARIOUS UNDERTAKERS AND BY USING DETECTION EQUIPMENT PRIOR TO ANY EXCAVATIONS TAKING PLACE, PERMIT TO WORK REQUIRED.
2. DEEP EXCAVATION REQUIRED FOR DRAINAGE WORKS. CONTRACTOR TO UTILISE BANKSMEN AND EMPLOY APPROPRIATE CONSTRUCTION TECHNIQUES TO PROTECT ALL WORKERS WITHIN DEEP EXCAVATIONS.
3. CONTRACTOR TO ASCERTAIN EXACT POSITION/DEPTH OF ALL SERVICES, INCLUDING BUT NOT LIMITED TO:
   - SURFACE WATER & FOUL DRAINAGE
   - HIGHWAY DRAINAGE
   - WATER
   - ELECTRICITY
   - TELECOMMUNICATIONS
   - CCTV
   - GAS & ANY OTHER UTILITIES WHICH MAY BE PRESENT
4. ALL TEMPORARY WORKS ARE THE RESPONSIBILITY OF THE CONTRACTOR. ALL TEMPORARY WORKS TO BE DESIGNED & DETAILED BY THE CONTRACTOR. SHORING/PROPPING ARRANGEMENTS TO BE ADEQUATE TO SUPPORT ALL APPLIED LOADS AND CONSIDERATION GIVEN TO THE ADJACENT STRUCTURE IN THE TEMPORARY CONDITION.
5. PRIOR TO COMMENCEMENT OF THE WORKS, CONTRACTOR TO ESTABLISH THE EXISTING FOUNDATION LEVELS OF THE ADJACENT PROPERTIES TO ASCERTAIN WHETHER FURTHER RETAINING STRUCTURES ARE REQUIRED.

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED SURFACE WATER CHAMBER AND PIPE RUN
- PROPOSED FOUL WATER CHAMBER AND PIPE RUN.
- PROPOSED PERFORATED SURFACE WATER PIPE.
- EXISTING DCWW FOUL SEWER
- PROPOSED ACO CHANNEL DRAINAGE.
- PROPOSED RAIN GARDEN SUDS FEATURES
- PROPOSED PLANTED 2 TIER WATER BUTT
- SVP — PROPOSED SOIL VENT PIPE, EXACT LOCATION TO BE CONFIRMED BY ARCHITECT.
- RWP — PROPOSED RAIN WATER DOWN PIPE, EXACT LOCATION TO BE CONFIRMED BY ARCHITECT.
- RE — PROPOSED RODDING EYE.
- POROUS PAVED SURFACE.

GENERAL

G1 DO NOT SCALE FROM THIS DRAWING.

G2 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G3 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G4 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G6 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITCT.

G7 FINAL LOCATIONS AND DETAILS OF SOIL VENT PIPES, STUB STACKS, RAINWATER DOWN PIPES, GULLIES ETC. TO BE CONFIRMED BY REFERENCE TO ARCHITECT' DRAWINGS.

G8 ALL THRESHOLD DRAIN DETAILS TO BE TO ARCHITECT' DETAILS.

G9 ALL LEVELS ARE TO BE CHECKED ON SITE.

DRAINAGE

D1 ALL DRAINAGE COMPONENTS ARE TO COMPLY WITH CURRENT BRITISH STANDARDS.

D2 DRAIN PIPE THROUGH WALLS OR BENEATH FOUNDATIONS (SPREAD ONLY) TO HAVE REINFORCED CONCRETE BRIDGE LINTELS OVER AND PIPE SURROUNDED IN FLEXIBLE MATERIAL (50mm).

D3 ALL PIPES INTO CHAMBERS TO SOFFIT TO SOFFIT U.N.O.

D4 AT ALL OUTFALL POINTS TO AN EXISTING NETWORK, THE POSITION AND INVERT LEVEL OF EXISTING DRAINS MUST BE CONFIRMED WELL IN ADVANCE OF THE PROGRAMMED DATE FOR INSTALLING ANY OF THE UPSTREAM DRAINAGE, OR ORDERING OF ANY MATERIALS IN ORDER TO ALLOW TIME FOR ANY NECESSARY REVISIONS TO THE HYDRAULIC DESIGN.

D5 ALL GRAVITY UPVC PIPEWORK TO BE TO BS 4660 OR BS 5481 WHERE RELEVANT UNLESS NOTED OTHERWISE.

D6 ALL NON ADOPTABLE DOMESTIC FOUL AND SURFACE WATER PIPE RUNS SHALL CONSIST OF 100mm DIA. PIPES LAID AT NO FLATTER THAN 1 IN 80 FALLS U.N.O.

D7 A SEWER OR LATERAL DRAIN WITH A NOMINAL INTERNAL DIAMETRE OF 100mm, OR A LATERAL DRAIN SERVING TEN OR LESS PROPERTIES IS LAID TO A GRADIENT NOT FLATTER THAN 1:80, WHERE THERE IS AT LEAST ONE WC CONNECTED AND 1:40 IF THERE IS NO WC CONNECTED.

D8 THERMOPLASTIC PIPES, JOINTS & FITTINGS FOR GRAVITY SEWERS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1401-1, BS EN 1852 & BS EN 12666-1.

D9 THERMOPLASTIC STRUCTURED WALL PIPE:
THERMOPLASTIC STRUCTURED WALL SEWER PIPE SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 13476-1 & WIS 4-35-01 AND BS EN 13476-2 OR BS EN 13476-3. PIPES SHALL BE BSI KITEMARKED OR HAVE EQUIVALENT THIRD PART CERTIFICATION. PIPES LESS THAN OR EQUAL TO 500mm IN DIAMETRE SHALL HAVE NOMINAL SHORT-TERM RING STIFFNESS NOT LESS THAN 8KN/m² (SN8) OR BE SUBJECT TO A QUALITY SYSTEM FOR STORAGE & EMBEDMENT.

Nom. SHORT TERM RING STIFFNESS OF 2KN/m² (SN2) IS ACCEPTABLE FOR PIPES GREATER THAN Ø 500mm, SUBJECT TO SUPPORTING STRUCTURAL DESIGN LOAD CALCULATIONS BEING PROVIDED.

TRANSPORTATION, HANDLING, STORAGE AND LAYING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTION.

WHERE A FITTING IS INSTALLED ON A SEWER LENGTH, IT SHALL HAVE THE SAME INTERNAL BORE AS THE SEWER. Max. LENGTH OF PIPE FOR LAYING IS 3.0m OR Ø x 10, WHICHEVER IS THE GREATER, UNLESS WELDED JOINTS ARE USED.

D10 OPTIMUM TRENCH WIDTH = PIPE + 300mm. CONTRACTOR TO ENSURE TRENCH WALLS ARE SUITABLY PROPPED.

D11 BACKFILLING TO PIPE TRENCHES BENEATH ROADS, CAR PARKING AND STRUCTURES TO BE M.O.T. TYPE 1 GRANULAR MATERIAL UP TO FORMATION LEVEL FROM THE TOP OF THE SPECIFIED PIPE SURROUND (WELL COMPACTED IN 150mm LAYERS).

D12 BACKFILLING TO PIPE TRENCHES BENEATH LANDSCAPED AREAS TO BE SELECTED EXCAVATED MATERIAL FREE FROM LARGE STONES GREATER THAN 75mm, LUMPS OF CLAY OVER 100mm, ANY TIMBER, FROZEN MATERIAL OR VEGETATION MATTER UP TO FORMATION / GROUND LEVEL FROM THE TOP OF THE SPECIFIED PIPE SURROUND (WELL COMPACTED IN 150mm LAYERS).

D13 GRANULAR MATERIAL NOMINAL SIZE 10mm SINGLE SIZED OR 14mm TO 5mm GRADED.

D14 BACKFILL MUST NOT BE LACED ON CONCRETE BEDDING OR SURROUND UNTIL THE CONCRETE COMPRESSIVE STRENGTH HAS REACHED 15N/mm².

D15 BRICKS OR BLOCKS MUST NOT BE PLACED IN THE BEDDING MORTAR FOR SETTING THE PIPES TO LEVEL .

D16 ROCKER PIPES TO BE PROVIDED AT TYPE 2 CONCRETE CHAMBERS AND AT TRANSITION FROM CONCRETE SURROUND (TYPE Z) TO GRANULAR SURROUND (TYPE S).ALL ROCKER PIPE LENGTHS TO BE 600mm.

D17 MAX DISTANCE FROM FACE OF CONCRETE SURROUND TO FIRST FLEXIBLE JOINT TO BE 150mm.

D18 MANHOLE COVERS AND FRAMES
MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF THE BS EN 124,M BS 7903 AND HIGHWAYS AGENCY GUIDANCE DOCUMENT HA 104/09. THEY SHALL BE OF NON ROCKING DESIGN WHICH DOES NOT RELAY TO THE CUSHION INSERTS.

MANHOLE COVER ON FOUL ONLY SEWERS SHALL BE OF LOW LEAKAGE TYPES IN ORDER TOP PREVENT EXCESSIVE SURFACE WATER INGRESS

AS A MINIMUM, CLASS D400 SHALL BE USED IN CARRIAGEWAYS OR ROADS (INCLUDING PEDESTRIAN STREETS), HARD SHOULDERS AND PARKING AREAS USED BY ALL TYPES OF VEHICLES.

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	22.08.2025	FIRST ISSUE	KB	KB	BT

DRAWING STATUS: **PRELIMINARY**

CLIENT: ROSS FREER

ARCHITECT: MATISCHOK & ROSS - ARCHITECTURAL SERVICES

PROJECT: WESTMINSTER ROAD, MOSS, WREXHAM

TITLE: PROPOSED DRAINAGE LAYOUT

STATUS:	PROJECT No.	DRAWING No.	REV:
S2	477	004	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:100	BT	HI	KB	BT	AUGUST 2025

MÔN CIVILS LIMITED