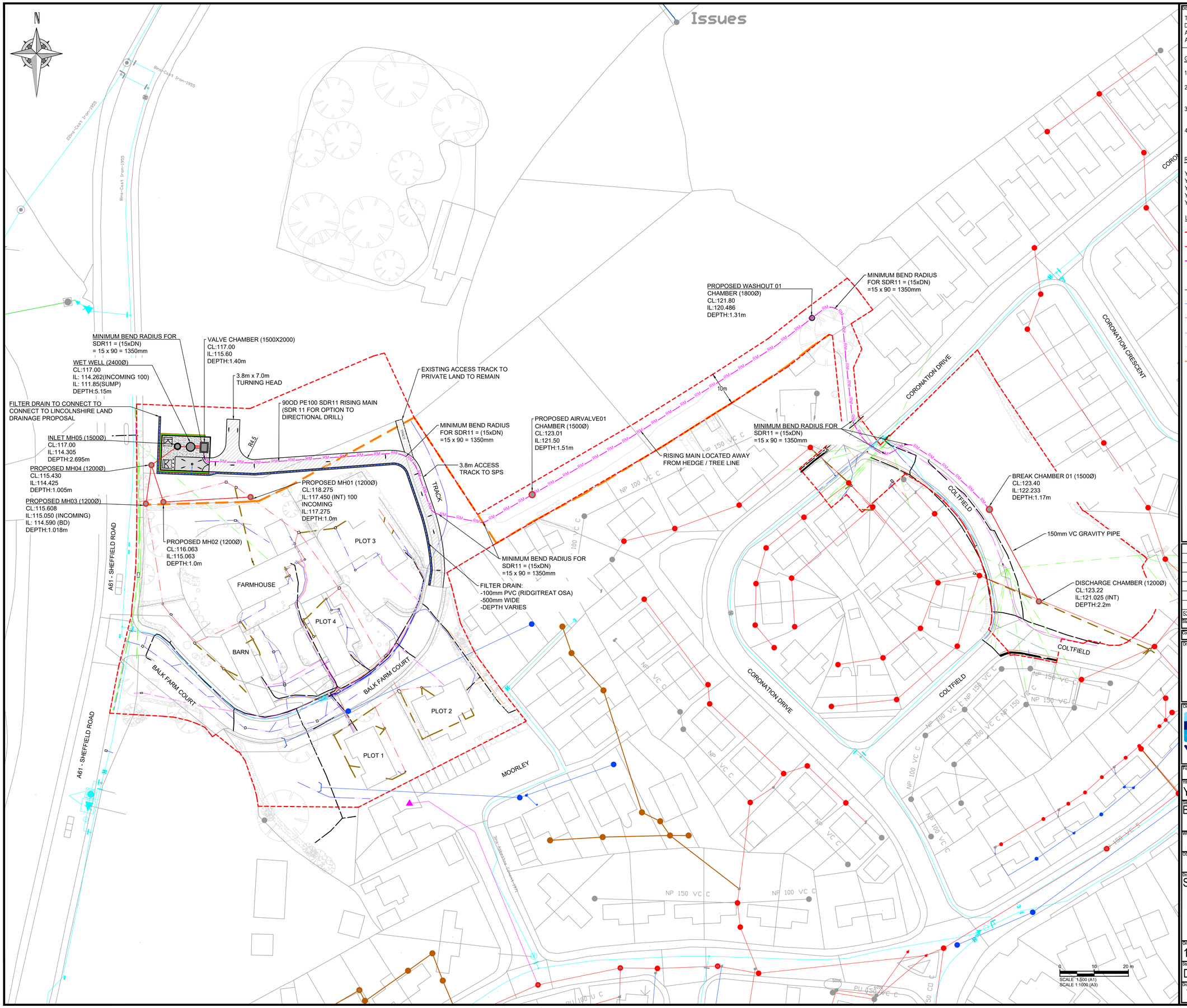
Issues



DISCLAIMERS & NOTES:

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GENERAL :

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS ARE IN MILLIMETRES (mm) & ALL LEVELS ARE IN METRES (m) AOD, UNLESS STATED OTHERWISE.
3. ALL DIMENSIONS & LEVELS TO BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORKS AND ANY DISCREPANCIES SHOULD BE REPORTED TO THE DESIGNER.
4. ALL WORKS TO BE IN ACCORDANCE WITH YORKSHIRE WATER'S ENGINEERING SPECIFICATION (CURRENT AT TIME OF CONTRACT) AND ASSET STANDARDS INCLUDING SEWERAGE SECTOR GUIDANCE.

REFERENCE DOCUMENTS AND DRAWINGS:

YW.205462-GHD-WTN-NCS-DR-C-0001 SITE LOCATION PLAN
YW.205462-GHD-WTN-NCS-DR-C-0003 RISING MAIN PLAN & SECTION
YW.205462-GHD-WTN-NCS-DR-C-0004 GRAVITY PIPEWORK PLAN & SECTION
YW.205462-GHD-WTN-NCS-DR-C-0005 SPS GENERAL ARRANGEMENT
YW.205462-GHD-WTN-NCS-DR-C-0006 SWEPT PATH ANALYSIS

LEGEND:

- SURVEY BOUNDARY LINE
- PROPOSED COMBINED WATER SEWER
- PROPOSED RISING MAIN
- PROPOSED BELOW GROUND STRUCTURE
- EXSITING FOUL WATER SEWER (YW RECORDS)
- EXISTING SURFACE WATER SEWER (YW RECORDS)
- EXISTING COMBINED SEWER (YW RECORDS)
- EXISTING RISING MAIN (YW RECORDS)
- EXISTING WATER MAIN (YW RECORDS)
- PUBLIC RIGHT OF WAY (INDICATIVE LOCATION)
- PROPOSED FILTER DRAIN CONSTRUCTION (63m²)
- PROPOSED CONCRETE FOOTPATH COMPOUND 150 THK GEN 3 CONC WITH 1 LAYER A393 MESH (100m²)
- PROPOSED CONCRETE HARDSTANDING 250 THK GEN 3 CONC WITH 2 LAYERS A393 MESH
- PROPOSED VEGETATED RETAINING WALL - FLEX MSE (OSA) (20m²)
- PROPOSED ACCESS ROAD (425m²)
- EXISTING ACCESS ROAD
- PROPOSED FENCING/RAILING (40m)
- PROPOSED CONCRETE BOLLARD (3m)

DRAFT

S2	P0	FOR INFORMATION	CH	JH	DH	21.03.25
Status Rev:		Description:	Orig:	Chk:	Appr:	Date:

Construction Date:

Originator / Partner / OEM Ref: GHD

GallifordTry
GHD
Richmond House, Lawnswood Business Park, Leeds, LS16 6QY, United Kingdom
T 44 (0)113 487 8600
E UKmail@ghd.com W www.ghd.com

YORKSHIRE WATER ALWAYS CONSIDERS
LIFE SAVING RULES

Client:

YorkshireWater
Yorkshire Water Services Ltd
Western House,
Western Way,
Halifax Road,
Bradford,
BD6 2SZ

Framework: AMP8 WASTE SOLUTIONS	Work Stream: INFRASTRUCTURE
YW Batch ID / Project Code: YW.205642	YW Solution ID: 446065

Site: BALK FARM COURT S101A

What three words: CHAIR - BRAVE - TONE

OS Grid Reference: 434411, 402205	DAZ or DMA References: 303

Drawing Title: SITE LAYOUT

Original Design / OEM Reference: 12653454	Size: A1	Scale: 1:500
Status Description: DESIGN ACCEPTANCE	Status: S3	Revision: P01

Drawing Number: YW.205642 GAL WTN NCS DR C 0002

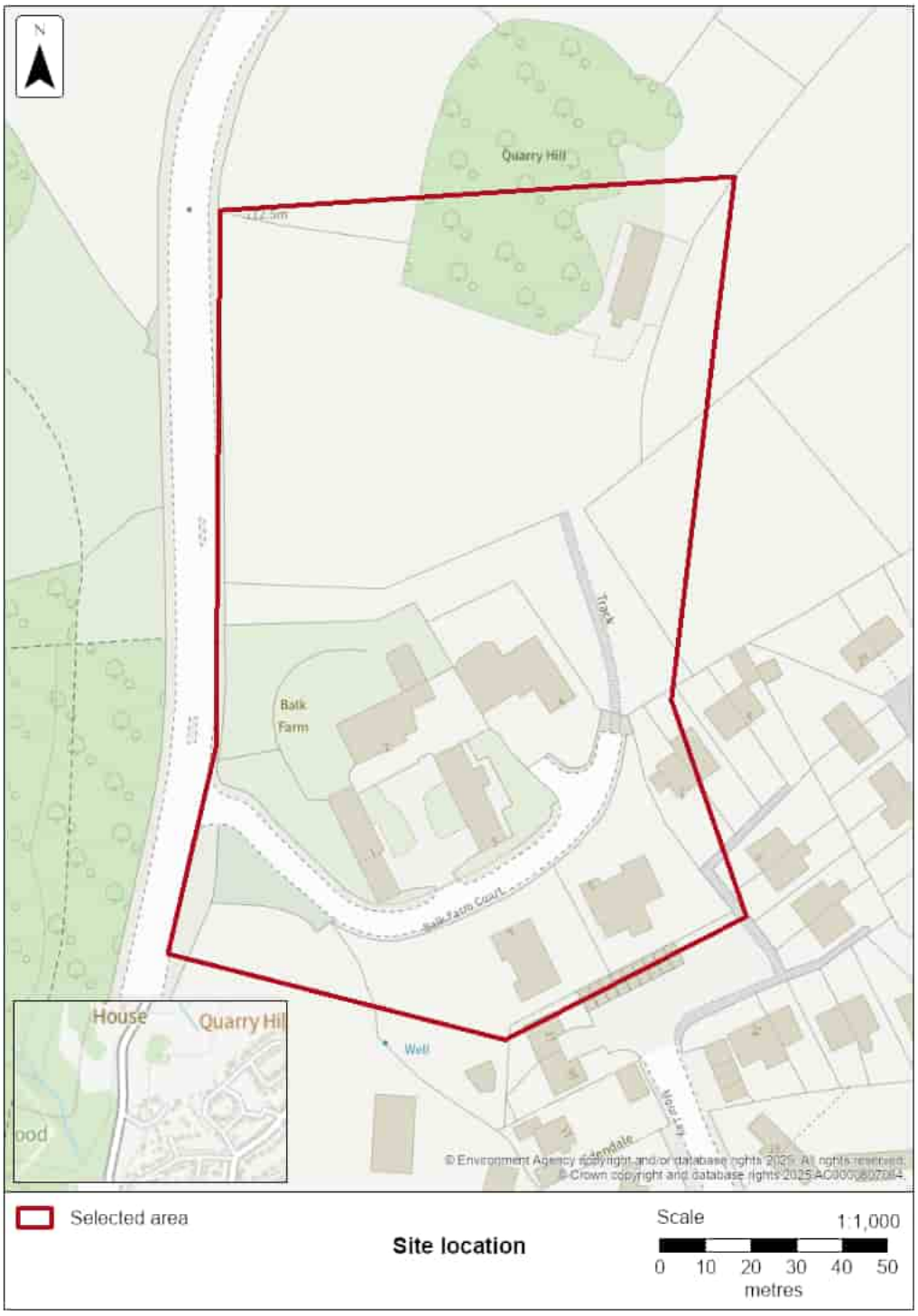
Appendix D

STAKEHOLDER CORRESPONDENCE

Flood risk assessment data

Location of site: 434449 / 402203 (shown as easting and northing coordinates)
Document created on: 12 September 2025
This information was previously known as a product 4.
Customer reference number: JE98PBMYN8HA

Map showing the location that flood risk assessment data has been requested for.



Outlook

RE: Customer contact for action - Flooding advice enquiry

From Craven , Oliver (SENIOR ENGINEER - ASSETS) <OliverCraven@barnsley.gov.uk>
Date Thu 9/18/2025 3:33 PM
To Ho, Jess <Jessica.Ho@wsp.com>
Cc Mierzejewska, Ania <Anna.Mierzejewska@wsp.com>

Hi Jessica,

Please see below comments to your recent enquiry.

• Details of any flood defence structure at the site or in the surrounding area

I am not aware of any flood defence structures within the area of the site.

• Drainage and water quality requirements (see below) Please could Barnsley Council provide advice on how they would expect the Climate Change guidance to be applied with regards to surface water attenuation requirements?

There should be no increase in surface water runoff from the new development. PPS25 recognises that the management of flood risk is not simply restricted to flood plains and that a catchment-wide approach should be employed.
Any balancing facility should be designed to accommodate a 1 in 30-year flow from the site and a 1 in 100-year flow retained within the site (including an allowance of 30% for climate change), without causing any flooding to buildings.

• Any specific SuDS guidance which is not already available on the website?

Please see guidance on our website

• Would a climate change central allowance of 28% for 2080s epoch be reasonable for calculating the storage requirement?

Please see above

• Would you like us to include an urban creep and if so what percentage?

A 10% allowance for Urban Creep should be incorporated into the design

If you have any further questions, please don't hesitate to contact me.

Thanks,

Oliver Craven
Assistant Engineer (Drainage)
Environment and Transport
Growth and Sustainability
Mobile: 07452990439
Email: olivercraven@Barnsley.gov.uk
Mail: Smithies Depot, Smithies Lane, Barnsley S71 1NL

From: Ho, Jess <Jessica.Ho@wsp.com>
Sent: 16 September 2025 16:29
To: Highway Maintenance <HighwayMaintenance@barnsley.gov.uk>
Cc: Mierzejewska, Ania <Anna.Mierzejewska@wsp.com>
Subject: RE: Customer contact for action - Flooding advice enquiry

Hi,

Thank you for confirming this. Can you provide us with an email to the Barnsley LLFA contact please as we will need to confirm certain aspects from the LLFA for our project?

Kind regards,

Jessica Ho
Assistant Consultant - Sustainable Water Management
BSc(hons), MSc, MCIWEM
(she/her)

WSP
Exchange Station,
Tithebarn Street,
Liverpool,
L2 2QP
United Kingdom

wsp.com

From: Highway Maintenance <HighwayMaintenance@barnsley.gov.uk>
Sent: 16 September 2025 16:15
To: Ho, Jess <Jessica.Ho@wsp.com>
Subject: FW: Customer contact for action - Flooding advice enquiry

Good Afternoon Jessica,

I hope you're doing well. Regarding your enquiry about flood risk and flooding data at the mentioned site, I'm afraid we are unable to act as a middle agent for you in this matter. However, I believe you can get the necessary information by contacting the Environment Agency directly at enquiries@environment-agency.gov.uk.

Thank you for understanding.

Highway Maintenance
Environment and Transport
Growth and Sustainability
Barnsley Metropolitan Borough Council
Email: Roads@Barnsley.gov.uk

From: Ho, Jess <Jessica.Ho@wsp.com>
Sent: 16 September 2025 15:18
To: Highway Maintenance <HighwayMaintenance@barnsley.gov.uk>
Cc: Mierzejewska, Ania <Anna.Mierzejewska@wsp.com>; Lamb, Georgie <Georgie.Lamb@wsp.com>
Subject: RE: Customer contact for action - Flooding advice enquiry

---

Hi,

Thanks for getting back to me. Please can you pass this enquiry onto the LLFA as it is has been quite difficult to contact them and it is unclear as to how to contact them. We would like to enquire about:

- Details of any flood defence structure at the site or in the surrounding area
- Drainage and water quality requirements (see below) Please could Barnsley Council provide advice on how they would expect the Climate Change guidance to be applied with regards to surface water attenuation requirements?
- Any specific SuDS guidance which is not already available on the website?
- Would a climate change central allowance of 28% for 2080s epoch be reasonable for calculating the storage requirement?
- Would you like us to include an urban creep and if so what percentage?

Kind regards,

Jessica Ho
Assistant Consultant - Sustainable Water Management
BSc(hons), MSc, MCIWEM
(she/her)

WSP
Exchange Station,
Tithebarn Street,
Liverpool,
L2 2QP
United Kingdom

wsp.com

From: Highway Maintenance <HighwayMaintenance@barnsley.gov.uk>
Sent: 16 September 2025 13:08
To: Ho, Jess <Jessica.Ho@wsp.com>
Subject: FW: Customer contact for action - Flooding advice enquiry

Good Afternoon

We don't have any specific records on flooding for this site as it falls under the jurisdiction of the Environment Agency. They recently published updated flood risk planning maps on the 27th of August, so I recommend that the client rechecks these maps for the most current information.

Additionally, it would be beneficial for you to get in touch with Yorkshire Water for further details about drainage and water quality requirements.

Many Thanks
Highway Maintenance
Environment and Transport
Growth and Sustainability
Barnsley Metropolitan Borough Council
Email: Roads@Barnsley.gov.uk

From: Highway Maintenance <HighwayMaintenance@barnsley.gov.uk>
Sent: 16 September 2025 12:15
To: HighwayDrainage <HighwayDrainage@barnsley.gov.uk>; Allen , Eddy (FLOOD RISK CO-ORDINATOR) <EdwardAllen@barnsley.gov.uk>
Subject: FW: Customer contact for action - Flooding advice enquiry

Can you have a look at this please?

Question	Response
Page 1 - Your details	
Title	Miss
First name	Jessica
Last name	Ho
Company name	WSP
Address	1, COLTFIELD, BIRDWELL, BARNSLEY, S70 5RH (UPRN: 100050615526)
Email address	jessica.ho@wsp.com
Telephone number	
Please tell us more about your enquiry and what you'd like us to do	Dear Sir / Madam, We have been instructed by our client to carry out an assessment of flood risk at a site. We are writing to request any flood risk and flood defence data and information with respect to the above site and any other pertinent information or opinion regarding development at the application site. From a review of data on the Environment Agency's Website we understand the site lies within Flood Zone 1. The OS grid reference for the site is 434437 , 402170 and the nearest post code is S70 5XJ. Please find enclosed a location map for your reference included within the pre-application request form. Please can you provide us with the following: • Historic

Question	Response
	records of flooding at the site or in close proximity to the site • Details of any flood defence structure at the site or in the surrounding area • Drainage and water quality requirements (see below) Please could Barnsley Council provide advice on how they would expect the Climate Change guidance to be applied with regards to surface water attenuation requirements? Typically, we have been designing attenuation systems for the 100 year + 20%CC event and testing for the 100 year + 40%CC event. Please could Barnsley Council provide us with any specific SuDS guidance which is not already available on the website? Please could Barnsley Council confirm whether they have any specific water quality requirements for surface water run off? We trust the above to be satisfactory, however, should you have any queries or require any further information from WSP to be able to answer the above queries, please do not hesitate to get in contact. Kind Regards, Jessica Ho

Thank you

From: BarnsleyMBC <NOREPLY@barnsley.gov.uk>
Sent: 16 September 2025 10:23
To: Highway Maintenance <HighwayMaintenance@barnsley.gov.uk>
Subject: Customer contact for action - Flooding advice enquiry

Barnsley Council

Customer contact for action - Flooding advice enquiry

You have received a new submission through the council website.

Important Notice: A Requestry login will be required to access these links from 15/12/2020. If you do not have an account please request one via the Digital Hub to make sure you have uninterrupted access.

View the submission details
You must be connected to the corporate network to access this link.

Please do not reply to this e-mail as it's sent from an unattended mailbox. Do not forward this email as it may contain sensitive information.

-LAEmHhHzdJzBlTWfa4Hgs7pbKI

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How to use this information

You can use this information as part of a flood risk assessment for a planning application. To do this, you should include it in the appendix of your flood risk assessment.

We recommend that you work with a flood risk consultant to get your flood risk assessment.

Included in this document

In this document you'll find:

- how to find information about surface water and other sources of flooding
- definitions for the terminology used throughout
- flood map for planning (rivers and the sea)
- information about strategic flood risk assessments
- information about this data
- information about flood risk activity permits
- help and advice

Information that's unavailable

This document **does not** contain:

- past floods
- flood defences and attributes
- modelled data

We do not have past flooding data for this location.

Please note that:

- flooding may have occurred that we do not have records for
- flooding can come from a range of different sources
- we can only supply flood risk data relating to floodng from rivers or the sea

You can contact your Lead Local Flood Authority or Internal Drainage Board to see if they have other relevant local flood information. Please note that some areas do not have an Internal Drainage Board.

We aren't able to display flood defence locations and attributes as there are no formal flood defences in the area of interest.

There is not any modelled data available for this location. This is because detailed modelling hasn't been carried out in this area.

Surface water and other sources of flooding

When using the surface water map on the check your long term flood risk service the following considerations apply:

- surface water extents are suitable for use in planning
- surface water climate change scenarios may help to inform risk assessments, but the available data fall short of what is required to assess planned development
- surface water depth information should not be used for planning purposes

To find out about other factors that might affect the flood risk of this location, you should also check:

- reservoir flood risk
- groundwater flood risk - you could use the British Geological Survey groundwater flooding data, groundwater: current status and flood risk and the guide on mining and groundwater constraints for development - further information may be available from the lead local flood authority (LLFA)
- your local planning authority's SFRA, which includes future flood risk

Your Lead Local Flood Authority is Barnsley District.

For information about sewer flooding, contact the relevant water company for the area.

Terminology used

Annual exceedance probability (AEP)

This refers to the probability of a flood event occurring in any year. The probability is expressed as a percentage. For example, a large flood which is calculated to have a 1% chance of occuring in any one year, is described as 1% AEP.

Metres above ordnance datum (mAOD)

All flood levels are given in metres above ordnance datum which is defined as the mean sea level at Newlyn, Cornwall.

Flood map for planning (rivers and the sea)

Your selected location is in flood zone 1.

Flood zone 3 shows the area at risk of flooding for an undefended flood event with a:

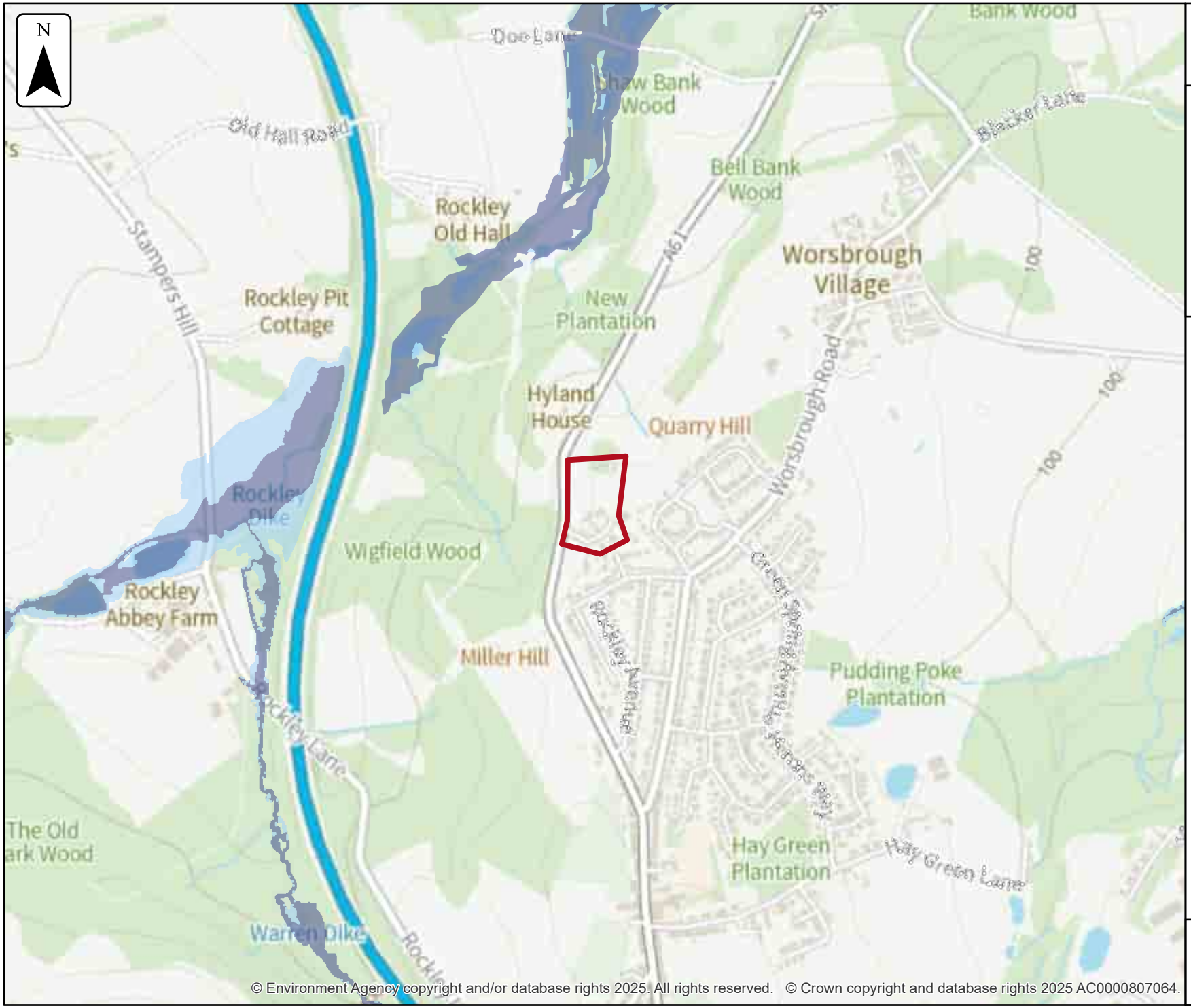
- 0.5% or greater probability of occurring in any year for flooding from the sea
- 1% or greater probability of occurring in any year for fluvial (river) flooding

Flood zone 2 shows the area at risk of flooding for an undefended flood event with:

- between a 0.1% and 0.5% probability of occurring in any year for flooding from the sea
- between a 0.1% and 1% probability of occurring in any year for fluvial (river) flooding

It's important to remember that the flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties
- refer to the probability of river and sea flooding, ignoring the presence of defences
- do not take into account potential impacts of climate change



Environment Agency

Flood map for planning

Location (easting/northing)
434449/402203

Scale
1:10,000

Created
12 Sep 2025

- Selected area
- Flood Zone 3
- Flood Zone 2

0 100 200 300 400 500
metres

Strategic flood risk assessments

We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment.

This should give you information about:

- the potential impacts of climate change in this catchment
- areas defined as functional floodplain
- flooding from other sources, such as surface water, ground water and reservoirs

Your Lead Local Flood Authority is Barnsley District.

About this data

This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood risk activity permits

Under the Environmental Permitting (England and Wales) Regulations 2016 some developments may require an environmental permit for flood risk activities from the Environment Agency. This includes any permanent or temporary works that are in, over, under, or nearby a designated main river or flood defence structure.

Find out more about flood risk activity permits

Help and advice

Contact the Yorkshire Environment Agency team at neyorkshire@environment-agency.gov.uk for:

- more information about getting a product 5, 6, 7 or 8
- general help and advice about the site you're requesting data for

Outlook

RE: Balk Farm Court - Drainage Information Request

From Graham S Phillips <Graham.S.Phillips@yorkshirewater.co.uk>
Date Mon 9/29/2025 4:11 PM
To Chris COOKE <Christopher.J.Cooke@yorkshirewater.co.uk>
Cc Sarah Albone <Sarah.Albone@yorkshirewater.co.uk>; Craig Stables <craig.stables@yorkshirewater.co.uk>

Hi Chris,

Thank you for your email.

It is standard practice for SPS compound drainage to remain onsite due to the risk of spillage from tankers and the work that is undertaken within the compound for maintenance of the pumps.

Based on the above I would be happy to provide acceptance of the proposed.

Many Thanks

YorkshireWater

Graham S Phillips
Sewer Diversion & Requisition Senior Engineer
Developer Services (Customer Experience)

M: 07790 616688
L: 0345 120 84 82 (option 1)

yorkshirewater.com/developers

My current working hours are M-F 8am to 4pm

From: Chris COOKE <Christopher.J.Cooke@yorkshirewater.co.uk>
Sent: 29 September 2025 16:07
To: Graham S Phillips <Graham.S.Phillips@yorkshirewater.co.uk>
Cc: Sarah Albone <Sarah.Albone@yorkshirewater.co.uk>; Craig Stables <craig.stables@yorkshirewater.co.uk>
Subject: FW: Balk Farm Court - Drainage Information Request

Hi Graham,

As discussed, would you mind confirming that YW DS are happy with the gully entering the foul wet well? It will be unrestricted discharge, with no rate as Ania mentions below.

Cheers,

Chris

YorkshireWater

Chris Cooke
Asset Planning Senior Sponsor
Wastewater Networks Asset Planning

07790 615043
Please note that I have a NWD every other Friday

From: Mierzejewska, Ania <Anna.Mierzejewska@wsp.com>
Sent: 29 September 2025 14:13
To: alex.kaye_gallifordtry.co.uk <Alex.Kaye@gallifordtry.co.uk>; Jonathan.Close_gallifordtry.co.uk <Jonathan.Close@gallifordtry.co.uk>; Chris COOKE <Christopher.J.Cooke@yorkshirewater.co.uk>; Geerhard VanDeventer (Morrison Construction) <Geerhard.VanDeventer@morrisonconstruction.co.uk>
Cc: Yasmin, Sofena <Sofena.Yasmin@wsp.com>; Ho, Jess <Jessica.Ho@wsp.com>; Mohun, Vic <Vic.Mohun@wsp.com>; matthew.brown_gallifordtry.co.uk <Matthew.Brown@gallifordtry.co.uk>; roger.brailsford_gallifordtry.co.uk <Roger.Brailsford@gallifordtry.co.uk>; Jiggins, Luke <Luke.Jiggins@wsp.com>; Maria Dychala <maria.dychala@yorkshirewater.co.uk>
Subject: Re: Balk Farm Court - Drainage Information Request

Hi Alex,

Thanks for responding. Please can we have the remaining information as soon as possible.

Hi @Chris COOKE,

If you have any updates on the engagement with the Developer Services department, we would greatly appreciate it. Additionally, could you please inform us whether a specific rate for surface water into the wet well is being considered or agreed upon, or if an unlimited discharge is being proposed?

That will ensure adequate narrative is provided in our drainage strategy.

Many thanks,
Ania

From: Alex Kaye (Galliford Try) <Alex.Kaye@gallifordtry.co.uk>
Sent: Monday, September 29, 2025 1:48 PM
To: Mierzejewska, Ania <Anna.Mierzejewska@wsp.com>; Jonathan Close (Galliford Try) <Jonathan.Close@gallifordtry.co.uk>; Chris COOKE <Christopher.J.Cooke@yorkshirewater.co.uk>; Geerhard VanDeventer (Morrison Construction) <Geerhard.VanDeventer@morrisonconstruction.co.uk>
Cc: Yasmin, Sofena <Sofena.Yasmin@wsp.com>; Ho, Jess <Jessica.Ho@wsp.com>; Mohun, Vic <Vic.Mohun@wsp.com>; Matthew Brown (Galliford Try) <Matthew.Brown@gallifordtry.co.uk>; Roger Brailsford (Galliford Try) <Roger.Brailsford@gallifordtry.co.uk>; Jiggins, Luke <Luke.Jiggins@wsp.com>; Maria Dychala <maria.dychala@yorkshirewater.co.uk>
Subject: Re: Balk Farm Court - Drainage Information Request

Hi Aina,

- The entire compound area will drain into the wet well.
- @Geerhard VanDeventer (Morrison Construction) Please can you re-issue .dwg file C-0003 with inclusion of all X-refs.
- Updated planning drawings attached (full suite of design documentation now accepted so drawings shouldn't change).
- @Geerhard VanDeventer (Morrison Construction) and @Jonathan Close (Galliford Try) please can you advise on the filter drain comments.

Many thanks,

Alex Kaye
Lead Project Engineer
(Design Management Lead)

alex.kaye@gallifordtry.co.uk
M: 07794031948

Galliford Try Asset Creation - North & East
2 Ripley Drive, Normanton Industrial Estate

Normanton, West Yorkshire, WF6 1QT

www.gallifordtry.co.uk

Ho, Jess

From: Emma Edwards <Emma.Edwards@environment-agency.gov.uk>
Sent: 12 September 2025 17:00
To: Ho, Jess
Subject: Request for information - Ref: EIR2025/24695
Attachments: GWCL standard enquiry response FAQ April 23.pdf; Automated Product 4 EC24695.pdf; Supporting Information EC24695.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Dear Jessica Ho,

I am writing in response to your request for information, received 15 August 2025, regarding 250816/JA13 FW: Balk Farm Court, Flood Risk Assessment – Enquiry.

We respond to requests for information under the Freedom of Information Act 2000 (FOI) and Environmental Information Regulations 2004 (EIR).

Please see below answers to your questions:

1. Please could the Environment Agency provide Product 4 data. We understand that there is no detailed hydraulic model for the site - If this is not correct, please can you provide this as well? - *Attached*

2. Historical records of flooding at or within the vicinity of the site from all sources of flooding. If the Environment Agency does not hold any records, please can you confirm that the site has no record of flooding in the past - *Attached*

3. Details of any flood defences in the area that might influence flooding at the site / surrounding area - *Attached*

4. Please could the Environment Agency confirm whether they have any specific water quality requirements for surface water runoff within South Yorkshire - *This appears to relate only to surface water. Where surface water is allowed to infiltrate to ground (i.e. SUDS) our approach to groundwater protection is detailed here: The Environment Agency's approach to groundwater protection.*

5. Groundwater levels on or within 500m of the site (including details of the strata in which the groundwater level observations are made) - *All our groundwater level monitoring data is now available here: Hydrology Data Explorer .*

6. Does the Environment Agency have any critical drainage areas that cover the development site and have these been notified to South Yorkshire? - *We don't map Critical Drainage Areas (CDAs), as we do not hold any data on critical drainage. CDAs are defined by the Lead Local Flood Authority (LLFA) and are usually included within a Surface Water Management Plan. You should look at the appropriate Surface Water Management Plan and Strategic Flood Risk Assessment that the LLFA hold as they are not areas which the Environment Agency define or have details on.*

7. Any additional flood data the Environment Agency considers useful for the above site - *Product 4 data has been provided, for anything more specific please submit another request with further details*.

Please refer to the Open Government Licence which explains the permitted use of this information.

Rights of appeal

If you are not satisfied with our decision, you can contact us within two calendar months to ask for the decision to be reviewed. We will then conduct an internal review of our response to your request and give you our decision in writing within 40 working days.

If you are not satisfied with the outcome of the internal review, you can then make an appeal to the Information Commissioner Office, the statutory regulator for EIR and FOI. The address is: Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, Cheshire. SK9 5AF.

Tel: 0303 123 1113 (local rate) or 01625 545 745 (national rate) | Fax: 01625 524 510 Email: casework@ico.org.uk | Website: www.ico.org.uk

Yours sincerely,

Emma Edwards

YOR Area Customers and Engagement Team

Your feedback is important to us - please visit Environment Agency FOI Customer Satisfaction Survey

Appendix E

GREENFIELD RUNOFF AND DRAINAGE MODEL CALCULATIONS

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

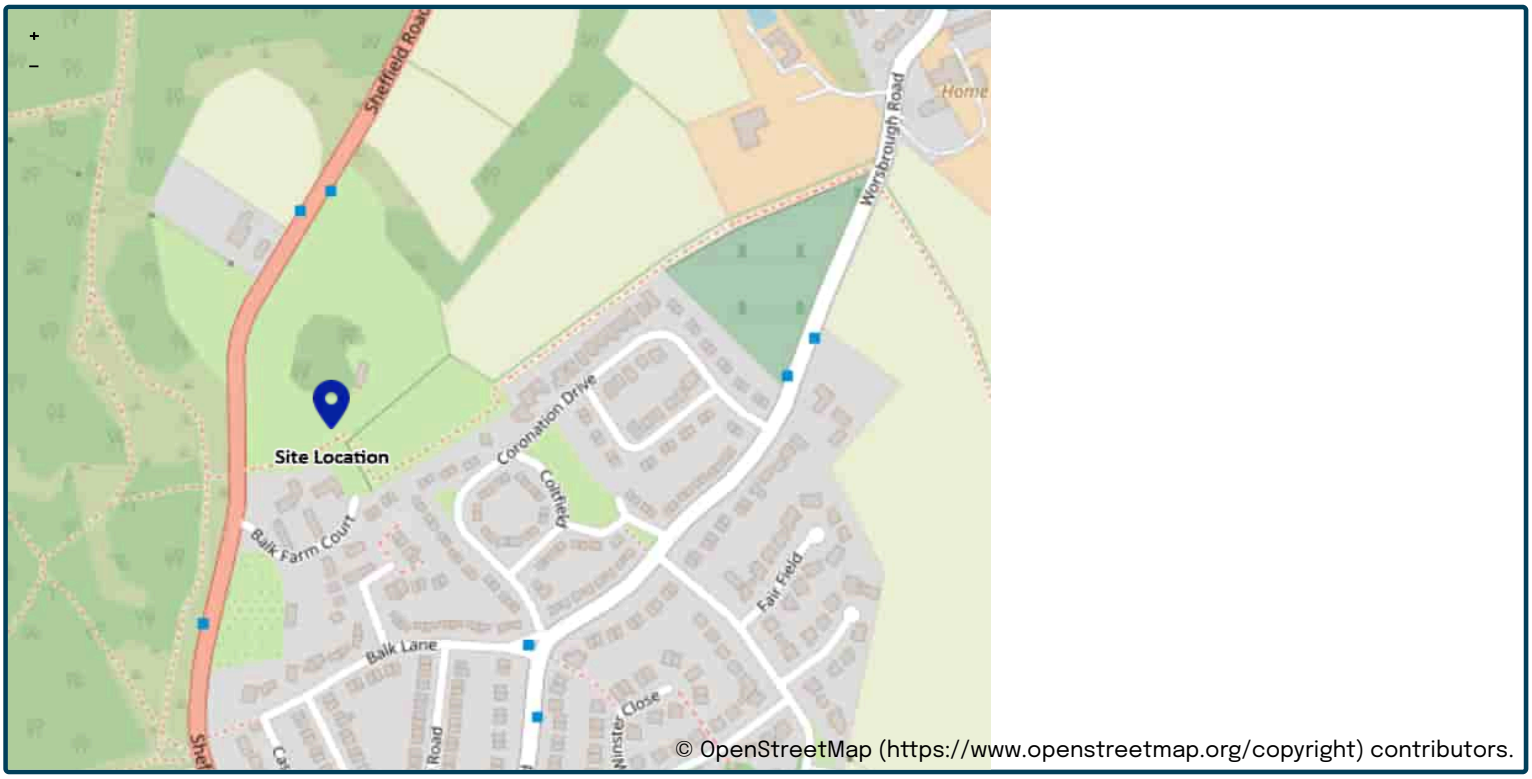
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Project details

Date	04/12/2025
Calculated by	
Reference	
Model version	2.2.2

Location

Site name	Balk Farm Court
Site location	



Site easting (British National Grid)	434465
Site northing (British National Grid)	402219

Site details

Total site area (ha)	0.1374 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	690 mm		690
How should SPR be derived?	WRAP soil type		
WRAP soil type	2		2
SPR	0.3		
QBar (IH124) (l/s)	0.2 l/s		

Growth curve factors

	My value		Map value
Hydrological region	3		3
1 year growth factor	0.86		
2 year growth factor	0.94		
10 year growth factor	1.45		
30 year growth factor	1.75		
100 year growth factor	2.08		
200 year growth factor	2.37		

Results

Method	IH124
Flow rate 1 year (l/s)	0.2 l/s
Flow rate 2 year (l/s)	0.2 l/s
Flow rate 10 years (l/s)	0.4 l/s
Flow rate 30 years (l/s)	0.4 l/s
Flow rate 100 years (l/s)	0.5 l/s
Flow rate 200 years (l/s)	0.6 l/s

Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

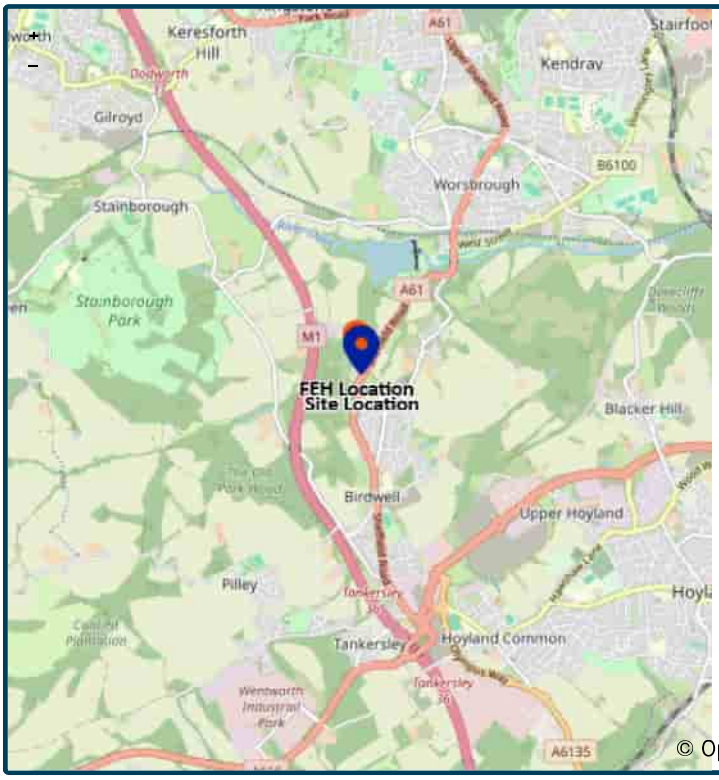
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	16/12/2025
Calculated by	AM
Reference	Balk Farm
Model version	2.2.2

Location

Site name	Balk Farm
Site location	



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Site easting (British National Grid)	434433
Site northing (British National Grid)	402213

Site areas

Total site area (ha)	0.137	ha

Roof area

Total roof area (ha)	0	ha
Contributing roof area (ha)	0	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	0.025	ha
Contributing paved area (ha)	0.025	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	0	ha
Contributing grass / vegetated area (ha)	0	ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	0.025	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+10%	
Contributing roof area (adjusted for urban creep) (ha)	0	ha
Contributing paved area (adjusted for urban creep) (ha)	0.025	ha
Contributing grass / vegetated area (adjusted for urban creep) (ha)	0	ha

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	1:1 (square)	
Storage design depth (m)	0.9	m
Storage side slope (1 in x)	Vertical sided	
Storage voids ratio (%)	30% (e.g. aggregate filled structure)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	User specified

User specified discharge

Flow rate (user specified) (l/s)	0.2 l/s

Final discharge rate

Runoff calculation method	User specified
Design flow rate (l/s)	0.2 l/s

Blockage risk

Specify the method	Orifice diameter
Minimum orifice diameter to prevent blockage (mm)	mm

	My value		Calculated value
Design orifice diameter (mm)	10 mm		10
Flow rate of orifice (l/s)	0.2 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file
	FEH_Point_Rainfall_FEH22_AM_434394_402264.csv
Distance from FEH location to site (km)	0.1 km
Climate change allowance factor	130%

Model results

- **Maximum discharge flow rate:** 0.2 (l/s)
- **Outflow orifice diameter:** 10 (mm)
- **Storage base length:** 9.2 (m)
- **Storage base width:** 9.2 (m)
- **Storage base area:** 85 (m^2)
- **Storage total volume:** 77 (m^3)
- **Storage total water volume:** 23 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880, 3600, 4320, 5040, 5760 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	1080	0.1	0.25	6.5	22
2	1080	0.1	0.30	7.7	26
10	1080	0.1	0.50	13	43
30	1440	0.2	0.66	17	57
100	1440	0.2	0.90	23	77
200	1440	0.2	0.95	27	90

Please note runoff estimation and storage volume estimation are subject to uncertainty. Storage volume results are therefore reported to the nearest 1 m^3 value, unless storage volumes are less than 10 m^3, in which case, storage volumes are provided to 1 decimal place.

Appendix A - Rainfall Depths

Rainfall depths (mm) with climate change

Duration (minutes)	Duration (hours)	1 years	2 years	10 years	30 years	100 years	200 years
15	0.25	7.18	9.61	19.25	25.40	32.60	37.21
30	0.5	9.31	12.52	25.22	33.75	43.72	50.08
60	1	11.76	15.81	31.85	42.85	55.99	64.40
120	2	17.45	21.92	39.59	51.62	66.22	75.97
180	3	21.20	25.95	44.71	57.47	73.36	84.21
240	4	24.08	29.03	48.62	62.02	79.09	90.91
360	6	28.38	33.66	54.57	69.21	88.39	101.87
540	9	32.88	38.53	61.07	77.27	99.27	114.79
720	12	36.18	42.15	66.04	83.60	107.97	125.00
900	15	38.77	45.02	70.07	88.95	115.30	133.37
1080	18	40.95	47.44	73.50	93.55	121.56	140.43
1440	24	44.44	51.35	79.25	101.11	131.66	151.66
1800	30	47.30	54.55	83.94	107.19	139.44	160.19
2160	36	49.81	57.34	87.97	112.28	145.66	166.88
2880	48	54.14	62.15	94.77	120.54	155.16	176.87
3600	60	57.96	66.35	100.41	126.81	161.67	183.53
4320	72	61.42	70.15	105.42	132.21	167.06	188.93
5040	84	64.67	73.70	110.02	137.05	171.73	193.53
5760	96	67.75	77.05	114.31	141.48	175.90	197.57

Rainfall depths (mm) without climate change

Duration (minutes)	Duration (hours)	1 years	2 years	10 years	30 years	100 years	200 years
15	0.25	5.52	7.39	14.81	19.54	25.08	28.62
30	0.5	7.16	9.63	19.40	25.96	33.63	38.52
60	1	9.05	12.16	24.50	32.96	43.07	49.54
120	2	13.42	16.86	30.45	39.71	50.94	58.44
180	3	16.31	19.96	34.39	44.21	56.43	64.78
240	4	18.52	22.33	37.40	47.71	60.84	69.93
360	6	21.83	25.89	41.98	53.24	67.99	78.36
540	9	25.29	29.64	46.98	59.44	76.36	88.30
720	12	27.83	32.42	50.80	64.31	83.05	96.15
900	15	29.82	34.63	53.90	68.42	88.69	102.59
1080	18	31.50	36.49	56.54	71.96	93.51	108.02
1440	24	34.19	39.50	60.96	77.78	101.28	116.66
1800	30	36.38	41.96	64.57	82.45	107.26	123.22

Duration (minutes)	Duration (hours)	1 years	2 years	10 years	30 years	100 years	200 years
2160	**36**	38.31	44.11	67.67	86.37	112.05	128.37
2880	**48**	41.64	47.81	72.90	92.72	119.35	136.05
3600	**60**	44.58	51.04	77.24	97.55	124.36	141.18
4320	**72**	47.24	53.96	81.09	101.70	128.51	145.33
5040	**84**	49.75	56.69	84.63	105.42	132.10	148.87
5760	**96**	52.12	59.27	87.93	108.83	135.31	151.98

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	0.750	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
J1	0.001	5.00	122.500		434480.762	402175.001	1.050
J2	0.001	5.00	122.500		434481.570	402179.206	1.093
J3			122.200		434481.234	402185.350	1.050
J4	0.001	5.00	122.000		434480.113	402191.056	1.050
J5	0.001	5.00	121.750		434479.157	402194.674	1.050
J6	0.003	5.00	121.600		434474.703	402205.735	1.550
J7	0.000	5.00	121.500		434471.236	402211.461	1.550
J8	0.003	5.00	121.000		434466.940	402213.051	1.550
J9	0.003	5.00	120.700		434459.342	402212.336	1.550
J10	0.009	5.00	119.000		434444.130	402209.689	1.550
SW1			117.000	600	434420.877	402209.705	1.815
SW2			117.000	600	434421.175	402216.597	1.888
SW3			117.000	600	434421.305	402219.706	1.919
OF			117.500		434421.277	402230.340	2.525
J15	0.002	5.00	120.700		434465.170	402219.211	1.550
J16	0.001	5.00	120.200		434457.851	402216.798	1.550
SW4			119.000	600	434443.461	402215.252	1.625
J18			117.500		434424.436	402209.567	1.550

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	J1	J2	4.282	0.600	121.450	121.407	0.043	100.0	150	5.07	50.0
1.001	J2	J3	6.153	0.600	121.407	121.150	0.257	23.9	150	5.12	50.0
1.002	J3	J4	5.815	0.600	121.150	120.950	0.200	29.1	150	5.17	50.0
1.003	J4	J5	3.742	0.600	120.950	120.700	0.250	15.0	150	5.20	50.0
1.004	J5	J6	11.924	0.600	120.700	120.050	0.650	18.3	150	5.28	50.0
1.005	J6	J7	6.694	0.600	120.050	119.950	0.100	66.9	150	5.37	50.0
1.006	J7	J8	4.581	0.600	119.950	119.450	0.500	9.2	150	5.39	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	1.005	17.8	0.1	0.900	0.943	0.001	0.0	10	0.294
1.001	2.066	36.5	0.3	0.943	0.900	0.002	0.0	9	0.587
1.002	1.874	33.1	0.3	0.900	0.900	0.002	0.0	10	0.556
1.003	2.617	46.2	0.4	0.900	0.900	0.003	0.0	10	0.811
1.004	2.362	41.7	0.5	0.900	1.400	0.004	0.0	12	0.814
1.005	1.231	21.7	0.9	1.400	1.400	0.007	0.0	21	0.615
1.006	3.348	59.2	0.9	1.400	1.400	0.007	0.0	13	1.232

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)
1.007	J8	J9	7.632	0.600	119.450	119.150	0.300	25.4	150	5.46	50.0
1.008	J9	J10	15.441	0.600	119.150	117.450	1.700	9.1	150	5.53	50.0
1.009	J10	J18	19.694	0.600	117.450	115.950	1.500	13.1	150	5.65	50.0
1.011	SW1	SW2	6.898	0.600	115.185	115.116	0.069	99.8	300	5.74	50.0
1.012	SW2	SW3	3.112	0.600	115.112	115.081	0.031	100.0	300	5.77	50.0
1.013	SW3	OF	10.634	0.600	115.081	114.975	0.106	100.0	300	5.89	50.0
2.000	J15	J16	7.707	0.600	119.150	118.650	0.500	15.4	150	5.05	50.0
2.001	J16	SW4	14.473	0.600	118.650	117.450	1.200	12.1	150	5.13	50.0
2.002	SW4	SW2	22.327	0.600	117.375	115.187	2.188	10.2	225	5.22	50.0
1.010	J18	SW1	3.562	0.600	115.950	115.410	0.540	6.6	150	5.67	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)
1.007	2.004	35.4	1.4	1.400	1.400	0.010	0.0	20	0.971
1.008	3.363	59.4	1.8	1.400	1.400	0.013	0.0	18	1.509
1.009	2.795	49.4	3.0	1.400	1.400	0.022	0.0	25	1.544
1.011	1.574	111.2	3.0	1.515	1.584	0.022	0.0	34	0.691
1.012	1.572	111.1	3.4	1.588	1.619	0.025	0.0	35	0.712
1.013	1.572	111.1	3.4	1.619	2.225	0.025	0.0	35	0.712
2.000	2.579	45.6	0.3	1.400	1.400	0.002	0.0	8	0.702
2.001	2.917	51.5	0.4	1.400	1.400	0.003	0.0	10	0.869
2.002	4.119	163.8	0.4	1.400	1.588	0.003	0.0	8	0.861
1.010	3.949	69.8	3.0	1.400	1.440	0.022	0.0	21	1.953

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	4.282	100.0	150	Circular	122.500	121.450	0.900	122.500	121.407	0.943
1.001	6.153	23.9	150	Circular	122.500	121.407	0.943	122.200	121.150	0.900
1.002	5.815	29.1	150	Circular	122.200	121.150	0.900	122.000	120.950	0.900
1.003	3.742	15.0	150	Circular	122.000	120.950	0.900	121.750	120.700	0.900
1.004	11.924	18.3	150	Circular	121.750	120.700	0.900	121.600	120.050	1.400
1.005	6.694	66.9	150	Circular	121.600	120.050	1.400	121.500	119.950	1.400
1.006	4.581	9.2	150	Circular	121.500	119.950	1.400	121.000	119.450	1.400
1.007	7.632	25.4	150	Circular	121.000	119.450	1.400	120.700	119.150	1.400
1.008	15.441	9.1	150	Circular	120.700	119.150	1.400	119.000	117.450	1.400
1.009	19.694	13.1	150	Circular	119.000	117.450	1.400	117.500	115.950	1.400

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	J1		Junction		J2		Junction	
1.001	J2		Junction		J3		Junction	
1.002	J3		Junction		J4		Junction	
1.003	J4		Junction		J5		Junction	
1.004	J5		Junction		J6		Junction	
1.005	J6		Junction		J7		Junction	
1.006	J7		Junction		J8		Junction	
1.007	J8		Junction		J9		Junction	
1.008	J9		Junction		J10		Junction	
1.009	J10		Junction		J18		Junction	

Pipeline Schedule

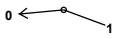
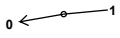
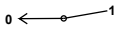
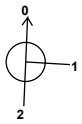
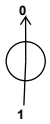
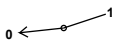
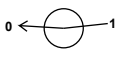
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.011	6.898	99.8	300	Circular	117.000	115.185	1.515	117.000	115.116	1.584
1.012	3.112	100.0	300	Circular	117.000	115.112	1.588	117.000	115.081	1.619
1.013	10.634	100.0	300	Circular	117.000	115.081	1.619	117.500	114.975	2.225
2.000	7.707	15.4	150	Circular	120.700	119.150	1.400	120.200	118.650	1.400
2.001	14.473	12.1	150	Circular	120.200	118.650	1.400	119.000	117.450	1.400
2.002	22.327	10.2	225	Circular	119.000	117.375	1.400	117.000	115.187	1.588
1.010	3.562	6.6	150	Circular	117.500	115.950	1.400	117.000	115.410	1.440

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.011	SW1	600	Manhole	Adoptable	SW2	600	Manhole	Adoptable
1.012	SW2	600	Manhole	Adoptable	SW3	600	Manhole	Adoptable
1.013	SW3	600	Manhole	Adoptable	OF		Junction	
2.000	J15		Junction		J16		Junction	
2.001	J16		Junction		SW4	600	Manhole	Adoptable
2.002	SW4	600	Manhole	Adoptable	SW2	600	Manhole	Adoptable
1.010	J18		Junction		SW1	600	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
J1	434480.762	402175.001	122.500	1.050					
						0	1.000	121.450	150
J2	434481.570	402179.206	122.500	1.093			1	1.000	121.407	150
						0	1.001	121.407	150
J3	434481.234	402185.350	122.200	1.050			1	1.001	121.150	150
						0	1.002	121.150	150
J4	434480.113	402191.056	122.000	1.050			1	1.002	120.950	150
						0	1.003	120.950	150
J5	434479.157	402194.674	121.750	1.050			1	1.003	120.700	150
						0	1.004	120.700	150
J6	434474.703	402205.735	121.600	1.550			1	1.004	120.050	150
						0	1.005	120.050	150
J7	434471.236	402211.461	121.500	1.550			1	1.005	119.950	150
						0	1.006	119.950	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
J8	434466.940	402213.051	121.000	1.550		1	1.006	119.450	150
									
						0	1.007	119.450	150
J9	434459.342	402212.336	120.700	1.550		1	1.007	119.150	150
									
						0	1.008	119.150	150
J10	434444.130	402209.689	119.000	1.550		1	1.008	117.450	150
									
						0	1.009	117.450	150
SW1	434420.877	402209.705	117.000	1.815	600	1	1.010	115.410	150
									
						0	1.011	115.185	300
SW2	434421.175	402216.597	117.000	1.888	600	1	2.002	115.187	225
						2	1.011	115.116	300
									
						0	1.012	115.112	300
SW3	434421.305	402219.706	117.000	1.919	600	1	1.012	115.081	300
									
						0	1.013	115.081	300
OF	434421.277	402230.340	117.500	2.525		1	1.013	114.975	300
J15	434465.170	402219.211	120.700	1.550					
									
						0	2.000	119.150	150
J16	434457.851	402216.798	120.200	1.550		1	2.000	118.650	150
									
						0	2.001	118.650	150
SW4	434443.461	402215.252	119.000	1.625	600	1	2.001	117.450	150
									
						0	2.002	117.375	225
J18	434424.436	402209.567	117.500	1.550		1	1.009	115.950	150
						0	1.010	115.950	150

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	0.750	Drain Down Time (mins)	2000	Check Discharge Volume	x
Winter CV	0.840	Additional Storage (m³/ha)	20.0		

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	0	10	0
30	0	10	0
100	30	10	0

Node SW3 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.500	Discharge Coefficient	0.600
Replaces Downstream Link	x	Design Flow (l/s)	0.2		
Invert Level (m)	115.081	Diameter (m)	0.008		

Node J2 Online Orifice Control

Flap Valve	x	Invert Level (m)	121.407	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.010		

Node J3 Online Orifice Control

Flap Valve	x	Invert Level (m)	121.150	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.010		

Node J4 Online Orifice Control

Flap Valve	x	Invert Level (m)	120.950	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.010		

Node J5 Online Orifice Control

Flap Valve	x	Invert Level (m)	120.700	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.010		

Node J6 Online Orifice Control

Flap Valve	x	Invert Level (m)	120.050	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.010		

Node J7 Online Orifice Control

Flap Valve	x	Invert Level (m)	119.950	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.010		

Node J8 Online Orifice Control

Flap Valve	x	Invert Level (m)	119.450	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.015		

Node J9 Online Orifice Control

Flap Valve	x	Invert Level (m)	119.150	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.015		

Node J10 Online Orifice Control

Flap Valve	x	Invert Level (m)	117.450	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.025		

Node SW1 Online Orifice Control

Flap Valve	x	Invert Level (m)	115.185	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.030		

Node J16 Online Orifice Control

Flap Valve	x	Invert Level (m)	118.650	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.023		

Node SW4 Online Orifice Control

Flap Valve	x	Invert Level (m)	117.375	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.020		

Node J18 Online Orifice Control

Flap Valve	x	Invert Level (m)	115.950	Discharge Coefficient	0.600
Replaces Downstream Link	x	Diameter (m)	0.020		

Node J2 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	121.407	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	121	Diameter (mm)	600

Node J3 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.001
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	121.150	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	120	Diameter (mm)	600

Node J4 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.002
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	120.950	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	255	Diameter (mm)	600

Node J5 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.003
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	120.700	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	315	Diameter (mm)	600

Node J6 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.004
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	120.050	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	376	Diameter (mm)	600

Node J7 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.005
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	119.950	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	390	Diameter (mm)	600

Node J8 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.006
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	119.450	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	100	Diameter (mm)	600

Node J9 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.007
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	119.150	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	182	Diameter (mm)	600

Node J10 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.008
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	117.450	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	54	Diameter (mm)	600

Node J18 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.009
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	115.950	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	856	Diameter (mm)	600

Node J16 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	2.000
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	118.650	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	12	Diameter (mm)	600

Node SW4 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	2.001
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	117.450	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	0	Diameter (mm)	600

Node SW1 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	0.30	Link	1.010
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	115.410	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)	1395	Diameter (mm)	600

Approval Settings

Node Size	✓	Accuracy (m)	1.000
Node Losses	✓	Crossings	✓
Link Size	✓	Cover Depth	✓
Minimum Diameter (mm)	150	Minimum Cover Depth (m)	
Link Length	✓	Maximum Cover Depth (m)	3.000
Maximum Length (m)	100.000	Backdrops	✓
Coordinates	✓	Minimum Backdrop Height (m)	

Approval Settings

Maximum Backdrop Height (m)	1.500	Return Period (years)	
Full Bore Velocity	✓	Maximum Surcharged Depth (m)	0.100
Minimum Full Bore Velocity (m/s)		Flooding	✓
Maximum Full Bore Velocity (m/s)	3.000	Return Period (years)	30
Proportional Velocity	✓	Time to Half Empty	x
Return Period (years)		Discharge Rates	✓
Minimum Proportional Velocity (m/s)	0.750	Discharge Volume	✓
Maximum Proportional Velocity (m/s)	3.000	100 year 360 minute (m^3)	
Surcharged Depth	✓		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year +10% A 15 minute summer	68.470	19.375
1 year +10% A 15 minute winter	48.049	19.375
1 year +10% A 30 minute summer	44.510	12.595
1 year +10% A 30 minute winter	31.235	12.595
1 year +10% A 60 minute summer	30.195	7.980
1 year +10% A 60 minute winter	20.061	7.980
1 year +10% A 120 minute summer	22.855	6.040
1 year +10% A 120 minute winter	15.184	6.040
1 year +10% A 180 minute summer	19.215	4.945
1 year +10% A 180 minute winter	12.490	4.945
1 year +10% A 240 minute summer	16.026	4.235
1 year +10% A 240 minute winter	10.648	4.235
1 year +10% A 360 minute summer	13.010	3.348
1 year +10% A 360 minute winter	8.457	3.348
1 year +10% A 480 minute summer	10.613	2.805
1 year +10% A 480 minute winter	7.051	2.805
1 year +10% A 600 minute summer	8.891	2.432
1 year +10% A 600 minute winter	6.075	2.432
1 year +10% A 720 minute summer	8.049	2.157
1 year +10% A 720 minute winter	5.409	2.157
1 year +10% A 960 minute summer	6.740	1.775
1 year +10% A 960 minute winter	4.464	1.775
1 year +10% A 1440 minute summer	4.982	1.335
1 year +10% A 1440 minute winter	3.348	1.335
30 year +10% A 15 minute summer	276.171	78.147
30 year +10% A 15 minute winter	193.804	78.147
30 year +10% A 30 minute summer	183.500	51.924
30 year +10% A 30 minute winter	128.772	51.924
30 year +10% A 60 minute summer	124.712	32.958
30 year +10% A 60 minute winter	82.856	32.958
30 year +10% A 120 minute summer	75.135	19.856
30 year +10% A 120 minute winter	49.918	19.856
30 year +10% A 180 minute summer	57.261	14.735
30 year +10% A 180 minute winter	37.221	14.735
30 year +10% A 240 minute summer	45.136	11.928
30 year +10% A 240 minute winter	29.987	11.928
30 year +10% A 360 minute summer	34.482	8.873
30 year +10% A 360 minute winter	22.414	8.873
30 year +10% A 480 minute summer	27.228	7.196
30 year +10% A 480 minute winter	18.090	7.196

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year +10% A 600 minute summer	22.366	6.118
30 year +10% A 600 minute winter	15.282	6.118
30 year +10% A 720 minute summer	19.997	5.359
30 year +10% A 720 minute winter	13.439	5.359
30 year +10% A 960 minute summer	16.533	4.354
30 year +10% A 960 minute winter	10.952	4.354
30 year +10% A 1440 minute summer	12.092	3.241
30 year +10% A 1440 minute winter	8.126	3.241
100 year +30% CC +10% A 15 minute summer	460.926	130.426
100 year +30% CC +10% A 15 minute winter	323.457	130.426
100 year +30% CC +10% A 30 minute summer	308.989	87.433
100 year +30% CC +10% A 30 minute winter	216.834	87.433
100 year +30% CC +10% A 60 minute summer	211.878	55.993
100 year +30% CC +10% A 60 minute winter	140.767	55.993
100 year +30% CC +10% A 120 minute summer	125.288	33.110
100 year +30% CC +10% A 120 minute winter	83.238	33.110
100 year +30% CC +10% A 180 minute summer	95.018	24.451
100 year +30% CC +10% A 180 minute winter	61.764	24.451
100 year +30% CC +10% A 240 minute summer	74.819	19.772
100 year +30% CC +10% A 240 minute winter	49.708	19.772
100 year +30% CC +10% A 360 minute summer	57.249	14.732
100 year +30% CC +10% A 360 minute winter	37.213	14.732
100 year +30% CC +10% A 480 minute summer	45.384	11.994
100 year +30% CC +10% A 480 minute winter	30.152	11.994
100 year +30% CC +10% A 600 minute summer	37.423	10.236
100 year +30% CC +10% A 600 minute winter	25.570	10.236
100 year +30% CC +10% A 720 minute summer	33.572	8.998
100 year +30% CC +10% A 720 minute winter	22.562	8.998
100 year +30% CC +10% A 960 minute summer	27.886	7.343
100 year +30% CC +10% A 960 minute winter	18.472	7.343
100 year +30% CC +10% A 1440 minute summer	20.468	5.486
100 year +30% CC +10% A 1440 minute winter	13.756	5.486

Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 97.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
30 minute winter	J1	22	121.463	0.013	0.1	0.0003	0.0000	OK
30 minute winter	J2	22	121.462	0.055	0.2	0.0226	0.0000	OK
30 minute winter	J3	45	121.175	0.025	0.0	0.0011	0.0000	OK
30 minute winter	J4	22	120.981	0.031	0.1	0.0027	0.0000	OK
30 minute winter	J5	22	120.738	0.038	0.1	0.0024	0.0000	OK
240 minute winter	J6	152	120.156	0.106	0.1	0.0193	0.0000	OK
240 minute winter	J7	180	120.014	0.064	0.1	0.0198	0.0000	OK
240 minute winter	J8	152	119.533	0.083	0.1	0.0081	0.0000	OK
240 minute winter	J9	152	119.310	0.160	0.2	0.0546	0.0000	SURCHARGED
30 minute winter	J10	23	117.574	0.124	0.8	0.0258	0.0000	OK
180 minute winter	SW1	200	115.376	0.191	0.3	0.0541	0.0000	OK
180 minute winter	SW2	208	115.374	0.262	0.3	0.0741	0.0000	OK
180 minute winter	SW3	208	115.374	0.293	0.2	0.0828	0.0000	OK
180 minute winter	OF	208	114.978	0.003	0.1	0.0000	0.0000	OK
15 minute winter	J15	11	119.157	0.007	0.2	0.0002	0.0000	OK
15 minute winter	J16	13	118.695	0.045	0.3	0.0030	0.0000	OK
15 minute winter	SW4	18	117.416	0.041	0.2	0.0116	0.0000	OK
180 minute winter	J18	132	116.122	0.172	0.4	0.0290	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
30 minute winter	J1	1.000	J2	0.1	0.161	0.006	0.0139	
30 minute winter	J2	1.001	J3	0.0	0.379	0.001	0.0061	
30 minute winter	J3	1.002	J4	0.0	0.037	0.001	0.0075	
30 minute winter	J4	1.003	J5	0.0	0.035	0.001	0.0067	
30 minute winter	J5	1.004	J6	0.0	0.028	0.001	0.0583	
240 minute winter	J6	1.005	J7	0.1	0.162	0.003	0.0245	
240 minute winter	J7	1.006	J8	0.1	0.085	0.001	0.0231	
240 minute winter	J8	1.007	J9	0.1	0.073	0.004	0.0682	
240 minute winter	J9	1.008	J10	0.2	0.130	0.003	0.0857	
30 minute winter	J10	1.009	J18	0.4	0.537	0.009	0.1523	
180 minute winter	SW1	1.011	SW2	0.3	0.318	0.002	0.3831	
180 minute winter	SW2	1.012	SW3	0.2	0.204	0.002	0.2104	
180 minute winter	SW3	1.013	OF	0.1	0.306	0.001	0.0026	2.5
15 minute winter	J15	2.000	J16	0.2	0.668	0.004	0.0181	
15 minute winter	J16	2.001	SW4	0.2	0.702	0.004	0.0041	
15 minute winter	SW4	2.002	SW2	0.1	0.641	0.001	0.0767	
180 minute winter	J18	1.010	SW1	0.3	1.006	0.005	0.0012	

Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 97.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
240 minute winter	J1	156	121.621	0.171	0.2	0.0036	0.0000	SURCHARGED
240 minute winter	J2	156	121.621	0.214	0.3	0.1298	0.0000	SURCHARGED
240 minute winter	J3	200	121.267	0.117	0.1	0.0231	0.0000	OK
240 minute winter	J4	156	121.147	0.197	0.2	0.0902	0.0000	SURCHARGED
240 minute winter	J5	156	120.962	0.262	0.2	0.0873	0.0000	SURCHARGED
180 minute winter	J6	168	120.614	0.564	0.4	0.5210	0.0000	SURCHARGED
180 minute winter	J7	292	120.211	0.261	0.4	0.2190	0.0000	SURCHARGED
60 minute winter	J8	48	119.850	0.400	0.6	0.1394	0.0000	SURCHARGED
120 minute winter	J9	106	119.591	0.441	0.6	0.3789	0.0000	SURCHARGED
60 minute winter	J10	44	118.208	0.758	2.2	0.5487	0.0000	SURCHARGED
720 minute winter	SW1	645	116.264	1.079	0.9	0.6611	0.0000	SURCHARGED
720 minute winter	SW2	660	116.258	1.146	0.4	0.3244	0.0000	SURCHARGED
720 minute winter	SW3	660	116.258	1.177	0.2	0.3332	0.0000	SURCHARGED
720 minute winter	OF	660	114.981	0.006	0.1	0.0000	0.0000	OK
15 minute winter	J15	10	119.164	0.014	0.8	0.0004	0.0000	OK
30 minute winter	J16	23	118.856	0.206	0.9	0.0534	0.0000	SURCHARGED
30 minute winter	SW4	34	117.531	0.156	0.5	0.0498	0.0000	OK
120 minute winter	J18	112	116.672	0.722	1.0	0.5905	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
240 minute winter	J1	1.000	J2	0.2	0.134	0.011	0.0754	
240 minute winter	J2	1.001	J3	0.1	0.334	0.003	0.0458	
240 minute winter	J3	1.002	J4	0.1	0.012	0.002	0.0517	
240 minute winter	J4	1.003	J5	0.2	0.026	0.003	0.0341	
240 minute winter	J5	1.004	J6	0.1	0.010	0.003	0.1062	
180 minute winter	J6	1.005	J7	0.4	0.162	0.019	0.1178	
180 minute winter	J7	1.006	J8	0.1	0.079	0.002	0.0407	
60 minute winter	J8	1.007	J9	0.3	0.070	0.009	0.1273	
120 minute winter	J9	1.008	J10	0.3	0.149	0.005	0.1386	
60 minute winter	J10	1.009	J18	1.1	0.649	0.023	0.1830	
720 minute winter	SW1	1.011	SW2	0.3	0.314	0.003	0.4858	
720 minute winter	SW2	1.012	SW3	0.2	0.080	0.002	0.2191	
720 minute winter	SW3	1.013	OF	0.1	0.328	0.001	0.0048	11.2
15 minute winter	J15	2.000	J16	0.8	0.668	0.017	0.0707	
30 minute winter	J16	2.001	SW4	0.5	0.877	0.009	0.0731	
30 minute winter	SW4	2.002	SW2	0.3	0.781	0.002	0.4445	
120 minute winter	J18	1.010	SW1	2.4	1.211	0.035	0.0545	

Results for 100 year +30% CC +10% A Critical Storm Duration. Lowest mass balance: 97.53%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	J1	58	121.793	0.343	0.5	0.0072	0.0000	SURCHARGED
60 minute winter	J2	58	121.793	0.386	0.6	0.2663	0.0000	SURCHARGED
600 minute winter	J3	420	121.423	0.273	0.2	0.1432	0.0000	SURCHARGED
600 minute winter	J4	375	121.254	0.304	0.2	0.1932	0.0000	SURCHARGED
600 minute winter	J5	375	121.070	0.370	0.2	0.1543	0.0000	SURCHARGED
360 minute winter	J6	320	120.822	0.772	0.4	0.9338	0.0000	SURCHARGED
600 minute winter	J7	630	120.343	0.393	0.1	0.3779	0.0000	SURCHARGED
60 minute winter	J8	48	120.085	0.635	1.1	0.3210	0.0000	SURCHARGED
120 minute winter	J9	96	119.811	0.661	0.8	0.6897	0.0000	SURCHARGED
60 minute winter	J10	45	118.726	1.276	3.5	1.4633	0.0000	FLOOD RISK
720 minute winter	SW1	705	117.000	1.815	0.6	1.3408	0.1037	FLOOD
1440 minute winter	SW2	1140	116.990	1.878	0.4	0.5316	0.0000	FLOOD RISK
1440 minute winter	SW3	1140	116.990	1.909	0.2	0.5404	0.0000	FLOOD RISK
1440 minute winter	OF	1140	114.983	0.008	0.2	0.0000	0.0000	OK
15 minute winter	J15	10	119.167	0.017	1.3	0.0005	0.0000	OK
30 minute winter	J16	23	119.061	0.411	1.5	0.2238	0.0000	SURCHARGED
60 minute winter	SW4	57	117.667	0.292	0.7	0.1269	0.0000	SURCHARGED
180 minute winter	J18	176	117.106	1.156	1.3	1.5400	0.0000	SURCHARGED

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	J1	1.000	J2	0.3	0.161	0.014	0.0754	
60 minute winter	J2	1.001	J3	0.1	0.379	0.004	0.0550	
600 minute winter	J3	1.002	J4	0.1	0.008	0.003	0.0891	
600 minute winter	J4	1.003	J5	0.1	0.022	0.003	0.0612	
600 minute winter	J5	1.004	J6	0.2	0.012	0.004	0.1945	
360 minute winter	J6	1.005	J7	0.5	0.123	0.021	0.1178	
600 minute winter	J7	1.006	J8	0.1	0.079	0.002	0.0408	
60 minute winter	J8	1.007	J9	-0.4	0.070	-0.012	0.1344	
120 minute winter	J9	1.008	J10	0.4	0.152	0.006	0.1390	
60 minute winter	J10	1.009	J18	1.5	0.684	0.030	0.1849	
720 minute winter	SW1	1.011	SW2	0.3	0.314	0.003	0.4858	
1440 minute winter	SW2	1.012	SW3	0.2	0.184	0.002	0.2191	
1440 minute winter	SW3	1.013	OF	0.2	0.328	0.002	0.0060	22.2
15 minute winter	J15	2.000	J16	1.3	0.620	0.028	0.0722	
30 minute winter	J16	2.001	SW4	0.7	0.894	0.014	0.1320	
60 minute winter	SW4	2.002	SW2	0.4	0.733	0.003	0.4494	
180 minute winter	J18	1.010	SW1	1.8	1.182	0.026	0.0627	

Appendix F

PROPOSED DRAINAGE LAYOUT

RESIDUAL RISK ASSESSMENT
WHEREVER POSSIBLE RISK IS DESIGNED-OUT OF THIS PROPOSAL DURING THE DESIGN PROCESS. WHERE THIS IS NOT POSSIBLE THE RISK WILL BE MINIMIZED AND ANY RESIDUAL RISK WILL BE NOTED AND INDICATED BY THE SYMBOL.

GR00 GENERAL HAZARD

HP00 HIGH POTENTIAL HAZARD

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION:

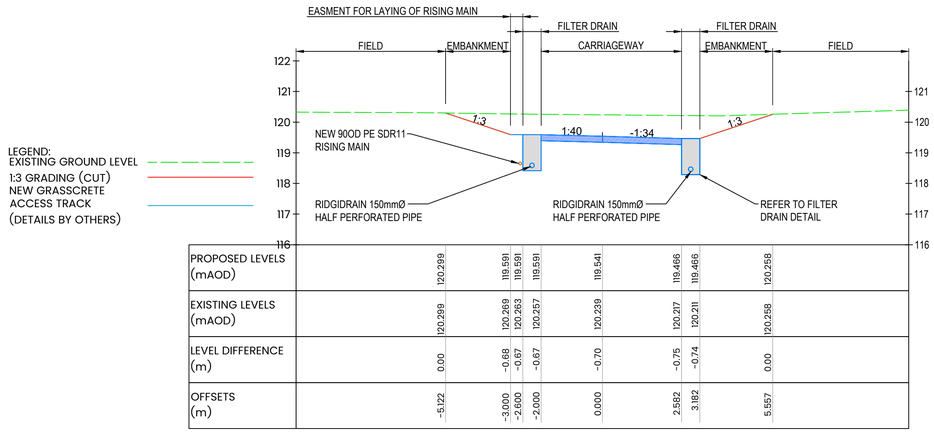
IN ADDITION TO THE HAZARDS OR RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, THE FOLLOWING SIGNIFICANT RESIDUAL RISKS SHOULD BE NOTED. FURTHER DETAILS ARE INCLUDED IN THE CDM DESIGN RISK MANAGEMENT REGISTER AND DESIGN RISK ASSESSMENT YW.205642-GAL-WTN-NCS-RA-Z-0001

SITE HAZARDS:

GR01	POSSIBLE STRIKE OF UNCHARTED/INCORRECTLY RECORDED SERVICES DURING CONSTRUCTION

DISCLAIMERS & NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS (mm) AND ALL LEVELS ARE IN METERES ABOVE ORDNANCE DATUM (mAOD) UNLESS OTHERWISE STATED.
2. DO NOT SCALE FROM DRAWING.
3. PIPES TO BE LAID WITH PERFORATIONS UPWARDS WHEN CONCRETE BED IS USED.
4. REFER TO DRAWING No. YW.205642-GAL-WTN-NCS-DR-C-0003 FOR SECTION CHAINAGES.
5. GRASSCRETE DETAILS AND DESIGN BY OTHERS. REFER TO INSTALLATION GUIDANCE OF GRASSCRETE GC2 WITH A252 REINFORCEMENT.

REFERENCES:
- YW.205642-GAL-WTN-NCS-DR-C-0003 – PUMPING STATION AND ACCESS ROAD SITE PLAN
- YW.205642-GAL-WTN-NCS-DR-C-0004 – SETTING OUT PLAN SHEET 1 OF 2
- YW.205642-GAL-WTN-NCS-DR-C-0015 – RISING MAIN PLAN & LONGITUDINAL SECTION SHEET 1 OF 3

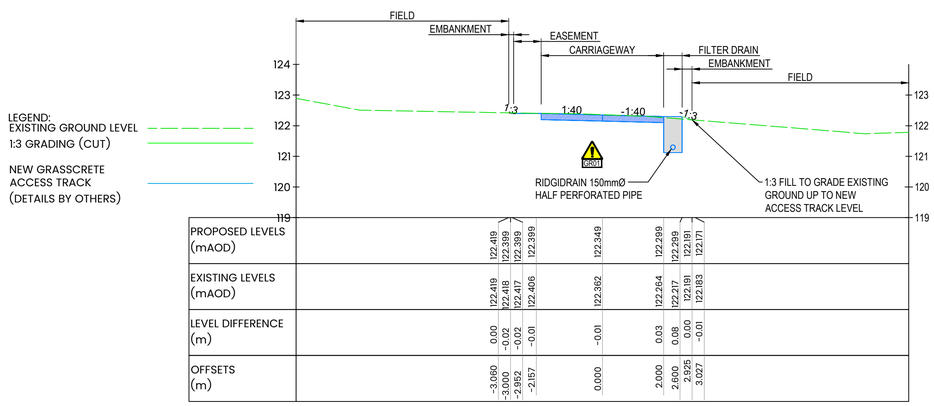


PROPOSED LEVELS (mAOD)	120.299	119.591	119.591	119.591	119.541	119.466	119.466	120.258
EXISTING LEVELS (mAOD)	120.299	120.269	120.263	120.257	120.239	120.217	120.211	120.258
LEVEL DIFFERENCE (m)	0.00	-0.68	-0.67	-0.67	-0.70	-0.75	-0.74	0.00
OFFSETS (m)	-5.122	-3.000	-2.600	-2.000	0.000	2.582	3.182	5.557

CHAINAGE 30.000

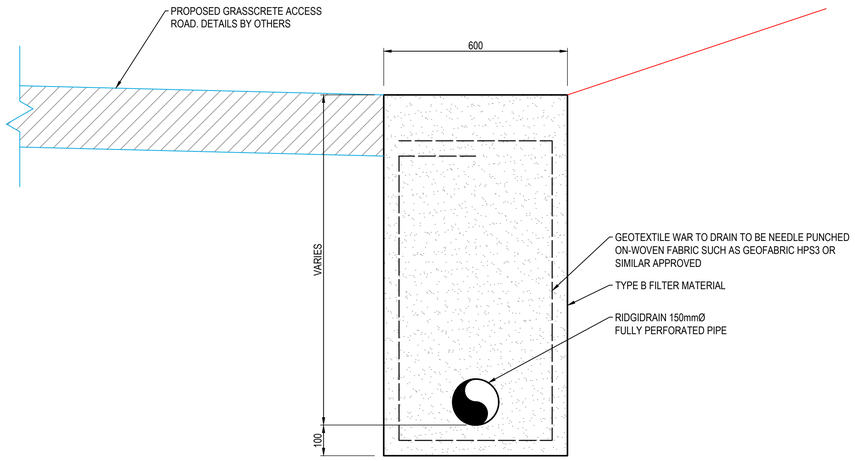
PROPOSED LEVELS (mAOD)	122.353	121.903	121.903	121.853	121.903	121.803	121.884	
EXISTING LEVELS (mAOD)	122.353	122.282	122.219	122.017	121.916	121.893	121.884	
LEVEL DIFFERENCE (m)	0.00	-0.38	-0.32	-0.16	-0.11	-0.09	0.00	
OFFSETS (m)	-5.538	-4.188	-3.188	0.000	2.000	2.600	2.844	

CHAINAGE 60.000



PROPOSED LEVELS (mAOD)	122.419	122.399	122.399	122.399	122.349	122.299	122.299	122.171
EXISTING LEVELS (mAOD)	122.419	122.418	122.417	122.406	122.362	122.264	122.217	122.191	122.183
LEVEL DIFFERENCE (m)	0.00	-0.02	-0.02	-0.01	-0.01	0.03	0.08	0.00	-0.01
OFFSETS (m)	-3.060	-3.000	-2.953	-2.157	0.000	2.000	2.600	2.925	3.027

CHAINAGE 80.000



FILTER DRAIN DETAIL
1:10

LEGEND:
NEW RISING MAIN
NEW FILTER DRAIN

A6.C01	FOR CONSTRUCTION	NC	GVD	KR	22/09/25
S5.P01	SHARED FOR DESIGN ACCEPTANCE	NC	GVD	KR	21/08/25
Status.Rev:	Description:	DB:	CB:	AB:	Output Date:

Construction Date:

Originator / Partner / OEM Ref:

GallifordTry

Our five Life Saving Rules

Client:

YorkshireWater

Yorkshire Water Services Ltd
Western House,
Western Way,
Halifax Road,
Bradford,
BD6 2SZ

Framework: AMP8 WASTE SOLUTIONS
Work Stream: INFRASTCTURE
YW Batch ID / Project Code: YW.205642
YW Solution ID: 446065
Site: BALK FARM COURT S101A
What three words: CHAIR - BRAVE - TONE
OS Grid Reference: E434411, N402205
DAZ or DMA References: 303
Drawing Title: ACCESS TRACK AND DRAINAGE SECTION VIEWS

0 200 500 mm
SCALE 1:10 (A1)
SCALE 1:20 (A3)

0 2 5 m
SCALE 1:100 (A1)
SCALE 1:200 (A3)

Original Design / OEM Reference: GALLIFORD TRY	Size: A1	Scale: 1:100
Status Description: FOR CONSTRUCTION	Status: A6	Revision: C01

Drawing Number: YW205642 GAL WTN NCS DR C 0031

INSET VIEW - OFFSITE LAND DRAINAGE

OUTFALL TO TIE IN WITH THE NEWLY CONSTRUCTED LAND DRAINAGE NETWORK BY YORKSHIRE WATER. A MINIMUM COVER OF 1.2M IS REQUIRED TO PROTECT OUTFALL PIPE BENEATH THIRD PARTY LAND. REFER TO LAND DRAINAGE PLAN REFERENCE LDC 0886 (INSET VIEW) FOR AS BUILT POSITION OF NEW LAND DRAIN

SW3
CL: 117.000
IL: 115.081
1200mmØ TYPE 2 MANHOLE
D400 COVER
ORIFICE PLATE FLOW CONTROL RESTRICTING FLOWS TO 0.2L/s FOR ALL STORMS UP TO AND INCLUDING THE 1 IN 100 YEAR PLUS 30% CLIMATE CHANGE

SW2
CL: 117.000
IL: 115.112
1200mmØ TYPE 2 MANHOLE
D400 COVER

SW4
CL: 119.000
IL: 117.375
1200mmØ TYPE 2 MANHOLE
D400 COVER

SURFACE WATER RUNOFF GENERATED BY PUMPING STATION WILL BE MANAGED INTERNALLY BY THE PUMPING STATION TO PREVENT THE RISK OF FOUL WATER CONTAMINATION TO THE SURFACE WATER NETWORK

225mm @ 1 in 10

300mm @ 1 in 100

A SMALL AMOUNT OF FLOODING OCCURS AT SW1 DURING THE 1 IN 100 YEAR PLUS CLIMATE CHANGE STORM EVENT. FLOOD WATER WILL FLOW TOWARDS THE DEPRESSION AT CENTER OF THE WET WELL

SW1
CL: 117.000
IL: 115.185
1200mmØ TYPE 2 MANHOLE
D400 COVER

FILTER DRAIN FALL GRADIENTS TO FOLLOW ACCESS ROAD. LEVELS CURRENTLY TAKEN FROM 3D SURFACE PROVIDED BY CLIENT

GRASSCRETE ACCESS ROAD TO BE LINED WITH 600mm WIDE FILTER DRAINS CONTAINING A 150mmØ PERFORATED CARRIER PIPE. MINIMUM DEPTH OF FILTER DRAINS TO 0.9m.

CHECK DAMS TO BE LOCATED ALONG FILTER DRAINS TO MAXIMIZE SURFACE WATER STORAGE POTENTIAL. CURRENT POSITION OF CHECK DAMS USED WITHIN HYDRAULIC CALCULATIONS ARE INDICATIVE AND WILL BE FINALISED DURING LATER DESIGN STAGES.

FILTER DRAINS TO COLLECT RUNOFF FROM GRASSCRETE AND ACCESS ROAD SIDE EMBANKMENTS.

GRASSCRETE MANUFACTURER LITERATURE INDICATES THAT THE GRASSCRETE HAS THE POTENTIAL TO INTERCEPT UPTO 95% OF RAINFALL LANDING UPON IT, TO REMAIN CONSERVATIVE IT HAS BEEN ASSUMED THAT THE GRASSCRETE WILL INTERCEPT 70% OF RAINFALL AND SO WILL HAVE AN IMPERMEABILITY OF 30% FOR THE HYDRAULIC CALCULATIONS.

A SIMILAR APPROACH HAS BEEN USED FOR THE RUNOFF GENERATED BY THE ACCESS ROAD EMBANKMENTS, WHICH WILL BE LEFT TO BECOME GRASS VERGES. A 30% IMPERMEABILITY HAS ALSO BEEN ASSUMED FOR THE VERGES.

N

DO NOT SCALE

DESIGN BASED ON LAYOUT DRAWING PROVIDED BY GALLIFORD TRY REFERENCE: YW205642-GAL-WTN-NCS-DR-C-0003

FOR PLANNING PURPOSES ONLY, NOT FOR CONSTRUCTION

KEY

- PROPOSED SURFACE WATER DRAIN
- PROPOSED FILTER DRAIN
- PROPOSED SURFACE WATER MANHOLE
- PROPOSED INDICATIVE RODDING EYE
- SURFACE WATER EXCEEDENCE FLOW PATH

REV	DATE	BY	DESCRIPTION	CHK	APP
P02	20/01/2026	DP	REVISION FOLLOWING COMMENTS	AM	VM
P01	12/12/2025	DP	FOR INFORMATION	DP	VM

DRAWING STATUS: S2 - FOR INFORMATION

wsp
Opus House, Yale Business Village, Wrexham Technology Park, Wrexham, LL13 7YL, UK
T+ 44 (0) 1978 368 100
wsp.com

CLIENT: YORKSHIRE WATER

SITE/PROJECT: BALK FARM COURT PUMPING STATION

TITLE: INDICATIVE SURFACE WATER DRAINAGE LAYOUT

SCALE @ A1:	CHECKED:		APPROVED:
1:200	AM		VM
PROJECT NO:	DESIGNED:	DRAWN:	DATE:
70118209	DP	DP	January 26

DRAWING No: 0040979-WSP-GDG-ZZ-DR-CW-0501 REV: P02

Appendix G

SUDS OPERATION AND MANUFACTURER DATASHEETS

Table 1: SuDS Maintenance Inspection Checklist

GENERAL INFORMATION			
Site ID			
Site Location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved Drawing Reference(s)	
Inspection frequency		Approved Specification Reference	
Type of development		Specific purpose of any parts of the scheme (e.g. biodiversity, wildlife and visual aspects)	

	Inspection date				**Inspection date**			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
GENERAL INSPECTION ITEMS								
Is there any evidence of erosion, channelling, ponding (where not desirable) or other poor hydraulic performance?								
Is there any evidence of accidental spillages, oils, poor water quality, odours, nuisance insects?								
Have any health and safety risks been identified to either the public or maintenance operatives?								
Is there any deterioration in the surface of permeable or porous surfaces (e.g. rutting, spreading of blocks or signs of ponding water)?								

	Inspection date				Inspection date			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
SILT/SEDIMENT ACCUMULATION								
Is there any sediment accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent Is removal required? If yes, state waste disposal requirements and confirm all waste management requirements have been complied with (consult Environment Agency or SEPA).								
Is surface clogging visible (potentially problematic where water has to soak into the underlying construction or ground (e.g. under-drained swale or infiltration basin)?								
Does permeable or porous surfacing require sweeping to remove silt?								
SYSTEM BLOCKAGES / LITTER BUILD UP								
Is there evidence of litter accumulation in the system? If yes, is this a blockage risk?								
Is there any evidence of any other clogging/blockage of outlets or drainage paths?								
VEGETATION								

	Inspection date				Inspection date			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
Is the vegetation condition satisfactory (density, weed growth, coverage etc.)? (Check against approved planting regime.)								
Does any part of the system require weeding / pruning / mowing? (Check against maintenance frequency stated in approved design.)								
Is there any evidence of invasive species becoming established? If yes, state action required.								
INFRASTRUCTURE								
Are any check dams or weirs in good condition?								
Is there evidence of any accidental damage to the system (e.g. wheel ruts?)								
Is there any evidence of cross connections or other unauthorised inflows?								
Is there any evidence of tampering with the flow controls?								
Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects? (Specify.)								
OTHER OBSERVATIONS								
Information appended (e.g. photos)								

	Inspection date				Inspection date			
	Details	**Y/N**	**Action required**	**Date Completed**	**Details**	**Y/N**	**Action required**	**Date Completed**
SUITABILITY OF CURRENT MAINTENANCE REGIME								
Continue as current Increase maintenance Decrease maintenance								
NEXT INSPECTION								
Proposed date for next inspection								

Grasscrete

the environmental paving solution

GrassConcrete

the original ...the best, that's the Grasscrete World

Our history

Grass Concrete Limited is a UK based company founded upon the principles of establishing environmental awareness in construction. Since our establishment in 1970 many of our aspirations that were then 'alternative' have now become part of mainstream policy adopted by governments and planners around the world.

Barely an issue in those days, the company set out to change traditional thinking towards paving technology. The company's credentials have grown with that of its original product, the unique Grasscrete paving system. Alongside this original invention further paving systems have been introduced as well as a range of earth retaining walls and green roofing solutions.

Why Grasscrete?

With architects and engineers now embracing environmental technology, the relevance of Grasscrete has never been greater. A product ahead of its time has found its era.

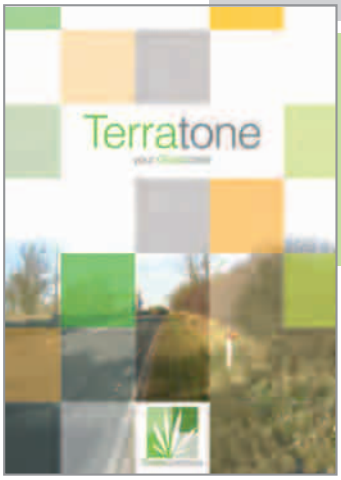
As probably the world's only supplier of a complete range of grass reinforcement products, we are able to say that Grasscrete stands alone in its unique capabilities. Though often thought of as a generic reference for grass reinforcement, it's much more than that and, indeed, shouldn't be confused with other types of grass paving.

The lightweight Grasscrete void former can be easily and cost effectively shipped throughout the World. Availability is enhanced by an extensive network of International Licensees.

applications

- Vehicle parking
- Access roads
- Fire and emergency access
- Laybys / pull ins
- Highway verges
- Abnormal load diversions
- SUDS (sustainable urban drainage system)
- Helipads
- Military installations
- Slope protection
- Drainage channels
- Flood prevention
- Swales
- Spillways

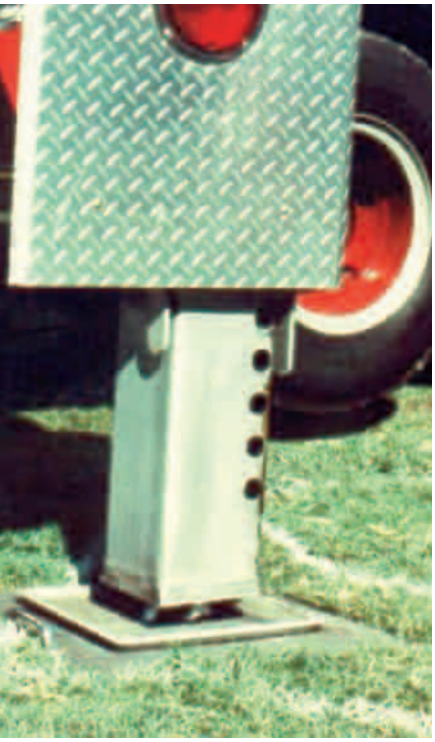
Grasscrete is available in soil tone concrete. Please ask for further details of Terratone



structural performance

Grasscrete combines the environmental appeal of natural grass with the engineering principles of reinforced concrete.

This unique cellular structure is created using the Grasscrete void former; vacuum formed with a patented anti-static coating to prevent concrete adhesion as well as enabling easy packing and separation.



Key benefits

Resists differential settlement

Modular, pre-cast concrete or plastic systems rely significantly on grass for stability by forming a composite tensile matrix. Under constant trafficking the combination of load and vibration can loosen root anchorage, leaving the surface prone to settlement in a syndrome known as 'elephant tracking'.

By contrast Grasscrete isn't structurally influenced by grass and can therefore be trafficked before grass establishment. The reinforced structure resists differential settlement and the flat, upper surface and pocket shape minimises vibration.

Ground heave

Grasscrete's unique pocket profile enables the release of frost heave and hydro-static pressure. These benefits enable the system to be used over frost influenced ground and in demanding slope protection works.

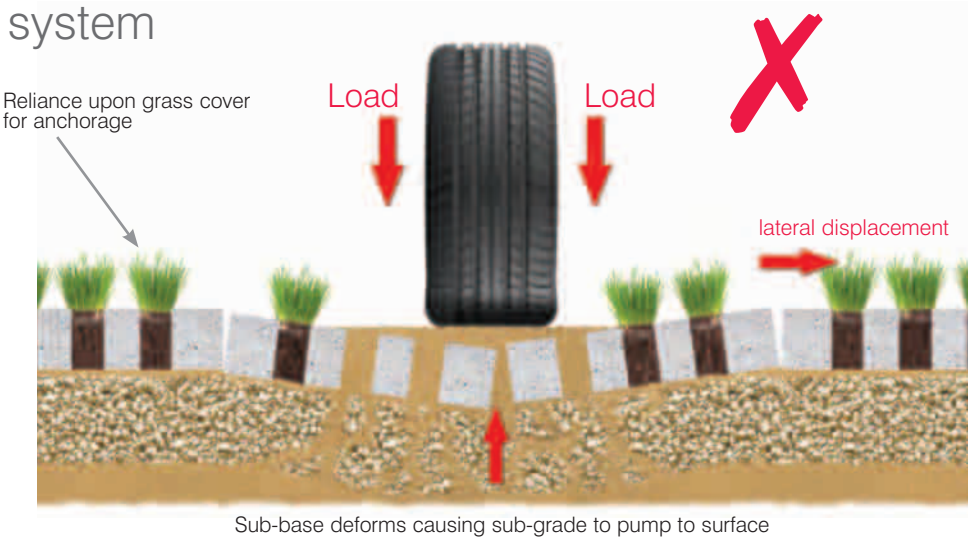
Sub-base depth

With an allowable ground-bearing requirement of just 45kN/m^2, Grasscrete can be installed over slimmer sub-bases than required for pre-cast or plastic types.

Edge details

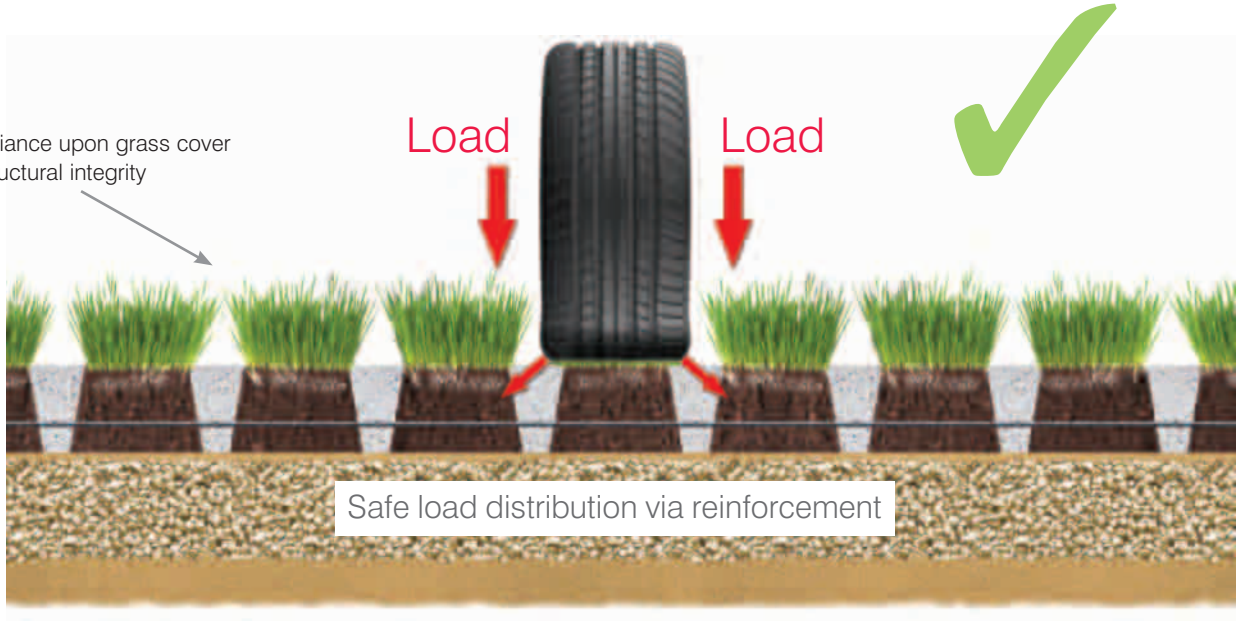
Modular pre-cast concrete or plastic systems require edge restraints or kerbs. For larger projects intermediate shear anchors may also be needed. Grasscrete however, requires no such details, enabling it to blend naturally with adjacent finishes with subtle delineation created by a monolithically cast solid concrete edge margin.

Pre-cast system



Sub-base deforms causing sub-grade to pump to surface

Grasscrete



key environmental benefits

Permeability

- Permeation rate up to 90% that of original ground
- Helps to reduce shrinkage in underlying clays
- Reduces on and offsite drainage requirements
- Works with BREEAM, LEED and BASIX environmental systems

Filtration

- Natural bio-filter created by organic/granular layers

Flood prevention and control

- Reduces surface water run-off
- Highly effective armouring layer for fast flowing water movement and storage
- Gives a hard engineering solution a soft landscape feel

Greenspace

- Promotes a feeling of greenspace well-being
- Helps to reduce the Urban Heat Island Effect
- Digests CO_2 at ground level emission source

Recycling

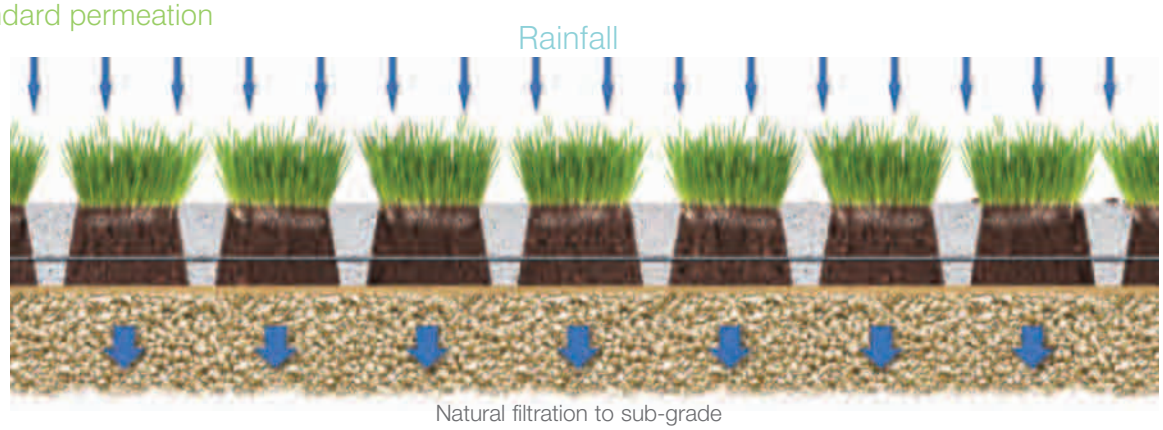
- Significant re-cycled content in void former manufacture
- Promotes re-use and re-cycling of topsoils and aggregates in construction

Carbon mileage

- Lightweight formers and patented nesting reduces transported volume
- Combines with locally sourced materials for construction

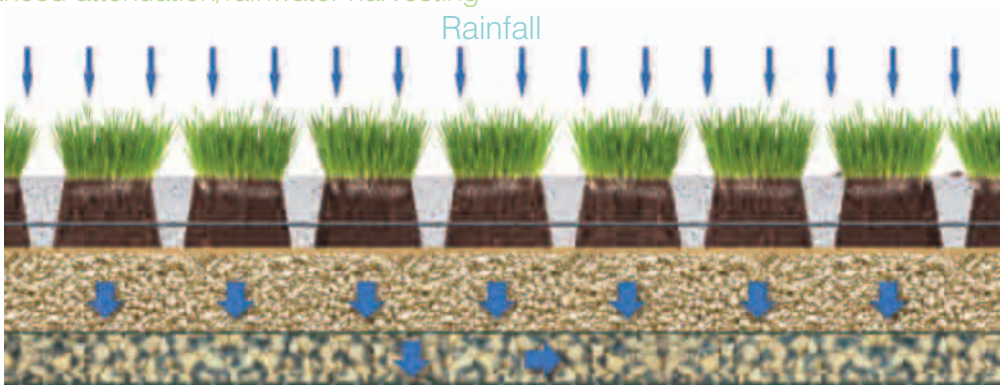
sustainable drainage technology(SUDS)

Standard permeation



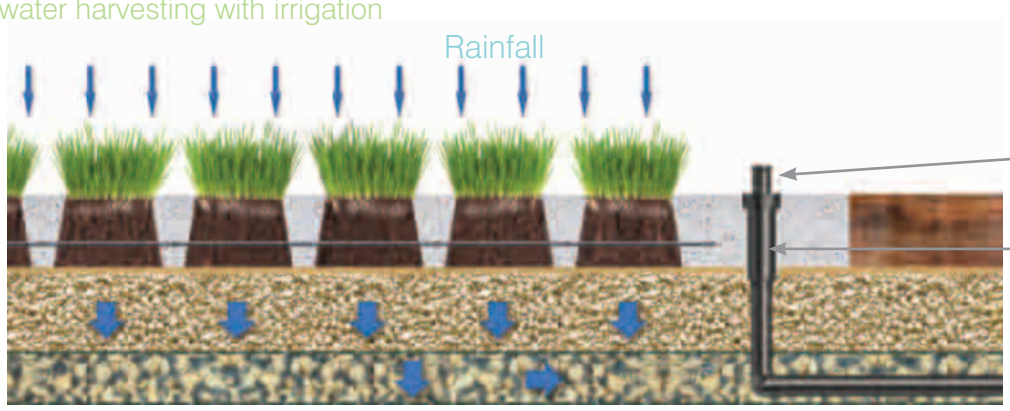
Natural filtration to sub-grade

Advanced attenuation/rainwater harvesting



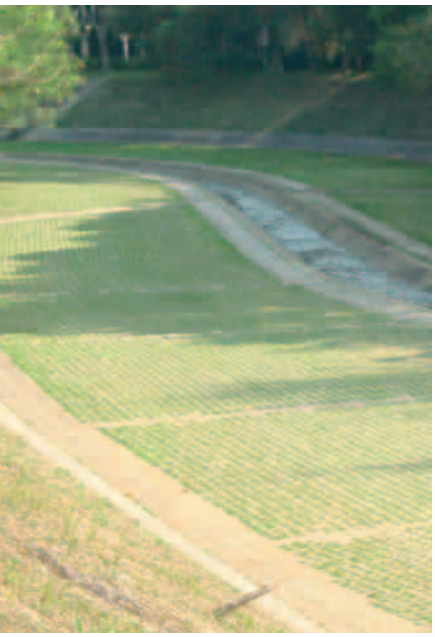
Permeation or Harvesting

Rainwater harvesting with irrigation



slope protection

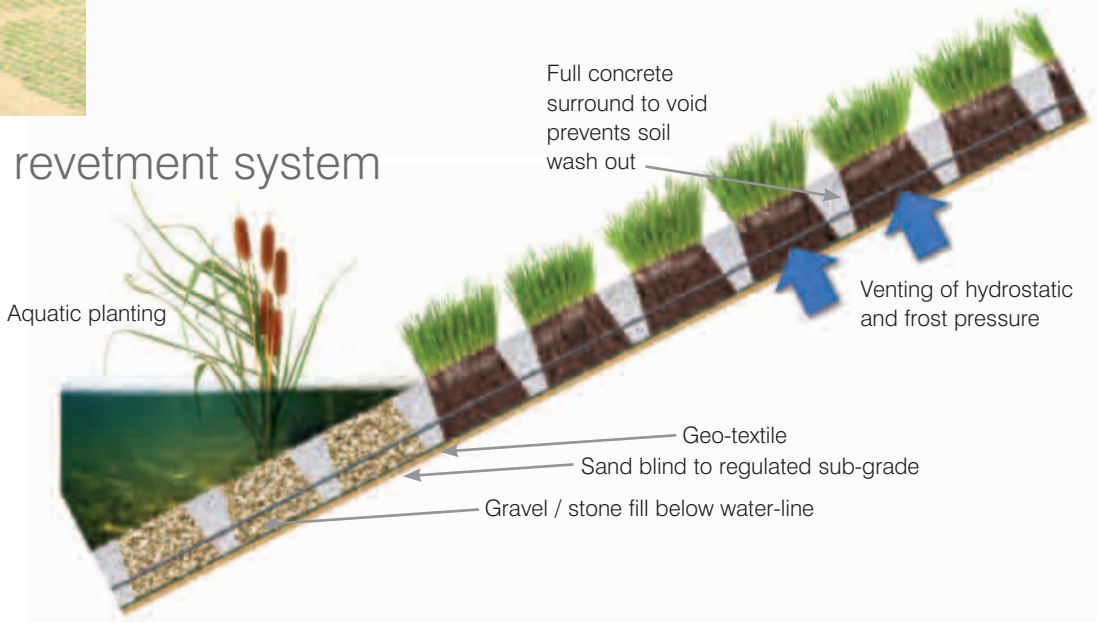
Grasscrete has been flow tested to rates in excess of 8 metres per second, enabling it to be used in exacting locations.



The Grasscrete construction phase also holds a number of key advantages for contractors when compared with pre-cast systems:

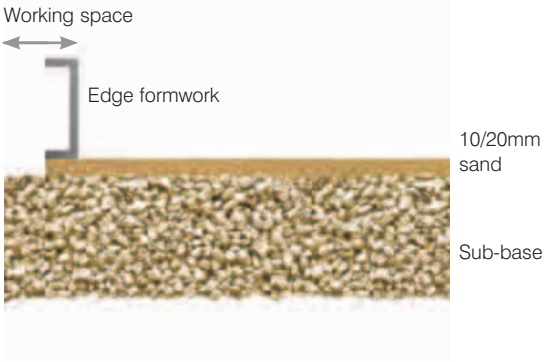
- The cast insitu process enables bays to be cast in varying locations and sequences safe in the knowledge that they will all eventually come together. This compares to the need to follow a strict linear process for installing pre-cast blocks to ensure that bonding is maintained.
- Site storage and handling requirements are minimised with one 12 metre long container of Grasscrete formers being able to cover the same area as forty 12 metre long loads of pre-cast blocks.
- In addition to normal topsoil and grass infill the Grasscrete pockets can also be filled with 20-5mm graded gravel for below water-line locations.
- The “at risk” period during the temporary works is much less for Grasscrete as it will perform without grass growth. This compares to pre-cast block types where grass growth is essential to maintaining stability.

The natural revetment system

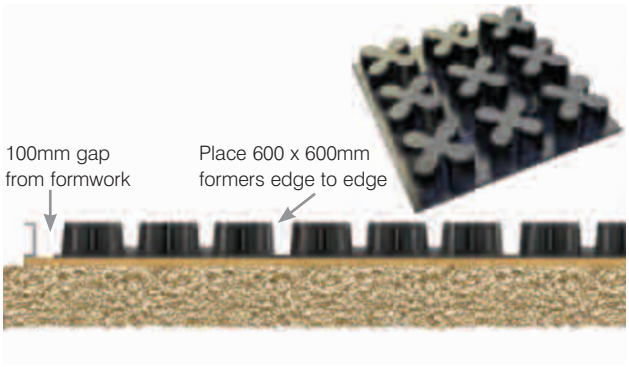


installation

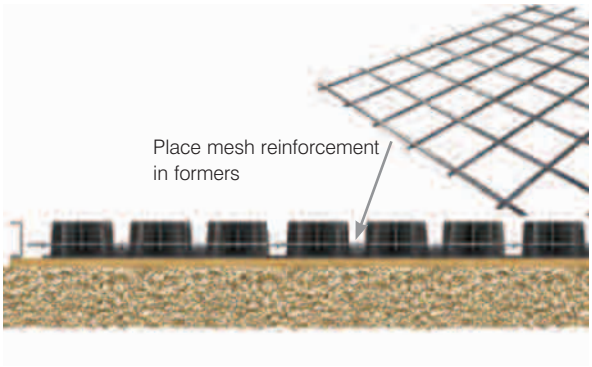
1. Preparation



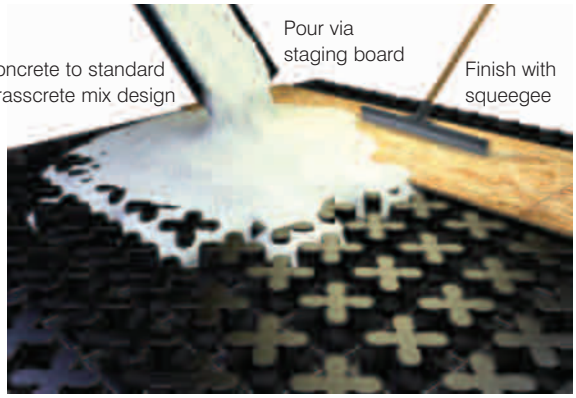
2. Lay formers



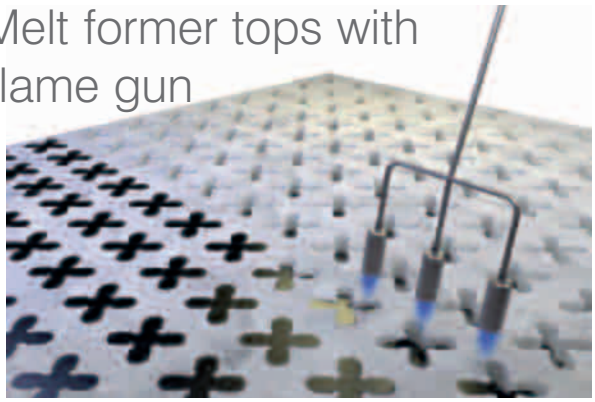
3. Mesh reinforcement



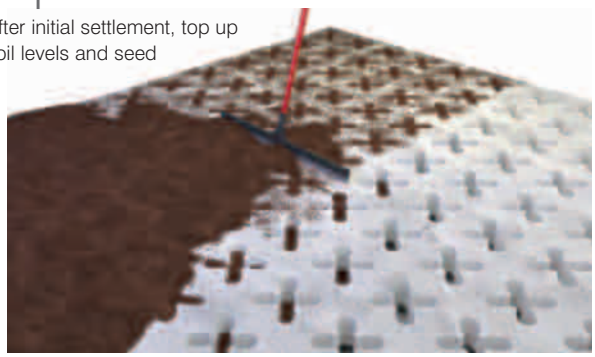
4. Concrete



5. Melt former tops with flame gun

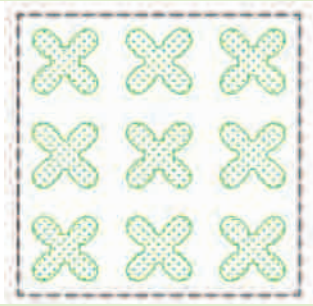


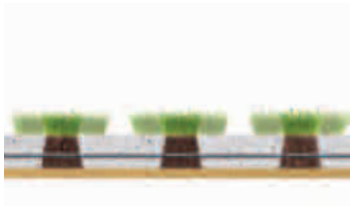
6. Top soil and seed



Types

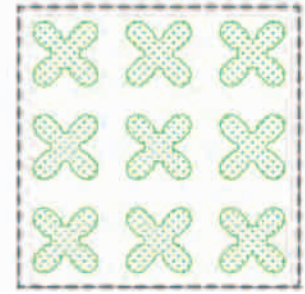
GC3

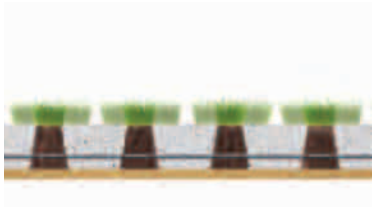




Void former size:	600 x 600 x 76mm
Paving depth:	76mm
Mesh reinforcement:	BS4483 Ref. A142 or A193 (200 x 200 x 6mm dia. or 200 x 200 x 7mm dia.)
Concrete coverage:	22m²/m³
Topsoil coverage:	24m²/m³

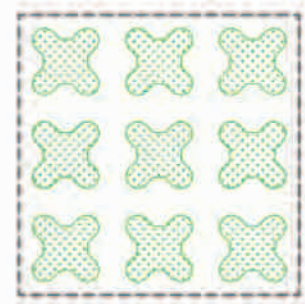
GC1





Void former size:	600 x 600 x 100mm
Paving depth:	100mm
Mesh reinforcement:	BS4483 Ref. A193 or A252 (200 x 200 x 7mm dia. or 200 x 200 x 8mm dia.)
Concrete coverage:	15.50m²/m³
Topsoil coverage:	18m²/m³

GC2



Void former size:	600 x 600 x 150mm
Paving depth:	150mm
Mesh reinforcement:	BS4483 Ref. A252 or A393 (200 x 200 x 8mm dia. or 200 x 200 x 10mm dia.)
Concrete coverage:	11.50m²/m³
Topsoil coverage:	12m²/m³

Specification

Grasscrete cast on site reinforced cellular paving.

Grasscrete formers type GC.....*, ...*mm deep laid on a consolidated sub-base with a 10/20mm blinding layer of sand. Steel mesh reinforcement to BS4483 reference .....*, weighing .....*kg/m². Concrete 30MN/m2 at 28 days with air entrainment of 3%. 10mm maximum aggregate and a .....*mm slump placed around formers and mesh and levelled to tops of formers. *(Where coloured concrete is required please suffix the GC former type reference with "Terratone" eg "GC3/Terratone".)* After 48 hours melt exposed tops of formers and fill with soil. Following settlement sow Grassmix No.....* at a rate of 50g/m² and top up with fine friable topsoil, apply fertiliser as necessary.

Expansion joints shall be incorporated at maximum 10 x 10m centres and shall consist of 25mm wide pre-soaked softwood filler.

Or for GC2 with A393 mesh only, and normally only when used for heavy load transference:

Expansion joints shall be incorporated at maximum 10 x 10m centres and shall consist of 25mm wide foamboard filler with 20mm diameter x 300mm long sawn mild steel dowels at 400mm centres with cap and debond to one side. Joint shall be sealed with cold applied sealant.

**Refer to data in Grasscrete Types table and Specification Guide for items to be completed.*

Specification guide

Vehicular use

Maximum vehicle weight	Grasscrete type	Depth	Reinforcement	Minimum Sub-base depth*	Sub-base type
0 - 3.4 tonnes	GC3	76mm	A142	100mm	(UK) Specification for Highway Works Clause 803 Type 1 sub-base (International) 40mm down crushed stone granular sub-base
3.4 - 4.3 tonnes	GC3	76mm	A193	150mm	
4.3 - 10.8 tonnes	GC1	100mm	A193	150mm	
10.8 - 13.3 tonnes	GC1	100mm	A252	150mm	
13.3 - 30.0 tonnes	GC2	150mm	A252	150mm	
30.0 - 40.0 tonnes	GC2	150mm	A393	200mm	

**Assumes a free draining allowable ground bearing of 45kN/m² which should also be sufficient to enable construction plant/delivery access.*

Water environment

Water flow rate	Grasscrete type	Depth	Reinforcement	Preparation (all types)
Up to 4.5 metres / second	GC3	76mm	A142	Trimmed earth sub-grade Sand blind Suitable geo-textile Fine protective cover of sand
Up to 6.0 metres / second	GC1	100mm	A193	
Up to 9.0 metres / second	GC2	150mm	A252	

Seed specification

Mix	Sowing rate	*Specification (temperate European)	Application
No. 1	35gms/m²	50% perennial ryegrass 20% slender creeping red fescue 25% strong creeping red fescue 5% browntop bent	Vehicular parking, amenity areas
No. 2	30gms/m²	20% chewings fescue 20% slender creeping red fescue 30% strong creeping red fescue 25% hard fescue 5% browntop bent	Fire paths, shaded low maintenance areas
No. 3	20gms/m²	25% perennial ryegrass 20% strong creeping red fescue 30% hard fescue 10% smooth stalked meadow grass 10% browntop bent 5% white clover	Slopes, road verges *For other climate types please contact us

Further specification information can also be found under NBS reference Q21-125

Please contact us for further information and advice relating to special mixes for applications such as water courses and spillways.

Grass Concrete Limited

Duncan House, 142 Thornes Lane, Thornes,
Wakefield, West Yorkshire WF2 7RE, England

Tel: +44(0)1924 379443 Fax: +44(0)1924 290289
info@grasscrete.com

Please note that information is given in good faith, without warranty and subject to alteration without prior notice.

A full range of brochures and technical guides are available upon request

grasscreteworld

@grasscreteworld

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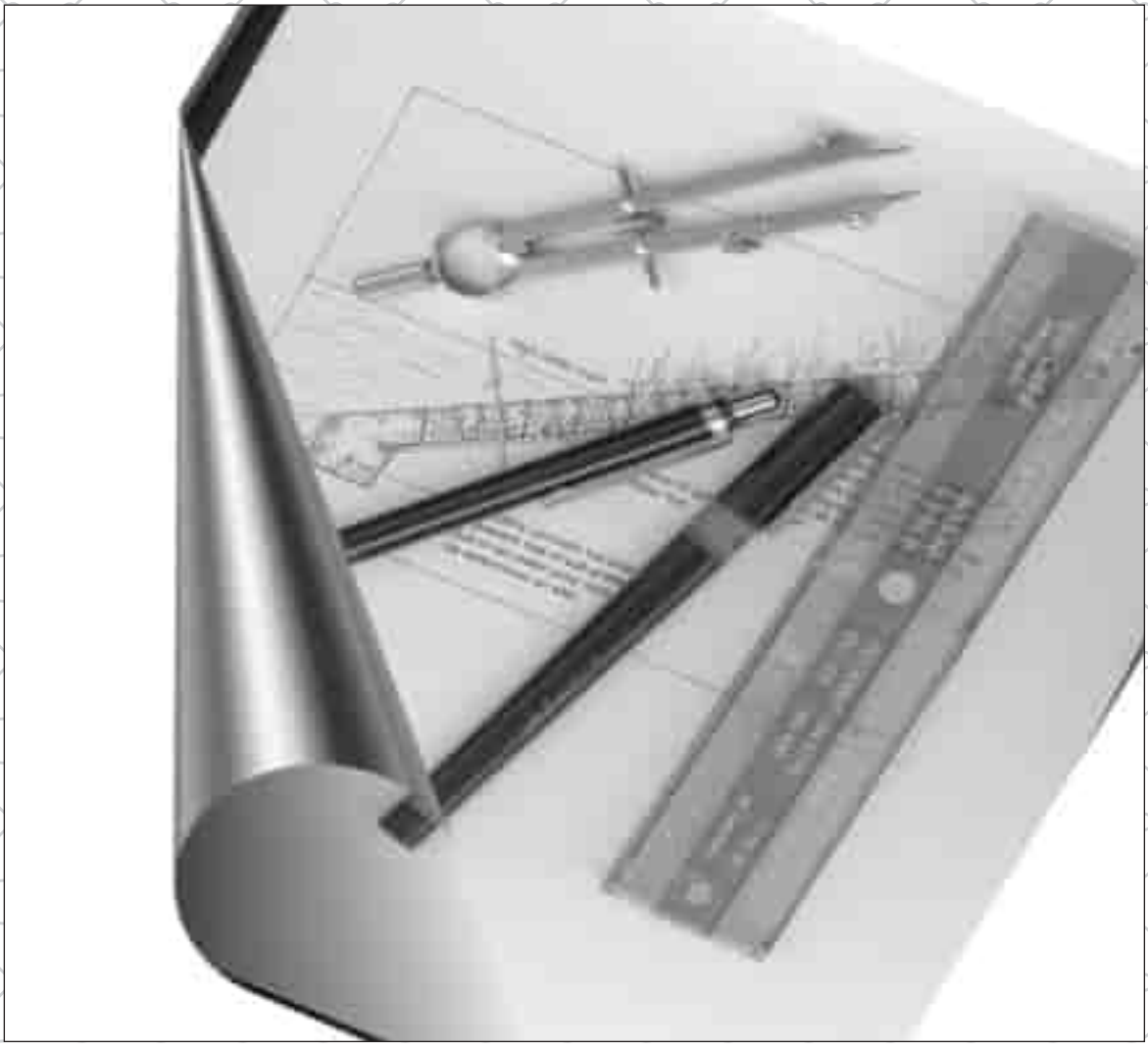
GRASSCRETE®

CAST INSITU PAVING SYSTEM

DESIGN AND SPECIFICATION GUIDE



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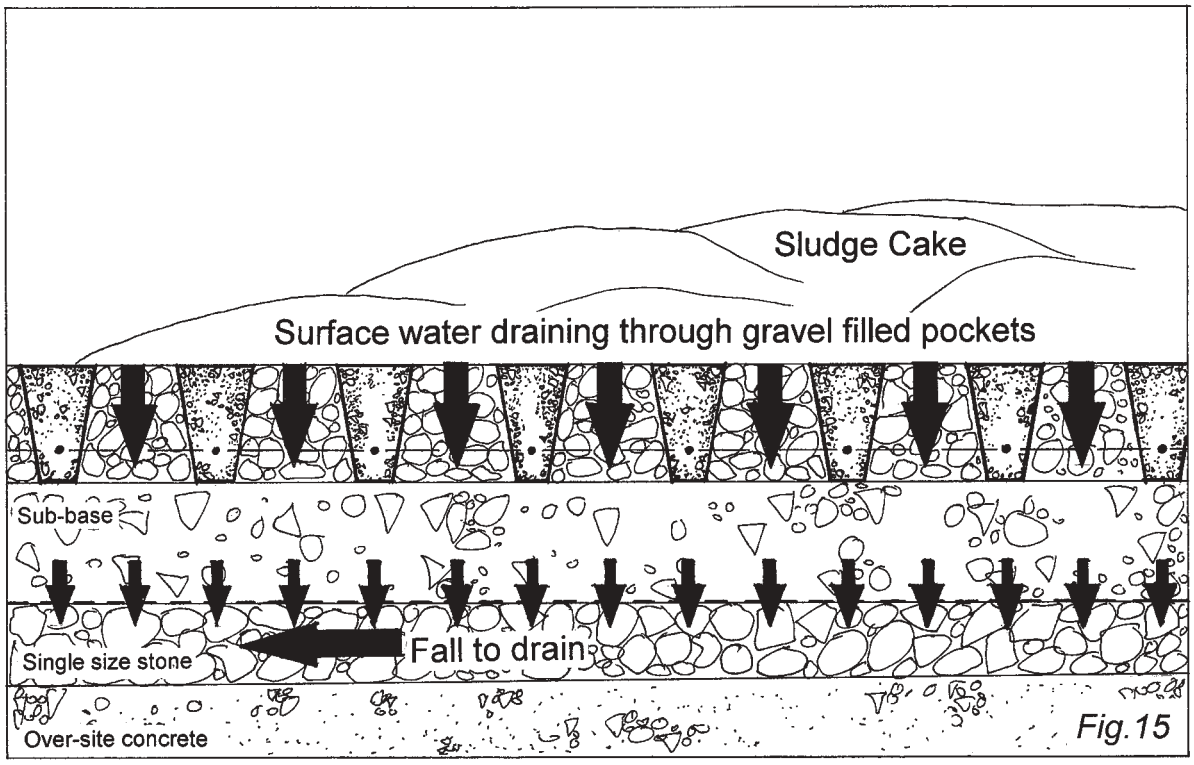

CHAPTER FIVE – USE AND MAINTENANCE

PART 1 ~ USE

A question often asked is one relating to the ease of use for both vehicles and pedestrians. Often the questions are influenced by previous experiences with other forms of grass reinforcement.

Vehicular Use

With a flat upper profile and a pocket shape designed to prevent tyre intrusion, vehicles have little difficulty in using the surface. The tyre rumble encountered is perhaps the lowest found amongst concrete systems and is in marked contrast to castellated precast units where the studded upstands cause discomfort in use and block displacement under vibration.

The integral solid edge margins to each bay prove a subtle definition for the user and is particularly important for fire access routes. This detail, together with the optional car bay markers, enables a fully delineated car park to be constructed without the need for painted lines.

Pedestrian Use

It cannot be expected that a grass and concrete surface will be as easy to walk on as a solid pavement system, particularly for high heel users. That said, the GRASSCRETE system is probably the easiest grass reinforcement system to walk on. The same advantages that hold for vehicles apply equally to pedestrian use, the plan shape of the pocket allowing feet to sit predominantly on concrete. The optional use of bay divisions also aids the process of disembarking from vehicles where the first foot is placed on a solid concrete surface.

PART 2 ~ MAINTENANCE

GRASSCRETE is not a miracle system – it grows natural grass. Just as a grassed lawn requires maintenance, then so will GRASSCRETE albeit to a lesser degree.

Regular vehicular use will trim the grass level down flush to the upper level of the concrete. In a typical car park application, the access routes may show a greater level of grass wear. It is advisable therefore to apply a routine maintenance programme, particularly to the access locations.

A simple maintenance programme can be described as –

1. Routinely cut areas subjected to infrequent use to even out growth levels
2. Apply liquid based fertilisers as follows – Spring : nitrogen based formula
   Autumn : phosphate based formula

   Powder or granule based fertilisers should be avoided due to potential for wind drift and build up on the concrete ribs which can result in scorching of the grass.
3. Regular trafficking may result in the soil levels falling slightly in the pockets. It is advisable to top up levels which are a potential trip hazard. Over filling should be avoided however as should compaction of the pocket fill which can injure grass growth.
4. After the construction of the pavement layer and if the surface is not to be used immediately, there is benefit to be gained from placing a fine layer of topsoil over the surface of the concrete. This will enable soil levels to be naturally replenished after settlement as well as providing a barrier against solar gain over the newly cast concrete.

PART 3 ~ GRASS TYPES

The actual grass seed specification will depend upon the climatic location or intended use. As GRASSCRETE is laid throughout the world, the type of indigenous grass will therefore vary with both rhizome or stolon growth types being encountered.

Grass types can be individually tailored for individual projects according to climate, use and aspect. For temperate climates, three amenity based mixes can be utilised to provide flexibility and economy.

Regularly Trafficked Areas

Such applications are generally associated with car parks where the grass will be required to grow under aggressive wear conditions. Normally, the concrete ribs are required to be visible to provide a surface which is less likely to slurry under use. The combination of these two factors suggests the specification of a ryegrass based mix which offers erect growth and excellent wear resistance. Our Mix No 1 suits this purpose.

Infrequently Trafficked Areas

The principle types of use under this category are fire access routes and road verges.

A typical fire access may be located around a high rise building which could place the roadway in shade. The seed mix should therefore be shade tolerant

A road verge for European applications will be subjected to surface water run off containing rock salt treatment applied to carriageway in winter months. The mix should therefore be saline tolerant.

Such applications call for minimal maintenance with a carpet of cover generally being required. The combination of these factors suggests the use of a mix with a high proportion of creeping red fescue. Our Mix No 2 is such a type.

Embankment/Slope Protection

A number of different variations upon a common theme can be considered. The mix should generally provide good root anchorage to prevent pull out.

A dry slope may call for a more manicured approach with a closer grass mix provided by creeping red fescues. Consideration should be given however to the potential for the surface to become slippery under wet conditions.

In waterborne slopes the grass will be required to perform a functional role. Our earlier chapters have described how a stemmed grass can form a protective thatch when laid prostate by heavy water flow. Such a mix will therefore call for a higher proportion of smooth stalked meadow grass. Maintenance of this type should be geared towards the period of maximum impounding, to achieve the maximum thatching effect, the grass should be left long during the wet season, our Mix No 3 is designed for such applications.

SEED SPECIFICATIONS

MIX	SOWING RATE	SPECIFICATION	APPLICATION
No 1	50gms/m^2	45% Creeping Red Fescue 5% Browntop Bent 50% Perennial Ryegrass	Vehicular Parking Amenity Areas
No 2	50gms/m^2	20% Chewing Red Fescue 45% Creeping Red Fescue 5% Browntop Bent 30% Hard Fescue	Fire Access Shaded low maintenance areas
No 3	50gms/m^2	52% Creeping Red Fescue 5% Smooth Stalked Meadow Grass 3% Browntop Bent 40% Perennial Ryegrass	Embankments

The difference between a good mix and a poor one is likely to be pence per m? on sowing but a much greater cost on failure. We would therefore recommend the selection of quality cultivars selected from the upper levels of the Sports Turf Research Institute's tables relative to the required function.

PART 4 ~ REMEDIAL WORKS

Occasionally it may be necessary to cut out sections of GRASSCRETE to allow for example, a new service trench to be constructed. Very occasionally, damage may occur due to inappropriate use. Under such circumstances, a remedial repair can be easily accommodated as shown in fig.16.

GRASS
CONCRETE
LIMITED

Walker House 22 Bond Street Wakefield
West Yorkshire WF1 2QP
England
Tel: +44(0)1924 379443 Fax: +44(0)1924 290289
E-mail: info@grasscrete.com Web: www.grasscrete.com

Exchange Station
Tithebarn Street
Liverpool

wsp.com

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