

Flood Risk Assessment and Drainage Strategy Addendum Report

Project name Land West of Turners Hill Road and North of Huntsland, Crawley Down
Project no. 1620011691-014
Client Wates Developments Ltd
Version 1.0

Prepared by DM/DF
Checked by AG/CL
Approved by AG

1 Introduction

The following information is provided to supplement that already detailed in the following reports:

- Flood Risk Assessment by Ramboll, 17/01/2025, Version 5.0 (FRA); and
- Drainage Strategy by Ramboll, 17/01/2025, Version 6.0 (Drainage Strategy).

This Addendum Report is in response to comments from the Lead Local Flood Authority (LLFA) dated to the 26th of February 2025, regarding applications DM/25/0016 and DM/25/0017, and the requested further information.

2 Required Further Information

The following sections present the LLFA requirements as detailed in the comments dated to the 26th of February 2025, and the requested further information:

LLFA Comment/Request

- 1. The Environment Agency released updated flood risk mapping following the new National Flood Risk Assessment (NaFRA2) in early 2025. The updated mapping uses new and improved methods to assess flood risk. The Risk of Flooding from Surface Water mapping suggests that the mapping more accurately reflects conclusions in the FRA. We request an updated FRA including the updated mapping.*

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Response

The following conclusions were determined in the previously submitted FRA, regarding the potential for surface water flood risk at the site:

- In Field 1, the previous mapping indicated that a large area in the northeast of the field was at a High risk from surface water flooding. A review of LiDAR topography data across the field suggested that the mapping in this location was incorrect, as areas at a lower elevation toward the north and west were indicated to be at lower risk.
- A number of different long sections were drawn across this area which further supported the conclusions regarding the inaccurate nature of the surface water mapping in this location.

The updated surface water mapping is split between a present-day scenario and a future scenario which accounts for the potential impacts of climate change.

Under both scenarios the site is shown to be approximately 99% free from surface water flood risk, including within all areas of proposed development. Furthermore, the updated mapping is shown to be more reflective of the topography of the site, with areas previously shown to be at risk no longer indicated to be at risk and watercourses/ditches that were observed in the wooded area while onsite are now picked up as potential surface water flow paths where previously these were not identified in the mapping. The updated mapping further supports the conclusions detailed above regarding the previous surface water mapping.

The updated mapping is presented in Figures 3.1 and 3.2 at the rear of the report.

LLFA Comment/Request

- 2. As mentioned previously, FEH2022 rainfall model should be used in calculations as FSR underestimates the volume of rainfall, therefore the quick storage estimates could be underestimating the volume of storage required. The other parameters in the pre-app letter and proforma such as Cv value 1 should also be used, to ensure there is enough space on parameter plan for surface water attenuation features.*

Response

Please see Appendix B for full details of updated runoff and storage calculations. It is noted that FEH 'QMED Rural' runoff rates (L/s) have been calculated for each outfall. The Flood Estimation Handbook (FEH) and the earlier Flood Studies Report (FSR) are a set of methods and associated data to enable recognised standard national methods for rainfall and flood estimation, and rainfall-runoff modelling. QMED is the median annual maximum flood. This is the peak rate of flow from a catchment for the median annual flood (a return period of 1 in 2 years). 'QMED Rural' represents the calculated QMED runoff rate from rural surfaces.

LLFA Comment/Request

- 3. There is no consideration of urban creep.*

Response

10% urban creep has been accounted for within the FEH storage calculations. See Appendix B.

LLFA Comment/Request

4. *As mentioned previously, the discharge rate should be greenfield runoff rate for the impermeable area/area being positively drained, not the greenfield runoff rate for the whole site. Based on information in the Drainage Strategy, we've calculated the greenfield runoff rate to be 4.78 l/s/ha therefore the total discharge rate should be no greater than 25.62 l/s based on current proposed impermeable area.*

Response

FEH 'QMED Rural' runoff rates (L/s) have been calculated for each outfall. The Flood Estimation Handbook (FEH) and the earlier Flood Studies Report (FSR) are a set of methods and associated data to enable recognised standard national methods for rainfall and flood estimation, and rainfall-runoff modelling. QMED is the median annual maximum flood. This is the peak rate of flow from a catchment for the median annual flood (a return period of 1 in 2 years). 'QMED Rural' represents the calculated QMED runoff rate from rural surfaces. See Appendix B for runoff calculations.

The suggested rates of 4.78 L/s/ha and 25.62 L/s are based on information from the previously submitted Drainage Strategy report that has now been superseded by the calculations undertaken as part of this Addendum report. Please see Appendix B for updated drainage strategy plans and supporting calculations.

LLFA Comment/Request

5. *The 3m easements mentioned on the drainage strategy need to be on drawings, to ensure maintenance access is maintained as the site layout develops.*

Response

3 m buffers have been provided to all storage basins. These are marked by dotted blue lines as shown on the Drainage Layout plan in Appendix B.

LLFA Comment/Request

6. *Thames Water guidance on foul pumping station easements may need to be considered in relation to proximity to the basin. Thames Water will be best placed to comment on this.*

Response

Thames Water have already responded regarding the proposed foul strategy at the overall site and nothing was raised regarding foul pumping station easements so we have therefore considered that they are satisfied in this regard.

The letter of communication from Thames Water can be found in Appendix C at the rear of the report.

LLFA Comment/Request

7. *It is unclear how the watercourses connect to the wider watercourse network. In addition the watercourse between Field 1 and 2 has not been picked up on the topographical survey.*

Response

As described in the previously submitted Drainage Strategy report, the intention is to discharge surface water at two separate locations, one into a ditch/watercourse in the northwest corner of Field 1, and the other into a ditch/watercourse between Fields 1 and 2.

In the previous surface water mapping no watercourses or surface water flow paths were indicated to be at and/or leading away from these locations. However, these watercourses/flow paths were identified during site visits and photos of these watercourses can be found in Appendix C of the previously submitted Drainage Strategy report, see Photos 1 and 7. When combined with the Photograph Location Plan, also located within Appendix C of the previous Drainage Strategy report, the presence of watercourses in these locations can be confirmed, and has been substantiated by the latest EA mapping.

Regarding the wider watercourse network, Figure 2.1 below shows the Ordnance Survey (OS) watercourse network above the updated EA surface water mapping (future scenario) and it confirms the ultimate destination of these identified surface water flow paths to which runoff from the proposed development is intended to discharge. As can be seen within Figure 2.1, runoff from the site ultimately reaches a watercourse within the wooded area flowing approximately south to north.

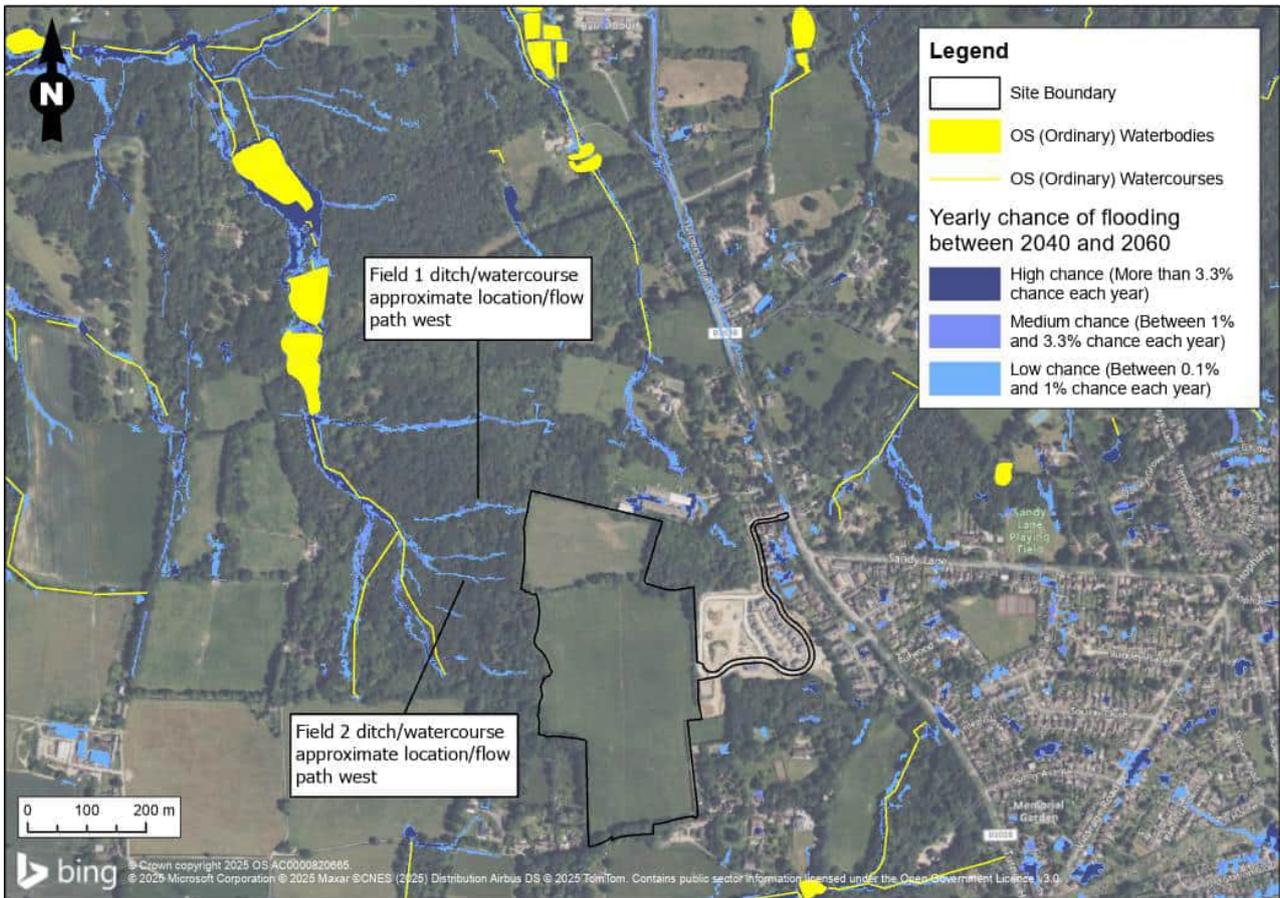


Figure 2.1: OS Watercourse Network & EA (2025) Surface Water Mapping

Regarding the query about the ditch/watercourse between Fields 1 and 2, it is acknowledged that this was not picked up on the topographical survey. Furthermore, it is acknowledged that in the previous Drainage Strategy report, the approximate route of the existing ditch/watercourse, as shown on the

Indicative Drainage Strategy Plan, was likely drawn to extend too far to the east along the boundary between Fields 1 and 2.

The presence of the ditch has however been confirmed on site and leaving the site and this is visualised in Photo 7 of Appendix C of the previous Drainage Strategy report. The presence of the ditch is further visualised in the photographs presented in Table 2.1 below which were taken from the northwest corner of Field 2/southwest corner of Field 1.

Table 2.1: Field 2 Discharge Location Photographs

	
<p>View looking down into ditch/watercourse on boundary of Fields 1 and 2 on dry day. Northwest corner of Field 2.</p>	<p>View looking downstream as ditch/watercourse, on boundary of Fields 1 and 2 on dry day, leaves the site toward the west.</p>



View looking upstream ditch/watercourse on boundary of Fields 1 and 2 on wet day. Far northwest corner of Field 2/southwest corner of Field 1.



View looking downstream on boundary of Fields 1 and 2 on wet day. Far northwest corner of Field 2/southwest corner of Field 1.

The Drainage Layout found in the rear of the report accurately details the discharge strategy for surface water from Field 2.

LLFA Comment/Request

8. *The indicative Drainage Layout needs to show the volume of storage can be achieved in the layout (4000 m³). It is suggested to add an estimated capacity for each feature.*

Response

Storage provisions have been provided on the drainage strategy layout drawings. See Appendix B.

LLFA Comment/Request

9. *Further information on what we require for an outline application can be found here: Surface Water Drainage Proforma. It is strongly suggested that this is used when preparing further information for resubmission to the LPA.*

Response

Noted. This document has been reviewed as part of this submission.

LLFA Comment/Request

10. Where it is intended that WSCC Highways will adopt highways, WSCC highways adoption standards will need to be followed. It is unlikely WSCC highways will adopt drainage features which are draining residential areas.

Response

Where the new access roads are to be adopted, the drainage within the highway will be adoptable. All drainage is designed to adoptable standards etc.

3 Appendices

3.1 Appendix A – Environment Agency (EA) Updated Surface Water Mapping



Legend

- Site Boundary
- Yearly chance of flooding between 2040 and 2060**
- High chance (More than 3.3% chance each year)
- Medium chance (Between 1% and 3.3% chance each year)
- Low chance (Between 0.1% and 1% chance each year)

Figure Title
EA Surface Water Flood Mapping - Future Scenario

Project Name
Land West of Crawley Down

Project No./Filey ID
1620011691-014 / RUK2021N00014

Date	Figure No.	Revision
March 2025	3.2	1.0

Prepared By DM	Scale 1:4,000 @A4
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Client
Wates Developments Ltd



Fig2.4_EASurfaceWaterFloodRisk.pagx



Legend

- Site Boundary
- Yearly chance of flooding**
- High chance (More than 3.3% chance each year)
- Medium chance (Between 1% and 3.3% chance each year)
- Low chance (Between 0.1% and 1% chance each year)

Figure Title
EA Surface Water Flood Mapping - Present Day

Project Name
Land West of Crawley Down

Project No./File ID
1620011691-014 / RUK2021N00014

Date	Figure No.	Revision
March 2025	3.1	1.0

Prepared By	Scale
DM	1:4,000 @A4

Client
Wates Developments Ltd



Fig2.4_EASurfaceWaterFloodRisk.pagx

3.2 Appendix B – Drainage Plans/Calculations

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- Notes
- DO NOT SCALE FROM THIS DRAWING.
 - ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE.
 - ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM UNLESS SHOWN OTHERWISE.
 - THE CONTRACTOR IS TO ENSURE THAT ALL BURIED SERVICES ARE LOCATED PRIOR TO CARRYING OUT ANY EXCAVATION.
 - FOR DETAILS OF DRAINAGE STRUCTURES REFER TO RELEVANT STRUCTURE GENERAL ARRANGEMENT DRAWINGS.
 - DRAINS TO BE LAID CURVED ON PLAN WHERE SHOWN ON DRAWINGS.
 - EXISTING DRAINAGE INFORMATION SHOWN ON THESE DRAWINGS ARE NOT EXHAUSTIVE. EXISTING DRAINS TO BE RETAINED ARE SHOWN. DRAINAGE TO BE ABANDONED NOT SHOWN. EXISTING DRAINAGE ENCOUNTERED NOT SHOWN ON THESE DRAWINGS SHALL BE TREATED AS DIRECTED BY THE ENGINEER.
 - WHERE SHOWN TO BE RETAINED, THE LOCATION OF EXISTING DRAINAGE SHALL BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION. THE CONDITION OF THIS EXISTING DRAINAGE SHALL ALSO BE VERIFIED, AS PART OF THE WORKS, IN ACCORDANCE WITH THE SPECIFICATION. EXISTING DRAINAGE FOUND TO BE DEFECTIVE IN ANY WAY SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE ENGINEER.
 - ALL EXISTING AND DIVERTED STATUTORY SERVICE INFORMATION IS SHOWN INDICATIVELY FOR REFERENCE ONLY. THE CONTRACTOR SHALL UNDERTAKE ALL NECESSARY INVESTIGATIONS TO DETERMINE THE EXACT LOCATION OF UNDERGROUND/OVERGROUND PLANT.



OUTLET INTO EXISTING WATER COURSE RESTRICTED TO F10 (SHELFIELD RATE), FLOW RESTRICTION: 0.8L/S

SURFACE WATER REQUIREMENTS:
 EXISTING: 11.27L/S
 PROPOSED: 11.27L/S
 PER GRAM BLOCK: 1.8L/S
 CONTRIBUTING AREA: 15516.51m²
 STORAGE REQUIRED: 1648m³

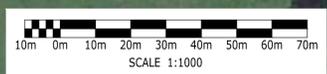
SURFACE WATER ATTENUATION PROVISION:
 1. 100% STORAGE WITHIN 300mm PERMEABLE PAVING
 2. 100% STORAGE IN SWALES
 3. 100% STORAGE IN ATTENUATION BASINS (1.5m DEEP)
 TOTAL PROVISION APPROXIMATELY 1475m³

OUTLET INTO EXISTING WATER COURSE RESTRICTED TO F10 (SHELFIELD RATE), FLOW RESTRICTION: 41.4L/S

SURFACE WATER REQUIREMENTS:
 EXISTING: 7.57L/S
 PROPOSED: 7.57L/S
 PER GRAM BLOCK: 1.8L/S
 CONTRIBUTING AREA: 4524.19m²
 STORAGE REQUIRED: 482m³

SURFACE WATER ATTENUATION PROVISION:
 1. 100% STORAGE WITHIN 300mm PERMEABLE PAVING
 2. 51.4M³ STORAGE IN SWALES
 3. 320M³ STORAGE IN ATTENUATION BASINS (1.5m DEEP)
 TOTAL PROVISION APPROXIMATELY 4482m³

CONFORMANCE DRAINS TO INTERCEPT OVER LANDSCAPING, PROTECTING THE ADJACENT PROPERTY, AND DISCHARGE TO THE EXISTING DITCH TO THE SOUTH WHERE EXISTING FLOWS ULTIMATELY DISCHARGE.



KEY:

- ExFW EXISTING FOUL WATER DRAINAGE
- FW PROPOSED FOUL WATER DRAINAGE
- PROPOSED FOUL WATER RISING MAIN
- PUBLIC SEWER FOUL WATER DRAINAGE
- PROPOSED FOUL WATER MANHOLE/INSPECTION CHAMBER
- PROPOSED SURFACE WATER MANHOLE/INSPECTION CHAMBER
- FLOW CONTROL CHAMBER
- SW PROPOSED SURFACE WATER DRAINAGE
- EXISTING DITCH RETAINED
- EXISTING CULVERT
- HEADWALL (EXISTING & PROPOSED)
- PERMAVOID STORAGE CRATES
- PERMEABLE PAVING
- SWALE / ATTENUATION BASIN
- FOUL PUMPING STATION
- SITE BOUNDARY

P01	PRELIMINARY ISSUE			
Rev	NJ	DF	CL	24.03.2025
	Description	Drawn	Checked	Approved
				Date

Purpose of Issue: **PURPOSE OF ISSUE**

Status: **SUITABILITY**

LAND WEST OF CRAWLEY DOWN



DRAINAGE LAYOUT SHEET 1

Project No:	1620011691	Scale (8A1):	1:1000	Date:	FEB 25
Drawn:	NJ	Designed by:	DF		
Drawing No:	RAM-HDG-XX-DR-C-00001			Rev:	P01

InputInput Type Area (ha) Volumetric Runoff Coefficient Discharge Rate (L/s) Infiltration Rate (m/hr) Safety Factor

Calculate

 Create New From Library

- All
- FEH

Method FEH

Number of Storms 24

Max. Run Time (mins) 2880

Input

Results

2D Graph

OK

Cancel

Results

Quick Storage Estimate variables require approximate storage of between 947m³ - 1464m³.

These values are estimates only and should not be used for final design purposes.

Input

Results

2D Graph

OK

Cancel

Input

Input Type Area (ha) Volumetric Runoff Coefficient Discharge Rate (L/s) Infiltration Rate (m/hr) Safety Factor

Calculate

 Create New From Library

- All
- FEH

Method FEH

Number of Storms 24

Max. Run Time (mins) 2880

Input

Results

2D Graph

OK

Cancel

Results

Quick Storage Estimate variables require approximate storage of between 2896m³ - 4413m³.

These values are estimates only and should not be used for final design purposes.

Input

Results

2D Graph

OK

Cancel

ICP SUDS / IH 124

ADAS 345

FEH

ReFH2

Greenfield Volume

Site Location

GB 533400 137250 TQ 33400 37250



Version 2022 Catchment

Area (ha) 2.994

SAAR (mm) 838.0

Map

SPRHOST 40.72

URBEXT 1990 0.0251

Median Annual Flood (QMED)

BFIHOST 0.516

FARL 1.000

Calculate

Results

QMED Rural (L/s) 19.8

QMED Urban (L/s) 20.4

OK

Cancel

ICP SUDS / IH 124

ADAS 345

FEH

ReFH2

Greenfield Volume

Site Location

Version CatchmentArea (ha) SAAR (mm)

Map

SPRHOST URBEXT

Median Annual Flood (QMED)

BFIHOST FARL

Calculate

ResultsQMED Rural (L/s) QMED Urban (L/s)

OK

Cancel

3.3 Appendix C – Thames Water Drainage Strategy Comments

From: BCTAdmin@thameswater.co.uk <BCTAdmin@thameswater.co.uk>
Sent: 18 February 2025 12:41:39 UTC+00:00
To: "planninginfo" <planninginfo@midsussex.gov.uk>
Subject: 3rd Party Planning Application - DM/25/0015
Importance: Normal

Mid Sussex District Council
Oaklands Road
Haywards Heath
West Sussex
RH16 1SS

Our DTS Ref: 78596
Your Ref: DM/25/0015

18 February 2025

Dear Sir/Madam

Re: LAND WEST OF , TURNERS HILL ROAD AND, NORTH OF HUNSTAND, CRAWLEY, WEST SUSSEX, RH10 4HN

Waste Comments

Following initial investigations, Thames Water has identified an inability of the existing FOUL WATER network infrastructure to accommodate the needs of this development proposal. As such Thames Water request that the following condition be added to any planning permission. "The development shall not be occupied until confirmation has been provided that either:- 1. All foul water network upgrades required to accommodate the additional flows from the development have been completed; or- 2. A development and infrastructure phasing plan has been agreed with the Local Authority in consultation with Thames Water to allow development to be occupied. Where a development and infrastructure phasing plan is agreed, no occupation shall take place other than in accordance with the agreed development and infrastructure phasing plan." Reason - Network reinforcement works are likely to be required to accommodate the proposed development. Any reinforcement works identified will be necessary in order to avoid sewage flooding and/or potential pollution incidents. The developer can request information to support the discharge of this condition by visiting the Thames Water website at thameswater.co.uk/preplanning. Should the Local Planning Authority consider the above recommendation inappropriate or are unable to include it in the decision notice, it is important that the Local Planning Authority liaises with Thames Water Development Planning Department (e-mail: devcon.team@thameswater.co.uk) prior to the planning application approval.

There are public sewers crossing or close to your development. If you're planning significant work near our sewers, it's important that you minimize the risk of damage. We'll need to check that your development doesn't limit repair or maintenance activities, or inhibit the services we provide in any other way. The applicant is advised to read our guide working near or diverting our pipes.

<https://eur02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.thameswater.co.uk%2Fdevelopers%2Flarger-scale-developments%2Fplanning-your-development%2Fworking-near-our-pipes&data=05%7C02%7Cplanninginfo%40midsussex.gov.uk%7Cb62b1b9502664d73585008dd5019a86d%7C248de4f9d13548cca4c8babd7e9e8703%7C0%7C0%7C638754793338007533%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIiIAiOiJXaW4zMmIsIkFOIjoiTWFpbCIsIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=ZTZscdG0DMjfsfs4T4NG7fPjc8Hk0Acc%2BnLT4X0KL7Y%3D&reserved=0>

We would expect the developer to demonstrate what measures will be undertaken to minimise groundwater discharges into the public sewer. Groundwater discharges typically result from construction site dewatering, deep excavations, basement infiltration, borehole installation, testing and site remediation. Any discharge made without a permit is deemed illegal and may result in prosecution under the provisions of the Water Industry Act 1991. Should the Local Planning Authority be minded to approve the planning application, Thames Water would like the

<https://eur02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.twitter.com%2Fthameswater&data=05%7C02%7Cplanninginfo%40midsussex.gov.uk%7Cb62b1b9502664d73585008dd5019a86d%7C248de4f9d13548cca4c8babd7e9e8703%7C0%7C0%7C638754793338056518%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMtIsIkFOIjoiTWfPbCIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=R1ftbua9hyeYzzG3umjni%2FQJ1I4sOZkR%2FnMiCugfBhI%3D&reserved=0> or find us on <https://eur02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.facebook.com%2Fthameswater&data=05%7C02%7Cplanninginfo%40midsussex.gov.uk%7Cb62b1b9502664d73585008dd5019a86d%7C248de4f9d13548cca4c8babd7e9e8703%7C0%7C0%7C638754793338069682%7CUnknown%7CTWFpbGZsb3d8eyJFbXB0eU1hcGkiOnRydWUsIlYiOiIwLjAuMDAwMCIsIlAiOiJXaW4zMtIsIkFOIjoiTWfPbCIldUIjoyfQ%3D%3D%7C0%7C%7C%7C&sdata=TQpz8cj26wdepAvTLzmKyjIZU9ae26IkBN7k7vCTCxcw%3D&reserved=0>. We're happy to help you 24/7.

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