

# Fairford drainage strategy.



Our next steps.



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# Summary.

We're working on how to reduce the risk of sewer flooding, pollution, blockages and restricted use of toilets and bathrooms in the Fairford area. For us, it's a priority. We'll continue to work with our customers and other stakeholders, such as Fairford Town Council, Cotswold District Council, Gloucestershire County Council and private land owners, to take action and make drainage improvements as quickly as possible.

## Our drainage strategy work

We began our drainage strategy work in 2015 by carrying out research and regularly meeting with customers who had been affected by drainage issues, as well as stakeholders in the local area. Over the last year, we've

undertaken detailed investigations which have helped us to understand the drainage problems in the Fairford area and find the best ways to prevent them from happening in the future.



## Immediate drainage improvements

As part of this work we've also made some immediate drainage improvements, including fixing a major sewer defect in East End, to the south east of Fairford, and working with stakeholders to clear the Courtbrook stream. This is an important watercourse to the east of the River Coln, and clearing it has allowed a highway drain to work properly and surface water that often causes flooding on East End, to be diverted out through the highway drainage network.

With other stakeholders we've helped to fund a scheme that's diverted significant amounts of surface water off Quenington Road. This has helped to prevent additional water from entering our sewers and the surface water flooding that can happen on Coronation Street and Milton Street. We've also provided funding for a community project that's being led by the Farming & Wildlife Advisory Group, to restore pedestrian access to the River Coln through Fairford, and improve its environmental quality.





## Our drainage proposals

Based on our recent investigations and findings we're proposing that further drainage activities are carried out (we call these interventions), that will help to reduce the drainage issues in the Fairford area in the future, these include:

- Sealing manholes in locations prone to surface water flooding
- Repairing any further sewer defects we find, particularly in areas where our inspections identify groundwater entering our sewer network
- Implementing sustainable drainage systems (often called SuDS\*), in customers' homes and businesses, to reduce the rain water entering our sewers from property roofs
- Installing monitors in our sewage pumping stations so that we can continually check how they're operating
- Monitoring groundwater levels so that we can try to predict and prevent the flooding and drainage issues that happen when groundwater levels are high
- Working with stakeholders to reduce flooding in West End Gardens which is caused by water running from a neighbouring field during wet weather.

\* SuDS are a range of drainage methods that can be used for slowing the speed at which surface water enters our sewer network, and/or redirecting surface water away from our sewers. Examples of SuDS include using water butts, planters and paving that allows water to pass through it.



## Assessment and selection

The long-term interventions that we're proposing will be assessed to make sure that their potential benefits outweigh their costs, and then prioritised.

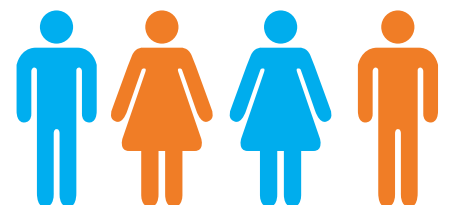
Those selected will be put in place during our next Business Plan period, which is between 2020 and 2025. Between now and then, we'll also continue to work closely with local stakeholders to deliver short-term drainage interventions and improvements in the Fairford area.

**benefits  
costs  
priorities**

### In this drainage strategy document we outline:

- The drainage process we're using
- How to find out more about what we did in stage one of the process
- The towns and villages that make up the Fairford area
- The things that can cause sewer flooding, blockages, pollution and restricted toilet use
- Our recent work in stage two and three of the process, particularly the investigations we've carried out and what we've found
- Our proposals and next steps for making future drainage improvements in the area
- How our customers can also help to improve drainage in the Fairford area now, and in the future.

## You can help



# About our strategy.

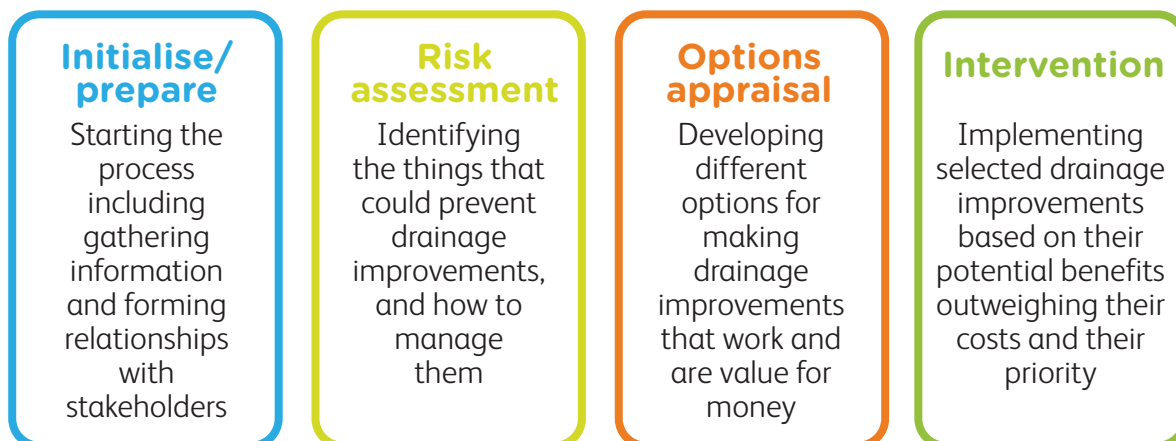
We've followed the guidance from our regulators, Ofwat and the Environment Agency, to produce this drainage strategy.

The good-practice process they recommend has four stages\*. We completed the first stage in 2016, which included a range of background research into the drainage issues in

the area. You can find out more about the work we did in stage one for the Fairford area, and other areas affected by drainage issues in our region, at [thameswater.co.uk/emmatosetuplink](https://thameswater.co.uk/emmatosetuplink).



## What this means



\* [ofwat.gov.uk/publication/drainage-strategy-framework-for-water-and-sewerage-companies-to-prepare-drainage-strategies](https://ofwat.gov.uk/publication/drainage-strategy-framework-for-water-and-sewerage-companies-to-prepare-drainage-strategies).

\*\* The estimated delivery timeline is dependent on factors including weather conditions, risks and costs, and is, therefore, open to change.

## Drainage Strategy Framework stages and timescales

We've put stages two and three of the process together as their activities are closely linked.

### In this combined stage we've:

- Carried out detailed investigations, assessed the risks in the area, such as its growing population and rising groundwater levels, and looked at how to manage them
- Found the root causes of the drainage issues and proposed options to improve them, based on if they're long-lasting and value for money
- Achieved some immediate drainage improvements through delivering some interventions ourselves and by working with stakeholders to deliver others that are outside of our control.

The final stage of the process, stage four, will start from 2018 onwards. This is the intervention stage when we'll carry out some short-term drainage interventions ourselves, and continue to work closely with local stakeholders to deliver others.

We'll also assess the long-term drainage interventions we propose, to make sure that their potential benefits outweigh their costs, which will be paid for by all of our customers. Potential benefits will be assessed based on a range of factors including the number of properties affected by drainage issues, the frequency that flooding might be expected to occur in the future, and its severity.

The proposed long-term interventions will then be reviewed and prioritised against the other investments we need to make across our business, to benefit all of our customers. The interventions that we select for the Fairford area will

be put in place between 2020 and 2025. If one or more of our proposed interventions are not selected, we'll use our increased understanding of the local drainage issues to help us continue our work in reducing flooding in the Fairford area and preventing service disruptions for our customers.

## Who else is involved?

Making drainage resilient in the Fairford area for the future requires close co-operation with a number of key stakeholders. They include the local councils, private land owners and people with rivers and streams on their land (also known as riparian owners).

Our role is to make sure that the sewers and other assets we operate, such as wastewater treatment works and sewage pumping stations, are kept in good condition, work efficiently and are resilient.

Water that enters our sewers unnecessarily or by mistake, stops them from working properly. This can lead to them overflowing and causing other drainage issues. We'll continue to work hard to resolve the drainage issues

that are within our control, and support stakeholders to deliver those that sit outside of this, so that together we can make the drainage improvements needed in the Fairford area.

### Other stakeholders can help to improve drainage in other ways such as:

- Stopping rainwater from running into our sewers from roads and private land
- Clearing ditches and streams that can cause blockages if left to grow wild
- Connecting pipes correctly from homes and businesses, rather than into our sewer system.



Drainage stakeholders



# The Fairford area.

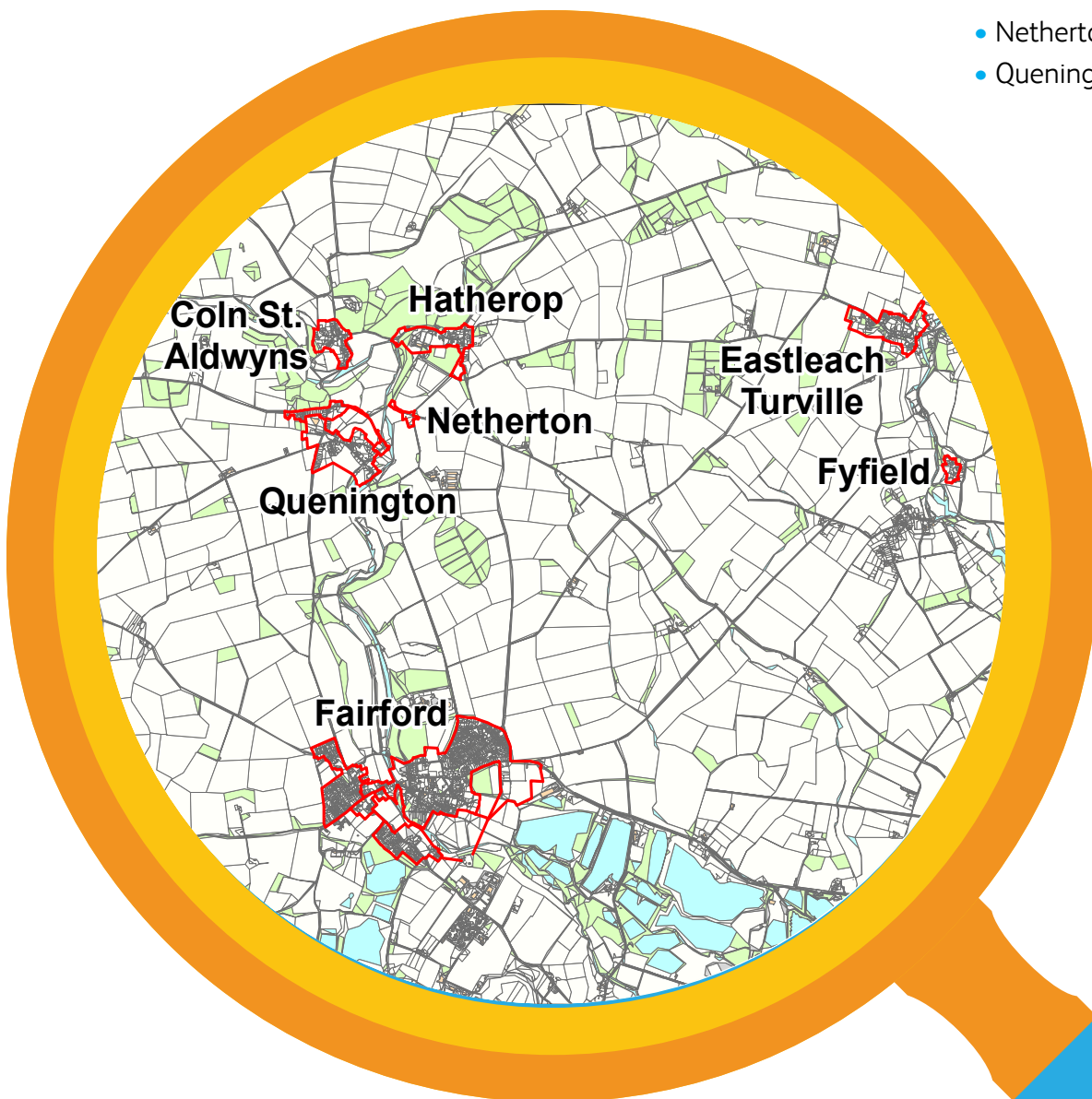
We serve over 4,000 customers in the Fairford area, in Gloucestershire. The wastewater is transported through 30 kilometres of sewer pipes and more than six sewage pumping stations. It then ends up at our sewage treatment works, where it's cleaned and treated before being returned safely back into the environment.

We've improved and extended our network in the area since it was originally built, by replacing some sewer pipes and building new sewage pumping stations, yet it remains under increasing pressure.

Our sewers have become overloaded at times for a number of reasons, unfortunately leaving some of our customers with drainage issues such as sewer flooding, sewer blockages and restricted use of their toilets and bathrooms.

## The Fairford area includes:

- Fairford
- Coln St. Aldwyns
- Eastleach Turville
- Fyfield
- Hatherop
- Netherton
- Quenington



The Fairford area\*

\* Source: Contains Ordnance Survey data Crown © copyright and database right (2015) [ordnancesurvey.co.uk](https://www.ordnancesurvey.co.uk).

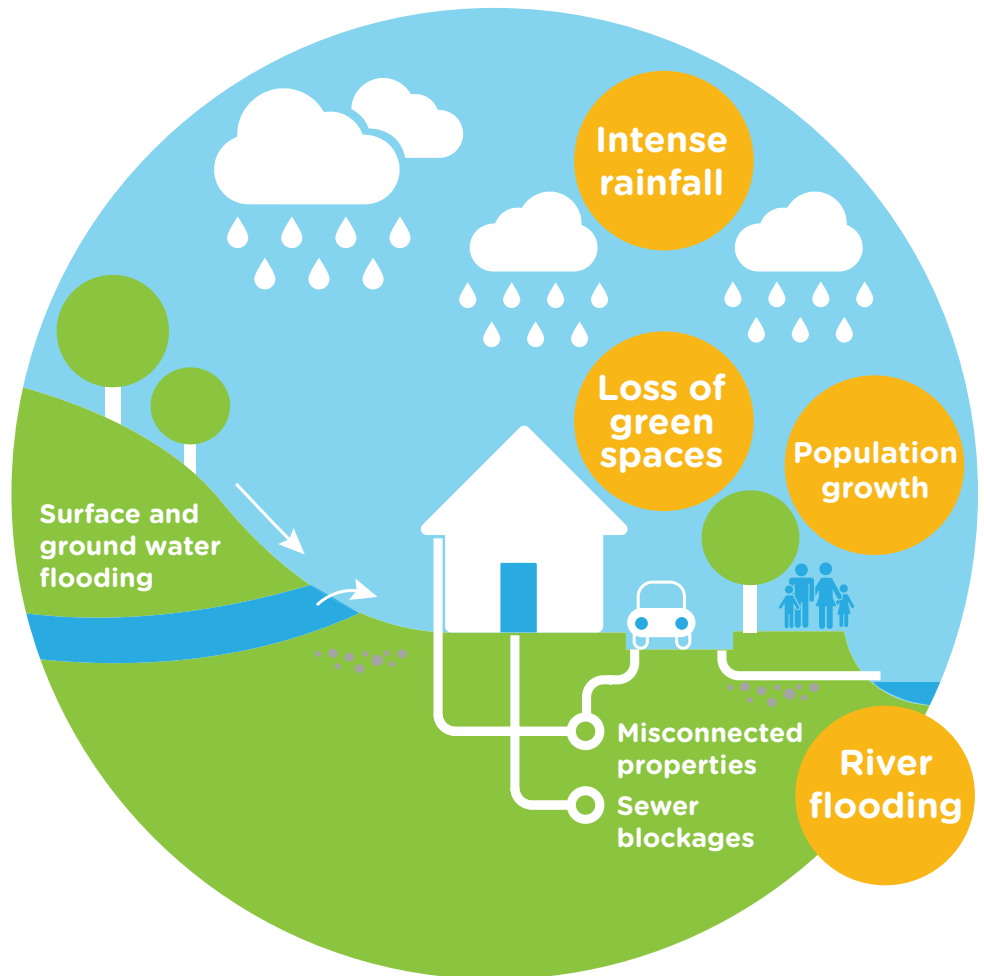
## Causes of drainage problems.

There are many things that can cause drainage issues, a number of which are not under our control. They can include:

- More periods of prolonged and heavy rainfall
- Growing numbers of people, houses and businesses entering the area
- Loss of green spaces that previously provided natural drainage for rainwater as new paths, extensions and houses are built
- Blockages in the sewer network, often due to fats, oils and grease being poured down drains
- Misconnected pipework that allows untreated wastewater to enter local rivers and streams
- River water and groundwater entering our sewers.

In certain conditions, one or more of these can prevent our sewer network from working as it should and can sadly cause sewer flooding in our customers' homes and businesses, on local highways and in surrounding environments.

That's why we're working together with other stakeholders to manage these issues and to improve drainage across the Fairford area. Together, we can prevent these unacceptable situations from happening again in the future.



Causes of drainage problems

# Our drainage investigations.

Over the last couple of years, we've carried out many detailed investigations in the Fairford area. They've given us a clear understanding of the root causes behind the drainage issues. They've included:



## Customer and stakeholder consultations

We sent sewer-flooding questionnaires to our customers in the Fairford area and invited them to 'drop-in' sessions at the Fairford community centre. We wanted to hear their drainage views and experiences, and to pinpoint problem locations. We also met with Fairford Town Council, Cotswold District Council, Gloucestershire County Council, presented at the Fairford Community Voice AGM and gained feedback from other local stakeholder groups.



## Flow and asset surveys

We checked the performance of our sewer network and the main assets we operate in the Fairford area. We placed three rain gauges and over 30 flow monitors across Fairford and Quenington, installed sewer rising main monitors at our sewage pumping stations, carried out manhole inspections and surveyed over 600m of the sewer network, using CCTV. This helped us to understand if our assets were contributing to the area's drainage issues.



## Highway drainage surveys

We wanted to find out if rainwater was draining from local roads into our sewer network by mistake. Gloucestershire County Council makes sure major roads and highways are maintained in the area, and that any surface water on the roads is drained into roadside gullies. We worked together with Gloucestershire County Council to carry out this survey, and to agree the proposed interventions.



## Site walkovers

We investigated beyond our sewer network to find the root causes of other drainage issues in the area, such as flood water from rivers and surface water runoff from agricultural land that may find its way into our sewer manholes. To help us to do this we hosted 'walkovers' at flood sites with some of our customers, Fairford Town Council, Cotswold District Council, and the Farming & Wildlife Advisory Group.



## Flooding 'trigger-levels' analysis

We analysed the groundwater levels and river levels that were recorded during periods when there was flooding and other drainage issues in the area. We wanted to use this information to help us define groundwater thresholds or 'trigger-levels'. If these levels are reached in future, it could trigger our local response teams to carry out specific work to help prevent the flooding and drainage issues, such as removing excess water from our sewers using lorries that carry large water tanks (we call them tankers).



## Impermeable area surveys

We measured the size of the impermeable area that's connected to our sewers, including driveways made out of concrete or tarmac, and roofs. As rainwater flows from these areas into our network, rather than naturally draining away, it reduces the capacity and performance of our sewers and contributes to the drainage issues in the Fairford area. The surveys enabled us to identify areas in Fairford where SuDS could be potentially implemented. This would help to slow down the flow of rainfall that enters our sewers during wet weather, and reduce the risk of sewer flooding.

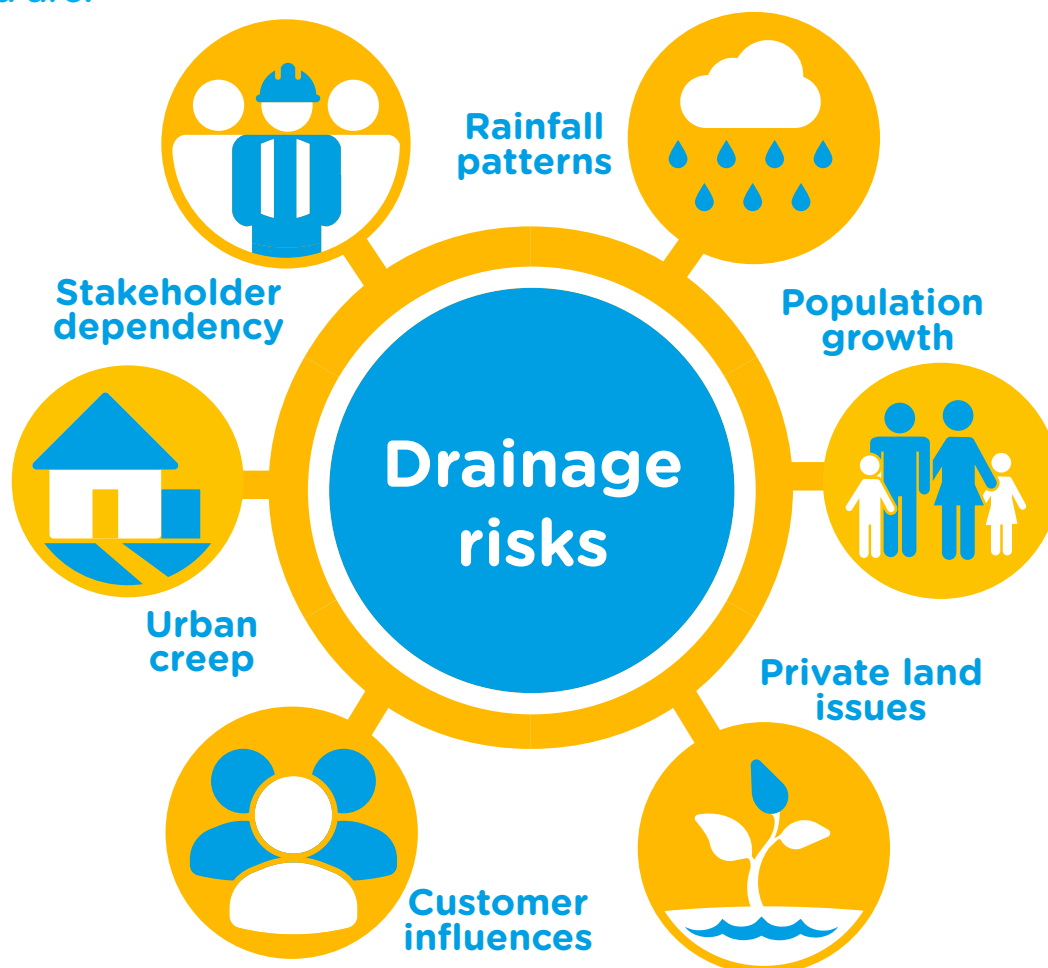
## Assessing drainage risks.

Alongside our investigations, we've assessed the risks to the success of our drainage strategy.

We've looked at a broad range from climate change and rainfall patterns, right through to those risks we've found at individual property level.

We've assessed each risk for its likelihood and how severe its impact could be on the Fairford area in the future.

The main risks we've identified are:



Assessing drainage risks

## Managing drainage risks.

We're managing the main risks that could prevent our drainage strategy from being successful. A number we can do by ourselves, and others we're tackling with other stakeholders. By managing these risks together, we're confident drainage improvements can be achieved in the Fairford area now, and in the future. The main risks we're managing are:



### Rainfall patterns

Intense, ongoing or above average rainfall patterns can overload our sewers and contribute to them flooding. Some recent climate change analysis suggests that rainfall could become 20% more intensive by the 2050s\*, increasing the potential for flooding. And so, we're working hard to prepare for the effects of climate change and to deliver our services to our customers during the worst weather conditions.

#### We're managing it by

Maintaining our sewer network on an ongoing basis to keep it operating properly, including cleaning it with high-powered hoses to remove silt, and fixing any damaged pipework we find. Also working with other stakeholders to reduce the amount of water entering our sewers. These actions will give us the sewer capacity we need to manage increasing rainfall and help improve drainage in the Fairford area.



### Population growth

As the Fairford area increases in size from growing numbers of people, houses and businesses, the demand on our sewer network also increases.

#### We're managing it by

Basing our plans on national population data and working with Local Planning Authorities and developers to prepare for growth in the area. This will help us to maintain our services for all of our customers – existing and new.



### Stakeholder dependency

We're unable to tackle all of the drainage issues ourselves, instead we depend on a number of stakeholders to work with us to improve drainage across our region.

#### We're managing it by

Fully supporting other stakeholders to deliver their responsibilities by providing information that may help them, championing their customer campaigns and jointly funding activities, where possible. For example, we helped to fund an intervention designed by Cotswold District Council to divert highway surface water off Quenington Road.

We've also provided funding for a community project that's being led by the Farming & Wildlife Advisory Group to restore pedestrian access to the River Coln through Fairford, and improve its environmental quality. This project also supports the 'Walkers are Welcome' status for the town and offers advice on how residents and visitors can help to reduce the risk of flooding from the River Coln.



## Private land issues

Some private land activities affect drainage, but sit outside of our control, such as agricultural land practices and maintaining private ditches and streams.

### We're managing it by

Working with local councils, private landowners and riparian owners to make sure that private land practices support our drainage work. For example, clearing streams and ditches of debris and vegetation helps to prevent water flooding from highway drains entering our sewers.



## Customer influences

Without knowing it, some of our customers are contributing to the drainage issues in their area. By pouring cooking fat, oil and grease down the drain, and other 'unflushables' such as wet wipes, sanitary items and cotton buds, sewers can get blocked. We've around 80,000 sewer blockages in our region every year, which prevent sewage from flowing freely, and can cause waste to back up. This can flood streets, rivers, gardens and in the worst cases, inside people's homes.

Misconnected properties are common, a report suggests 140,000 properties in the UK are currently misconnected\*. This means their drainpipes are incorrectly connected to our sewer network, reducing its capacity and leading to sewer flooding during heavy rainfall.

### We're managing it by

Providing our customers with information and tips to help us keep our sewers running clear, and working with local councils to ensure misconnected pipes are fixed. We're also encouraging our customers to disconnect rainwater pipes from our sewers and to use other water-saving devices to reduce the water entering our network.



## Urban creep

When green areas are paved over with impermeable materials that don't naturally drain, such as concrete and tarmac, more rainwater enters our sewer network and reduces its capacity.

### We're managing it by

Working with local councils and other stakeholders to make sure that urban creep is kept to a minimum. We're also working with our customers to encourage them to use water butts to collect rainwater from their property roofs and to use permeable materials for new driveways and paths. This will reduce the amount of rainwater entering our sewers and the possibility of flooding during periods of wet weather.

**Did you know?**

**You'll need planning permission from your local council to use impermeable materials in your home improvements.**

\* UKWIR, 2013. Sewer Misconnections: What is the True Non- Agricultural Diffuse Water Pollution Impact? Report 13/SW/01/3, UK Water Industry Research (UKWIR).



# Findings and interventions.

We've found the root causes for the drainage issues in the Fairford area and put together some proposals to improve them. Our proposals consider the risks in the area, the ability to create long-lasting improvements and value for money. We're confident the options we're proposing to be delivered in stage four of the process will achieve effective drainage improvements for the Fairford area for many years to come.



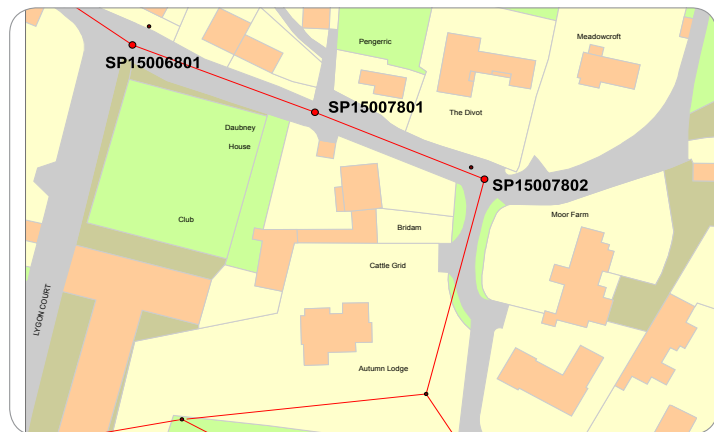
## Rainwater from highways

### We found

Surface water from roads and highways is entering our sewer network through manhole covers, in some areas of Fairford. Local residents and Fairford Town Council have told us about a number of manhole covers that receive lots of surface water from roads and highways during wet weather, and that often flood. These include manholes in Coronation Street, Milton Street and East End.

### Our proposed interventions

- Prioritising the sealing of the manhole covers in East End, as identified in red on the map. During wet weather highway flooding affects this location the most in the Fairford area. By targeting these manhole covers we'll help to prevent highway surface water from entering our sewers and reducing their capacity.



Proposed manhole sealing in East End.

Working with the Farming & Wildlife Advisory Group, Cotswold District Council, Fairford Town Council and Gloucestershire County Council to:

- Support the Road Surface Water Diversion Scheme. This scheme was identified by the Farming & Wildlife Advisory Group and designed by Cotswold District Council as outlined in the following image. It will help to reduce the amount of rainwater flowing

down Quenington Road and Coronation Street towards Milton Street (A417) during wet weather. This rainwater can enter our manholes and lead to a reduction in the capacity of our sewers.



Proposed 'Quenington Road' Highway Drainage Works.

### Benefits of proposed interventions

- Reduce the sewer flooding on Coronation Street, Milton Street (A417), and East End.
- Increase the capacity of our sewers during wet weather by preventing surface water from roads and highways from entering our sewers through manholes in Coronation Street, Milton Street and East End.
- Help us to maintain our wastewater services to customers in the Fairford area during wet weather.

### Delivery timeframe

Proposed for 2018-2019.

For more information on the Highway drainage survey please see the Appendix.



## Rising ground-water levels

### We found

Groundwater can enter our sewers when levels are high which reduces their capacity and increases their risk of flooding. There's a strong link between the rising groundwater levels across the Fairford area and the drainage issues some of our customers have experienced, including sewer flooding and restricted use of their toilets and bathrooms.

### Our proposed interventions

- Monitoring groundwater levels in our control centre and informing our response teams if thresholds are passed. The teams will carry out an action plan specifically designed for the area to reduce or remove the flooding issue, such as checking sewer water levels and using tankers to take away excess flows from our sewers.
- Installing monitors in our sewage pumping stations to help us identify when our pumps are operating more than we expect them to. This could mean that groundwater is entering our sewers which shouldn't be there. We'd investigate further to find out the root cause of the drainage issue affecting our pumping stations.

### Benefits of proposed interventions

- Give us the capability to predict and prevent some sewer flooding issues before they occur, through monitoring groundwater levels and pumping station flows.
- Increase the capacity of our sewers and reduces the risk of sewer flooding when tankering is used to remove excess flows from our sewers.
- Help us to maintain our wastewater services to customers in the Fairford area during wet weather.

### Delivery timeframe

Proposed for 2018- 2025.

For more information on the Flooding 'trigger-levels' survey and analysis, please see the Appendix .



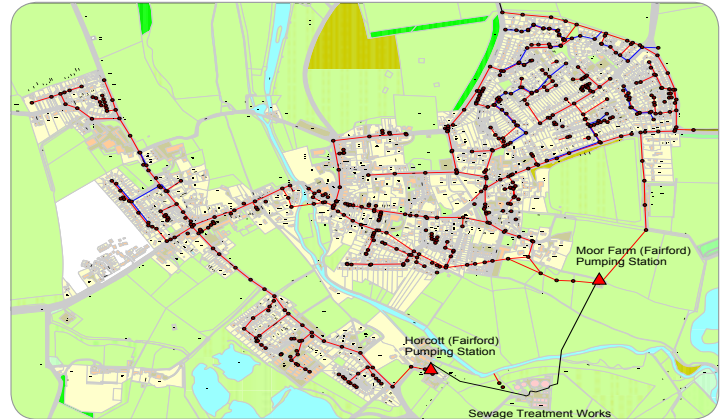
## Maintaining our assets

### We found

Our assets such as sewers, manholes and pumps can be damaged in many ways, from age deterioration and blockages, to roadworks and tree roots. We've identified a number of defects which are allowing groundwater to enter our sewers. We'll continue to inspect our assets and fix any problems we find.

### Our proposed interventions

- Reinforcing sewer repairs with watertight lining. For more details please see the 'Lift & Look surveys' section in the Appendix.
- Sealing manhole covers in areas prone to surface water flooding as detailed in the 'rainwater from highways' findings.
- Installing new monitors at our sewage pumping stations including those for Fairford, as identified in red on the map. This will help us to keep a close check on how our pumping stations are working and alert us to any issues, or if any upgrades are needed.



Proposed pumping station monitor installation

### Benefits of proposed interventions

- Increase the capacity of our sewers and reduces the risk of sewer flooding.
- Improve our capability to monitor how our sewage pumping stations are operating. For example, we'll be alerted when they're operating for longer periods than expected, this can be due to too much groundwater entering our sewers and would be investigated further. We'll also receive alerts when our pumping stations are not operating as they should, and if maintenance or upgrades are needed.
- Help us to maintain our wastewater services to customers in the Fairford area during wet weather.

### Delivery timeframe

Proposed for 2018- 2025.

For more information the please see the 'Lift & Look' and CCTV surveys in the Appendix.





## Rainwater from land

### We found

The Fairford area is prone to rainwater running from agricultural land and into our sewer network, particularly in north west Fairford. We've found that rainwater collects and then travels from an agricultural field towards a stone drain which lies behind a property on West End Gardens, as illustrated on the map. The stone drain isn't large enough to accept all of the water that runs from the field during very heavy rainfall, and so the back garden of the property becomes flooded. The flood water then reaches our sewer network through the drains and a manhole cover on the property.



Path of agricultural runoff flowing to West End Gardens.

### Our proposed intervention

Working with the District Council, County Council and Fairford Town Council to:

- Investigate and resolve the land drainage issues linked to the field north of West End Gardens.

### Benefits of proposed intervention

- Reduces the flooding at the property on West End Gardens.
- Reduces the amount of surface water entering our sewers.
- Increases the capacity of our sewers and reduces the risk of sewer flooding by resolving the land drainage issue.
- Helps us to maintain our wastewater services to customers in the Fairford area during wet weather.

### Delivery timeframe

Proposed for 2020- 2025.

For more information on this survey and the findings from West End Gardens please see the Appendix.



## Rainwater from roofs

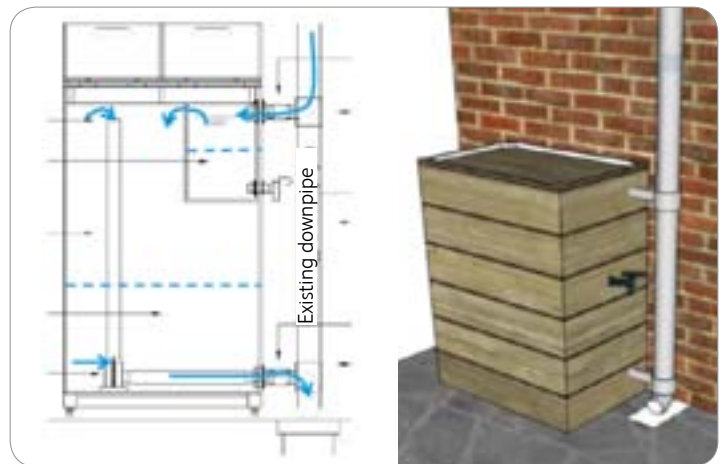
### We found

The downpipes on property roofs can be mistakenly connected to our sewers. Misconnected property roofs, mainly located in the old part of Fairford, are currently contributing significant volumes of rainwater into our sewer network. This is reducing the capacity of our sewers and adding to the area's drainage and flooding issues.

### Our proposed intervention

Working with Fairford Town Council to:

- Investigate if roof drainage can be separated from the sewer network. It may be possible to do this jointly through customer campaigns and the installation of SuDS for our customers in affected areas. The type of SuDS we propose to be used are planters which would be connected to the downpipes from property roofs, as illustrated.



Proposed SuDS 'planters' for misconnected roof drainage.

### Benefits of proposed intervention

- Increases the capacity of our sewers and reduces risk of sewer flooding by limiting the volume of water that enters our sewers from misconnected property roofs.
- Helps us to maintain our wastewater services to customers in the Fairford area during wet weather.

### Delivery timeframe

Proposed for 2020- 2025.

For more information on the Impermeable area survey please see the Appendix.

## Immediate drainage improvements.

As we developed our proposed options to achieve long-term drainage improvements in the Fairford area, we also identified some actions that could achieve immediate improvements. We've put a number of these in place already, and supported drainage stakeholders to deliver others, including:

### Clearing the Courtbrook stream

Based on the findings from our Highway drainage survey we approached Cotswold District Council who, together with the riparian owner, worked to clear the debris and vegetation from the Courtbrook stream. This is an important watercourse as it receives water from the highway drain network in Fairford, east of the River Coln. (Please see the Appendix for more information). This will reduce, and potentially help prevent water from entering our sewers from nearby roads, and surface water flooding in East End, which is in the south-east of the Fairford area.

**Complete**



### Installing pumping station monitors

We've installed rising main monitors and supporting communication tools at four of our sewage pumping stations, located in Fairford and Quenington.

This will help us to keep a close check on how our pumping stations are working and alert us to any issues, so that we can reduce service disruptions for our customers.

**Complete**



### Diverting surface water on Quenington Road

The Farming & Wildlife Advisory Group approached us about diverting water from local roads into the ditches that sit on both sides of Quenington Road, near West End Gardens. Based on wider stakeholder discussions, Cotswold District Council designed an intervention that they delivered with joint funding from us, Fairford Town Council and Gloucestershire County Council. This was successfully completed in 2017, and will reduce:

- the surface water runoff further down Quenington Road and Coronation Street
- the amount of surface water entering our sewer network following heavy rainfall
- the risk of local flooding and disruption of our services to our customers in this area.

**Complete**



### Fixing the sewer defect at East End

Our asset surveys found a defect in a side connection to a main sewer in East End, which was allowing large amounts of groundwater to enter the sewer network.

We've repaired this which will increase capacity within the sewer network and help to prevent flooding and loss of service for our East End customers following heavy rainfall.

**Complete**



# Our next steps.

From 2018 onwards, we'll begin the final stage of the drainage strategy process, stage four. This is the intervention stage when we'll carry out some long-term drainage interventions ourselves, and continue to work closely with local stakeholders to deliver others that are outside of our control.

Our first activity will be to assess all of our proposed long-term drainage interventions to make sure that their potential benefits outweigh their costs. We'll then review and prioritise them against the other investments we need to make across our business, to benefit all of our customers.

The drainage interventions we select for implementation in the Fairford area will be put in place during our next Business Plan period, which is between 2020 and 2025. We'll work with our customers and other stakeholders to implement them as swiftly as possible in that period.

Between now and then, we'll also continue to work closely with local stakeholders to deliver short-term drainage interventions and improvements in the Fairford area.

## Over the next 6 to 12 months our work will be focused on:

### Further drainage investigations

Carrying out further drainage investigations, including checking the performance of our local sewage pumping stations. We'll make sure they're working at their best and not more than they should be, which can often mean water is entering our sewers that shouldn't be there. We'll investigate further any issues we find to help us to improve drainage in the Fairford area.

### Flooding 'trigger-levels' plan

Improving the accuracy of our flooding warnings or 'trigger-levels', and planning how we can best respond if they are triggered. This will help us to manage the flooding in the area and reduce other drainage issues.



### Stakeholder engagement

Agreeing how we'll deliver the chosen interventions with other drainage stakeholders. Attending the Fairford Town Council meetings to regularly update on our findings and progress. We'll also offer advice on how everyone can help improve drainage in the area.

### Maintaining our assets

Ongoing sewer inspections in the area and fixing any problems we find, to stop them from causing drainage issues.

## Our next steps

# You can help.

We've received a lot of support for our drainage work and we know that some of our customers, and other drainage stakeholders, are already working hard in a number of areas. However, our findings from this stage suggest that there's still more to do, and by doing it we can improve drainage in the Fairford area, and across our region, now and in the future. And so, there are lots more things everyone can do to help improve drainage, including taking the following simple steps.



## 1. Use water-saving gadgets

There are a number of water-saving gadgets you can use in your homes and gardens, and some are free to our customers. By reducing the amount of water entering our sewers we can free-up capacity to manage heavy rainfall, and reduce the volume that's flushed away for treatment. By connecting your downpipes to a water butt you can collect a free source of water for watering your garden. This could not only help to save money on your water bills, but also help us to reduce the amount of rainfall entering our sewers. To find out more, and to apply for our free water-saving gadgets please use these links:

[freebies.thameswater.co.uk](https://freebies.thameswater.co.uk).

[thameswater.co.uk/My-Account/Customer-Offers/Customer-Offers](https://thameswater.co.uk/My-Account/Customer-Offers/Customer-Offers).

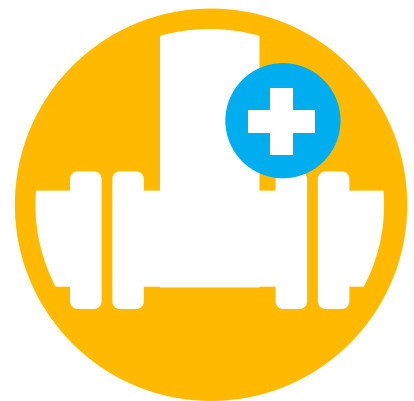


## 2. 'Bin it – don't block it'

We're working hard to keep our sewers running clear from nasty blockages and to help people understand what can and can't go down the drain. Things such as cooking fat, oil, food waste, wet wipes and make-up pads all mix together in the sewers to create blockages. These can grow so large that the sewers become completely blocked. Once this happens the consequences can be devastating, as raw sewage is forced back up into people's homes. If it's not poo, pee or paper, please 'Bin it – don't block it'.

For more information on how you can help us, please follow this link:

[binit.thameswater.co.uk](https://binit.thameswater.co.uk).



## 3. Check your plumbing

Some of our customers have their rainwater pipes incorrectly connected to our sewer network. This plumbing mistake reduces the capacity of our sewers and can lead to flooding during heavy rainfall. We're providing our customers with information and tips to help them work out if their property is connected properly, and what to do if it isn't. We're also working with local councils to ensure misconnected pipes get fixed. You can check if your property is connected properly by using this link:

[connectright.org.uk](https://connectright.org.uk).



#### 4. Choose drainage-friendly home improvements

If you're planning to pave over your garden for a driveway or an extension, choosing materials that allow rainwater to drain through them will help us to tackle drainage issues in your area. You'll need planning permission from your local council to use impermeable materials in your home improvements, such as concrete or tarmac. They don't allow rainwater to drain away, instead it can run into our sewer network. For more advice on drainage-friendly home improvements please follow these links:

[planningportal.co.uk/info/200130/common\\_projects/45/paving\\_your\\_front\\_garden](https://planningportal.co.uk/info/200130/common_projects/45/paving_your_front_garden).

[developers.thameswater.co.uk](https://developers.thameswater.co.uk).



#### 5. Take care of watercourses on your land

If you own land or property next to a river, stream or ditch you're called a 'riparian landowner'. This means you've certain responsibilities for taking care of the watercourse on your land, and preventing its water from entering our sewer network. To find out more about the duties of a riparian owner please refer to this government guidance:

[gov.uk/government/uploads/system/uploads/attachment\\_data/file/454562/LIT\\_7114.pdf](https://gov.uk/government/uploads/system/uploads/attachment_data/file/454562/LIT_7114.pdf).

[gov.uk/government/publications/riverside-ownership-rights-and-responsibilities](https://gov.uk/government/publications/riverside-ownership-rights-and-responsibilities).

# Appendix.



## Highway drainage surveys.

In 2016, we carried out Highway drainage survey, which were jointly funded with Gloucestershire County Council. Our surveys concluded that the high volume of rainfall entering our sewers isn't caused by highway misconnection issues in the area, but a number of other things.

The main findings from the surveys include:

### Surface water contribution

Surface water contributes a significant volume of rainfall to our sewer network. Both local councillors and residents have told us about areas prone to surface water flooding when there has been heavy rainfall. Many of these flood areas are near to sewer manhole covers, which are allowing the rainwater to run into our sewers.

### Overgrown Courtbrook stream

We discovered a highway drain that was not on the council's records and which was prevented from draining due to overgrown shrubs and plants in the Courtbrook stream. Local residents of East End, near Moor Farm, had told us about repeated flooding during periods of wet weather, particularly from highway drains.

We flushed water down the highway network nearby, using tankers. We

mixed dye into the water to help us to find out which highway drain pipes they were connected to, and discovered the unrecorded drain. We also found that the overgrown Courtbrook stream was stopping rainwater from leaving this drain and the highway network, east of the River Coln, instead it was causing it to flood in East End. Figure 1 outlines this connection and the flooding area.

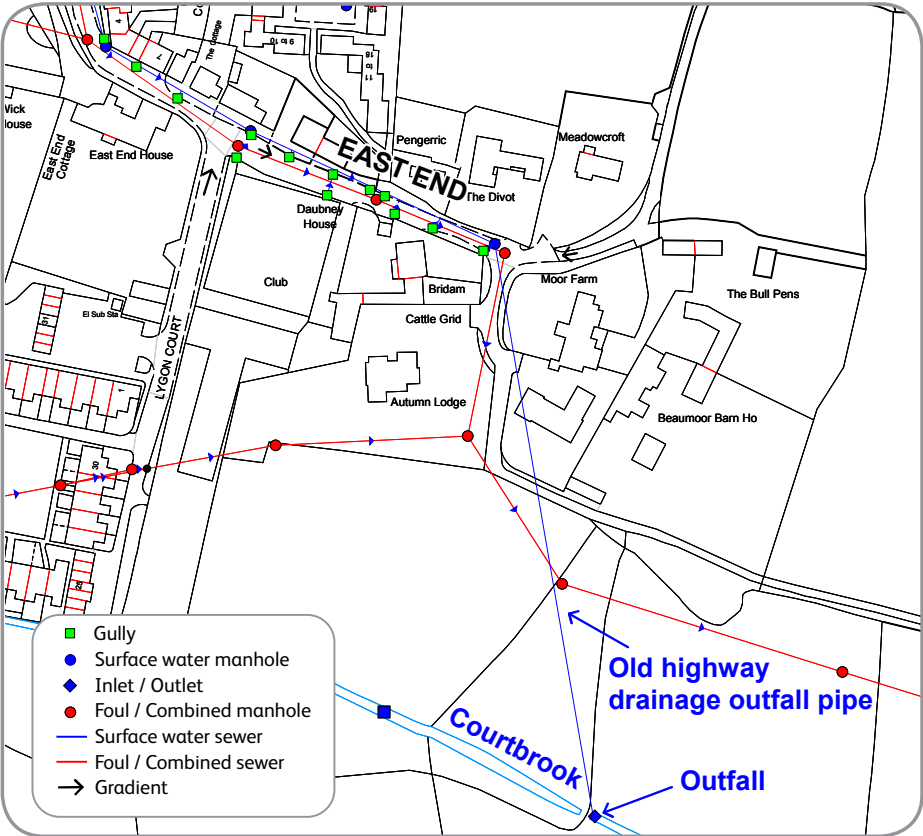


Figure 1 East End sewer network and highway drainage network.



We approached Cotswold District Council who, together with the riparian owner, arranged for the

watercourse to be cleared (please see Photos 1, 2 and 3). This should help to reduce flooding from highway drains

in the East End area, and the surface water entering our sewers through nearby manhole covers.



**Photo 1 Courtbrook stream before it was cleared.**



**Photo 2 Courtbrook stream after it was cleared.**

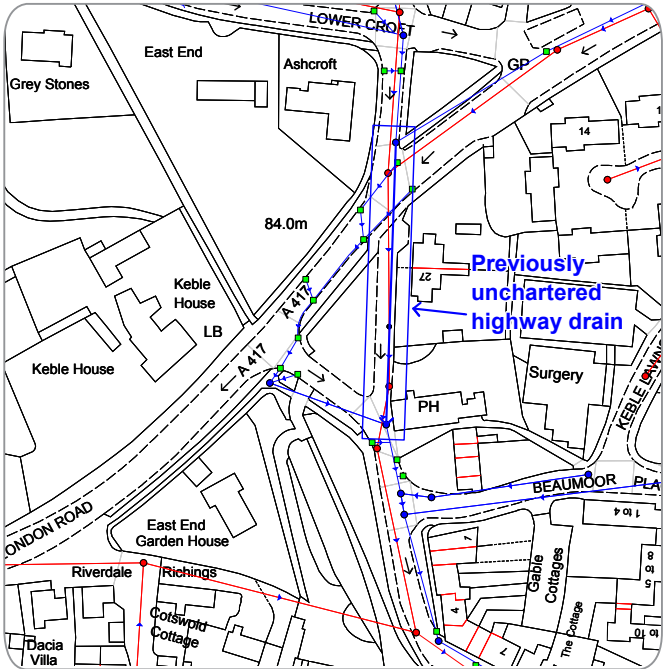


**Photo 3 Courtbrook stream after it was cleared.**

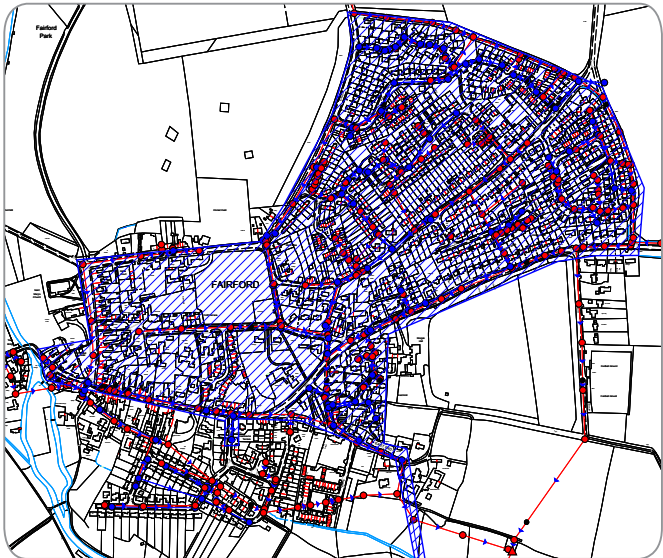
# Further unrecorded highway drainage connections

We traced more unrecorded connections within the highway drainage network. It's common for there to be some as the highway drainage network has been around for a very long time, and hasn't always been controlled by the county council. But it's important we understand how rainwater from highways is collected and where it's taken to, so that we can make sure it doesn't flow into our sewers instead. Using our tankers to wash dye down the highway drains we traced a number of previously unrecorded highway drain connections including:

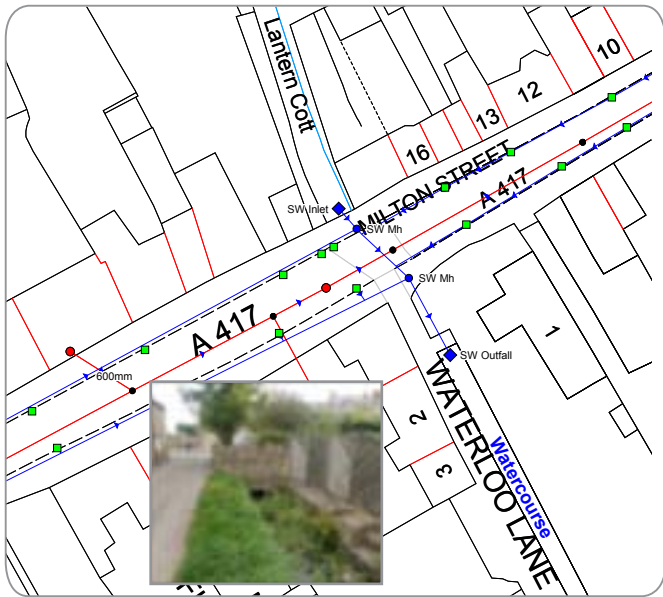
- One from London Road to East End (as outlined in Figure 2). Finding this connection confirmed that the highway drainage system in north east of Fairford is served by the outfall at East End / Moor Farm (as highlighted in Figure 3). This emphasised the importance of clearing the Courtbrook stream to help reduce flooding in this area.
- Connections from High Street to Back Lane and London Street.
- Highway drains and manholes connecting Coronation Street with Milton Street and Cirencester Road with Milton Street. During our investigations we expected, but didn't find, tanker water in the watercourse that runs from north of Milton Street to Waterloo Lane. Figure 4 outlines the expected highway drain connections from the council's records. The records appear to be inaccurate, or alternatively there could be a blockage in the highway drains network which is contributing to the pooling of rainwater water on the A417. We propose that this is investigated further by Gloucestershire County Council's Highways Department, to understand if there's a restriction of the highway drainage network in that location.



**Figure 2 Confirmed highway drain network connection at London Rd / East End.**



**Figure 3 Highlighted area served by highway drain outfall at Moor Farm.**



**Figure 4 Milton Street potentially restricted highway drainage network.**



## Blockages in the highway drainage

We found blockages from tree roots and silt in 150m of highway drain at the junction of London Road and East End. We used CCTV to undertake this survey, Photo 4 shows some of our findings. We shared this information with GCC who have cut back the tree roots and are planning to carry out other clearance work in this section of their highway drainage network. This should help to increase its capacity and reduce the volume of surface water entering our sewers instead.

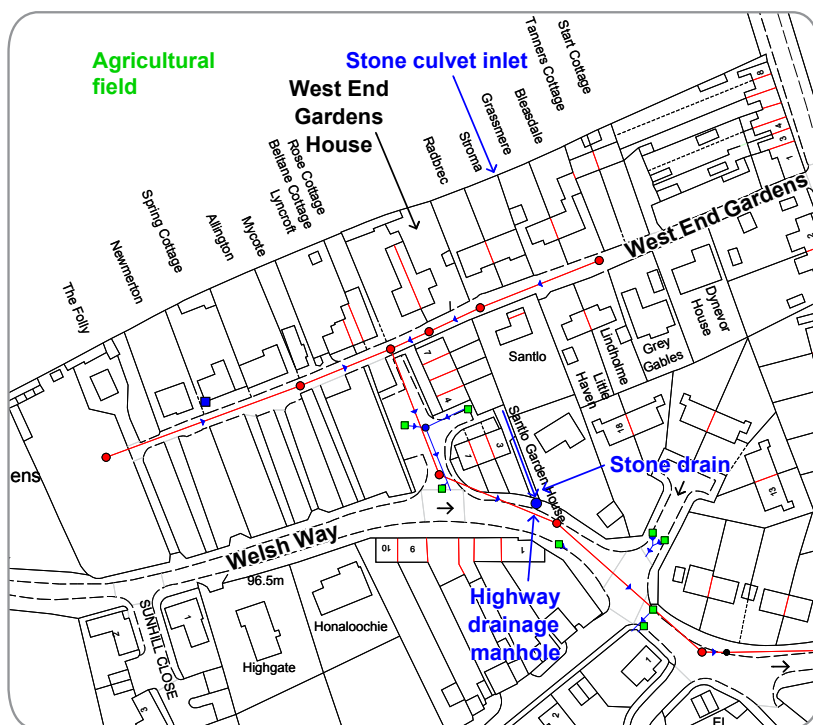


**Photo 4 London Road CCTV snapshot of tree roots restricting highway drain.**

## Surface water from agricultural land

We confirmed that a stone drain (as shown in Figure 5), is unable to cope with the amount of surface water running into it from nearby agricultural land north of West End Gardens, during periods of wet weather. This issue was raised with us by the Farming & Wildlife Advisory Group during a site walkover. Our surveys found that this flood water can find its way into our sewers through manhole covers, stopping them from working properly and sometimes causing a reduction in our services to local residents. During our survey investigations we:

- Jetted water from our tankers into the top of the stone pipe connected to the stone drain, and near to the agricultural land. The water did not come out of the stone drain as we'd expected, and into the highway drainage manhole in Welsh Way. We propose further investigation to help us better understand where the water from the agricultural field drains to, after it enters the stone drain.
- Made several attempts to inspect the stone drain using CCTV from the entrance of the stone pipe, and through the highway drainage manhole, as seen in Photos 5 and 6. We were stopped from carrying out detailed inspections because of sediment and a grid blocking our access. We propose that further investigation is carried out, working with a number of drainage stakeholders, to understand if the water running from the agricultural land could be directed away from the stone drain as suggested by the Farming & Wildlife Advisory Group.



**Figure 5 West End Gardens stone drain and highway drainage network.**



**Photo 5 and 6, CCTV photos of stone pipe and stone drain seen from inside the highway drainage manhole.**



# ‘Lift & Look’ and CCTV surveys.

In February 2017 we did a ‘Lift & Look’ survey in the Fairford area. We went down into the sewer network to inspect the condition of our sewers and to see how they were working. The ‘Lift & Look’ survey, along with CCTV footage we took in 600 metres of sewers, found points where groundwater is entering our network through cracks and other defects.

When we find groundwater entering our sewers we class it as a: seeper, runner or gusher, with a gusher being the most severe and creating the biggest problem for our network’s performance.

## The main findings from the surveys include:

### The West End Gardens area

This area had groundwater entering our sewers from several locations. These are

highlighted in red in Figure 6. A number of these locations were classed as either seepers or runners, but we also found one gusher. This was in the sewer that runs from manhole SP14013301 to SP14014301.

Reducing the number of locations where groundwater enters the sewers in the West End Gardens area will help to increase capacity in the sewer network that runs from this location to Horcott pumping station. Greater capacity in

our sewers means fewer incidents of flooding for our local customers.

We’ll make sure that the broken pipe is repaired as a priority, and all affected sewers in this area are relined in the future, to reduce the amount of groundwater entering our sewers.

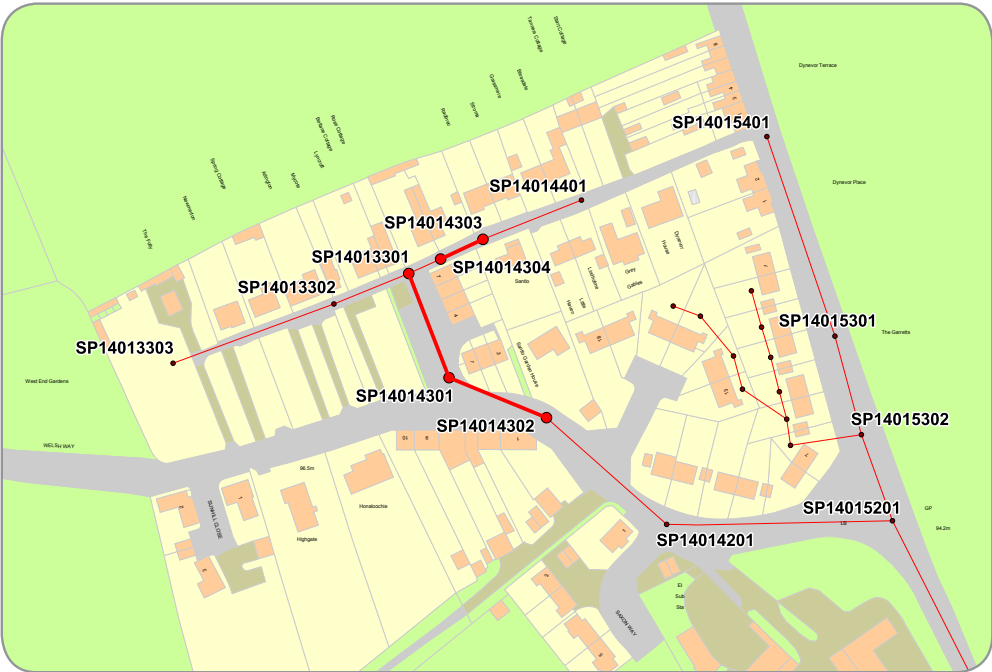


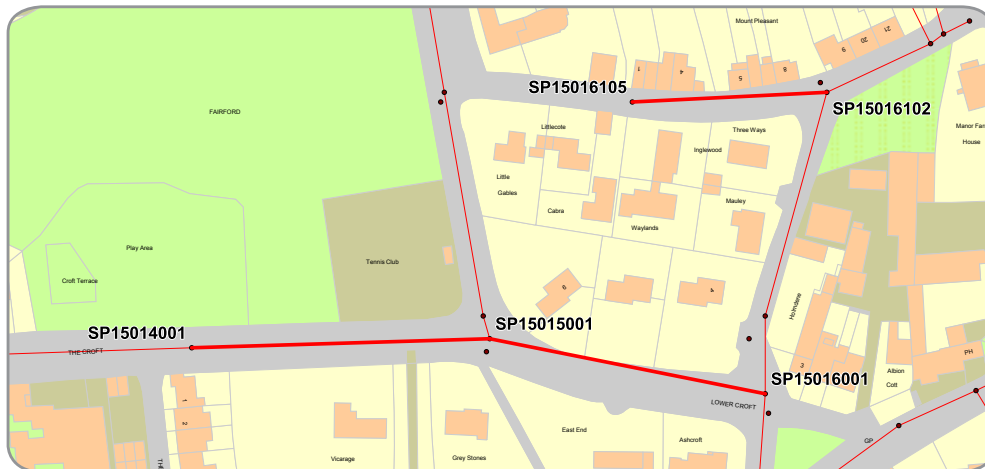
Figure 6 Locations where groundwater is entering our sewer network in the West End Gardens area.

## The Croft area

At two locations in the The Croft area we found groundwater was flowing into our sewers. These areas are highlighted in red in Figure 7. We found one classed

as a runner from a pipe that connects to the main sewer, and one classed as a gusher in the sewer that runs from manhole SP15005001 to SP15006001.

We'll investigate further the runners from the side connections into the main sewers, and carry out repairs to the gusher in the main sewer.



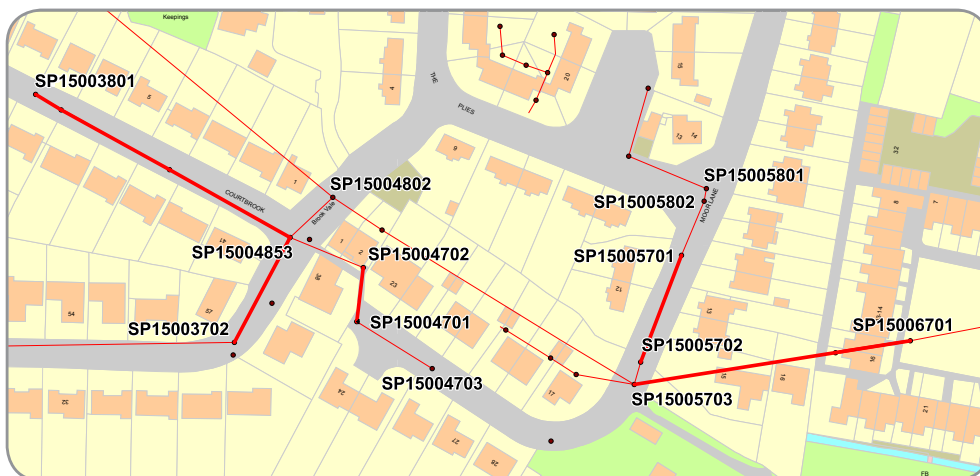
**Figure 7** Locations where groundwater is entering our sewer network in The Croft area.

## The Courtbrook and Manor Lane area

This area had groundwater entering our sewer network at several locations.

The affected sewers are highlighted in red in Figure 8. We found runners in a number of locations within the main sewer, and gushers from two pipes connected to manholes SP15005703 and SP15005704.

We'll investigate further the gushers from the side connections into the main sewers, and carry out repairs to the defects in the main sewer.



**Figure 8** Locations where groundwater is entering our sewer network in The Courtbrook and Moor Lane area.

## East End area

Groundwater entering our sewer network at five locations in East End. The affected sewers are highlighted in red in Figure 9. All five locations were found to be from the side connections, rather than the main sewer. Three were classed as runners and the other two classed as gushers. The most severe gusher we'd seen within the whole catchment area

was found from a lateral upstream of manhole SP15007802.

Fixing the problem of groundwater entering the foul sewer network in East End could significantly increase the capacity of the sewer network from East End to Moor Farm pumping station. Greater capacity in our sewers means fewer incidents of flooding from the

foul network, which is good news for our customers.

We've carried out work to fix the gusher from the side connection just upstream of the manhole SP15007802. We'll investigate further the water that's entering the main sewer from the side connections, and carry out repairs where possible.



**Figure 9** Locations where groundwater is entering our sewer network in East End.



## Impermeable area survey.

Impermeable ground doesn't allow rainwater to drain through it naturally such as driveways made out of concrete or tarmacadam, and roofs. Instead the rainwater from these areas pools together and often flows into our sewer network.

This additional water reduces the capacity of our sewers, stops them from working properly and contributes to the drainage issues in the local area. Our survey measured the size of the impermeable area in the catchment and we investigated its impact on our sewer network.

### Survey findings:

Our survey in the Fairford area found significant amounts of rainwater caught from the roofs of local properties flows into our sewer network, rather than draining away naturally. The total area of roofs which incorrectly enter our sewers is equivalent to the size of two football pitches. Most of the rainwater from roofs comes from properties in the old

parts of Fairford, as highlighted in red in Figure 10.

We propose investigating the possibility of removing roof drainage from our sewer network with Fairford Town Council, Gloucestershire County Council and Cotswold District Council. This could increase capacity in our sewers and reduce the risk of flooding incidents for local residents.

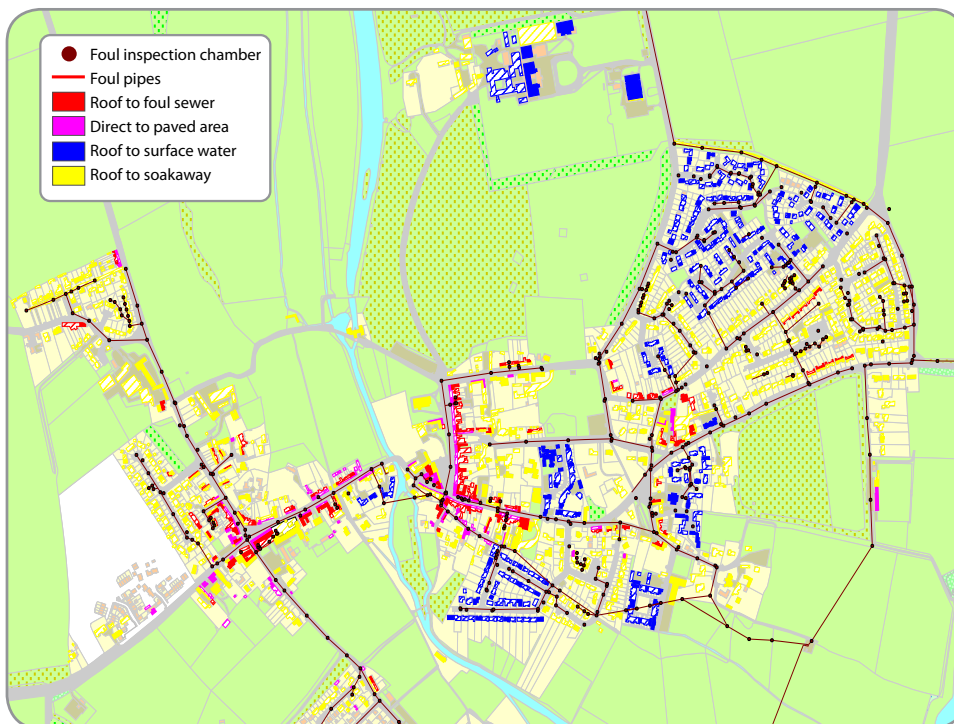


Figure 10 Impermeable area survey findings summary.





# Flooding ‘trigger-levels’ analysis.

We analysed the groundwater levels and river levels that were recorded during periods when there was flooding and other drainage issues in the area. We wanted to use this information to set up groundwater warning signs or ‘trigger-levels’ so that we could investigate the impact this groundwater has on our sewers.

We defined red and amber trigger-levels, with red being the most critical warning sign. A red trigger-level tells us that sewer flooding is very likely and that rapid action is needed to reduce the drainage issues. An amber trigger-level warns that sewer flooding is possible.

If an amber level is reached our local team will check for unusually high activity at our sewage pumping

stations. This could be a sign of groundwater entering our sewer network which shouldn’t be there. If a red level is reached the team will lift manhole covers in areas known to flood, to make sure our sewers have a safe level of water in them, and we can reduce their risk of flooding.

Figure 11 is a graphical illustration of our flooding trigger-levels analysis. The green line indicates the changing river

level over time, the brown line shows the changing local groundwater level over time and the crosses identify when sewerage issues have occurred in the Fairford area. Figure 11 demonstrates that there’s a correlation between high river/groundwater levels and sewerage issues that have occurred in the Fairford area, particularly when the red line threshold level has been met or exceeded.

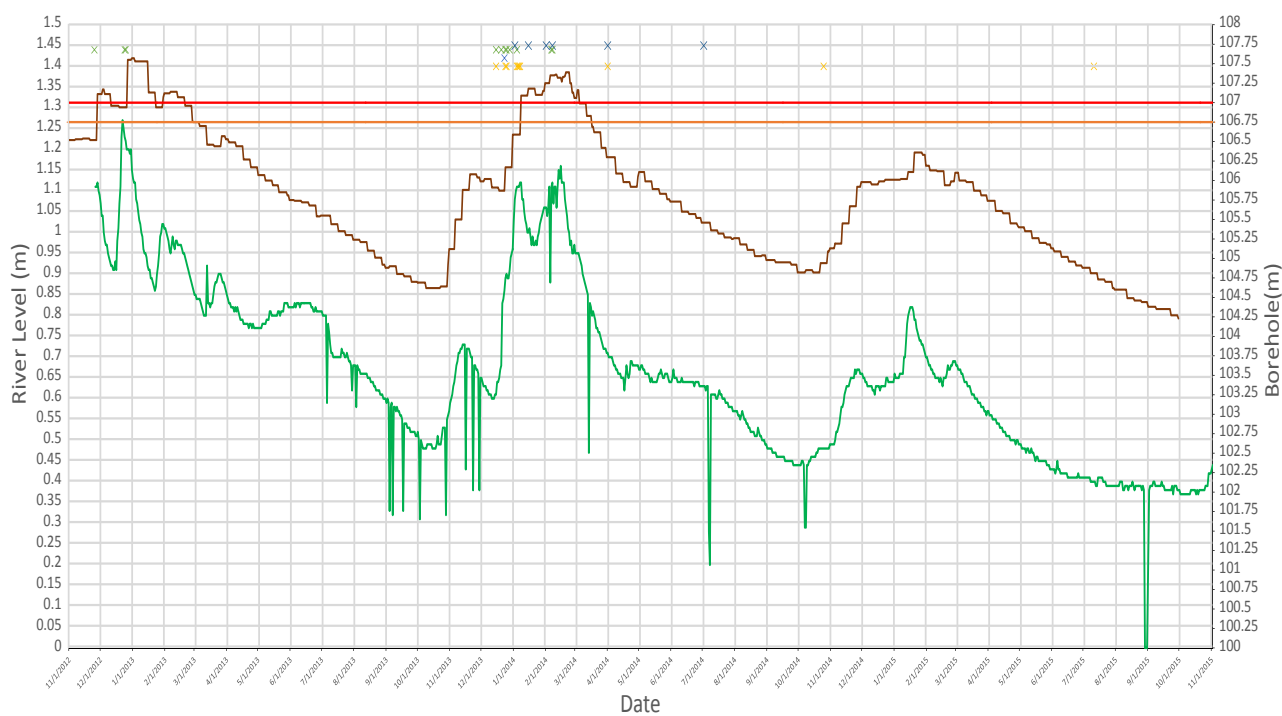


Figure 11 Flooding ‘trigger-levels’ analysis.

We propose that we continue to check and refine these flooding trigger-levels to improve their accuracy, particularly when trigger-levels have been reached. This will help us to understand how our sewer network copes with different

weather conditions and groundwater levels. We’ll then be able to plan how we can best respond to help reduce sewer flooding and drainage issues for our customers in the Fairford area, now and in the future.

