



The Counters Creek flood alleviation scheme

1. Executive Summary

The Counters Creek flood alleviation scheme (CCFAS) was developed following widespread basement flooding caused by intense rainfall events between 2004 and 2007 in the Counters Creek Catchment. The scheme aims to provide flood risk reduction to basement properties at risk from flooding and is due to be completed in March 2020.

1.1. Previous proposal

- The earlier proposal involved implementing a package of measures, including: a 5km tunnel sewer, the provision of anti-flooding devices (otherwise known as FLIPs) and local sewer upgrades or local schemes.
- Between 2014 and 2016 this proposal was presented to the public by Thames Water. As part of this consultation, a number of routes and access sites for the new tunnel sewer were tabled and the locations of the local schemes changed with each proposed alignment to compliment the protection this tunnel sewer would provide.
- It became apparent that Cremorne Wharf, in Chelsea, would be a key site for the construction of the new sewer and in order to facilitate construction it would be necessary to integrate the solution with the works proposed for the Thames Tideway Tunnel project at this site.
- However, due to the limited size of the site, planning implications and risk of delays to both projects, access to the Cremorne Wharf site to construct the new sewer would not have been possible until the Thames Tideway Tunnel work (more information about this work can be found [here](#)) was complete in 2024. This would have meant an unacceptable delay to the project.

1.2. Further Investigations

- Following extensive customer engagement and further investigations from 2015 to 2017 it was confirmed that the remaining number of properties at risk of basement sewer flooding due to surcharge, was much lower than originally thought. This meant that construction of a new large tunnel sewer was not an appropriate solution for the problem faced.
- The investigations have given us a clearer view of the scale of basement flood risk in the Counters Creek area and we concluded that it was not in customers interest to continue with this element [tunnel sewer] of the scheme, but to provide protection through a local solution approach.

1.3. Current proposal

- Our new proposal includes FLIPs, local schemes and Sustainable Drainage Systems (SuDS).
 - MGJV is working with us to install FLIPs on a rolling basis between now and March 2020.
 - Barhale Ltd is working with us to develop and finalise plans for up to seven local schemes. Construction on the first three of these schemes started in February 2019, with a further four to follow later in the year. One of these schemes will be in the Royal Borough of Kensington and Chelsea.
 - We will also be delivering SuDS in five streets in the London Borough of Hammersmith and Fulham and are working collaboratively with the local authorities to deliver these projects.

We are confident that our revised approach to alleviating hydraulic basement sewer flooding in the Counters Creek area will provide targeted, robust protection to all those that have suffered basement flooding in the past and provides a resilient solution that will withstand challenges such as climate change and population growth. Furthermore, our approach will be less disruptive in a congested area of London than a large infrastructure project and is compatible with the future plans for sustainable drainage in London.

2. CONTENTS

1. Executive Summary	1
1.1. Previous proposal	1
1.2. Further Investigations	1
1.3. New proposal	1
2. CONTENTS	2
3. INTRODUCTION AND HISTORY	2
4. OUR PREVIOUS PROPOSAL	3
4.1. SuDS TRIAL	4
4.2. WHY OUR PROPOSED SCOPE HAS CHANGED	4
5. OUR NEW PROPOSAL	5
5.1. FUTURE RESILIENCE OF OUR PROPOSALS	8
5.2. BENEFITS TO OUR CUSTOMERS	9
6. Appendices	10
6.1 Appendix 1: Glossary of Terms	10
6.2. Appendix 2: FLIPs FAQ Sheet	11
6.3. Appendix 3: Local schemes 2008 to 2010	12
6.4. Appendix 4: Customer Communications	13

3. INTRODUCTION AND HISTORY

Basement property flooding has been a long-standing problem in the Royal Borough of Kensington and Chelsea (RBKC) and the London Borough of Hammersmith and Fulham (LBHF), referred to as the Counters Creek catchment area. The sewerage system in the Counters Creek area, like much of London, is a combined system meaning that it collects both ‘foul’ flows from properties (toilets, sinks, washing machines etc) and rainwater ‘run off’ from roads and roofs (see Appendix 1 for a more detailed explanation). During heavy rainfall the sewer system can become full and lead to the sewers’ contents flowing back into a property causing what is known as ‘hydraulic sewer flooding.’ Some basement properties may be vulnerable to hydraulic sewer flooding because they are at a similar level to the sewer and therefore water finds it easier to flow back up the pipe and into the property. There are around 11,000 basements in the Counters Creek catchment.

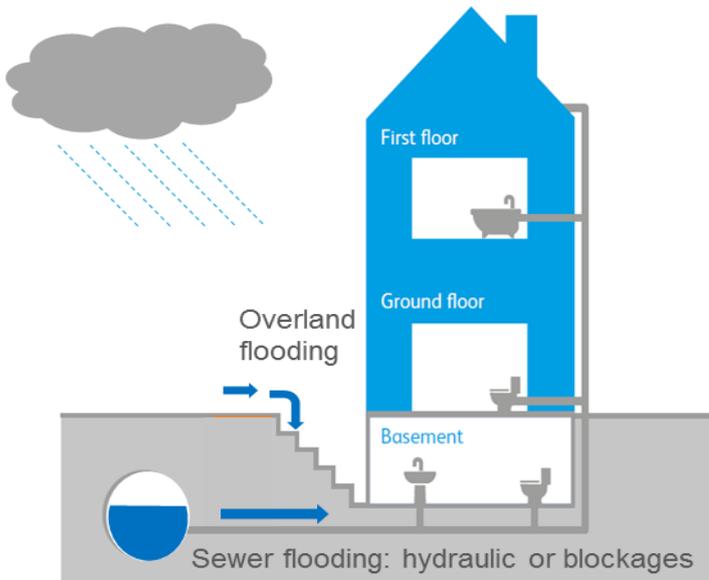


Figure 1: Types of basement flooding.

Many basements, constructed in Victorian times, were used for coal storage. The conversion of these underground areas into residential flats with new toilet, shower, kitchen and bathroom connections to the sewer has resulted in increased flooding incidents during heavy rainfall when the sewer flows back up through these connections into the basements. Since the 1990s Thames Water has been providing FLIPs to basement properties as a flood protection measure. FLIPs work by pumping the flows from a property into the sewer, providing protection even in the most extreme weather. (Appendix 2: FLIPs FAQ Sheet contains more detail on how they work).

Between 2004 and 2007 the Counters Creek catchment area experienced a number of intense rainfall events which resulted in widespread basement flooding. At the time it was not clear how much of the flooding was due to hydraulic sewer flooding, blockages or overland/surface flooding but Thames Water's response to these incidents was the Counters Creek flood alleviation scheme (CCFAS). The CCFAS was developed with the intention of providing flood protection to those impacted by hydraulic sewer flooding. As this scheme would take a while to plan and design, Thames Water decided to continue with localised flood protection in the form of FLIPs and local flood alleviation schemes to the properties that had evidence that they were most at risk from hydraulic sewer flooding.

To enhance our understanding of the flood risk we undertook extensive catchment modelling of the sewerage system. This modelling allowed Thames Water to not only investigate properties known to have succumb to basement flooding but also to assess other properties that may have flooded but for various reasons was not reported.

4. OUR PREVIOUS PROPOSAL

For some time we have been reviewing properties impacted by hydraulic sewer flooding (including properties believed to be at risk) and since 2007 investigating options for the Counters Creek flood alleviation scheme. As part of this, we successfully protected over 1,000 properties through the installation of FLIPs and implementation of the following local schemes:

- Norland Square Phase 1: completed in 2009
 - Norland Square Phase 2: completed in 2009
 - Westbourne Grove: completed in 2008/2009
- (More information about these schemes can be found in Appendix 4)

In 2013 we finalised our proposals to protect the area from the type of widespread basement flooding experienced in 2007. They consisted of a package of measures as follows: a 5km strategic tunnel sewer; continued installation of FLIP devices; and further local schemes. In addition, we proposed three Sustainable urban Drainage Systems (SuDS) pilots to better understand their potential benefits in an urban setting.

The package of solutions was planned to be completed by March 2020 and was approved by Ofwat (the Industry Regulator) as part of Thames Water's Business Plan for the period 2015-2020. Work then began on developing the design of the proposed tunnel sewer in 2014.

4.1. SuDS TRIAL

Sustainable urban Drainage Schemes (SuDS) are systems that either separate or attenuate surface run-off during heavy rainfall, slowing down or preventing rainwater getting into the sewer network, thus reducing the risk of both overland flooding and hydraulic sewer flooding. Between 2014 and 2015, Thames Water worked with RBKC and LBHF in an innovative collaboration to implement three SuDS trials in:

- Mendora Road, LBHF (See figure 2)
- Melina Road, LBHF (See figure 3 and 4)
- Arundel Gardens, RBKC (See figure 5)

These projects involved installing and monitoring three different SuDS designs including: permeable block paving, permeable asphalt and planted gardens in the Counters Creek catchment and monitoring them to gain information on feasibility, performance and maintenance over a two-year period.

The trial won the Green Organisation Green Apple Award for Sustainability in 2017 and the results are now being used to inform other sustainable drainage systems undertaken by Thames Water in this area and across London.



4.2. WHY OUR PROPOSED SOLUTION HAS CHANGED

Following approval for the project by Ofwat in 2014, work began on developing the design of the new tunnel sewer, with a number of different sites considered. We were aware that any site would likely experience a high number of lorry movements during construction. This was likely to cause significant disruption in built up areas of London. A number of residential areas would also have been impacted for periods of two to four years during the construction of shafts where the existing sewer network was to be connected into the new sewer tunnel.

Due to the potential impacts of the project, Thames Water held two public consultations and two interim engagement events (Spring and Autumn 2015) in the period between 2014 to 2016. During this time alternative sites for the construction of the new sewer tunnel and its shafts were considered (see figure 6 for alignment as proposed in 2016).

The main outcomes from the public and stakeholders' consultations were:

1. Cremorne Wharf, located off Lots Road next to the River Thames, was the preferred site from where the new sewer could be constructed.
2. Along the route of the new tunnel sewer, four sites were required for the construction of the shafts. Thames Water consulted on several sites, however even the best options available were still located close to built-up residential areas, potentially causing huge disruption for residents and businesses.
3. The cumulative traffic impact along Lots Road was also expected to be significant. This would have been caused by the construction of the new tunnel sewer from Cremorne Wharf as well as the construction of the works associated with the consented Thames Tideway Tunnel (which is a different project to the Counters Creek Flood Alleviation Scheme) and other new developments along this road.

Cremorne Wharf had been earmarked as a construction site for the Thames Tideway Tunnel from 2017 to 2024. The implementation of the Thames Tideway Tunnel project was at an advanced stage with the Development Consent Order already granted, the contractors who would undertake the works procured, and the design underway. Thames Water would need access to the Cremorne Wharf site in order to construct the CCFAS sewer, therefore, Thames Water entered into negotiations with the team constructing the Thames Tideway Tunnel project to explore how the two schemes could be integrated and be constructed within their required time periods.

However, due to the compact nature of the site, differing planning regimes and the significant risk of delay to both projects, the construction of the new sewer for the CCFAS would have to wait until the work on the Thames Tideway Tunnel project had completed. This meant that the expected flood protection could not be provided within the planned timescale of March 2020.

5. THE SOLUTION BEING DELIVERED

Following the completion of our negotiations with the Thames Tideway Tunnel Project in 2017 we started a study reviewing the work that had been carried out to date. Additionally, we reviewed recent rainfall events to assess the effectiveness of the protection measures we had put in place since 2007, including the local sewer upgrade schemes and FLIPs.

As mentioned, since 2007 Thames Water had installed over 1,000 FLIPs and constructed a number of local schemes. In June 2016 there were two intense rainfall events; one on the 16th and the other on the 23rd. The total number of flooding incidents reported to Thames Water in the Counters Creek catchment was 17.

The low number of flooding incidents in June 2016 compared with the hundreds recorded in 2007 indicated these measures had significantly reduced the risk of hydraulic sewer flooding to basement properties.

In May 2018, there was another intense storm. The number of flooding incidents reported in the Counters Creek area was around 46 (all in LBHF), but following further investigations it became apparent that the majority of these had flooded due to operational issues (like blockages) and only 14 had flooded due to hydraulic issues. This was further confirmation that the protection measures implemented since 2007 had been effective in reducing the risk of flooding to basement properties.

In order to estimate how many properties remained at risk of hydraulic sewer flooding, we also examined the flooding records of all the properties on our register that had yet to be protected. As

part of this review we contacted all basement properties in the area (whether or not they were recorded on our data base as having experienced any kind of flooding) to update our records. Appendix 5 gives further details of our customer engagement over the life of the project. Our review revealed that there were around 1,000 properties from the list used to develop our original proposals that had not had a protection measure installed. Of those, we estimated only between 200-400 properties were potentially at risk of hydraulic sewer flooding and therefore required protection. These properties were not clustered around a few locations but were dispersed across the whole area.

From this study we concluded that the protection measures implemented since 2007, notably the FLIPs and local sewer upgrades, had been successful in providing protection and significantly reducing the risk of hydraulic sewer flooding in the area. Furthermore, modelling showed that the number of properties potentially remaining at risk of hydraulic sewer flooding was much lower than we had originally thought. Given these conclusions, a large and disruptive new storm relief sewer was not seen as appropriate or beneficial. Thames Water therefore decided not to continue with the tunnel sewer component of the original scheme but would continue to provide protection to all those properties remaining at risk of hydraulic sewer flooding using further FLIPs and local sewer upgrades, which had proven to be successful at providing protection to date.

Following the conclusion of our study we commenced engagement with all our customers on our sewer flooding history database (SFHD) who had not yet been provided with a solution, as we wanted to confirm whether hydraulic sewer flooding had taken place. This was achieved through a combination of telephone calls, email and door-knocking. The aim was to contact the property owners and residents (if different) to conduct a survey of the sewer connection with the basement. This would confirm if the property had experienced or was at risk of hydraulic sewer flooding and develop a solution should this be required. **As a result of this process we have confirmed around 240 additional properties which require protection, which will be achieved through FLIPs and seven local sewer upgrade schemes.**

Our studies also examined whether there was a potential to create new flooding to neighbouring properties through the installation of the FLIPs devices (known as 'detriment'). There is no evidence to suggest widespread detriment has been caused as a result of the FLIP installations to date as the recent intense rainfall events of 2016 and 2018 show the number of properties with confirmed hydraulic sewer flooding is small. Despite this, Thames Water has decided to take a precautionary approach to the installation of new FLIPs in the area. Using our verified hydraulic models we have developed a risk based approach to identify streets where detriment might occur following the installation of new FLIPs and plan to install SuDS in five streets (listed in section below) as a result to reduce the risk in these areas.

FLIP installations

Thames Water has appointed MGJV contractors for the construction of the FLIP devices. These works are in progress across both boroughs and programmed to be completed by March 2020.

Local schemes

Thames Water has appointed Barhale Ltd for the construction of the local sewer upgrades (known as local schemes). These schemes typically involve increasing the sewer capacity in a street by installing a new sewer alongside the existing sewer. This protects multiple properties in one street or area at a time. The planned local scheme locations are:

- Castletown Road, WD14 9HF (LBHF)
- Tabor Road W6 0BN (LBHF)
- Perrymead Street SW6 3SW (LBHF)
- Bowerdean Street SW6 3TW (LBHF)

- Parsons Green Lane, Pursers Cross SW6 4HS (LBHF)
- Harbledown Road SW6 4HS (LBHF)
- Queensdale Road W11 4SG (RBKC)
- Bradbourne Street SW6 3TE (LBHF)

SuDS and monitoring

We have learned valuable lessons from the three SuDS trials and we are using this knowledge to maximise the performance of the new SuDS. The proposed SuDS schemes (all located in LBHF) will have a variety of features. Predominantly the surface of some car parking bays will be replaced with permeable paving which allows rainwater to permeate through into underground storage boxes. In addition to these, engineered tree pits and rain gardens that store and take up water for growth will be installed. In all these features water can be stored underground and passed into the sewer system at a slower rate, reducing the amount of water entering the sewer in a rainfall event. The five locations of these SuDS locations are:

- Munster Road SW6 4EN (LBHF)
- Greenside Road W12 9JG (LBHF)
- Bassein Park Road W12 9RN (LBHF)
- Godolphin Road W12 8JE (LBHF)
- Rostrevor Road SW6 5AU (LBHF)

We also plan to install depth monitors into the sewers at a further twelve locations. This will aid in assessing and tracking the long term performance of the network following completion of all our flood alleviation works. These locations are:

- Acfold Road (LBHF)
- Bowerdean Street (LBHF)
- Dancer Road (LBHF)
- Ladbroke Grove (RBKC)
- Linver Road (LBHF)
- Percy Road (LBHF)
- Ranelagh Road (LBHF)
- Rosebury Road (LBHF)
- Rycroft Street (LBHF)
- Studdridge Street (LBHF)
- Wandsworth Bridge Road (LBHF)
- Whittingstall Road (LBHF)

It is apparent from the above lists that almost all the potential detriment (as a result of the planned FLIPs installations) lays within the LBHF. This is because the sewer pipe sizes are generally much smaller in this area compared to those within the RBKC so are more sensitive to the installation of FLIPs.

Following completion of the FLIPs, local schemes and SuDS in March 2020, we expect the risk of hydraulic sewer flooding in the area to be low and the Counters Creek Flood Alleviation Scheme will be complete. As with any scheme such as this there are however no guarantees that new reports of flooding will not occur. Newly reported incidences occurring after completion could be for a variety of reasons including:

- New basement developments which have not complied with building regulations or planning policies (see later).
- Sewer blockages or other operational issues.
- Previously unreported hydraulic sewer flooding following a severe event.
- A storm event with a higher intensity than the design industry standards for sewers (over a 30-yr storm event).

However, we believe future flooding in the area will be manageable within both Thames Water's and the local authorities' current operations.

5.1. FUTURE RESILIENCE OF OUR PROPOSALS

In designing our new solutions, we have considered the potential changes that could happen as a result of climate change, population growth and future development in the area. We have looked at this in two ways:

1. The solutions to alleviate current hydraulic sewer flooding, such as FLIPs, local schemes and SuDS, have been designed to take into account a 20% uplift in rainfall which whilst not consistent with CC predictions is in line with national guidance for CC assessment.
2. We have used our hydraulic models to study the wider network to understand how this will perform in the future.

In terms of the second point, we have included the impacts of climate change and population growth over the next 25 years in our modelling as well as future developments and the commissioning of the Thames Tideway Tunnel. Future developments, like those proposed at Old Oak Common and Earls Court, are seen as having positive impacts, if implemented properly, because they are subject to planning policies which include requirements for SuDS. As the Counters Creek area is already built up, the rainwater runoff pre-development will enter the sewerage system, the result of the development and the implementation of sustainable drainage will significantly reduce the amount of rainwater entering the system. This could potentially more than offset the small increase in domestic, foul water flows arising from the additional housing units that are part of the development.

Thames Water is working with the local authorities and developers in the implementation of SuDS. At present Thames Water is involved in the implementation of SuDS at the following locations within LBHF:

- White City: Westway
- White City: Australia Road
- Queen Caroline Street behind Hammersmith Apollo
- Field Road

Collaboration between the different organisations for flood management, particularly in relation to the implementation of SuDS is set to grow in the future supporting the resilience of the sewer network.

Our modelling work shows the beneficial effects described above will balance the adverse effects of climate change and population growth over the next 15 to 20 years, and therefore our current solution to basement hydraulic flooding in Counters Creek is a resilient approach in the medium to long term. Thames Water has also invested in flow monitors across the sewer network. These can be used in real time to predict the flows and levels in the system when heavy rain is forecast. This provides further operational resilience to the area.

Finally, throughout the scheme we have worked with the Independent Advisory Group (IAG), an external group of experts that were brought together in 2012 by Thames Water to review and challenge our plans for the scheme and its outputs. The group were involved in the development of our solutions to ensure that the approach would meet the flood risk reduction and customer

protection level required. Our work with the IAG is still ongoing and their challenges have helped us to ensure we are taking the best approach to address the flooding problem in the catchment area.

On request of our Customer Challenge Group (CCG) in 2018, our current solution has been reviewed by an independent expert at WSP. The outcome of this review was an endorsement for our proposal and the mitigation measures we are installing to protect customers from hydraulic flooding.

5.2. BENEFITS TO OUR CUSTOMERS

Our current approach to alleviating hydraulic sewer flooding in the Counters Creek area has the following benefits to our customers:

- First and foremost, all customers who we have confirmed to require protection from hydraulic sewer flooding will be protected. Our approach targets the properties which are at risk, providing a more robust solution that will protect those properties to a high standard.
- The project will protect customers within the original timescale of March 2020, much sooner than the new storm relief sewer would have done had it gone ahead.
- Our approach will be far less disruptive across both boroughs than a large construction project would have been. Any disruption caused will be minimised and localised to those that will receive a benefit from the work, rather than affecting those in the wider area.
- The solution is compatible with London's future drainage plans which are being drawn up by Thames Water and will be consulted with the local authorities.
- Our approach is a lot less expensive than the large infrastructure project previously proposed.

6. Appendices

Appendix 1: Glossary of Terms

- Blockages – Blockages in pipes usually occur when items that are not meant to get in to the wastewater system do and they get stuck, meaning wastewater cannot easily flow away. Blockages in homes are usually caused by fat, oil and grease that congeals in the pipes setting hard, wipes (even ones that say flushable do not break down) and sanitary items. Bin in, don't block it.
- CCFAS – Counters Creek flood alleviation scheme
- CCG – Customer Challenge Group
- Detriment – The potential impact of a FLIP installation on surrounding property's risk of flooding
- FLIP - Flooding Local Improvement Process. A FLIP is an electrically-powered pump, which operates when the sewer network is at capacity. The electrical pumps isolate the property from the network, protecting it from hydraulic flooding during times of heavy rainfall.
- Hydraulic sewer flooding – A specific type of sewer flooding caused by surcharging flows from the local sewer network during intense rainfall events where the network is at capacity. Sewer flooding can be caused by a range of factors, including blockages or operational issues.
- IAG – Independent Advisory Group
- LBHF – London Borough of Hammersmith and Fulham, one of the Boroughs that makes up the Counters Creek catchment area
- Local schemes – Street-level protection methods which aim to protect multiple properties at once from basement sewer flooding. These come in many forms but the most common used in our project have been the construction of a new section of sewer next to the original sewer to increase network capacity.
- Overland Flooding – flooding caused by the build-up of rainwater on the surface of streets/pavements due to lack of gully space or saturation of ground surfaces that leads to flows running overland and into basements/lightwells
- RBKC – Royal Borough of Kensington and Chelsea, one of the Boroughs that makes up the Counters Creek catchment area
- SuDS – Sustainable urban Drainage Systems.
- SFHD – Our sewer flooding history database which holds all reported flooding incidents within the Thames Water region. Flooding can have many causes and this database aims to categorise the reports by their cause, date and extent.
- Thames Tideway Tunnel – more information about the company building this tunnel can be found [here](#).



FLIP device Frequently Asked Questions

1. What is a FLIP?

FLIP stands for Flooding Local Improvement Process. A FLIP is an electrically-powered pump, which operates when the sewer network is at capacity. The electrical pumps isolate the property from the network, protecting it from hydraulic flooding during times of heavy rainfall.

2. How does a FLIP work?

The FLIP has an 'on and off' level within it which relates to the level of flow entering it. This controls when the pump comes on as it is not operational at all times, but only when needed. There is a non-return valve within the unit that prevents surcharge from the main sewer entering the protected property when the levels become too high. It is connected to the electricity supply serving the property and has a separate control panel which is fitted nearby. There is an alarm light on the control panel to warn of any issues with the FLIP unit.

3. Why is my property getting a FLIP?

As part of the Counters Creek flood alleviation scheme we are looking at installing FLIPs at properties that have experienced sewer flooding in the Counters Creek catchment area to help protect residents from sewer flooding. To make sure that a property is eligible for a FLIP, and that it will be the best flood alleviation option we need to have evidence of sewer flooding from the event. If we have this evidence then we carry out a survey. If the results of this survey show that you are at high risk of flooding and you require flood protection then we will be in touch with you to discuss this.

4. How reliable are FLIPs?

Overall FLIPs are very reliable. They have a minimum 15 year lifespan and we will service them every year to check for any faults and replace them at the end of their usable life. As the FLIP is connected to your power supply it is recommended that during power failure the use of toilets, sinks, showers and baths is limited. This restriction is to prevent incidents of self-flooding and applies to other properties connected to the drain pipe, e.g. flats above basements.

If there is a power cut and the FLIP does not automatically restart when the power supply is restored, then you should phone Thames Water on **0800 056 2625** or on **0800 316 9800** as the FLIP will need to be reset.

5. Does my FLIP require maintenance?

Yes. FLIPs are serviced and maintained by Thames Water. We service a single pump system once a year and a double pump system twice a year. If, for any reason, the FLIP fails to operate, a red or blue warning light should signal. If this alarm is triggered then you should call **0800 316 9800** and quote the reference **FLIP**. This number operates 24 hours a day, seven days a week.

6. What happens when I sell my property?

The presence of a drainage device will obviously alert potential purchasers to the risk of flooding. However, you are legally obliged to inform purchasers of any risks, problems etc., relating to the purchase of a property – including flooding. With your agreement, the purchaser will be given advice by Thames Water and the opportunity to continue to benefit from the device.

Appendix 3: Local schemes 2008 to 2010

- Norland Square Phase 1: completed in 2009

This phase of the scheme involved works to reduce the risk of flooding in Upper Addison Gardens, Holland Road and Elsham Road which were all caused by excess flows in the adjacent Counters' Creek Sewer.

Upper Addison Gardens: Two new manholes, a short length of throttle pipework (small diameter pipes to provide flow control) and a flap valve were installed here to stop flows from the Counters' Creek Sewer surcharging back into the sewer during storm events. Works also included the construction of a new manhole upon the existing Lower Addison Gardens sewer adjacent to an existing manhole and filling the interconnecting pipework as it was no longer needed.

Holland Road and Elsham Road: Flows were diverted, using newly installed pipework, from the Holland Road sewer (north of the Addison Crescent junction) into the existing 'Russell Road' pumping station located in Holland Gardens. The works included improvements to the existing Russell Rd sewage pumping station wet well.

- Norland Square Phase 2: completed in 2009

This phase of work aimed to help reduce the risk of internal and external flooding to properties in Addison Avenue, and Norland Square (west) at peak flow times.

The sewers that discharged into the Holland Park Avenue sewer from Addison Avenue and Norland Square (west) were isolated at the connection point. Local flows were intercepted and sent back towards St. James's Gardens via new tunneled pipework. The shaft near St. James's Gardens also contains pumping equipment which returns flows to the adjacent drainage catchment at a controlled rate.

- Westbourne Grove: completed in 2008/2009 (near the RBKC/Westminster boundary)

This scheme was designed to alleviate hydraulic flooding to properties in Westbourne Grove.

The scheme involved constructing shafts to intercept flows from main sewer on Garway and Queensway Road into a new 1500mm diameter storage tunnel beneath Westbourne Grove. The 350m long tunnel was connected to a new pumped storage shaft on the Hallfield Road estate which controlled and pumped flows back in to the Westbourne Grove sewer.

Appendix 4: Customer Communications

Thames Water records all the flooding reports on its “Sewer Flooding History Database”. Following the storm events in 2004, 2005 and 2007, a large number of flooding reports were added to the database.

Some residents may not have reported flooding. In order to understand the extent of the problem, it was important to investigate the properties with reported flooding and to try to find out about any unreported flooding.

Following the storm of 2007, Thames Water decided to engage with its customers to get a better understanding of the full extent of the problem.

2008 to January 2018: Invitations were sent out every six months to customer meetings held in the town halls of LBHF and RBKC. Around 3000 invitations letters were sent out each time to those who had either suffered from flooding, registered an interest or lived near properties whose residents had reported flooding. The meetings were advertised in the local press and on our website and at the venues. At each meeting Thames Water’s contact details for the reporting of flooding were provided. The attendees were asked to report basement flooding if they had not done so already so that Thames Water could provide protection. These meetings were led by members of the Thames Water Executive team. The format was typically a 30-minute presentation on progress followed by a question and answer session. These approximately six monthly meetings started in 2008 and continued until January 2018. There was a pause in 2017 whilst we completed our investigation in to different solutions.

2010 and 2012: Thames Water contacted customers impacted by flooding to survey their properties and gather information relating to the flooding incidents they might have suffered.

2014 to 2016: two public consultation and two interim engagement events were held, each lasting approximately one month. These comprised of venues located at various locations within the two London Boroughs where the proposals were presented and feedback from the customers collected. At each event, the attendees were asked to report any flooding they might had experienced so that Thames Water could provide protection.

2017: Thames Water sent out flooding questionnaires to some 30,000 basement properties to review and update its database thus making a further attempt to tease out any further unreported basement flooding.

2018: Ten drop-in events at various locations were held in early 2018 to inform the customers of the new proposals. Again at each event the residents were asked to report any flooding they might have experienced so that protection could be provided as appropriate.

2018: Using the Flooding database and the customer contacts mentioned above, Thames Water prepared a list of all the basement properties which might had been impacted by flooding. This list comprised of 1135 potential properties. All the properties on the list were contacted through telephone calls, emails, letters and door knocking. The aim was to interview each customer and survey their basement properties in order to establish the mechanisms of flooding. It is often found that flooding is caused not because of the flows backing up from the sewers but because of other issues not relating to the sewers’ capacity. Flooding incidents caused by a blocked drain or by ground water ingress into the basement or by rainwater not being able to drain away due to blocked

gullies in the front light or back garden are common. It was therefore important to interview the customers and survey their properties to establish the causes of flooding before offering protection.

The results: It was possible to interview 835 out of the 1135 properties (a success rate of 74%). Several attempts were made to interview the remaining 300 customers but they did not respond.

Following interviews and property surveys, it was concluded that around 240 out of the 1135 properties had most likely flooded due to the flows backing up from the sewer network and that the remaining properties had flooded due to other reasons not relating to the sewers' capacity.

The new proposals will protect these remaining 240 properties.

Notes: During the public consultations, between 2014 and 2016, there were around 2000 reports of flooding with approximately 1700 requiring protection. During our review in 2017/2018, these figures had reduced.

The reasons for this reduction are:

1. Thames Water has been providing FLIP protection on a rolling programme, so some of the properties with reported flooding had been protected by the time of the review in 2017/2018.
2. Closer examination of the basement properties (through surveys and interview of the residents) revealed that some of the flooding incidents were not due to the backing up of flows from the sewers but due to other reasons.
3. There have been a large number of basement conversions, particularly in recent years. Many basements have been deepened or dug out to create living space. Building Regulations 2000 require provision of adequate drainage by the developer. The Drainage and Waste Disposal Document H 2002 edition - sections 2.9 to 2.12 include the need for pumped drainage in high risk areas and an anti-flooding valve in low risk areas. We discovered that some basement developers had complied with the requirements of the Building Regulations and that these basements no longer flooded.

We also found that some developers had not complied with the requirements of the Building Regulations, which require a pump system to be installed in new basements in high risk areas, which the Counters Creek area comes under, and were being flooded as a result. Thames Water has decided not to offer protection to those who have not complied with the Building Regulations or the local authority planning requirements.