Introduction

Kent County Council as the Highway Authority in Kent manages over a quarter of a million roadside drains across the county together with 6200km of pipework, manholes, soakaways, and other assets associated with highway drainage. It is the second largest asset group within the highway authority.

The asset base is increasing every year as part of our highway improvements and as newly adopted highways join the network from new developments.

Highway Drains are designed to:

- remove surface water run-off from the highway to help keep roads safe and minimise problems
- prevent damage and make roads last longer through effective drainage
- minimise surface water from the highway affecting properties or land

Our highway drains are not usually designed to provide drainage for other areas outside of the highway boundary, such as for land drainage or privately owned property or developments.

Planned and Reactive Maintenance

KCC need take an asset management led approach to maintaining over 0.25 million highway drains across the county. Our current approach is set out below.

- Yearly inspections and cleansing of roadside drains throughout our key routes that link towns and villages.
- Twice yearly cleansing of roadside drains we have designated as most vulnerable to flooding – which are identified using enquiry data from historic reports from the public.

If a drain is not on the planned programme, it is maintained in response to reports of flooding. Reported drains are then risk assessed for highway safety and internal property flooding.

Other parts of the drainage system owned by the highway authority, such as pipes, soakaways, lagoons, and ponds are maintained on a reactive basis if problems are found during the routine drain maintenance or identified from flooding reports. Reactive maintenance is usually undertaken within 28 to 90 days of a report being received, unless it is an emergency.

Emergency attendances are undertaken as a ‘make safe’ service, particularly those which occur out of hours. In these instances, KCC would act within 2 hours. This may involve closing the road temporarily, clearing the flood with tankers or assisting the emergency services or partner organisations.

The highway authority does not maintain public foul or surface water sewers, drainage serving private property, or land drainage features such as roadside ditches and watercourses. KCC would refer these matters to the relevant authority or landowner as appropriate.

Drainage repairs, improvements, and schemes:

If any defects within the drainage system are identified during routine maintenance operations, the enquiry will be passed to one of our local Drainage Engineers for further assessment. KCC aim to undertake these assessments within 28 days of being referred to the engineer. KCC currently have one drainage engineer covering the Swale Borough, together with two schemes engineers for larger improvement works between them covering the entire county.

Our engineers carry out a variety of investigation and civil engineering works to repair or improve our drainage systems. KCC can carry out specialist work such as CCTV investigations in order identify defects. This is supported by dedicated contractor resources via our Drainage Framework Contract (comprising three civil engineering contractors) to enhance our resources for delivery of drainage repair works in addition to those services provided by our term maintenance contractor, Amey.

If flooding keeps happening in the same place, KCC will investigate how the situation can be improved and these sites will be entered onto a forward programme of planned work. Currently our countywide highway drainage capital works budget for 21/22 is £4.5m of which £1.5m is allocated to drainage improvement schemes across the county.

The availability of funding is clearly a significant constraint, with many conflicting priorities throughout the county. Works are prioritised according to the risk to highway safety and risk to internal property flooding first and foremost, as well as consideration of other impacts to the highway asset. This may mean larger drainage schemes take several years to come forward or are phased according to availability of funding and resources.

Mitigating Flood Risk to the Public Highway

We are experiencing intense rainfall events on an increasingly frequent basis in Kent, with recent thunderstorms generating a volume and intensity of rain well beyond that of the above design capability of highway drainage systems or the receiving network

As well as prolonged winter rainfall, summer 'flash flooding' is becoming an increasingly significant risk to the highway authority. When such events occur, run-off often used the highway as a conduit to escape to lower ground, either as 'overland flows' which following the topography or as 'exceedance flows' where a drainage system was unable to cope. This could lead to highway flooding or property damage in a location that was remote from the original source of the flood water.

The burden on our highway drainage systems can also be exacerbated by many other factors including:

- The age and condition of highway drainage systems. Some systems can be more than 100 years old and / or be operating beyond their original design life or original designed capacity.
- Operational issues arising from budget limitations for ongoing routine maintenance.
- Capacity issues of drainage systems not under the control of the Highway Authority, such as public sewers or private ditches and watercourses into which they connect.
- Structural damage to drainage systems by third parties or site environs (such root damage from adjacent trees and hedges) that may go unnoticed until significant rainfall occurs.
- Poor maintenance of drainage features in land adjacent to the highway which then flows onto the highway (including ditches and culverts, as well as urban drainage from buildings, hardstanding, parking areas).
- 'Urban Creep' effects such as additional run-off onto highways from the widespread paving of front gardens in residential areas.
- Increases in the peak intensity of rainfall brought about by climate change.

In our experience, most existing highway drainage systems will cope with up to around 20mm of rainfall in a single day without significant impacts or disruption. However, in the 'flash flooding' events we have seen in Swale throughout July and August 2021 rainfall often exceeds 30 to 40mm in depth and clearly was sufficient in intensity and volume to overwhelm drainage systems.

In many instances KCC attend flooding incidents where flood water has already drained on arrival or has been caused by minor issues such as leaves or litter on top of gully grates washed down by high intensity rainfall. Follow up reactive maintenance is often required after a flood to remove the debris washed down from surrounding areas.

Improving Revenue Funded Asset Maintenance

It is key to manage our existing assets appropriately to reduce the risk of flooding occurring. In addition, it is important to protect our investment in areas where capital funded repairs and drainage improvements are carried out. This is likely to require additional future revenue funding and smarter use of existing funding.

The highway drainage team has been exploring better drainage management via the 'Live Labs' project to seek a more encompassing software platform, dedicated to the complexities of drainage, that has the functionality to support our maintenance activities while communicating as much data as required to the Pitney Bowes Confirm system (WAMS) already in operation within the authority.

In addition to the improved customer service experience, our research highlighted several areas where the financial opportunity for better management of the drainage network is significant. Kaarbontech were identified as the appropriate platform for Kent and their trial includes several stages and options as part of an approach to drainage management differently in Kent. Trials were initially undertaken in the District of Maidstone and subsequently expanded to other parts of the county this year. The broad goals of the project include:

- Collecting an inventory of drainage assets.
- Attributing historic information from other council systems to assets.
- Defining and prioritising zones of interest.
- Risk profiling maintenance based on prioritised assets.
- Assessing if and how handhelds devices can play a part in future maintenance.
- Allowing ongoing data collection to feed into the risk profiling automatically.
- Incorporate smart gully level sensors in key areas.
- If the trial is successful invest in the asset management software platform to map all our drainage assets to include the final outfalls, this will reduce cost as future investigations will not be required as we have the asset plotted, including all CCTV surveys.

In the Maidstone area alone, it was identified that half of all the drains contained less than 20% capacity of silt, and only 4% greater than 71% of silt. This highlights the opportunity for reduction in cleansing frequency (i.e. less than annually) for many areas where silt and debris loading are low but consequently increasing the frequency of maintenance for other areas that evidence a need for more frequent proactive maintenance (i.e. greater than annually).

The highway authority hopes to move to this smarter and more proactive maintenance regime countywide from April 2022.

Developing our Future Capital investment Programme

The Highway Authority adopted a new Highways Asset Management Plan covering the period from 2021.22 to 2025/26 earlier this year. This has been published on KCC's website via the following link: https://www.kent.gov.uk/about-the-council/strategies-and-policies/transport-and-highways-policies/managing-highway-infrastructure

The plan includes a summary of asset condition, a service level risk assessment which sets out the services KCC do and do not provide as well as a forward work programme for the next five years.

This will also be subject to regular updates. Our team keeps a 'live' version of the programme to feed into the published updates.

The current 5 year forward work programme for highways drainage was developed following a GIS analysis using data from our own records as well as published data such as surface water flood risk mapping. The assessment balances highway impacts, route type and impacts outside of the highway such as property flooding.

Not every site identified will require drainage improvement works to reduce the risk of flooding. There may be instances where minor repairs or an enhanced maintenance regime are sufficient. In other circumstances there may not be a solution that is viable or within KCC's control to deliver (e.g. where the receiving drainage system is owned by other parties such as Southern Water).

It should also be noted that future improvements must be cost-beneficial (i.e. is the costs of delivering them must be outweighed by the benefits they provide) and any improvements made are unlikely to eliminate the risk of surface water flooding - all measures can be overwhelmed by a rainfall event of sufficient extremity.

There is an obvious need to work closely with the various water and utility organisations to develop co-operative programmes to align our operational needs to their ongoing asset modernisation and water management obligations. Multi agency meetings are currently held between KCC (as both Highway Authority and Lead Local Flood Authority), the Environment Agency, Southern Water, and other risk management authorities on a quarterly basis.

Swale Borough Specific Actions

KCC are carrying out a wide range of work throughout the Swale Borough and across the county. In Swale KCC have received over 500 reports of flooding or blocked drains in the last 6 months alone due to the well above average rainfall throughout the year so far.

Reporting flooding issues

KCC encourage all residents, members, and other parties to report urgent problems with highway drainage using our contact centre on 03000 41 81 81 or via the highway fault reporting tool our website for less urgent issues. It's important for issues to be logged formally in this way so that they are properly recorded. Enquiries should not be sent to KCC officers directly via email.

Latest works and investigations into key flooding issues

A2 Canterbury Road, Snipeshill, Sittingbourne

This location has been affected by flooding during heavy rainfall events. A large drainage system is located within public open space and receives surface water from a Southern Water owned surface water sewer providing drainage for housing estate to the south. Separate drainage for the A2 has also undergone maintenance work which helps to limit flooding of the public highway.

A full assessment of the existing drainage has been carried out by colleagues in KCC's Flood and Water Management Team, as Lead Local Flood Authority in Kent. Working in consultation with Swale Borough Council as the landowner, proposals have been designed to reduce the flood risk to the area and incorporate sustainable drainage and public open space improvements. An evidence base for an application for a capital investment grant from central government via the Environment Agency's Flood Defence Grant in Aid has also been produced to support delivery of the scheme.

If successful, this funding will support the council's contributions to the scheme and allow delivery to be progressed. It is not currently known whether this funding application will be successful or a timeframe in which funding will be awarded.

Lansdown Road, Woodberry Drive and Coombe Drive, Sittingbourne

This location has been subject to flooding of the highway and property in May 2018 and August 2020 during exceptionally high rainfall. To reduce the flooding risk to property in the future, KCC commissioned a review of options for mitigation, completed February 2021. The review highlighted significant increase in the amount of surface water run-off contributing to the highway drainage due to widespread paving of front gardens for driveways. This increases flood risk to the area.

Detailed designs have been completed for the highest risk area at Lansdown Road and works are underway for the first phase of highway drainage improvements, expected to complete by 2nd December 2021. Additional works are to follow within Lansdown Road near Woodberry Drive to reduce flooding risk further. KCC hope to complete this within the current financial year. This will in turn benefit Coombe Drive, the low point of which was impacted by flood water from Lansdown Road in those severe weather events. Drainage improvements for other parts of the estate are to follow in the future.

School Lane and Ashtead Drive, Bapchild

Flooding has occurred in this location on a regular basis, with the lowest point at the end of Ashtead Drive flooding across its full width. This makes property access difficult and affects the curtilage of two residential properties in severe circumstances. Flood water originates from surrounding fields and highway, flowing along School Lane and in turn overwhelming the existing soakaways.

The design of an additional soakaway at the junction with Ashtead Drive has been completed and construction is expected to be complete by mid December 2021.

The Street, Lynsted

Flooding of the highway and adjacent property occurred near the junction with The Vallance in May 2018. Less severe flooding has also been reported since that time. Surveys were conducted and identified the existing drainage system appeared to have been damaged by 3rd party utility works.

A scheme was developed to repair the damage. At the same time, additional drains were incorporated into the highway drainage system making it is less vulnerable to blockage from debris from the adjacent roads whilst providing better silt controls as well as being easier to maintain in the future. This work was completed in full at the end of September 2021.

The Street, Doddington

Investigation into the enlargement of a drainage pond at Old Lenham Road has been undertaken by KCC's Flood and Water Management Team to determine whether this would provide any meaningful reduction in flood risk within the village. The assessment indicates limited benefit to enlarging the pond however allocation has been made to perform maintenance of the pond (desilting) within the forward work programme (note this part of the road lies the Maidstone District).

Works have also been undertaken near the garage due to an overflowing gully. The pipework along the road was jetted due to be completely blocked on 15th September 2021. The crew was able to jet through, but some further jetting may be beneficial. This will require a road closure and has been allocated to the area engineer to progress.

Tanner Street, Faversham

Severe flooding occurred at Tanner Street on 1st August 2021 during exceptionally heavy rainfall. During this flood, a manhole cover to the public combined sewer overflowed into the road with such force that the road pavement around it was severely damaged.

Flooding has been experienced during other periods of heavy rainfall in prior years, with residents also commenting that flooding of sewerage was experienced. This has included instances where toilets within properties have overflowed, leading to internal damages.

The surface water and foul/combined sewers within the road are operated by Southern Water. KCC believes highway drains are linked to the surface water sewer, which outfalls into the watercourse. Neither the road drains nor surface water sewer are intended to discharge overflowing foul/combined sewers, only rainwater from the road and building roofs.

Residents wish to see a new dedicated pipe constructed to take surface water away to the Westbrook Stream. This may be feasible, subject to review of land ownership and constraints such as underground services, but it would not resolve the issues surrounding overflowing foul/combined sewers – these issues lie solely with the sewerage undertaker. KCC cannot control these matters.

KCC held a meeting with Southern Water at the location. We have agreed to undertake CCTV surveys of the existing highway drainage layout to confirm its connectivity with surface water sewers. The information will also be required should alternative highway drainage layouts be viable in principle to progress. KCC hope to have these surveys completed before the end of the year.

Church Road, The Brents, Faversham

Flooding has been reported at Church Road associated with water backing up through drains during very high tides within Faversham Creek. KCC believes highway drains are linked to Southern Water's surface water sewers, which in turn outfall into the creek. Outfalls would usually be fitted with flap valves to prevent backflow of water.

KCC plans to undertake CCTV surveys of highway drains to confirm whether they link to Southern Water surface water sewers. If this is the case, Southern Water will need to ensure that outfalls are fitted with valves and that these are operating correctly. If any other outfalls are found, KCC will undertake the appropriate action. KCC has contacted Southern Water to request any information from investigations they have undertaken into this issue.

Whitstable Road, Faversham

Flooding has been reported during heavy rainfall in the area between Park Road and Abbey Fields. Severe flooding also occurred here on 1st August 2021 at the same time as other floods due to the extremely heavy rainfall. Residents have commented that overflowing foul/combined sewers operated by Southern Water have contributed to the flooding.

During our emergency attendances, the flood water has usually receded within 1-2 hours without intervention (other than road closures to ensure safety of highway users). The drainage systems here include some highway drains which link to Southern Water sewers, and some outside Park Row which connect directly to the watercourse behind the school. Any highway drainage linked to sewers will not operate at times of sewers running to capacity or overflowing in severe events. This leaves the highway drainage outfall taking all the water. A meeting has been held between Southern Water and KCC to highlight these issues.

A lot of work has been carried out by KCC to ensure the watercourse behind the school is sufficiently clear to convey away water, as well as new 'Beany Block' kerb drains to help to convey away water to the watercourse. This was completed in November 2020 and appears to have been beneficial in reducing flood risk and reducing the likelihood of blockage, but it does not eliminate it.

KCC has included this location within our forward works programme to investigate what else the highway authority can do within its control to reduce the flood risk to the highway and the surrounding property.

Works by Third Parties

KCC received notification from Helen Whately MP that Southern Water have committed to an investment of £2m million at Faversham Wastewater Treatment Works to improve capacity, efficiency and reduce the number of CSO (combined sewer overflow) releases into Faversham Creek. The letter notes the improvement works are underway and anticipate completion by the end of 2023. KCC expects there to be some benefit to the issues raised in the Faversham Area because of this work

KCC Capital funded Forward Works Programme

Overleaf is an extract from the forward works programme for specific actions being undertaken within the borough. This list is not exhaustive as the forward works programme does not include works being raised in response to routine enquiries or being progressed by the district engineers.

It should therefore be read in conjunction with the JTB highway works programme which includes other pertinent matters currently under investigation.

Swale Borough Highway Drainage Forward Works Programme

USRN	Road Name	Road No.	Parish	Description of Works	Extents	Identification	Years:	Project Stage
39001274	London Road	A2	Bapchild	Review of any outstanding drainage issues	Whole Road	WAMS Enquiries	20-22	Continue to monitor for any issues.
39000735	London Road	A2	Teynham	Review of any outstanding drainage issues	Whole Road	WAMS Enquiries	20-22	Continue to monitor for any issues.
39001772	Warden Road	C134	Eastchurch	Asset Renewal Scheme	Junction with Plough Road	Engineer Identified	20-22	Delivery - Part-completed. Further works to be undertaken.
39001303	Tonge Corner Road	N/A	Tonge	Full survey to be undertaken and scheme to be developed	Tonge Corner	WAMS Enquiries	21-23	Continue to Monitor – Placed on enhanced maintenance regime.
39001007	Queenborough Road	A250	Halfway	Review of any outstanding drainage issues	Whole Road	SWMP and WAMS enquiries	21-23	Scoping – Surveys Required of existing drainage
3900703	Lansdown Road	N/A	Sittingbourne	Drainage Improvement Scheme	Whole Road	Surface Water Flood Events	21-23	Delivery – Phase 1 at Peel Drive in Progress
39000315	Coombe Drive	N/A	Sittingbourne	Drainage Improvement Scheme	Whole Road	Surface Water Flood Events	21-23	Design – Outline assessment completed.

39001429	Woodberry Drive	N/A	Sittingbourne	Drainage Improvement Scheme	Whole Road	Surface Water Flood Events	21-23	Design – Outline assessment completed.
39000042	Ashtead Drive	N/A	Bapchild	Asset Renewal Scheme	Ashtead Drive and School Lane	Surface Water Flood Events	21-23	Delivery – Programmed Late November 2021.
39000210	Canterbury Road	A2	Sittingbourne	Drainage Improvement Scheme	Snipeshill Open Space at Greenways	SWMP & S.19 2018 Flood Event and WAMS enquiries	21-23	Design in progress by LLFA Team.
39001105	Selling Road	C125	Selling	Review of any outstanding drainage issues	Under Railway Bridge. Road becomes Fox Lane.	WAMS Enquiries	21-23	Automatic illuminated Flood Signs Ordered. Further works opportunities to be assessed.
39001404	Whitstable Road	B2040	Faversham	Drainage Improvement Scheme	Outside Recreation Ground	Surface Water Flood Events	21-23	Feasibility
39000429	Elm Grove	N/A	Sittingbourne	Drainage Improvement Scheme	Whole Road	Surface Water Flood Events	21-23	Feasibility
39000745	Lower Hartlip Road	C94	Hartlip	Asset Renewal Scheme	Outside 'Evergreen'	Engineer Identified	21-23	Feasibility
39000098	Bexon Lane		Bredgar	Asset Renewal Scheme	Local to a property called Coppelstones	Engineer Identified	21-23	Feasibility