

KENT FLOOD RISK MANAGEMENT COMMITTEE

Monday, 9th March, 2020

2.00 pm

Council Chamber, Sessions House, County Hall,
Maidstone





AGENDA

KENT FLOOD RISK MANAGEMENT COMMITTEE

Monday, 9th March, 2020, at 2.00 pm

Ask for: **Andrew Tait**

Council Chamber, Sessions House, County Hall, Maidstone Telephone **03000 416749**

Tea/Coffee will be available 15 before the start of the meeting in the meeting room

Membership (7)

Conservative (6): Mr A R Hills (Chairman), Mr A H T Bowles, Mrs L Hurst,
Mr P W A Lake, Mr K Pugh and Mr H Rayner

Liberal Democrat (1) Mr I S Chittenden

UNRESTRICTED ITEMS

(During these items the meeting is likely to be open to the public)

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1. Substitutes
2. Declarations of Members' Interest relating to items on today's agenda
3. Minutes of the meeting on 11 November 2019 (Pages 1 - 16)
4. Update from the Environment Agency on Flood and Coastal Risk Management - Presentation by Sally Harvey, Environment Agency Kent and South London Area Director

5. Natural Flood Defences - Presentations by Phil Williams (Natural England) and Tom Cook (Environment Agency)
6. December 2019 Floods - KCC Debrief Report (Pages 17 - 28)
7. Environment Agency and Met Office Alerts and Warnings and KCC severe weather response activity (Pages 29 - 40)
8. Other items which the Chairman decides are Urgent

EXEMPT ITEMS

(At the time of preparing the agenda there were no exempt items. During any such items which may arise the meeting is likely NOT to be open to the public)

Benjamin Watts
General Counsel
03000 416814

Friday, 28 February 2020

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KENT COUNTY COUNCIL

KENT FLOOD RISK MANAGEMENT COMMITTEE

MINUTES of a meeting of the Kent Flood Risk Management Committee held in the Council Chamber, Sessions House, County Hall, Maidstone on Monday, 11 November 2019.

PRESENT: Mr A R Hills (Chairman), Mr A H T Bowles, Mr I S Chittenden, Mr K Pugh, Mr H Rayner, Mr P Vickery-Jones (Canterbury CC), Mr S McGregor (Sevenoaks DC), Mr H Rogers (Tonbridge and Malling BC), Mrs C Mackonochie, Mrs G Brown (KALC), Mr C Mackonochie (KALC) and Mr M Deadman (Kent Fire and Rescue)

IN ATTENDANCE: Mr M Tant (Flood and Water Manager), Mr T Harwood (Resilience and Emergency Planning Manager), Ms L Guthrie (KCC Manager, Kent Resilience Team), Miss L Butfoy (Resilience and Emergency Planning Project Officer) and Mr A Tait (Democratic Services Officer)

UNRESTRICTED ITEMS

12. Minutes of the meeting on 22 July 2019
(Item 3)

RESOLVED that subject to Mr McGregor being recorded as the representative of Sevenoaks DC rather than as a substitute, the Minutes of the meeting held on 22 July 2019 are correctly recorded and that they be signed by the Chairman.

13. Dates of future meetings
(Item 4)

The Committee noted the following future meeting dates:-

Monday, 9 March 2020;

Monday, 6 July 2020;

Monday, 23 November 2020; and

Monday, 8 March 2021. *This date was subsequently changed to **Monday, 15 March 2021***

14. Water Sustainability and Farmer Co-ordination - Presentation by Tom Ormesher, NFU Environment and Land Use Adviser
(Item 5)

(1) Mr Tom Ormesher from the NFU (SE England) gave a presentation. The accompanying slides are contained within the electronic papers on the KCC website.

(2) Mr Ormesher said that membership of the NFU in Kent was in the region of 1,500 out of some 46,000 in England and Wales. It was the biggest farming organisation in the UK. Mr Ormesher was also the NFU's representative on the Medway Flood Action Plan Group and the Kent Water Task Group. The scope of his presentation would encompass flooding, water quality and water resources, outlining how the NFU could help co-ordinate responses at a farmer level.

(3) Mr Ormesher said that he had just completed an 18-month Nuffield Farming Scholarship. This had included visits to the USA where he had interviewed some 200 people including farmers, farming organisations, and financial institutions. This experience would inform his presentation.

(4) Mr Ormesher set the scene by saying that Kent was an extremely important area for fruit and vegetable production and farming in general. Some 80% of apples and pears in the UK were produced in Kent together with two thirds of its berries. Kentish fruit and vegetables production was, therefore, the single most important contributor to the regional agricultural economy. The accompanying slide showed the highest value Grade 1 and 2 agricultural land within the South East Region, including the North Kent Coast and the most south westerly parts of the County, equating to some 15% of the national resource. Significantly, all these areas were within the Flood Plain.

(5) Mr Ormesher moved on to explain that farming policy would be changing over the next five to seven years. The UK would be removing itself from the EU Common Agricultural Policy's system of area-based support to one of "public money for public good" which was more environmentally focussed on clean air and clean water. There would be greater emphasis on whole farm plans and third-party audits and assessment. The Government would probably adopt a more arms-length approach. This would require a local co-ordinated framework for sustainable development which achieved the right balance between sustainable business and environmental delivery.

(6) Mr Ormesher then quoted from the 2018 *UK Committee on Climate Change's* report which stated that there needed to be a 700% increase in the volume of water for irrigation by the 2050s in order to maintain present day levels of potato production. The accompanying slide highlighted the problem by identifying the large number of areas in England and Wales where no water was available. This represented a great co-ordinating challenge. At a national level, farming used 1% of the total water resource. The irrigated area within the UK had contracted by 40% during the first decade of the 21st century.

(7) Mr Ormesher then said that water quality was also a significant issue. Progress was being made towards the goal of creating a healthy clean water environment. The agricultural industry had played an important role by achieving a 35% reduction in nitrate fertiliser since the 1980s together with a 20% reduction in manure due to more efficient livestock production, leading to a 34% improvement in the soil-to-nitrate balance since the 1990s. Further improvements were needed at an increased pace. This was also true in respect of flooding. An example of the increased danger had occurred in Spring 2018 in Buckinghamshire where a farmer had found his land completely flooded out following a short, sharp rainfall event. He had never experienced any such problem in over 40 years.

(8) Mr Ormesher then showed a circular flow chart which demonstrated the links between the qualities needed to develop co-ordination solutions. He stressed the key importance of engaging with farmers in a business-friendly manner in order to promote measures to mitigate flooding on or originating from their land.

(9) Mr Ormesher said that he had put together a comprehensive list of organisations involved in water resource management. At the top were the regulators such as the EA and the Rural Payments Agency (RPA). Next came outside bodies who undertook voluntary measures. These were Catchment Sensitive Farming (CSF), the Catchment Partnerships, the Rivers Trust, the Wildlife Trust, the Farming and Wildlife Advisory Group (FWAG), and the Game and Wildlife Conservation Trust (GWCT). Below them came the producer organisations which were rarely farmer-led or commercially focussed.

(10) Mr Ormesher said that his preferred alternative approach was based on the US *Third Party Programme*. This involved farmer-led commercial organisations. He had visited and studied a wine growers' association in California and the Farm Bureau of Ventura County where the farmers paid an acreage fee to the Bureau to undertake the administrative and compliance work such as monitoring of water quality and best practice measures. The benefit to the farmers was that they obtained this support at a far cheaper rate than if they were to undertake it independently.

(11) The *Watershed Agricultural Council* was a farmer-led executive body in New York State which had the responsibility of delivering clean water on behalf of New York City which funded this body to invest in farms through a series of whole-farm plans. This could include better cattle storage facilities or maize establishments. It represented a farmer-friendly approach which understood the needs of the business and secured public benefit and also enabled the farmers to access commercial opportunities.

(12) *Sustainable Sonoma* was supported by the Wine Growers Association and was working towards being the first 100% sustainable County in the USA. The resultant certification was beneficial to the individual farmers and would promote tourism in the County. Another example of the US Third Party Programme was the *Why Buy Pure Catskills* programme, which was run by the Wine Growers' Association and focussed on the marketing opportunities that sustainability provided.

(13) Mr Ormesher summed up the US Third Party Programme's model by saying that the farmer-led commercially minded organisations sat as an intermediary group between the Regulator and the Farmers. The Farmers worked to the aims of the partnership organisation that they fully trusted to have their best interests at heart, whilst the Regulator also trusted its aims and standards of water sustainability and water resource benefits. As a result, there only needed to be a minimum of direct contact between the Regulator and the Farmers.

(14) Mr Ormesher turned to the question of Farm Resilience. He gave the example of a rainwater harvesting system, developed by a Third Party Programme in a small dairy farm of 180 acres. It collected 6 months of rainwater for water use during the April to October Californian dry period. This meant that the Farm no longer needed to extract water from a stream which contained an endangered salmon population.

(15) Another example of successful Farm Resilience was an aquifer storage and recovery system in the Netherlands, developed by a co-operative organisation. It passed processed water from sugar beet (75% water) through a series of injection wells in a field during the autumn and winter months. The success of this operation could be seen during the drought of 2018 when the farm was able to continue extracting water whilst others were unable to do so.

(16) Mr Ormesher said that an excellent model for future Whole Farm Management Plans in the UK could be found in the Conservation Plan that many US farmers needed to produce. In essence, this was a portfolio of resource management on the farm which had to be provided in order to be eligible for farm loans, insurance and disaster relief. They also provided the public with reassurance that the farm was managing its risks appropriately.

(17) Mr Ormesher then gave three examples of Farmer Accreditation. Farmers had worked together to achieve a higher level than they could have done on their own. Citrus Growers in Spain had gone through a water stewardship certification process which had enabled them to gain a strong relationship with one of the greatest retailers in Germany. Dairy Farmers in New Zealand had developed their own milk processing assurance scheme which enabled them to access the highly lucrative Chinese market which it supplied with infant milk. *The States of Jersey* (Channel Islands) was a programme that required all farms to be *Linking Environment and Farming* (LEAF) Assured. This ensured that Jersey was able to demonstrate that its farms were amongst the most sustainable in the World.

(18) Mr Ormesher then described a project he had been working on. This was *A Vision for the Arun Valley* which had come about as a result of the Environment Agency's decision to withdraw from Flood Risk Management in that area. The Arun Valley was flood-prone and also had a number of statutory designations. It was a Special Protected Area which was of international importance, particularly for bird protection. A programme was being developed for all the key stakeholders to balance the needs of conservation, land management, people and property in an affordable manner. The project had identified priorities and was now developing a delivery organisation. This might be a community interest company or a company limited by guarantee that would provide a locally co-ordinated framework that the farmers could buy into. He concluded his presentation by saying that the idea of a co-ordinated framework at the core of farm resilience projects was not yet widely taken up in the UK but that he believed it would be of very great importance nationally and particularly productive in the County of Kent.

(19) Mr Vickery-Jones said that District Councils had an obligation to build housing and were often permitting development on high quality farmland. He asked whether this would increase the difficulty of developing agricultural water stability. Mr Ormesher replied that the First Reading of the Environment Bill had now successfully taken place. This Bill would lead to the preparation of local bio-diversity strategies. All planning applications would need to demonstrate bio-diversity net gain. Local Authorities would have conservation easement powers through Section 106 Agreements to secure conservation enhancement on farms. The NPPF sought to protect best quality agricultural land, but could not do so as much as was necessary. Thought needed to be given to how this protection could be enhanced.

(20) The Chairman noted the point made that Kentish Grade 1 and 2 agricultural land equated to some 15% of the national resource. He asked whether the views of the NFU and others responsible for its maintenance were fully taken on board when the Environment Agency was considering whether to develop sea defences in these areas. Mr Ormesher replied that there was a system of cost benefit analysis which took the value of farmland into consideration. The value attributed to farmland in these calculations was, however, lower than that for properties, which was the key factor. He added that sea defences had on many occasions been built out of bomb damage material from WW2. This ageing infrastructure was protecting very significant assets.

(21) Mr Bowles said that the sea wall between Faversham and Whitstable had been built following the flood event of 1953. It had provided adequate flood defence for many years thereafter. There had been a lot of under-erosion on the toe of that seawall as well as a great deal of sinkage with some sections being 18 inches higher than others. Yet there were no plans to modernise it despite the need to protect Grade 1 farmland, the England to France electricity exchange line, the main London to Margate railway line and the London to Thanet road communication network. It was not just people and houses that were at risk. The national infrastructure was at risk as well.

(22) RESOLVED that Mr Tom Ormesher be thanked for his presentation and that its content be noted.

15. Winter Preparedness - Presentation by Earl Bournier, Asset Manager, Drainage, Structures and Safety Barriers
(Item 6)

(1) Mr Earl Bournier (KCC Asset Manager, Drainage, Structures and Safety Barriers) gave a presentation. The accompanying slides are contained within the electronic papers on the KCC website.

(2) Mr Bournier opened his presentation by discussing the major impact of Climate Change. The Winters were likely to be 2C warmer, leading to an extra 14 inches of rain which increased the risk of flooding from storms, resulting in damage to properties, businesses and infrastructure, particularly in threatening coastal towns. Another impact of Climate Change was the variability of extreme events. The last two extreme rainfall events had not taken place in Winter but in May 2018 and June 2019. On both occasions, these events had occurred completely unexpectedly.

(3) Mr Bournier continued by saying that the Environment Agency had recorded the rainfall in Snodland in June 2019 as a 1 in 256-year flood event. Drainage systems were not designed to cope with this amount of rainfall which equated to nearly 2 months of rain in 1½ hours. The residents had not previously experienced any flooding for over 50 years.

(4) Mr Bournier then addressed the question of what KCC could do to help. It was able to help residents by assisting to clear water and protect property where practically possible as the event was happening, and also after the event as part of the clear up operation in ensuring that the highway drainage asset was cleansed. It could respond to questions and complaints from residents who wanted to know why

their houses were flooding. It investigated the drainage systems, carried out CCTV surveys, undertook root cutting, jetted the systems, cleansed the soakaways and did flood testing. It kept the highway users safe.

(5) Mr Bourner then provided figures to demonstrate reactive cleansing carried out since April 2019. KCC had undertaken 4267 cleansing jobs following customer enquiries, dealt with 337 emergencies, carried out 353 CCTV surveys, cleansed 69 soakaways (at a cost of £5 – 6K each) and undertaken 321 repairs and 111 schemes.

(6) Mr Bourner said that KCC had changed its approach to cleansing. It now carried out pre-inspections of over 90,000 gullies on main roads in order to establish if cleansing was required. Known flooding hot spots were cleansed twice a year on some 300 roads. This often involved simply clearing away leaves.

(7) KCC had increased its budget for capital works from £3m to £5m per year to update, replace or install new drainage systems. The number of highways engineers had doubled and KCC could roll over its capital monies into the next financial year, enabling it to design very complicated drainage systems one year and install it the next. KCC spent £2.5m per year on drainage cleansing.

(8) Another important part of KCC's work was supporting multi-agency Flood Forums. These were attended by KCC Flood and Water Management Team, Highways, the Environment Agency and water companies. They took place in communities which had been affected by flooding and played a crucial part in supporting as well as re-assuring the residents.

(9) Mr Bourner showed the Committee a pre-inspection on scheduled cleansing in order to demonstrate that extra gullies in some of the County's Districts amounted to over 30% of the original total. In Dover, this percentage figure was 49%. The additional money provided would enable KCC to clear all the gullies that required cleansing or un-jamming. This also involved more efficient cleansing methods consisting of jetting the lines and outlets.

(10) Mr Bourner moved on to discuss ways in which KCC sought to educate residents. This was important because certain areas of the County were low-lying and prone to flooding due to the topography of the land. Houses built at the bottom of valleys would find that surface water reached the low points. Many properties had created large driveways with no drainage facilities, taking away the grass which acted as natural soakage areas. The water generally ran onto the highway.

(11) Mr Bourner said that KCC Highways received over 7,000 enquiries per year relating to flooding either on the highway or impacting private property. Some of these could be very emotional. For example, enquiries were made by families that had still not been able to return to their properties after the flooding event of June 2019.

(12) Mr Bourner then informed the Committee of the number of drainage assets in Kent. There were 250,000 roadside drains, 250 ponds and lagoons, 15 pumping stations and 8,500 soakaways. The tasks for KCC Highways were to maintain road safety and minimise nuisance; prevent damage to the structural integrity of the highway and maximise its lifespan; and to minimise the impact of highway water on

the surrounding environment. The time taken to respond to enquiries about these assets had reduced over the past year from 3 months to 28 days.

(13) Several factors were taken into consideration when KCC Highways decided how it was going to prioritise its work. It had legal obligations in respect of disruption to the highway network, it had to fulfil KCC's obligations in respect of road safety and internal property flooding. It also had to consider how much work was needed; whether the existing asset worked and whether it was future-proofed.

(14) There were significant factors affecting drainage maintenance. The infrastructure was damaged and ageing. Some of it was between 30 and 40 years old. There was limited capacity to add drainage systems. There was a reliance on third party infrastructure. Water from KCC's systems drained into Southern Water systems leading to complicated discussions over responsibility for repairs. It was important that farmers cleared their ditches in order to reduce the land drainage damage that KCC had to respond to in order to sustain its network. Utility companies were modernising their own infrastructure, which often led to water drainage systems being involuntarily damaged. Road sweeping by the District Councils was insufficient and affected the gullies, which only needed a few uncleared leaves to become blocked.

(15) Mr Bourner concluded his presentation by summarising the outcomes that KCC Highways wanted to achieve. These were: fewer incidents of highway flooding; increased customer satisfaction and confidence; a robust defence against increased claims for damage and personal injury; roads and footways that were protected from the adverse effects of standing water; reduced disruption from carriageway flooding; and greater resilience against increasingly frequent intense rainfall events.

(16) Mr Pugh said that in Eastchurch on the Isle of Sheppey for example, KCC Highways had often been called out to clear the gullies due to flooding in the High Street following a downpour. KCC Highways would check them and say that *their* systems were working properly, and that the problem originated with those owned by Southern Water. This did not help the residents as flooding was still taking place on a frequent basis. People were having to move out of their properties, and when they put their claims into KCC it took a very long time to receive a reply. The main cause of the problem was that the gullies were undersized and old, needing replacement. He asked when and how this was likely to happen. Mr Bourner replied that there was one particular property whose problems had taken 3 years to solve. KCC Highways and Southern Water were due to carry out the repairs, which would also solve the problems that had caused Eastchurch High Street to flood.

(17) Mr Bowles referred to the significant flooding event of May 2018 in Swale East. He said that he was pleased with progress in some areas but not in others. He would use the slides provided to inform the Parish Councils in his constituency and would also meet Mr Bourner at a later stage in order to discuss his remaining concerns in detail. He considered that whilst a great deal of work was being undertaken, there was a need for better communication to ensure that people fully understood the problems that were causing delays.

(18) Mr Rogers said that even though gullies were being cleared more speedily than before, this work was undermined where he lived as soon as the hedge cutting season began, often resulting in the gullies becoming blocked again. He asked whether there was any requirement on the farming community to sweep the roads

after they had cut the hedges. Mr Bourner said that most of the hedges were private. KCC could only control what happened to those hedges that were its own property. There was no need for a TRO for hedge cutting to take place. The only action open to the public was to report the detritus to their District Council, who would then be able to arrange for it to be cleared away. Individual landowners had the cost of clearance charged to them if it could be proved that they were responsible.

(19) Mrs Brown suggested that parishes could recruit “gully wardens” who would be able to clear minor obstructions such as leaves more quickly and only ask for KCC’s assistance if the gully continued to be blocked. This would enable KCC to concentrate on major tasks.

(20) Ms Guthrie said that the Kent Resilience Team was seeking to broaden the Flood Warden role into that of a Community Emergency Warden. The intention was to ensure that the Flood Wardens did not reduce in number due to extended periods of inactivity. They would instead, become the “eyes and ears” within the community, reacting to relatively minor events such as Mrs Brown had described and taking pressure off KCC Highways.

(21) Mr Bourner replied to questions from Mr Rayner by saying that an electronic map detailing all the gullies in Kent was in production and would be broken up into Districts and giving cleansing dates. This map would be made available on the KCC website after the Swale Inspection had taken place towards the end of the current financial year. Hotspots were identified on plans which showed how many enquiries had been received together with any significant details. Multi Agency meetings were taking place. They involved KCC and Southern Water amongst other partners, aiming to bring about closer working.

(22) Mr Rayner then asked what amelioration was available when water flooded onto the roads. Mr Tant replied that this was a matter for his Team and that it depended on the nature of the land. Kent had a varied geography. If the land was permeable, the aim would be to make water go into the ground. When the land was impermeable, different solutions were sought. Often, the land in question would have a historic issue, in which case, an attempt might be made to identify previous solutions. It was proving increasingly difficult to identify easy solutions in the light of the increasing number of storm and flooding events.

(23) Mr Mackonochie noted the discussion about broadening the role of Flood Wardens. He said that the Borough Council supported his Parish and its community with litter picking on highways but would only do so if the speed limit was lower than 30 mph. Mr Bourner replied that no one would be expected to pick leaves off the gullies on A Roads. It was simply too dangerous. The aim was to encourage Wardens to undertake such tasks on residential roads only.

(24) Mr Vickery-Jones referred to new roadworks funded by a developer which were being undertaken in William Street in Herne Bay. Local people had written to KCC on many occasions to complain about the flooding but were not getting any response. He asked who they should talk to. Mr Bourner replied that they should log the enquiry in order to have a reference number that they could refer to. This would lead to the problem being assigned to one of the Engineers in his team who would carry out investigations after establishing contact with the local residents. He offered

to look into this particular matter if Mr Vickery-Jones would like to write to him in greater detail.

(25) RESOLVED that Mr Earl Bourner be thanked for his detailed update report and that its contents be noted.

16. Drainage and Wastewater Management Plans - Presentation by Max Tant
(Item 7)

(1) Mr Tant gave a presentation. The accompanying slides are contained within the electronic papers on the KCC website.

(2) Mr Tant said that the water companies were now required under their latest business plan to prepare Drainage and Wastewater Management Plans during their next Asset Management cycles. “Drainage” referred to the system of pipes and drainage stations that drained water in a sewage undertaker’s area of control. “Wastewater” referred to the plant and process that happened at the Wastewater Treatment Work up to the point where the wastewater was discharged into the environment.

(3) Mr Tant continued that all planning for drainage and wastewater, including replacement and upgrade of pipes, pumping station overhauls, and refurbishment of Wastewater Treatment Works was made on a 5-year statutory business planning cycle. These Plans were submitted for approval to OFWAT and the EA. There were, however, many challenges. The long-term capacity for new development needed to be understood and catered for, the implications of Climate Change needed to be assessed, together with discharges into the natural environment. Furthermore, due to their 5-year nature, these Plans did not provide certainty to Local Authorities when they planned for housing and industrial development.

(4) The water industry had an obligation to produce 25-year plans for water resources, but no corresponding duty for drainage and wastewater. The Government, National Infrastructure Commission and Environment Agency had all strongly urged the water industry to provide more long-term plans. In response, the water industry had brought together many organisations with responsibilities for different aspects of drainage and flooding in order to produce a new framework for long term drainage and wastewater planning. This Framework had been published in Summer 2019 and had now been built into the business plans of every water company in England and Wales. It was expected that this process would become statutory in the future.

(5) Mr Tant then said that Drainage and Wastewater Management Plans were undertaken over three levels. Level 3 was the most local, considering the catchment of Wastewater Treatment Works, including the network areas that supplied it. This could also include surface water. Level 2 involved the aggregation of Level 3 units into a larger unit such as a river basin. Level 1 was for the whole of the water company’s sewerage area. Dividing the Drainage and Wastewater Management Plans into these three levels enabled different authorities to engage with the water companies at whichever level was the most appropriate.

(6) Mr Tant went on to describe the Drainage and Waste Management Plan process, which all of the Level 3 catchments were part of. This process was divided into four tiers, the first of which was risk-based screening in terms of 23 published set criteria, all of which had to be met. The second tier was the baseline risk assessment and vulnerability assessment which involved a more comprehensive investigation of the issues, usually involving some form of modelling. The next tiers were problem characterisation and options development.

(7) Mr Tant said that the intention was for the water companies to develop their Drainage and Wastewater Management Plans collaboratively with partners on various areas such as flooding, planning and water quality. This process would give other organisations the opportunity to work with the water companies to ensure that their needs were incorporated into drainage and wastewater management planning. A wide range of organisations would benefit from this approach. These included the Lead Local Flood Authorities, Planning Authorities, Highways Authorities, Environmental NGOs, Catchment Improvement Groups, Rivers Trusts, Local Wildlife Trusts and the Environment Agency.

(8) Mr Tant moved on to consideration of the ways in which the process could benefit other stakeholders. It would enable effective planning and support for economic growth and resilient communities and for protection and enhancement of the environment. It would facilitate better partnership working and the collaborative creation of solutions; it would provide multiple benefits to achieving best value to the economy, society and the environment over the long term; and it would provide a long term and robust idea of what the wastewater and drainage structure was going to be.

(9) Mr Tant then informed the Committee that Southern Water the primary sewage undertaker in Kent was planning to undertake Drainage and Wastewater Management Plans on river basins in their Level 2 areas (The Medway, North Kent, the Stour and the Rother) starting in April 2020 and completing them in 2022. Flood Risk Management Plans and River Basin Management Plans were being developed at the same time.

(10) Mr Tant concluded by saying that the Drainage and Wastewater Management Plans would examine total lifetime costs of infrastructure investments rather than concentrating purely on the capital expenditure costs.

(11) Mr Bowles said that he was impressed by the amount of officer time and effort that was going into the production of Plans and Strategies. He added that there was a risk that there would be insufficient resources left over to actually put them into practice.

(12) Mr Chittenden said that most of the problems arose in villages such as Staplehurst, Headcorn and Marden in situations where water did not simply drain away. He asked whether the Drainage and Wastewater Management Plans would deal with how sewage was to be removed or simply be limited to issues of water quality. Mr Tant replied that the Plans would look at everything to do with the drainage and wastewater system from the point where the rain was collected until it was discharged into the environment. They would look at capacity, flood history, potential new development, population growth, climate change, pollution incidents, and combined sewer overflows. If any of these issues was identified as a problem,

the catchment would be looked at in greater detail. The water companies were regulated industries who had to get agreement from OFWAT for their general strategy. This could include being asked to cut back on projects in order to reduce costs. Negotiations between OFWAT and the water companies could take lengthy periods. The latest round of negotiations had been particularly long. The Plans would have the benefit of informing the business planning process, which would provide more evidence as to what projects would be undertaken. In addition, OFWAT had now broadened the range of outcomes that drainage should achieve. Historically, the water companies had been asked to concentrate purely on internal flooding to properties. This had now been increased to incorporate external flooding and extreme flooding events.

(13) Mr Chittenden then asked whether OFWAT would enforce against targets. Mr Tant replied that OFWAT was very strict on business plans. Southern Water had made several submissions and OFWAT had ordered their revision. It was unclear at present how Drainage and Wastewater Management Plans were going to be regulated. The process was being scrutinised by the Government, OFWAT, the Environment Agency and the National Infrastructure Commission who would make it very clear if they were not satisfied.

(14) RESOLVED that the report be noted and that an update on progress be submitted to the Committee in 2020.

17. Kent Emergency Planning - Presentation by Tony Harwood and Lisa Guthrie
(Item 8)

(1) Mr Tony Harwood (KCC Resilience and Emergency Planning Manager) and Ms Lisa Guthrie (KCC Kent Resilience Team Manager) gave a joint presentation. The accompanying slides are contained within the electronic papers on the KCC website.

(2) Mr Harwood began his part of the presentation by saying that his role within Emergency Planning related to ensuring the County Council's legal and regulatory compliance with emergency planning and response duties and optimising the resilience of KCC services. The Strategic HQ Emergency Planning Team that he managed was small but dedicated. It planned for and responded to a wide range of threats and incidents.

(3) Mr Harwood explained that the overarching legislation to which his Team worked was the Civil Contingencies Act 2004 which placed a duty on the Local Authority and other partners to put in place appropriate Emergency Plans and to undertake business continuity planning for both the Authority itself as well as supporting the resilience of the private and voluntary sectors. This legislation included warning and informing the general public. A significant element of the Team's role involved day-to-day activities in response to emergencies.

(4) Mr Harwood then showed a slide showing a breakdown of the type of calls registered on the Duty Emergency Planning Officer logging system. This showed that the largest portion of calls received related to coastal and fluvial flooding events. It also showed a whole range of responses to events such as electricity outages,

pollution incidents and road traffic incidents. Some 215 Alerts had been received since 1 April 2019. This equated to roughly 1 alert each day.

(5) Kent's emergency planning profile was partly dictated by the County's geographical location. Kent could be described as a "Front Line County" strongly influenced by its proximity to continental Europe as exemplified by its vulnerability to major events such as those experienced during the 2nd World War, the Herald of Free Enterprise tragedy and latterly EU withdrawal planning. The Herald of Free Enterprise had capsized in Belgian waters in March 1987, but its impact on the County's communities, particularly in East Kent had been of such magnitude that an IT tracking database had needed to be built up from scratch and a dedicated KCC established in order to respond to the event in all its traumatic complexity.

(6) Mr Harwood said that effective planning for emergencies was crucial. These plans were living documents, needing to be refined and updated in the light of a rapidly changing world and experience. Some 14 KCC emergency plans were currently in operation. Most of these were generic, whilst others (such as the plans for major accident hazards, gas pipelines, major industrial sites and for radiation incidents) were specific and highly detailed. The generic emergency plans contained a command and control model which could be implemented no matter what the nature of the event that was being responded to.

(7) Mr Harwood continued by saying that business continuity planning was another essential aspect of his team's work. Business continuity plans played a vital role in ensuring that businesses and services were able to continue to operate in the event of disruption. Failure to plan effectively would have a significant detrimental impact on the community. KCC operated 172 service specific business continuity plans. All of them were kept fully up to date by using a model template and monitoring system that was refined whenever circumstances changed.

(8) Mr Harwood then said that KCC's own command and control model operated along similar lines to that of key partners and the Kent Resilience Forum, ensuring that the Authority's own ability to respond was uncompromised and could dovetail with partners. One of the roles of KCC's command and control system was to prevent the County Council from straying beyond those areas of response that were its responsibility.

(9) Mr Harwood said that the County Emergency Centre was available 24 hours each day. It operated a weekly command rota.

(10) All levels of response had to be considered. The strategic policy making role was covered by the Duty Director. Whenever an event occurred, the Duty Emergency Planning Officer would establish contact with the Duty Director in order that strategic oversight was in place and that elected Members were informed as appropriate. On-call Tactical Managers (drawn from KCC's middle management) fulfilled a generic role, utilising their specialist competencies. The operational level was fulfilled by the on-call Emergency Response Team, consisting of administrators, IT specialists and operational responders. The Emergency Response Teams also participated in regular exercises and training events.

(11) Mr Harwood concluded by explaining the role of the on-call Recovery Director whose role in County-wide or multi-District events was to lead multi-agency work to

help communities, families and individuals re-establish their lives in the aftermath of an emergency.

(12) Ms Guthrie's part of the presentation concentrated on the Kent Resilience Team, which KCC was fully committed to. It had been set up in 2014 and consisted of Emergency Planning Officers from KCC, Kent Fire and Rescue and Kent Police. Its Interim Head was Mr Matthew Deadman from Kent Fire and Rescue as Ms Fiona Gaffney had been seconded to fill the Full Time Kent Brexit Co-ordinator role until the end of January 2020. There were three managers, one from each of the three main partners. Membership of the Team also included some multi-agency funded posts.

(13) The decision to form the Kent Resilience Team had been taken in 2014 in order to extend the work of the Joint Emergency Services Interoperability Programme (JESIP) in the co-ordination of planning, training and response. The Kent Resilience Team was able to pool agencies together and co-locate them, bringing about better co-ordination and communication and thereby facilitate improved response activity.

(14) Ms Guthrie said that the Kent Resilience Team was based at Kent Fire and rescue HQ at The Godlands in Tovil. It had several levels of governance, including a Governance Board, a Steering Group, an Executive Board and a Delivery Board. KCC's representatives on these Boards were Mr P M Hill (Cabinet Member for Community and Regulatory Services), Mr Mike Overbeke (Head of Public Protection), Mrs Barbara Cooper (Corporate Director of Growth, Environment and Transport), Ms Fiona Gaffney and Ms Lisa Guthrie respectively.

(15) Ms Guthrie said that her Section within the Kent Resilience Team consisted of KCC Resilience Officers who were funded through a Service Delivery Agreement between KCC and 9 of the Districts. They worked closely with these Districts, carrying out their risk assessments, preparing their emergency plans and providing training.

(16) The resilience officers also organised local exercises, an example of which was a flooding scenario named *Operation Saracen* which had taken place in Aylesford during June. It had involved Flood Wardens and Local Councillors and had highlighted both the risk of flooding to the Village and the importance of its Flood Wardens.

(17) The Kent Resilience Team was also working through the Local Flood Plan templates with the District Authorities in the light of recent national changes produced by DEFRA. They were also working with the Parish Councils on their own local Emergency and Flood Plans.

(18) Ms Guthrie said that her role also involved linking with the quarterly meetings of the Local Authority Emergency Planning Group which consisted of the local District emergency planning officers. This facilitated the key factor of uniformity of approach whilst also enabling the officers to become familiar with one another. She added that the importance of being able to ask "how are you?" instead of "who are you?" should not be underestimated.

(19) The Kent Resilience Team also linked to the *South East Seven*, who were the other Local Resilience Forums in the South East area. The value of this was to be measured through the development of relationships and the sharing of best practice. In practical terms, it also facilitated mutual aid and cross-border working with other counties such as West Sussex as well as Medway.

(20) The Kent Resilience Team also delivered a training programme to all Category 1 and 2 Responders. The latter included the Kent Voluntary Sector. Ms Guthrie said that the Kent Resilience Team worked closely with the Kent Voluntary Sector Emergency Group, which included organisations such as South East 4x4, the Salvation Army and the British Red Cross.

(21) Ms Guthrie said that all KCC resilience officers (whether part of the Kent Resilience Team or KCC itself) were Duty Emergency Officers who were on-call at all times. Their task was to receive the Alert and share the information both within KCC and externally. They acted as the first port of call for Blue Light emergencies, passing the data on to the appropriate authority and co-ordinating the response. They acted as advisers to the KCC Duty and Recovery Directors, represented KCC within multi-agency command and control structures, supported welfare centre operations and the Local Authority Co-ordinating Group Operations and Emergency Centres.

(22) Ms Guthrie then explained that each District Council had its own Emergency Centre. These were set up to be identical to the County Emergency Centre and each other. This meant that any Officer from any Authority would be familiar immediately with the surroundings.

(23) Duty Officers could also be Chairs of the Severe Weather Advisory Groups (SWAGs). These would often be set up in advance if Warnings were received from the Met Office or the EA. SWAGs would commence the strategic planning for the coming event by considering its likely impact and the resources available for the response. Depending on the circumstances, the SWAGs could then become a more formal Tactical Co-ordination Group led by a Silver Commander.

(24) Ms Guthrie then said that her section within the Kent Resilience Team worked closely with the KCC Resilience Team. Their Business Plans were linked, and they provided planning, training and exercising whilst also reviewing plans for lessons to be learned following major national and local events or following changes in national statutory guidance.

(25) Ms Guthrie went on to say that the Kent Resilience Team set up task and finish groups to address policy and practice matters. She explained that flooding had an impact or influence on many of the risks that were planned for. She gave examples such as pandemics, loss of utilities and structural collapse.

(26) Ms Guthrie turned to the issue of winter preparations. The Kent Resilience Team undertook an annual review of the resources available in the Districts and the Voluntary Sector including 4 x 4s, bedding and blanket stocks. They also organised Winter Preparedness Workshops involving the EA, the Met Office, KCC Highways, KCC Social Care, the NHS and the Voluntary Sector to focus on roles and expectations.

(27) Ms Guthrie continued by setting out priorities for future Winter Preparedness work. There would be a strong focus on community resilience. *The What If?* Community Resilience Programme in West Sussex was an example of best practice in this area in that it involved contributions at every level of the community, engaging with people from a very early age. The role of flood wardens would be expanded. National guidance had been developed since the Grenfell Tower disaster and would inform the process of recruiting spontaneous volunteers. Reservoir planning was being developed with the Districts, particularly with Ashford BC.

(28) Ms Guthrie concluded by saying that although the Kent Resilience Team was multi-agency in composition, KCC's priorities were very well represented and progressed within the Kent Resilience Team.

(29) Mr Rayner asked about arrangements with Medway Council in respect of the wreck of the SS Montgomery which had sunk off the coast of Sheerness in 1944 and was full of high explosives and ammunition. He asked the same question in respect of the potential risk of an explosion at the Gas Import Terminal on the Isle of Grain.

(30) Ms Guthrie confirmed that Kent and Medway worked closely together. She explained that the Isle of Grain Terminal was the responsibility of Medway Council under the *Control of Major Accident Hazards* (COMAH) Regulations. A specific evacuation plan had been developed for the Isle of Grain in the event of an explosion or other emergency.

(31) Mr Deadman informed the Committee that the SS Montgomery was a hazard which came under the jurisdiction of the *Receiver of Wreck*. She was currently reviewing the risk posed by the SS Montgomery. Once this review had been completed, the Kent Resilience Team would carry out its own review of its ability to respond if an event affecting the County were to occur.

(32) Mr Vickery-Jones said that Canterbury CC had received an application for the construction of a Hydrogen Production Plant in Herne Bay. He asked whether the Kent Resilience Team's role was to give an opinion on the safety before, during or after the planning process. Mr Harwood replied that the KCC Resilience and Emergency Planning Team had the role of commenting on spatial plans and large applications, which included the application described. KCC Emergency Planning received a regular list of District and County planning applications and it was an onerous but necessary task to identify those which required them to comment as appropriate. It was far preferable to ensure that risks to safety were identified early during the planning process rather than at a later stage.

(33) RESOLVED that Mr Tony Harwood and Ms Lisa Guthrie be thanked for their presentations and that their content be noted.

18. Environment Agency and Met Office Alerts and Warnings and KCC severe weather response activity since the last meeting
(Item 9)

(1) Mr Harwood introduced the report. He informed the Committee that since publication of the papers there had been an additional 5 flood alerts issued by the Environment Agency, giving a total of 47 flood alerts and 5 warnings (9 fluvial and 43 coastal) since the last meeting (paragraph 2.4). The overall figure of 52 alerts and warnings contrasted dramatically with the figure of 4 alerts for the same period in 2018.

(2) Mr Harwood also updated the number of Met Office severe weather warnings in paragraph 2.5 to 24 (16 for rain and 4 for thunderstorms).

(3) Mr Harwood then corrected the dates in paragraph 2.8 of the report by saying that the Environment Agency's Incident Room had operated from Sunday, 29 September through to Wednesday, 2 October.

(4) Mr Harwood said that an extremely intense rainfall event had taken place, on Friday, 8 November in the Folkestone area leading to property flooding. The response to this event had involved unblocking gullies and intervening to support vulnerable residents. The recovery and de-brief phases were now in operation.

(5) The relatively dry summer of 2019 had been followed by a damp October and early November. It was still unclear whether groundwater and river recharge measures would need to be taken, as further intense rainfall was still needed in order to improve the water resource position.

(6) RESOLVED that the warnings received since the last meeting of the Committee be noted.

To: Kent Flood Risk Management Committee – 9th March 2020

From: Stephanie Holt-Castle, Interim Director of Environment, Planning and Enforcement

Subject: December 2019 Floods KCC Debrief Report

Classification: Unrestricted

Summary: Overnight on 19th into 20th December 2019 surface water, highway and fluvial flooding impacts were felt right across Kent. At least 65 residential and commercial properties were affected by internal flooding, with others affected by surcharging sewerage and domestic drainage systems. Around 150 residents were evacuated from their homes at the peak of the flooding. Disruption and damage to highway and other transport networks also resulted. KCC undertook an internal debrief on 7th January to identify lessons learned. Kent Flood Risk Management Committee is requested to provide oversight and scrutiny of the recommendations arising from the debrief and contribute any additional learning from the KCC response.

1. Background

- 1.1 This report sets out policy and practice recommendations arising from the KCC internal debrief initiated to capture lessons learned from flooding experienced across Kent following an exceptional rainfall event overnight on 19th and into 20th December 2019.
- 1.2 The County Emergency Centre (CEC) at Invicta House was mobilised at 07:00 on Friday 20th January and worked closely with the Environment Agency Incident Room with which a direct telephone link had been established early on, and a range of other partners.
- 1.3 Over the weekend of 21st and 22nd December the CEC function moved onto a virtual footing, administered by the Duty Emergency Planning Officer (DEPO), Resilience and Emergency Planning Manager, Duty Communications Officer and Highways Senior Duty Officer. Strategic oversight was delivered through the on-call Duty Director. KCC personnel, including officers from Highways and Social Care Out of Hours, delivered a range of operational roles on the ground, often in challenging conditions, throughout this weekend.
- 1.4 As the weekend progressed, the situation on the ground gradually improved. However, some further isolated property flooding occurred across parts of the Low Weald, as pulses of flood water moved through the River Medway catchment towards the sea. Kent Highways and partners supplied sandbags, flood sacks and other practical interventions in an effort to limit impacts upon vulnerable properties.
- 1.5 Significantly, 150 residents were evacuated from the Little Venice Country Park and Marina near Yalding on the Saturday, before any flooding had occurred and during daylight hours. Adult Social Care undertook assessments and supported any potentially vulnerable residents. The site was subsequently

flooded but all floating platforms functioned effectively, protecting the residential caravans from significant damage. All evacuated residents were subsequently back in their homes by 24th December.

- 1.6 Interventions to address highway and surface water flooding were the focus of sustained KCC activity throughout this event. Some 200 calls were received by KCC connected to the flooding, with localities across Mid and West Kent hardest hit. Culverstone Valley, M26 J2a, Chart Sutton, East Peckham, Tonbridge, Staplehurst, Five Oak Green, Yalding and Collier Street all sustained flood impacts. Wherever it was technically feasible early preventative interventions were undertaken. For example, at The Quarries, Boughton Monchelsea, KCC worked alongside partners to introduce warning signage and to pump rising floodwaters to tankers, thus protecting nearby property, as well as allowing recovery of stranded cars.
- 1.7 The River Len east of Maidstone, which has historically been implicated in destructive flooding in the County Town, was a further focus of KCC activity. The County Council's legal and regulatory duties for offsite emergency planning for reservoirs saw proactive engagement with the Environment Agency and landowners on water level management and function of dam structures and sluices. No property flooding was observed along the course of the River Len and all contained waters operated safely, however, some surcharging from wastewater infrastructure and pollution did occur and liaison is now ongoing with Southern Water to address root causes. It is worthy of note, in light of the Committee's recent interest in natural flood solutions, that the re-naturalised corridor of the River Len east of Maidstone town centre provided storage for a significant volume of floodwater within its restored woodland and wetland.
- 1.8 The Community Warden service was particularly active in the Dartford area during the flooding, supporting local communities and providing an incident liaison role with 'eyes and ears on the ground' in support of the CEC.
- 1.9 Yalding saw significant KCC and partner interventions through Friday and into the weekend, with its position at the confluence of the Rivers Medway, Beult and Teise bringing challenges. The innovative Confluence Group of stakeholders met regularly throughout the flooding to discuss overall effectiveness of local planning and response. Significantly, a number of local road closures were recklessly ignored by some drivers.
- 1.10 Neighbouring East Sussex saw the closure of the busy Eridge Road as the result of a culvert collapse. This seriously impacted routes in and out of Tunbridge Wells. KCC Highways worked closely with colleagues in East Sussex to minimise the impact of this closure. A landslip also led to the closure of the railway line between Tonbridge and Redhill.
- 1.11 The threat of groundwater emergence intensified in East Kent as a result of the rainfall associated with this weather event. Flows in the Nailbourne, near Canterbury, required closure of South Barham Road and installation of demountable barriers to protect The Causeway.

2. Debrief

- 2.1 In line with best practice an early internal debrief took place on 7th January 2020 to capture lessons learned from the December flooding. Outputs also enabled effective engagement with a subsequent multi-agency debrief which was held on 20th February. Sixteen KCC personnel participated in the internal debrief, which followed established Local Resilience Forum structured debrief protocols and was chaired by the Resilience and Emergency Planning Manager.
- 2.2 The resultant internal debrief was then written-up by the Resilience and Emergency Planning Service with outputs circulated to participants in draft for final sign-off ahead of its being tabled at Kent Flood Risk Management Committee.

3. Next steps

- 3.1 A total of 27 recommendations arose from the internal debrief which are reproduced at Appendix 1. All recommendations are now being implemented or assimilated into wider development of policy and practice.
- 3.2 Following December's severe weather events further flooding was experienced across Kent in the wake of Storms Ciara and Dennis in February. An internal debrief for these events took place on 28th February and the resultant debrief report will be discussed at the next meeting of Kent Flood Risk Management Committee in July.

4. Recommendations

- 4.1 Kent Flood Risk Management Committee is requested to note this report and provide oversight and scrutiny of the recommendations arising from the debrief and contribute any additional learning from the KCC response.

5. Contact Details

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Appendix 1

	STRUCTURED DEBRIEF REPORT
Debrief commissioned by:	KCC Resilience and Emergency Planning Service
Event:	December floods 2019
Date of Event:	19 th - 24 th December 2019
Date of Debrief:	7 th January 2020
Debrief Location:	Dymchurch Room, Invicta House, County Hall
Debrief Team:	Tony Harwood (Resilience and Emergency Planning Manager) & Laura Newman (Resilience Officer)
Debrief Participants:	Joe Frampton (Kent Resilience Team / GET Portfolio Office), Louise Butfoy (Resilience and Emergency Planning Service), Sacha Taylor (Kent Resilience Team), James Lomas (Kent Resilience Team), Guy Gardener (Kent Resilience Team), Sian Deller (Kent Resilience Team), Steve Scully (Kent Resilience Team), Suz Elvey (Media and Communications), Paul Bufford (Adult Social Care and Health), John Callaghan (Adult Social Care and Health), Jodi Gore (Highways Transportation and Waste), Max Tant (Flood and Water Management), Andy Jeffery (Kent Resilience Team), Simon Jones (Highways, Transportation and Waste).
Debrief Summary:	<p>Overnight on 19th to 20th December 2019 flood impacts were felt across the County which persisted into coming days - with Mid and West Kent most affected. Some 65 residential and commercial properties were impacted by internal flooding with others affected by surcharging sewerage systems. 150 residents were evacuated from their homes at Little Venice Country Park and Arena. Management of water levels within contained waters on the course of River Len were another focus.</p> <p>Interventions to tackle surface water and highway flooding and resultant impacts on communities were the focus of sustained KCC activity. Some 200 calls were received by KCC from members of the public regarding flooding. Areas affected included Culverstone Valley, M26 J2a, Chart Sutton, Edenbridge, Five Oak Green, East Peckham, Tonbridge, Boughton Monchelsea, Staplehurst, Yalding and Collier Street.</p>

ITEM	IDENTIFIED BY	REC. No.	Recommendation
AREAS FOR IMPROVEMENT			
Capacity of highway drainage system to absorb increasingly frequent intense rainfall events was again tested.	Jodie Gore (HT&W)	01	<ul style="list-style-type: none"> a. Debrief recommended that Government is approached to consider policy change ensuring new and upgraded highways drainage systems have 1in 20year event capacity (for climate change impacts), as is already required for water utility infrastructure [HT&W, F&WM] b. KCC should offer itself as a national pilot for policy change in relation to highway drainage infrastructure capacity [HT&W, F&WM]

Reservoir operator awareness of downstream implications of their actions and completeness of information held on individual reservoirs within existing plans was challenged during incident.	Guy Gardener (KRT) Laura Newman (R&EPS)	02	<ul style="list-style-type: none"> a. Ensure all reservoir owners and operators are issued with latest Kent and Medway Offsite Reservoir Inundation Emergency Plan [R&EPS] b. Undertake updates to Kent and Medway Offsite Reservoir Inundation Emergency Plan to ensure that more detail is captured on each individual reservoir and associated downstream contingency planning and validate through exercise [R&EPS]
Effectiveness of some individual property level flood protection was challenged.	Guy Gardener (KRT)	03	<ul style="list-style-type: none"> a. Property level flood protection functionality in Yalding area to be raised at multi-agency December floods debrief [KRT]
Maintenance and in some cases loss of ditches and other flood storage and attenuation features on private land was considered to have contributed to flooding in some areas of county such as the Low Weald.	Tony Harwood (R&EPS)	04	<ul style="list-style-type: none"> a. Specific locations where ditches and other flood attenuation features have been lost to be identified and communicated to Flood Risk Management Team [HT&W, R&EPS, KRT]
Highways Drainage assets and personnel were under intense pressure by midday Friday 20 th December. This resulted in prioritisation of interventions to property or threatened property flooding.	Jodie Gore (HT&W)	05	<ul style="list-style-type: none"> a. Review Highways Drainage resources and formalise prioritisation protocol and associated communication strategy and reflect this in relevant planning [HT&W]

<p>Duty Director came under significant operational work pressure during Friday and Saturday 20th and 21st December (because of professional role), which resulted in All Member briefing email not being circulated until evening of Sunday 22nd December when colleague took back Duty Director mantle.</p>	<p>Simon Jones (HT&W)</p>	<p>06</p>	<p>a. Emergency Planning and Communications colleagues to revisit relevant guidance to ensure appropriate support for Duty Director to enable timely All Member Briefing circulation [R&EPS, KRT and Media & Comms]</p>
<p>Concern that guidance contained within DEPO Handbook was too prescriptive and should be refined to enable greater flexibility across command and control in future dependent upon characteristics of incident.</p>	<p>Guy Gardener (KRT)</p>	<p>07</p>	<p>a. Amend DEPO Handbook to enable greater flexibility across command and control in recognition of characteristics of incident [R&EPS, KRT]</p>
<p>Co-operation and co-ordination with East Sussex County Council on cross border impacts could have been more effective.</p>	<p>Guy Gardener (KRT)</p>	<p>08</p>	<p>a. Triggers and structures for cross-boundary co-operation to be discussed with South East 7 [KRT]</p>
<p>Sharing of stories and images from KCC flood response activity would have assisted public reassurance and understanding of scale and complexity of response.</p>	<p>Suz Elvey (Media and Comms)</p>	<p>09</p>	<p>a. All responding KCC services to consider opportunities to brief Media and Communications colleagues on response interventions and capture images where appropriate [ASCH, CYPE, HT&W, KRT, R&EPS, Wardens]</p>
<p>Visualisation of breadth of KCC services (from County Emergency Centre) would have been enhanced by the installation of a wall chart illustrating the entire KCC structure with key contact numbers.</p>	<p>Joe Frampton (KRT)</p>	<p>10</p>	<p>a. KCC structure chart with key contact details to be installed within County Emergency Centre [R&EPS]</p>

<p>Concerns were aired that KRF Risk Assessment for surface water events and wider planning assumptions for severe weather events do not adequately reflect cumulative impact of increases in frequency and intensity of rainfall events and other climate change impacts.</p>	<p>Guy Gardener (KRT), Louise Butfoy (R&EPS)</p>	<p>11</p>	<p>a. KRT to raise issue of risk assessments and other planning assumptions and cumulative impact of increases in frequency and intensity of rainfall events and other climate change impacts through KRF and at multi-agency Christmas floods debrief [KRT]</p>
<p>The collection of data on internal inundation of residential and commercial premises (as required by Flood and Water Management) during and following this event was fragmented across agencies and is potentially incomplete.</p>	<p>Tony Harwood (R&EPS), Max Tant (F&WM)</p>	<p>12</p>	<p>a. R&EPS to contact partners and seek to build up an accurate picture of premises flooded [R&EPS] b. List of flooded properties to be shared with Flood and Water Management team [R&EPS]</p>

AREAS THAT WENT WELL			
The series of SWAGs held in the days preceding the floods served to inform preparation by KCC (and our partners) for the eventual flooding.	Guy Gardener (KRT)	13	a. Ensure that KCC Flood Response Emergency Plan emphasises importance of early initiation of SWAG meetings [R&EPS]
DEPO and Duty Director roles were both effective and complementary.	Guy Gardener (KRT), Simon Jones (HT&W)	14	a. Further evidences value of DEPO and Duty Director roles which should be further formalised in all relevant planning [R&EPS]
The County Emergency Centre (CEC) functioned effectively and supported and enhanced the County Council response.	Guy Gardener (KRT)	15	a. Further evidences value of County Emergency Centre which should be further formalised in all relevant planning [R&EPS]
The deployment of DEPO into the CEC improved communication and effectiveness of County Council response.	Guy Gardener (KRT)	16	a. Amend DEPO Handbook to reflect policy support for DEPO deployment to CEC [KRT]
The close links established early on and maintained thereafter between the CEC and Environment Agency Incident Room notably enhanced the effectiveness of the response.	Guy Gardener (KRT), Tony Harwood (R&EPS)	17	<p>a. Amend KCC Flood Response Emergency Plan and CEC Handbook to reflect value of establishing early links with EA Incident Room during flood emergencies</p> <p>b. Underline value of close working relationship between CEC and EA Incident Room at multi-agency December floods debrief</p>

Effective co-ordination between KCC and Kent Fire and Rescue Service (including the Tactical Adviser Water and Flooding) enhanced the effectiveness of the response.	Guy Gardener (KRT), Tony Harwood (R&EPS)	18	a. Underline value of close working relationship between KCC and KF&RS (including Tactical Adviser Water and Flooding) during floods at multi-agency debrief [KRT]
Pro-active highways drainage interventions, informed by local knowledge, such as pumping to tankers and sandbag / flood sax installation were effective. Good working relationship between DEPO and other Emergency Planners and Highways Drainage colleagues contributed to this effectiveness (i.e. institutionalise direct reporting channel).	Jodi Gore (HT&W), Guy Gardener (KRT), Tony Harwood (R&EPS)	19	a. Ensure all relevant HT&W and corporate flood response plans reflect local knowledge and value of pro-active highways drainage interventions [KRT, R&EPS] b. Ensure direct communications between Emergency Planners and Highways Transportation and Waste in relation to pro-active highways interventions to protect at risk communities [HT&W]
Enhanced flood storage contribution from recently restored semi-natural land on River Len floodplain upstream of Maidstone significantly ameliorated downstream impacts from increased flows.	Tony Harwood (R&EPS)	20	a. Consider flood storage contribution from semi-natural land uses within resilient landscapes / natural capital initiatives [R&EPS]
Pro-active precautionary evacuation of Little Venice Country Park and Marina was effective.	Guy Gardener (KRT)	21	a. Promote through multi-agency debrief the development of guidance for pro-active precautionary evacuation of Little Venice Country Park and Marina in future similar flooding events [KRT]
Severe Weather Impacts Monitoring System (SWIMS) event initiated for December floods with good engagement by KCC to date. All teams must appropriately capture costs and resources arising from response, including staff time dedicated to response.	Tony Harwood (R&EPS)	22	All teams must appropriately capture costs and resources arising from December floods response using SWIMS, including staff time dedicated to response [All]

No.	RECOMMENDATIONS	OWNER	COMMENTS
01	<ul style="list-style-type: none"> a. Debrief recommended that Government is approached to consider policy change ensuring new and upgraded highways drainage systems have 1in 20year event capacity (for climate change impacts), as is already required for water utility infrastructure. b. KCC should offer itself as a national pilot for policy change in relation to highway drainage infrastructure capacity. 	HT&W, F&WM	
02	<ul style="list-style-type: none"> a. Ensure all reservoir owners and operators are issued with latest Kent and Medway Offsite Reservoir Inundation Emergency Plan. b. Undertake updates to Kent and Medway Offsite Reservoir Inundation Emergency Plan to ensure that more detail is captured on each individual reservoir and associated downstream contingency planning and validate through exercise. 	R&EPS	
03	Property level flooding functionality in Yalding area to be raised at multi-agency December floods debrief.	KRT	
04	Specific locations where ditches and other flood attenuation features have been lost to be identified and communicated to Flood Risk Management Team.	HT&W, R&EPS, KRT	
05	Review Highways Drainage resources and formalise prioritisation protocol and associated communication strategy and reflect this in relevant planning.	HT&W	
06	Emergency Planning and Communications colleagues to revisit relevant guidance to ensure appropriate support for Duty Director to enable timely All Member Briefing circulation.	R&EPS, KRT and Media & Comms	
07	Amend DEPO Handbook to enable greater flexibility across command and control in recognition of characteristics of incident	R&EPS, KRT	
08	Triggers and structures for cross-boundary co-operation to be discussed with South East 7.	KRT	
09	All responding KCC services to consider opportunities to brief Media and Communications colleagues on response interventions and capture images where appropriate.	ASCH, CYPE, HT&W, KRT, R&EPS and Wardens	
10	KCC structure chart with key contact details to be installed within County Emergency Centre.	R&EPS	
11	KRT to raise issue of risk assessments and other planning assumptions and cumulative impact of increases in frequency and intensity of rainfall events and other climate change impacts through KRF and at multi-agency December floods debrief.	KRT	

No.	RECOMMENDATIONS	OWNER	COMMENTS
12	<ul style="list-style-type: none"> a. R&EPS to contact partners and seek to build up an accurate picture of premises flooded. b. List of flooded properties to be shared with Flood and Water Management team. 	R&EPS	
13	Ensure that KCC Flood Response Emergency Plan emphasises importance of early initiation of SWAG meetings.	R&EPS	
14	Value of DEPO and Duty Director roles to be further formalised in all relevant planning.	R&EPS	
15	Further evidences value of County Emergency Centre which should be further formalised in all relevant planning.	R&EPS	
16	Amend DEPO Handbook to reflect policy support for DEPO deployment to CEC.	KRT	
17	<ul style="list-style-type: none"> a. Amend KCC Flood Response Emergency Plan and CEC Handbook to reflect value of establishing early links with EA Incident Room during flood emergencies b. Underline value of close working relationship between CEC and EA Incident Room at multi-agency December floods debrief. 	R&EPS, KRT	
18	Underline value of close working relationship between KCC and KF&RS (including Tactical Adviser Water and Flooding) during floods at multi-agency debrief.	KRT	
19	<ul style="list-style-type: none"> a. Ensure all relevant HT&W and corporate flood response plans reflect local knowledge and value of pro-active highways drainage interventions b. Ensure direct communication links between Emergency Planners and Highways Transportation and Waste in relation to initiating pro-active highways interventions to protect at risk communities (i.e. institutionalise direct reporting channel). 	HT&W, KRT and R&EPS	
20	Consider flood storage contribution from semi-natural land uses within resilient landscapes / natural capital initiatives.	R&EPS	
21	Promote through multi-agency December floods debrief the development of guidance for pro-active precautionary evacuation of Little Venice Country Park and Marina in future similar flooding events.	KRT	
22	All teams must appropriately capture costs and resources arising from December floods response using SWIMS, including staff time dedicated to response.	All	

To: Kent Flood Risk Management Committee – 9th March 2020

From: Stephanie Holt-Castle, Interim Director of Environment, Planning and Enforcement

Subject: Environment Agency and Met Office Alerts and Warnings and KCC severe weather response activity.

Classification: Unrestricted

Summary: To update Kent Flood Risk Management Committee on the current water situation, Environment Agency and Met Office Warnings, and flood response activity since the last meeting of the Committee on 11th November 2019.

1. Background

- 1.1 This report is the latest of the regular updates to the Committee addressing the current water situation and severe weather and flood response activity, covering the period from November 2019 through to March 2020.
- 1.2 The KCC Resilience and Emergency Planning Service Duty Emergency Planning Officer (DEPO) and Contact Point receive Environment Agency (EA) and Met Office alerts and warnings regarding severe weather on a 24/7 basis. Site specific severe weather impacts are notified to the DEPO by the emergency services and other resilience partners, with reports from the public received by Contact Point and passed on to the DEPO and/or Kent Highways. DEPO further initiates multi-agency reporting using the innovative Severe Weather Impacts System (SWIMS) to capture resources and costs arising from severe weather incidents.
- 1.3 Some 85,500 residential and commercial addresses across Kent are located within areas identified as at risk from fluvial (river) or tidal (coastal) flooding. Where possible, flood vulnerable properties are offered a Flood Warning Service by the EA. Early warning of flood risk to communities (including areas outside of floodplains) is delivered through Flood Guidance Statements, Severe Weather Warnings and mobilisation of the Kent Resilience Forum (KRF) Severe Weather Advisory Group (SWAG).

2. Latest situation

- 2.1 The autumn and winter has seen a succession of wet months, with 169% of the long-term average rainfall falling in December for example, and overall rainfall totals ranging from 'Above average' in East Kent to 'Notably High' in West Kent.

The exception was January which witnessed 'Below Normal' rainfall at 86% of the long-term average. The latest monitoring data available (source: EA 11th February 2020) indicates that river flows within the County are all now within the 'Normal' range, except for groundwater-dominated catchments which are 'Above Normal'. This follows the 'Exceptionally High' levels reached following the heavy rainfall in December.

- 2.2 Groundwater aquifers across Kent are currently all within 'Above Normal' to 'Notably High' ranges. After December's substantial rainfall and resultant rapid recharge, groundwater levels have now stabilised. The Environment Agency states that the current ground conditions will continue to support further recharge assisted by the significant rainfall experienced across Kent during February. December's rainfall was sufficient to generate widespread winterbourne flow throughout January, however, none of these seasonal watercourses were flowing along their entire length by February.
- 2.3 All Kent drinking water reservoirs remain above their long-term average and are all at 100% with the exception of Bewl which is currently at 94% capacity.
- 2.4 As a result of the exceptional rainfall experienced in December and Storms Ciara and Dennis in February, there was a sextupling (x6) in the number of Flood Alerts received during this period when compared with last year. 131 Flood Alerts and 30 Flood Warnings were issued by the EA since the last meeting in November (133 fluvial and 28 coastal)¹. This contrasts with 25 Flood Alerts (15 fluvial and 10 coastal) in the corresponding period last year.
- 2.5 **December Flooding (19th – 22nd December)** - Significant surface water, highway and fluvial flood impacts were felt across the County resulting in property flooding across parts of the Low Weald and in North West Kent. The EA reported 65 properties flooded as a result of fluvial or surface water flows throughout this period (source: EA). Around 150 homes in Little Venice, Yalding were evacuated on Saturday 21st, with Adult Social Care colleagues proactively assessing and supporting vulnerable residents. Impacts arising from December's flooding was notable in terms of the demands upon Kent Highways in dealing with surface water impacts on the local road and footway network. Multi-agency co-ordination was achieved through regular SWAG meetings which were held throughout this period, whilst a number of individual agencies, including EA and KCC, mobilised their own command and control structures. Officers from the County Council's directorates and many Elected Members were involved in dealing with impacts arising from the flooding. A range of further interventions were triggered by the EA, KCC and partners, which included closing flood gates, public warning and informing, pumping of

¹ Please see appendix 1

floodwater from the highway to tankers, mobilisation and deployment of additional staff resources, supplying sandbags and other practical action in an effort to limit impacts upon residents, businesses, vulnerable property, livestock and infrastructure. Locations particularly affected by the flooding included the Culverstone Valley, M26 Junction 2A, Chart Corner at Chart Sutton, Fishers Road at Staplehurst, The Quarries, Boughton Monchelsea, East Peckham, Angel Lane, Tonbridge Sports Ground, Five Oak Green and Yalding/Collier Street.

- 2.6 **Storm Ciara (8th – 9th February)** – High winds of up to 73mph (recorded at Langdon Bay, Dover) followed by heavy rainfall impacted Kent through this weekend. A range of interventions were triggered by the EA, KCC and partners both in preparation for and in response to storm impacts. Multi-agency co-ordination was achieved through regular SWAG meetings. Interventions ranged from closing flood gates through to public warning and informing and mobilisation of voluntary sector partners including South East 4x4 and Kent Search and Rescue. Impacts arising from Storm Ciara were particularly significant in terms of Kent Highways, Highways England, energy and water utilities, Network Rail and Districts who dealt with surface water, fallen trees and other windblown debris. Fluvial flooding affected parts of West Kent, resulting in fluvial and surface water flood damage to approximately 68 properties (source: EA). Damage to coastal defences also occurred in the Lydd area, triggering significant recovery activity by the EA.
- 2.7 **Storm Dennis (15th – 16th February)** – Less than a week after Ciara, Storm Dennis struck the UK on 15th February bringing further strong winds (67 mph recorded at Manston) and heavy rainfall (53.3mm recorded at Eden Vale) exacerbating storm and flooding impacts and limiting partners' opportunity for recovery from Ciara. The EA chaired regular multi-agency SWAG meetings in the lead-up to the storm and key responding agencies mobilised their own command and control structures. Stretches of the local road network across the County were inundated, with surface water on the highway and fallen trees dealt with by round the clock Kent Highway interventions. Fallen trees and windblown debris were a particular problem for many infrastructure operators. Further interventions included closing flood gates, public warning and informing, pumping floodwater to tankers, road closures, mobilisation and deployment of additional staff resources, supplying sandbags and flood sacks and other practical action in an effort to limit impacts on communities. Around 150 mobile homes at Little Venice, Yalding were pre-emptively evacuated in response to Flood Warnings. A further four properties were affected by flooding in West Kent and approximately 1,000 properties were left without power. Seawater ingress impacts were recorded near Lydd, and flooding impacts resulted in road closures at Sheephurst Lane at Collier Street, Hampstead Lane, Mill Lane, Symonds Lane and Laddingford Road at Yalding and Lees Road in

Laddingford. Sadly, two fatalities occurred during Storm Dennis when an individual entered the sea at Herne Bay and a sailor fell overboard at Margate.

- 2.8 Following Storms Ciara and Dennis, the County Council is investigating the potential for a bid against the Bellwin Scheme of Emergency Financial Assistance to Local Authorities, which works to reimburse councils for costs incurred during the response phase of an incident. To be eligible for the grant, the County Council must submit an expression of interest within the prescribed timetable and have spent 0.2% of its calculated annual budget on works reported to MHCLG. For the current financial year, the Bellwin Scheme threshold for KCC is a further £1,764,324.
- 2.9 This period since 11th November 2019 saw an increase in the number of Met Office Severe Weather Warnings issued compared to the corresponding period. Since November, 47 Severe Weather Warnings were issued, with 43 Yellow and 4 Amber (21 for rain, 17 for wind, 8 for fog and 1 for ice)². The total for the same period in 2018/19 was 13 (1 for wind, 1 for ice and fog, 5 for fog, 4 for ice and 4 for snow and ice).
- 2.10 The Thames Barrier was closed on 4 occasions since the last meeting (2 for tests and 2 for operational purposes)³. The figure for the corresponding period last year was also 4 (3 tests and 1 operational)³.
- 2.11 A number of EA chaired KRF SWAG teleconferences have taken place since the last meeting comprising:
- 13th and 14th November in response to fluvial floods as a result of heavy rainfall (Yellow Rain Warning);
 - 20th December in response to fluvial, surface, highway and groundwater flooding (Yellow Rain Warning);
 - 17th January in response to groundwater flooding specifically in the Nailbourne, Canterbury area;
 - 5th and 7th February in response to Storm Ciara (Yellow and Amber Wind Warnings); and
 - 13th and 14th February in response to Storm Dennis (Yellow and Amber rain and wind warnings).
- 2.12 The EA's Area Incident Room operated from:
- 13th - 18th November, with a total of 213 personnel active throughout the response during this period;

² Please see appendix 2

³ Please see appendix 3

- 18th - 27th December, with 240 personnel active;
- 15th – 16th January, with 20 personnel active;
- 17th - 18th January, with 33 personnel active;
- 10th February, with 7 personnel active; and
- 15th – 17th February, with 140 personnel active

The KCC DEPO, County Emergency Centre, on-call Duty Directors and a range of other partners supported these EA operations.

2.13 EA Community Information Officers (CIOs) deployment took place between November 2019 and February 2020:

- 14 -18 November – 18 CIOs on standby, none deployed;
- 18 – 23 December - 28 CIOs deployed to Tonbridge, Yalding, East Peckham, Edenbridge, Penshurst, Forest Row, Hartfield, Canterbury (Westgate Gardens), Collier Street, Hunton, Laddingford, Otford, Westerham, Lamberhurst, Goudhurst, Marden, Little Venice, Smarden, Headcorn, Linton, Plucks Gutter, Grove Ferry, Ashford and Tovil;
- 8th-9th February (Storm Ciara) – 4 CIOs deployed to Forest Row, Vauxhall Lane (Tonbridge), Capel and Five Oak Green; and
- 15th-16th February (Storm Dennis) - 21 CIOs deployed during the event, with some volunteering for more than one shift. Locations visited included: Laddingford, Yalding, Five Oak Green, Collier Street, East Peckham, Capel, Tonbridge, Postern, Edenbridge, Sundridge, Maidstone, Tovil, East Farleigh, Barming, Teston, Little Venice and Cobham.

2.14 The severe weather impacts felt this autumn and winter across the UK reflected the Met Office long-term forecast, which predicted a warmer and wetter than average winter. These forecasts also correlate with the ‘Intergovernmental Panel on Climate Change (IPCC) special report on the impacts of global warming of 1.5°C’, which projected shifts in seasonal and rainfall patterns, increases in the frequency and magnitude of extreme weather events such as a greater frequency and intensity of rainfall and storm events, resulting in escalating coastal storm surges and an elevated risk of tidal/coastal flooding events in the South East of England.

3. Looking forward

3.1 According to Met Office long-term forecasts, confidence is very high for warmer temperatures for March, April and May. The long-term rainfall forecast is less clear; however, it suggests wetter than average conditions over this period. Overall, the Met Office anticipates generally warmer and wetter conditions across the UK for the spring period.

- 3.2 The EA continuously runs surge forecasts, informed by astronomical tide calculations. If a risk of coastal flooding is forecast this information is communicated to partners. Elevated spring tides with a corresponding higher risk of coastal flooding, if in combination with high winds, are forecast between 9th - 15th March, 25th - 28th March, 6th - 13th April, 23rd - 27th April, 5th – 12th May and 23rd – 26th May 2020.
- 3.4 The national East Coast Flood Group is running an east coast surge exercise between 6th – 8th October 2020 (CoastEx20). The aim is to exercise national and county level response, information exchange and mutual aid during a major flooding incident along the East Coast of England. Planning is currently at an early stage, but it has been proposed that Kent will participate at a Bronze / Operational level, focussing primarily on local response, rather than command and control. Personnel from KCC services met on 29th January to agree their preferred scenario and level of engagement. An aspiration for a focus upon evacuation and shelter interventions within any scenario arose from this meeting.
- 3.5 Kent Flood Risk Management Committee will continue to receive regular updates on water resources, flood alerts, weather warnings and response.

4. Recommendations

- 4.1 That Members note the warnings received since the last meeting of the Committee; and contribute to planning and response policy and practice through oversight and debate.

9. Contact Details

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Appendix 1: EA Flood Alerts and Warnings issued since 11th November 2019		
Date issued	Flood Zone	Status
02/11/19	Coast from Fairlight to Dungeness including The Tidal Rother	Alert
	Upper River Medway Area	
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
07/11/19	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	Alert
08/11/19	Pent Stream in Folkestone	Alert
11/11/19	Upper River Stour	Alert
13/11/19	River Teise area from Lamberhurst to Goudhurst	Alert
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
	Upper River Medway Area	
	Upper River Stour	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
	Rivers Eden and Eden Brook Area	
26/11/19	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	Alert
	Rivers Eden and Eden Brook Area	
	Upper River Stour	
	Upper River Medway Area	
27/11/19	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	Alert
	Lower River Medway Area	
	Middle River Medway Area	
	Lower River Stour	
28/11/19	Tidal Stour Area from Fordwich to Stonar Cut	Alert
	Coast from Ramsgate to Kingsdown	
	Coast from Whitstable to Margate	
	Isle of Sheppey and Coast from Kemsley to Seasalter	
	Coast from Dartford to Allhallows	
	Tidal Medway, Medway estuary and Isle of Grain	
29/11/19	Coast from Dartford to Allhallows, and	Alert
	Isle of Sheppey and coast from Kemsley to Seasalter	
	Tidal Medway, Medway estuary and Isle of Grain	
12/12/19	Upper River Medway Area	Alert
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
13/12/19	Lower River Medway Area	Alert
	Middle River Medway Area	
	Upper River Stour	
16/12/19	Upper River Medway Area	Alert
	Rivers Eden and Eden Brook Area	
	River Bourne from Hadlow to East Peckham	
	Middle River Medway Area	
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
17/12/19	Lower River Medway Area	Alert
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	

18/12/19	Upper River Stour	Alert
	Rivers on the Isle of Sheppey Area	
	Tidal Stour Area from Fordwich to Stonar Cut	
	Upper River Stour	
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
	Upper River Medway Area	
19/12/19	Rivers Eden and Eden Brook Area	Alert
	Upper River Medway Area	
	Rivers Eden and Eden Brook Area	
	Middle River Medway Area	
	River Teise area from Lamberhurst to Goudhurst	
	River Bourne from Hadlow to East Peckham	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
River Rother and its tributaries from Turks Bridge to the Royal Military Canal and Upper River Stour		
19/12/19	Upper River Medway Area and Upper River Stour	Warning
20/12/19	Lower River Medway Area	Alert
	Rivers on the Isle of Sheppey Area	
	Middle River Medway Area	
	River Teise area from Lamberhurst to Goudhurst	
	River Darent from Westerham to Dartford	
	Rivers Eden and Eden Brook Area	
	Upper River Stour	
	River Teise and Lesser Teise area from Horsmonden to Yalding	
	Shuttle and Cray and Lower River Stour	
20/12/19	Middle River Medway Area	Warning
	River Teise area from Lamberhurst to Goudhurst	
	River Darent from Westerham to Dartford	
	Rivers Eden and Eden Brook Area	
	Upper River Stour	
	River Teise and Lesser Teise area from Horsmonden to Yalding	
	Shuttle and Cray Lower River Stour	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
	Rivers Eden and Eden Brook Area	
	21/12/19	
Middle River Medway Area		
Middle River Medway Area and River Beult from Pluckley Bethersden to Hampstead Lock at Yalding		
22/12/19	Lower River Stour	Alert
22/12/19	Middle River Medway Area	Warning
	Lower River Stour	
23/12/19	Middle River Medway Area	Warning
14/01/20	Coast from Dartford to Allhallows	Alert
	Tidal Medway	
	Medway estuary and Isle of Grain	
	Isle of Sheppey and coast from Kemsley to Seasalter	
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
	Rivers Eden and Eden Brook Area	
Upper River Medway Area		

	Lower River Medway Area	
	River Bourne from Hadlow to East Peckham	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
	Coast from Fairlight to Dungeness including The Tidal Rother	
15/01/20	Middle River Medway Area	Alert
26/01/20	Upper River Medway Area	Alert
27/01/20	Upper River Medway Area	Alert
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
28/01/20	Lower River Medway Area	Alert
09/02/20	Coast from Sandgate to Dungeness	Alert
	Coast from Fairlight to Dungeness Including the Tidal Rother	
	Coast from St Margaret's at Cliffe to Sandgate	
	Coast from Ramsgate to Kingsdown	
	Coast from St Margaret's at Cliffe to Sandgate	
	Upper River Medway	
	Rivers Eden and Eden Brook Plenty	
	Swalecliffe and West Brooks	
	Lower River Medway	
Middle River Medway Area		
09/02/20	Coast from St Margaret's at Cliffe to Sandgate	Warning
10/02/20	Coast from Dartford to Allhallows Tidal Medway	Alert
	Medway estuary and Isle of Grain	
	Isle of Sheppey and coast from Kemsley to Seasalter	
	Coast from Whitstable to Margate	
	Upper River Stour	
	Lower River Stour	
10/02/20	Properties seaward side of tidal defences from Greenhithe to Gravesend	Warning
	Coast from Sandgate to Dungeness	
	Dungeness Power Station Operational Area	
11/02/20	Coast from Dartford to Allhallows	Alert
	Tidal Medway	
	Medway estuary and Isle of Grain	
	Coast from Dartford to Allhallows	
	Isle of Sheppey and Coast from Kemsley to Seasalter	
12/02/20	Coast from Dartford to Allhallows	Alert
	Tidal Medway, Medway estuary and Isle of Grain	
	Isle of Sheppey and Coast from Kemsley to Seasalter	
	Coast from Fairlight to Dungeness including The Tidal Rother	
	River Rother and its tributaries from Turks Bridge to the Royal Military Canal	
13/02/20	Upper River Medway Area	Alert
	River Bourne from Hadlow to East Peckham	
	River Teise area from Lamberhurst to Goudhurst	
	Rivers Eden and Eden Brook Area	
	Lower River Medway Area	
	Upper River Stour	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
	River Teise and Lesser Teise area from Horsmonden to	

	Yalding	
14/02/20	Middle River Medway Area	Alert
15/02/20	River Darent from Westerham to Dartford	Alert
	Upper River Medway Area	
	River Teise area from Lamberhurst to Goudhurst	
	Rivers Eden and Eden Brook Area	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
	Middle River Medway Area	
	Upper River Stour	
	River Rother and its tributaries from Turks Bridge to the Lower River Stour	
	Royal Military Canal	
	Lower River Medway Area	
	River Bourne from Hadlow to East Peckham	
River Teise and Lesser Teise area from Horsmonden to Yalding		
15/02/20	Middle River Medway Area	Warning
16/02/20	Rivers Eden and Eden Brook Area	Warning
	Upper River Medway Area	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
	Lower River Medway Area	
	Middle River Medway Area	
	River Teise and Lesser Teise area from Horsmonden to Yalding	
	River Teise area from Lamberhurst to Goudhurst	
	River Beult from Pluckley and Bethersden to Hampstead Lock at Yalding	
16/02/20	Rivers on the Isle of Sheppey Area	Alert
	Lower River Stour	
23/02/20	Coast from Fairlight to Dungeness including the Tidal Rother	Alert
25/02/20	Coast from Fairlight to Dungeness including the Tidal Rother	Alert

Appendix 2:

47 Met Office Severe Weather Warnings issued (including updates)

- 43 Yellow
- 4 Amber
- 28 Low Impact
- 19 Medium Impact

Appendix 2: Met Office Severe Weather Warnings – November 2019 to March 2020

Weather Element	Number of Warnings	Dates of Weather Events
Fog	8 (5 Events)	19 th Nov 2019 3 rd Dec 2019 4 Dec 2019 17 th -18 th Dec 2019 30 th Dec 2019
Rain	21 (4 Events)	14 th Nov 2019 19 th -22 nd Dec 2019 14 th -15 th Jan 2020 15 th -16 th Feb 2020
Wind	17 (5 Events)	2 nd Nov 2019 14 th -15 th Jan 2019 8 th -10 th Feb 2020 15 th Feb 2020 29 th Feb – 1 st Mar 2020
Ice	1 (1 Event)	26 th Feb 2020

Met Office Flood Guidance Statements

19th December 2019	Minor Impact – Low Likelihood River & Surface
19th & 20th December 2019	Minor Impacts – Medium Likelihood Significant Impacts – Low Likelihood Minor Impacts – Low Likelihood River & Surface
21st & 22nd December	Significant Impacts – Low Likelihood Minor Impacts – Medium Likelihood Minor Impacts – Low Likelihood River & Surface
15th February 2020	Significant Impact – Very Low Likelihood River & Surface
16th February 2020	Significant Impact – Medium Likelihood River & Surface
17th February 2020	Significant Impact – Low Likelihood River & Surface
17th & 18th February 2020	Minor Impact – Low Likelihood Minor Impact – Medium Likelihood River

Appendix 3: Environment Agency Thames Barrier closures since 11th November 2019

Thames Barrier closures	Date	Status
Thames Barrier closed	18/11/2019	Test

Thames Barrier closed	17/12/2019	Test
Thames Barrier closed	10/02/2020	Operational
Thames Barrier closed	11/02/2020	Operational