KENT FLOOD RISK MANAGEMENT COMMITTEE

Monday, 22nd July, 2019

2.00 pm

Council Chamber - Sessions House

AGENDA

KENT FLOOD RISK MANAGEMENT COMMITTEE

Monday, 22nd July, 2019, at 2.00 pm Ask for: **Andrew Tait**

Council Chamber - Sessions House 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 March 2019 (Pages 5 - 16)

4. Presentation by Claire Lee (Environment Agency) on the latest coastal modelling for Kent

5. Kent Environment Strategy - Sustainable Communities: Presentation by Carolyn McKenzie (KCC Head of Sustainable Business and Communities) and Christine Wissink (Project Manager)

6. KCC Flood Response Emergency Plan Update (Pages 17 - 120)

7. Flood Risk Management Policies (Pages 121 - 192)

   (a) Drainage and Planning Policy
   (b) Land Drainage Policy
   (c) Flood and Water Management Act 2010: Section 19 Investigation Policy

8. Environment Agency and Met Office Alerts and Warnings and KCC severe weather response activity since the last meeting (Pages 193 - 196)

9. 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, 12 July 2019

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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 on Monday, 11 March 2019.

PRESENT: Mr A R Hills (Chairman), Mr A H T Bowles, Mrs L Hurst, Mr P W A Lake, Ida Linfield (Substitute for Mr I S Chittenden), Mr H Rayner, Mr R J Thomas (Substitute for Mr K Pugh), Mrs R Doyle (Canterbury CC), Mr D Mortimer (Maidstone BC), Mr J Scholey (Sevenoaks DC), Mr G Lewin (Swale BC), Mrs C Mackonochie (Tunbridge Wells BC), Mrs G Brown (KALC) and Mr C Mackonochie (KALC)

ALSO PRESENT: Ms S Hamilton, Mrs P A V Stockell and Mrs L Wright (Thanet DC)

IN ATTENDANCE: Mr M Tant (Flood and Water Manager), Mr T Harwood (Resilience and Emergency Planning Manager) and Mr A Tait (Democratic Services Officer)

UNRESTRICTED ITEMS

1. Minutes of the meeting on 12 November 2018
(Item 3)

RESOLVED that subject to the deletion of "container" in Minute 17 (18), the Minutes of the meeting held on 12 November 2018 are correctly recorded and that they be signed by the Chairman.

2. Climate Change Impacts Forecast (UKPC 18) - Presentation by Mark Rogers, Met Office Advisor Civil Contingencies
(Item 4)

(1) Mr Mark Rogers from the Met Office gave a presentation. The accompanying slides are contained within the electronic agenda papers on the KCC website.

(2) Mr Rogers said that the UK Climate projections (UKPC) had been launched at the end of 2018 using the most recent scientific evidence to provide a comprehensive analysis of how the climate in the UK could change by the end of the 21st Century. This document updated its predecessor which had been published in 2009. The work had been led by DEFRA with the Environment Agency and the Met Office as delivery partners. The purpose of this work was to help inform decision-making so that adaptations could be made, and resilience built over the next 50 to 100 years.

(3) Mr Rogers then said that projections were based on the latest developments in climate science, including state-of-the-art global climate models, innovative regional climate models and up to date observational data. They were based on four different "Representative Concentration Pathway" (RCP) levels of greenhouse gas

concentrations. These ranged from RCP 2.6 (which was compatible with the aim of limiting global warming since pre-industrial levels to below 2˚C) to RCP 8.5, which represented the "reasonable worst-case scenario."

(4) Mr Rogers said that overall in the UK, the headline findings were that there would be hotter, drier summers leading to more thunderstorms and torrential downpours. There would be a greater frequency of milder, wetter winters leading to more river flooding. There would also be further rises in sea level around the entire UK coastline, particularly in the South. It was projected that by 2100 there would be a rise of between 29 cm and 115 cm depending on whether there was a low or high emission scenario.

(5) Mr Rogers picked the two periods 2020-39 and 2060-79 for deeper analysis in South East England. The average winter temperatures were most likely to rise by up to 1^{O}C in the 2020-39 period. Depending on RCP levels, there would be an increase of between 1 and 3^{O} between 2060 and 79. Winter precipitation would increase by up to 10% between 2020 and 2039.

(6) Summer temperatures were expected to rise by 1 to 2^{o} between 2020 and 2039 and between 1 to 2^{o} or 3 to 4^{o} between 2060 and 2079 depending on RCP emission scenarios. Precipitation levels would fall by up to 10% between 2020 and 39 and between 10 and 40% from 2016 70 79, again depending on RCP emission scenarios.

(7) Mr Rogers replied to a question from Mrs Doyle by saying that the projections did not take natural phenomena such as volcanoes into account because it could not be predicted if and when they were likely to occur.

(8) In response to a question from Mr Lewin, Mr Rogers said that the modelling for UKPC18 was far better than for UKPC9. In his view, any mis-assessment of the projections within the study were more likely to be on the side of caution than otherwise. The next projections were likely to take place in ten years' time. Meanwhile, the new projections would continue to be monitored.

(9) Mr Scholey asked whether the projections would lead to the Environment Agency altering its flood risk maps. Mr Heeley (Environment Agency) replied that they were awaiting guidance on how to apply the latest figures and would begin updating at that stage.

(10) Mr Tant said that the flood map that was used for planning took no account of climate change. The Environment Agency was preparing guidance which was due to be released later in the year. This would take account of UKPC18. There were, however, situations where there was a statutory need to take climate change into account. UKPC9 would continue to be in use for this purpose for the moment.

(11) Mr Heeley said that Flood Zones 1,2 and 3 within the flood maps were based on present day climatic conditions. The hydrologic and coastal models that had been developed over the previous few years contained scenarios which factored in climate change.

(12) The Chairman said that the current climate models often worked to a 1 in 100 or 200 year risk. It was likely that once the Environment Agency had absorbed the

new projections, they would need to make practical adjustments by, for instance, reviewing whether a 1 in 100-year design continued to be fit for purpose.

(13) Mr Heeley said that the Environment Agency would need to ensure that any projects it brought forward were climate change resilient and that the new data was factored into its project planning when assessing cost benefits.

(14) Mr Mortimer said that some 28 local authorities in the UK were in the process of issuing a climate change emergency policy. As Leader of Maidstone BC he had asked Environmental Officers to look into questions such as emissions and the carbon footprint in the Borough. He asked whether there was any advice that could assist.

(15) Mr Rogers said that everyone should try to do what they could, either as individuals or as a local authority or national government. At the same time, it needed to be understood that emissions had a global impact. This meant that Britain would be as affected as the rest of the World if other countries did not reduce their emissions in the same way as the UK. Locally, the main benefit of emissions reduction was to people's health.

(16) Mr Harwood said that a number of local authority climate change strategies had looked at both mitigation and adaptation. The importance of adaptation was underlined by UKPC18. Spatial and other planning work could be undertaken in terms of making space for water (surface, fluvial and coastal) or by providing tree cover to enable better percolation of water into the ground. It was also increasingly important to safeguard and conserve groundwater resources.

(17) The Chairman said that it would be very useful for the Committee to receive a further update in the near future on how the climate change projections set out in UKPC18 would affect the south east region, including Kent.

(18) RESOLVED that Mr Mark Rogers be thanked for his presentation and that the significance of the climate change projections contained within UKPC18 be noted.

3. Environment Agency - Flood Risk Vision for the future of Kent - Presentation by Frank Heeley, Team Leader, Partnership and Strategic Overview - SE London and North Kent
(Item 5)

(1) Mr Frank Heeley, Environment Agency Partnership and Strategic Overview Team Leader - SE London and North Kent gave a presentation. The accompanying slides are contained within the electronic agenda papers on the KCC website.

(2) Mr Heeley began his presentation by saying that the Environment Agency aimed to work collectively to respond to the challenges faced over the next decades through its ability to manage catchment strategies, taking account of multiple factors and benefits. It also had to consider in detail how these activities could be resourced through partnership funding of projects and schemes.

(3) Mr Heeley then said that the 25-year Environment Plan was an ambitious document put together by DEFRA covering waste, clean water, and the mitigation of climate change effects. One of its targets was the protection of 300,000 homes from flooding by the end of the current funding cycle in March 2021. This target was just over half way to being fulfilled, and a large number of the projects were set to conclude in the last three months of the cycle. This work was supported by the EA's corporate strategy "*Creating a better place*."

(4) The challenges faced included EU exit. The EA was currently manning its Incident Room as part of DEFRA's response. It was ensuring the mitigation of any environmental impacts (such as waste) arising from the use of Manston Airport as an Operation Stack queuing point. This work could potentially take place at the expense of the Environment Plan's priorities. Other challenges were the securement of partnership funding and the need to ensure that the projects were managed to time and cost.

(5) Mr Heeley moved on to give an overview of flood risk in Kent. He said that there were some 60,000 residential and commercial properties at risk of flooding from the rivers and the sea. He clarified that those areas in Kent designated Flood Zone 2 had a flood risk likelihood of 0.1% and that the likelihood for Flood Zone 3 was 1%. These figures would be subject to re-evaluation when the recent amended climate change projections were fully taken into account. An additional factor was that development continued to be permitted in Flood Zone 2 areas.

(6) Mr Heeley went on to provide the Committee with statistical information. He said that the national allocation to the 2019/21 capital programme was £845.7m of which £113.8m was allocated to Kent and South London. He pointed out that this region traditionally received a greater proportion of the national allocation than other regions and that it also had a good track record of delivering its projects. The EA was forecasting that flood risk to a further 21k properties would be reduced over the next two years (7.5k in 2018/19).

(7) Mr Heeley showed the Committee a list of the capital schemes in Kent for the period 2019/21. He drew attention to the two major schemes which were the Hythe Ranges Scheme to protect against a 1 in 200 year scenario and the Lydd Ranges Scheme where the significant part of the capital scheme was the responsibility of the East Kent team. The entry that appeared under this heading on the Kent table related to the shingle replenishment part of this scheme.

(8) Mr Heeley said that in recent years, funding had been allocated on a national basis to those projects that delivered the greatest benefits in terms of outcome measures. The South East received a higher proportion of national funding than other areas because of the high number of beneficiaries and its ability to deliver. Two projects were, however, likely to slip into a future funding period. One of these was in East Peckham which had a significant funding shortfall.

(9) Mr Heeley then said that the partnership model had changed from an "all or nothing" approach to a scheme where no project was unrealisable if sufficient partnership funding was made available. The Environment Agency worked to a strict spreadsheet to identify the funding it could provide, depending on the benefits that could be achieved. This allowed a far more flexible collaborative approach, although

it meant that those schemes with fewer benefits required significant funding from the beneficiaries.

(10) Mr Heeley said that the Environment Agency had been widely praised for the way it worked with Local Authorities and private enterprise in order to bring about a communal approach to flood defences. The East Kent Engineering Partnership, for example, had provided excellent schemes whilst developing value engineering to enable delivery at lower cost.

(11) The Local Authority Capital Programme consisted of four projects (Chatham Waterfront, Hythe to Folkestone Beach Management Replenishment and Recycling, and Hythe to Folkestone Beach Recharge) at a combined cost of nearly £6m.

(12) Mr Heeley moved on to consider future schemes. Some of them such as the Great Stour Flood Alleviation were underfunded for the next two years according to the national allocation. The EA was working with KCC and Canterbury CC to ensure that further work could be carried out in the next six-year programme. The Nailbourne Schemes were purely levy-funded. More information would soon be available to enable an options appraisal.

(13) Mr Heeley said that planned work during the next 6-year capital programme (beginning in 2021) including the Medway Estuary and Swale Flood and Coastal Erosion Risk Management (FCRM) Strategy had now received approval. Work was also being undertaken in close co-operation with contractors to identify and develop next generation projects. Local Enterprise Partnerships would also be involved in this process.

(14) Mr Heeley then explained that Shoreline Management Plans (SMPs) set the strategy for coastal management over the next 100 years. There were four management approaches which had been widely consulted upon within the communities and partnerships. These were “hold the line”, “no active intervention”, “manage realignment” and “advance the line.” The latter option had never been adopted largely because such an approach would run the risk of encroaching upon the natural inter-tidal habitat. A “refresh” was currently underway, designed to make the SMPs more accessible to the public.

(15) Mr Heeley then turned briefly to the question of climate change, which had been widely discussed during the previous item. He said that although total rainfall levels were expected to fall during future summers, the resultant storms would be very intensive and lead to a greater risk of flooding. This could in turn lead to increased costs and funding gaps for the capital programme due to the need to defend to a higher scale.

(16) Mr Heeley concluded his presentation by saying that the Environment Agency had protected a significant number of people during its current programme. In addition, it responded to some 1,000 planning consultations each year. He believed that good strategic planning was the most valuable way of preventing people becoming the victims of flood risk. Catchments needed to be developed in a way that allowed for slower run-off and encourage groundwater percolation to replenish the aquifers. The EA would be investing many of its resources in strategic planning for catchment areas over the next few years. This would involve engagement across communities, infrastructure levies, new modelling and flood mapping. Finally, the EA

had an important role as a Category 1 responder and would continue to encourage people to sign up for flood warnings, particularly in the Medway catchment area and around the Stour, where they also needed to encourage people to become flood wardens and increase flood risk awareness.

(17) Following a question from Mrs Brown, Mr Lake said that he was the Local Member for the Leigh Barrier. He had recently attended a presentation on how raising the barrier was going to work. He was very pleased with the work that was going to be undertaken for Leigh and Hildenborough but had concerns over how this was going to affect areas further up river. He hoped that the same presentation would be delivered in Penshurst so that people could consider the impact of adjusting the height to the new barrier in terms of raised floodwater.

(18) Mr Lake then said that he regretted that there had been no attempt to clear the Eden and Medway rivers of fallen trees and other natural debris. He was also concerned that the EA had stated that there was going to be no attempt to maintain the weirs above the barrier. Once they crumbled away, an awful lot of water would hit the barrier rather than being held back.

(19) Mr Heeley replied to Mr Lake by saying that the EA's Asset Teams made risk assessments of whether there was an immediate danger to properties as a result of not carrying out river maintenance work. This enabled the prioritisation of high risk areas. He offered to seek a response on the specific area in question. The same principle applied to weir maintenance. Although any project was potentially fundable, grant money would only be forthcoming if there was a level of benefit with sufficient partnership funding to merit it.

(20) Mr Lake said that Chafford Weir at Fordcombe had at one time powered a paper mill. The same power could be used again to provide electricity for housing in the locality. He believed that the best approach would be to hold back the water whilst utilsing the power that was coming downstream.

(21) The Chairman suggested that this topic could be considered at the next meeting of the Committee.

(22) Ida Linfield asked what provision there was for clearing waste from motorways in the event of live animal transportation becoming stranded during the Brexit period. She also asked whether flood risk provision in Canterbury only covered the Nailbourne or whether other areas were involved. Mr Heeley replied that animal welfare was the responsibility of DEFRA. The EA was looking to identify sites for the disposal of animals that died on the motorways during the Brexit period. Contingency Plans were in place and the EA was working closely with Strategic Command in Kent to help inform the permitting regulations. There were 16 people working each day to ensure that the environmental implications were managed.

(23) In response to Ida Linfield's second question, Mr Heeley said that the EA was developing a project to protect the Great Stour. This would probably be part of the next pipeline of schemes.

(24) Mr Heeley replied to a question from Mrs Doyle by saying that the future great Stour Alleviation Scheme to protect 300 properties at risk in Canterbury and the middle Stour would concentrate on making improvements to the Great Stour in order

to prevent water reaching the properties. Where this was not possible, they would move into property protection. He added that options for the Nailbourne would be ready in the Spring and could be reported to the next meeting of the Committee.

(25) Mr Heeley replied to a question from Mrs Mackonochie by saying that the EA was only funded to protect housing that had been built before 2012. It was expected that those built afterwards would have taken climate change and flood risk into account.

(26) Mrs Hurst asked what provision was being put on place to go beyond the Stour and whether it could have any impact on the Wantsum. Mr Heeley said that he was not in a position to give a detailed answer to the question. The principle adopted by the EA when developing projects was that it must not put new people at risk. He was therefore confident that there would be no detrimental effect on the Wantsum.

(27) The Chairman said that he would aim to have the points raised during this item addressed at the next meeting of the Committee.

(28) RESOLVED that Mr Heeley be thanked for his presentation and that matters raised during the discussion be further considered at the next meeting of the Committee.

4. Middle Medway Flood Resilience Project Update - Presentation by Peter Waring, Project Manager and E A Senior Flood Advisor, Kent and South London
(Item 6)

(1) Mr Peter Waring (EA Senior Flood Advisor, Kent and SE London) gave a presentation. The accompanying slides are contained within the electronic agenda papers on the KCC website.

(2) Mr Waring introduced himself as the Middle Medway Flood Resilience Scheme Project Manager. He showed the Committee a diagram of the Medway Catchment and identified the Middle Medway as within the Low Weald, focused on the confluence of the Medway, the Beult and the Teise and incorporating the Lesser Teise. It contained the parishes of Yalding, Hunton, Collier Street, Marden, Nettlestead, East Farleigh, West Farleigh Wateringbury, Teston and Barming as well as a number of smaller communities.

(3) Mr Waring then said that the Middle Medway area had always been at risk of flooding and that significant flooding events occurred every couple of decades. Records indicated that flooding had been taking place since at least 1643. He added that the impact of flooding on society had increased continually over the years. Furthermore, flooding incidents were now happening more frequently and with greater intensity due to changing weather patterns.

(4) Mr Waring briefly set out some of the existing flood risk management measures within the Medway catchment. There was a series of embankments at Edenbridge to protect the town as well as the flood storage area at Leigh, where the capacity was going to be increased for the benefit of Tonbridge and Hildenborough.

The capacity increase at Leigh would, however, have a minimal beneficial impact on the Middle Medway area.

(5) Mr Waring went on to say that the EA had considered a number of options to reduce flood risk in the Middle Medway area. Unfortunately, none of these could be implemented without increasing the risk to other communities or without incurring far greater cost than the benefit to the community that they would protect. The EA had, for example looked at storage on the rivers Beult and Teise; at walls and embankments around communities; and at measures to improve conveyance through the flood plain. None of these had been cost effective or had any technical merit. This meant that the only remaining option was property flood resilience.

(6) Mr Waring moved on to discuss property flood resilience in detail. He said that there were two aspects to this. These were resistance and resilience. Resistance was the installation of measures that prevented the ingress of flood water into the property. This could include door barriers, flood doors, and non-return valves on waste pipes. These were “passive” structures that would prevent internal flooding even if there was nobody inside because they did not have to be re-installed or switched on. Resilience did not prevent the ingress of flood water. It was the use of material to enable the rapid recovery of the property if internal flooding took place. It involved the use of materials such as lime plaster (which did not contain gypsum or other soluble materials), and closed cell plastic insulation (which was impervious to dampness). These materials would enable the property to become dry and habitable very quickly. These materials were expensive to retro-fit. The aftermath of a flood would be an ideal time for retro-fitting to take place. Unfortunately, this very rarely happened because Insurance payments generally simply paid for the restoration of the property to its former state.

(7) Mr Waring showed the Committee a detailed map of the Middle Medway Project Area and pointed out that the majority of the projects were in a diamond-shaped area between the Lesser Teise, the Beult and Yalding. The Project Area as a whole extended from Laddingford in the west to Queen Street in the south west to the plain area of Marden to the south and across to Stile Bridge to the east. The most downstream area was in East Farleigh to the north.

(8) Mr Waring said that a series of engagement events with residents had taken place in 2016/17. This had been followed by scoping and full property surveys of 454 properties during Spring and Summer 2017. This had established that 46 properties were not suitable for Property Flood Resilience (PFR).

(9) The work had begun with Phase 1A, which was a pilot scheme of 28 properties, where resistance measures were installed by the end of 2017. This phase was tested by a Flood Exercise in Spring 2018. Phase 1B had just begun and would see the installation of resistance measures in some 256 properties by the end of 2019. Detailed surveys of these properties had already been carried out. A Flood Exercise would also be carried out by the end of the year. Phase 2, led by KCC and Maidstone BC, would be for those properties that were only suitable for resilience due to their fabric and mode of construction.

(10) Mr Waring then discussed the challenges. Some residents had decided not to participate, which could become an issue if they lived in a terraced or semi-detached property. Even if all the other properties in a terrace had flood resistance measures

installed, flooding to the property which did not agree to PFRs would affect them all. It was therefore important to persuade all terrace owners to be part of the scheme if at all possible.

(11) Mr Waring continued that it was sometimes very difficult to contact residents. They might be at work or only live in the property occasionally. Some were let out to tenants who did not pass on the information to their landlords. If a property changed hands, it was very possible that the new owners were not made aware of the project by the time they arrived.

(12) Another challenge was posed by listed buildings. Sixty two of the 256 houses in Phase 1B were actually listed and could only proceed after separate applications to the Local Authority. It would be essential to ensure that the work undertaken did not damage the properties' heritage value or undermine the historical significance of the building.

(13) Mr Waring showed four pictures to demonstrate the measures that were now in place after phase 1A, consisting of both passive measures and those requiring the owners to take action upon receipt of a Flood Alert.

(14) Mr Waring concluded his presentation by quickly reminding the Committee of the three levels of the Flood Warning System. A Flood Alert was given when there was flooding of low-lying land and roads, but no property flooding was expected. People were encouraged to be vigilant and to pay attention to weather forecasts. A Flood Warning was issued when flooding of properties was expected. Immediate action was required, including the deployment of flood barriers, moving furniture upstairs and moving out of the property to safety. A Severe Flood Warning was issued following consultation with emergency partners when the flooding began to present a high risk to life, requiring evacuation if feasible and not already undertaken.

(15) Mrs Brown said that the Environment Agency had done a very good job of keeping the community up-to-date on its activities. She asked whether there was any further information on Phase 2 of the project. Mr Waring replied that KCC and Maidstone BC had asked the EA to engage some consultants to undertake some initial assessments for the 46 properties involved. This work had been completed within the past fortnight. He had then produced a brief interpretive report, which was currently being peer-reviewed. His next step would be to discuss the conclusions with the two Local Authorities.

(16) Mrs Wright asked whether the new developing Local and Neighbourhood Plans should specify that new housing should be built with the capability of withstanding flooding. Mr Waring replied that the EA would probably object when it was consulted about any development that was the subject of flood risk. It considered that the best form of flood defence was to avoid building properties in the flood plain. There could be exceptions to this general principle, such as domestic extensions or agricultural buildings that were being converted. It was possible that no objection would be raised if it was possible to convert a building so that there was no risk of flood water entering by, for example, raising the finished floor level. Essentially, the EA would object whenever there was a risk of inundation to a property.

(17) The Chairman said that 400 new three-storey houses were being built in his Romney Marsh constituency, which was for the most part Flood Zone 3. He asked whether there was any conflict between this type of development and flood regulations. Mr Waring replied that providing there was no accommodation on the ground floor, the property would be classified as flood resilient.

(18) Mr Waring replied to a question from Mrs Brown by saying that there were a lot of listed properties in Yalding. It was feasible to raise floors and sacrifice the ground floor for storage and garages in buildings if they were not listed. Another suggestion had recently been made during a presentation in Yalding that it might be possible to introduce a raised walkway system. He did not consider that this could be implemented without significantly changing the character of the village.

(19) Mr Waring then said that the walkway system would work at properties such as the former Rose and Crown public house in East Peckham. The EA had withdrawn its objection to the development because it was designed to raise up the property so that all the accommodation was at ground floor level leading to a walkway above flood level, which would take the inhabitants to an area that was at a much lower risk of flooding. This system would allow the residents to go about their normal business during a flood event.

(20) Mr Waring replied to a question from Mrs Mackonochie by saying that when the EA had looked at options for the Yalding/Collier Street area, they had taken into account the impact of water storage in these villages on nearby communities. As there would have been a detrimental impact to them, this particular option had automatically become unviable.

(21) RESOLVED that Mr Waring be thanked for his presentation and that its content be noted.

5. Environment Agency and Met Office Alerts and Warnings and KCC severe weather response activity since the last meeting
(Item 7)

(1) Mr Harwood introduced the report. He informed the Committee that since publication of the papers there had been an additional fluvial flood alert on the River Eden issued by the Environment Agency (paragraph 2.5) and an additional Met Office severe weather warning for wind (paragraph 2.6). It was also noted that the last closures of the Thames Barrier (Appendix 3) had taken place in 2019 rather than in 2018 as set out in the table.

(2) Mr Harwood referred to paragraph 2.1 of the report which showed that the above average rainfall in November and December had been followed by two months where it had been below average, leading to all river catchments in Kent being in the “below normal” to “notably low” ranges.

(3) Mr Harwood then drew attention to paragraph 3.2 of the report which set out the risk of coastal flooding in combination with high winds in the periods between 20 and 25 March, 18 and 23 April, and 17 and 21 May.

(4) Mr Harwood said that the county had not seen the flood impacts that had been prevalent in previous years. The ground was dry for the time of year when rivers and reservoirs were usually replenished. During the high levels of rainfall in November and December, water had been diverted to the reservoirs, which were consequently at a good level. Groundwater and river levels were, however, now very low.

(5) Mr Harwood then said that although the main concern was lack of rainfall, the current trend of flash flooding concentrated in very localised parts of the county would continue to be a risk during the summer. There was a need to remain vigilant and to plan appropriately.

(6) The Chairman said that the recent unseasonal warm weather had resulted in local flora sucking up more water than would normally have been the case because of the extended growing season. He had discussed this with Affinity Water and Southern Water who had both expressed concern over the potential effects that could result. At the same time the spring tides could cause problems due to the oscillations in the jet stream. He was confident in the ability of KCC staff to respond effectively to emergencies in any of these circumstances.

(7) In response to a question from Mr Thomas, Mr Harwood said that community resilience was a significant area of work for the Emergency Planning Team. He would welcome the opportunity to help Local Members scope the specific issues within their electoral divisions so that they could report back to their communities.

(8) Mrs Brown said that the most important things that local representatives from districts or parishes at risk of flooding could do were to urge their constituents to sign up to receive flood warnings and to ensure that they knew who their local flood warden was.

(9) RESOLVED that the report and content of the ensuing discussion be noted.

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To: Kent Flood Risk Management Committee – 22nd July 2019

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

Subject: KCC Flood Response Plan

Classification: Unrestricted

Summary: To provide an update to Kent Flood Risk Management Committee on the evolution of the latest Kent County Council Flood Response Plan (Issue 7).

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1. Rationale for and scope of updates to the Flood Response Plan

1.1 KCC Flood Response Plan is a longstanding document which outlines the principles governing KCC's response to flooding events within the local authority's administrative area and enables compliance with the County Council's enforcement and response duties. This plan also provides geographical data and an analysis of current research in relation to the various flood risks posed to Kent's residents, natural and built environment. The County Council's recent recognition of the UK Environment and Climate Emergency has both raised the profile and wider relevance of this area of Resilience and Emergency planning and response activity.

1.2 Updates and revisions include:

1.2.1 A new horizon scanning section addressing both current and projected climate change impacts and the uncertainty around the potential consequences for Kent (see section 5.3). This new section expands upon the risks identified in the UK Climate Change Risk Assessment 2017 and incorporates additional research from the Intergovernmental Panel on Climate Change (IPCC) and Committee on Climate Change (CCC), specifically focusing on the impacts to the South East.

1.2.2 A new section on people and communities rendered vulnerable by virtue of age, infirmity, poor health, deprivation etc. has also been included (see section 9.2). This provides an analysis on social vulnerability (i.e. political, social and economic factors which can constrain the ability of the population to respond to an event and their ability to adapt) to flooding and the associated impacts on the health and social care sectors, which is informed by research from Climate Just, 2019. This section incorporates new maps showing communities exhibiting multiple layers of deprivation located within geographical areas vulnerable to flooding for surface water, fluvial and coastal flooding impacts, also produced by Climate Just (see figures 9.3, 9.4 and 9.5).

1.2.3 Further updates address recent organisational change, contacts, links and revisions to corporate and multi-agency command and control.

2. Next steps

2.1 Following discussion at Flood Risk Management Committee, and subsequently at the four Directorate Resilience Groups, any amendments will be incorporated into a final draft which will then be presented for sign-off at Growth Environment and Transport Directorate Management Team (GET DMT) on 7th August. The KCC Flood Response Emergency Plan will then be uploaded to both the Resilience Direct secure platform and Kent.gov.

2.2 At last Kent Resilience Forum Severe Weather Group meeting on 4th July 2019 it was agreed that KCC will participate within a new Local Multi-agency Flood Plan task and finish group, which will ensure that KCC's Flood Response Plan and other 'single-agency' flood plans are complimentary to multi-agency flood planning and response in Kent and Medway.

3. Recommendations

3.1 That Kent Flood Risk Management Committee review the draft plan and contribute any further considerations or additional content requirement.

Louise Butfoy, Resilience and Emergency Planning Project Officer, Growth, Environment and Transport tel. 01622 761340 e-mail louise.butfoy@kent.gov.uk

Background documents:

- *Draft KCC Flood Response Plan (Issue 7).*

Kent County Council Flood Response Plan

Issue 7 July 2019

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Next scheduled review: July 2021

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Issue & Review Register

Summary of changes	Issue number & date	Approved by
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Minor updates	Issue 1.1 February 2013	Steven Terry Emergency Planning Manager
Entire document updated, incorporating lessons from winter 2013/14 severe weather events, and subsequent debriefs	Issue 2 June 2014	Tony Harwood Senior Resilience Officer
Minor updates	Issue 3 December 2014	Tony Harwood Senior Resilience Officer
Minor updates	Issue 4 June 2015	Tony Harwood Resilience and Emergencies Manager
Plan format change and updates	Issue 5 June 2016	Tony Harwood Resilience and Emergencies Manager
Update and synchronisation with latest version Pan Kent Flood Plan	Issue 6 July 2017	Tony Harwood Principal Resilience Officer
Major updates	Issue 7 July 2019	Louise Butfoy Project Officer

NOTE: The latest version of this plan can always be found at on Resilience Direct and Kent.gov.

Next review scheduled: July 2021

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Organisation Kent County Council

Approved by: **Date: July 2019**
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Distribution List (electronic):

Title	Role/Organisation
Duty Directors and Support	KCC
Tactical Managers and Support	KCC
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KCC Highways and Transportation Duty Officers	KCC
KCC Contact Point / Agilisys	KCC
Kent Resilience Team	Multi-agency
Flood Management Team	Environment Agency

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1. Introduction

1.1 The purpose of this plan is to set out the principles that govern the Kent County Council response to a flooding event within their local authority administrative area.

1.2 This Plan is produced and maintained by Kent County Council Resilience and Emergency Planning Service to meet the requirements of the Civil Contingencies Act 2004.

2. Scope

2.1 The main objective of the Plan is to ensure an informed and co-ordinated response to a flood event, which will protect life and well-being, with the mitigation of property and environmental damage as a strong supporting objective.

2.2 The focus of this plan is primarily on coastal, fluvial (river), surface water and ground water flooding.

2.3 This plan incorporates guidance arising from the Pitt Review, and acknowledges and recognises the impacts of climate change and associated extreme climatic events as identified in the UK Climate Change Risk Assessment 2017.

2.4 The Plan provides information on actions, roles and responsibilities in response to a flood in the Kent County Council administrative area. A range of Kent-wide plans/frameworks have been published by the Kent Resilience Forum which compliment this plan and may be found in electronic format on Resilience Direct. Specifically, these include the following:

- Pan Kent Strategic Emergency Framework;
- Pan Kent Multi-agency Flood Plan;
- Kent County Council Recovery Framework;
- Kent County Council Flood Response Plan;
- Local Multi-agency Flood Plans;
- Kent Resilience Forum Welfare Centre Guidelines;
- Kent Resilience Forum Psychological Care Guidelines;
- Kent Resilience Forum Resilient Communities Plan; and
- KRF Identifying Vulnerable People in an Emergency Plan.

2.5 The procedures in this response plan will be activated when any of the following criteria are met:

- Met Office Severe Weather Warning received for heavy rain or rapid snow melt;
- Flood Alert/Flood Warning /Severe Flood Warning issued;
- Intelligence received from KCC colleagues, partners or public indicates flooding may occur;

- Properties are threatened by flooding;
- Properties are affected by flooding; and
- Intelligence indicates that human or animal welfare is threatened by flooding or risk of flooding.

See section six for more detail of the plan activation.

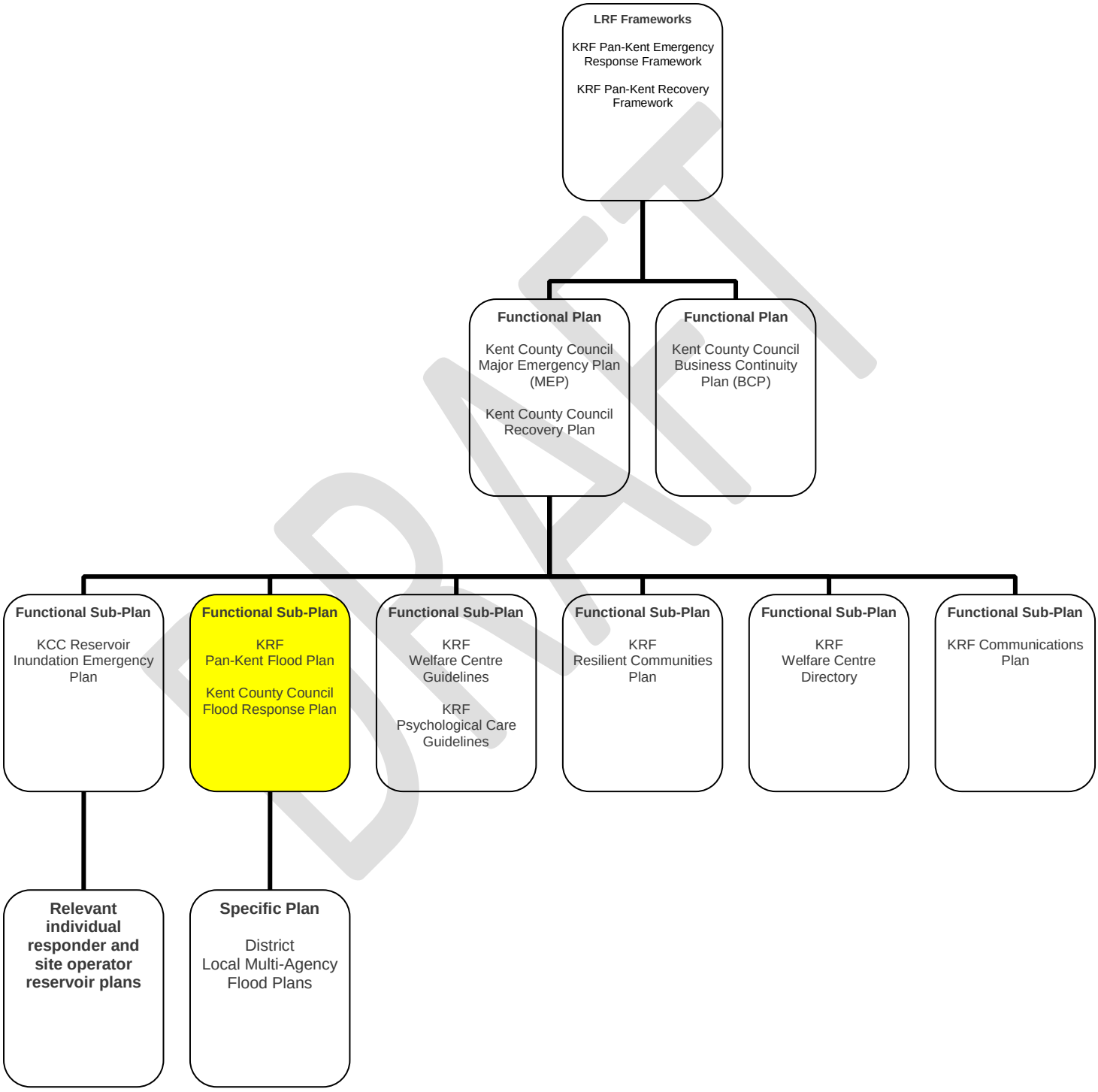
3. Audience

3.1 This document is intended for use by all Kent County Council Directorates, duty officers and command and control personnel to inform and support their planning for and response to major flooding events within the County.

4. Related and Interdependent Plans

The relationships between response plans are indicated in the diagram below.

Figure 4.1 - Related and Interdependent Plans



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5. The Risk of Flooding

5.1 Risk Assessment

Risk is a product of the likelihood and impact of a given hazard or threat. The impact will depend upon the exposure of people and property to the hazard and their respective vulnerability to harm. In Kent, the risks from flooding vary according to the source of the flooding and the characteristics of the people and property exposed to flooding.

Assessed risk details, including critical infrastructure, are contained in the Risk Registers at RRF (Regional Resilience Forum), LRF (Local Resilience Forum) and at local responder level.

Residual risk is that remaining after mitigation measures (in this case tidal and fluvial defences) have been taken, recognising that flood risk cannot be eliminated entirely.

5.1.1 Community Risk Register

An assessment of the risk of flooding in Kent can be found in the Community Risk Register 2015 (at Local Resilience Forum level) which is accessible via Resilience Direct.

The risk of flooding in Kent is divided into 7 main categories under the Hazard Category of Severe Weather.

H19 - Flooding: Major coastal and tidal flooding affecting more than two UK regions (This is the national picture to provide context for local risk assessment).

HL16 - Local coastal / tidal flooding (affecting more than one Region).

HL17 - Local coastal / tidal flooding (in one Region).

H21 - Flooding: Major fluvial flooding affecting parts of more than two UK regions. (This is the national picture to provide context for local risk assessment)

HL18 - Local / Urban flooding (fluvial or surface run-off).

HL19 - Local fluvial flooding.

HL20 - Localised, extremely hazardous flash flooding.

Risk is assessed based on the likelihood and impact to give an overall Risk Rating. The risk assessment within the Community Risk Register gives a 'Very High' Risk Rating outcome for all of the above hazards.

More locally, coastal flood risk is seen by the Kent Resilience Forum Risk Assessment and Severe Weather Subgroups as the highest risk due to the length of coastline in Kent, the nature of that coastline and the size and demographic profile of the communities living in coastal areas and following advice from the Environment Agency (see Appendix D).

5.2 Flood Risk

In total, around 88,000 properties in Kent are estimated to be at risk of flooding, and there is significant development pressure across the county, so this figure is increasing. In addition, many more people work in, visit or travel through potentially vulnerable areas and could be unfamiliar with the risk.

As a result of man-made climate change, both the chance and consequence of flooding are increasing. According to the UK Climate Change Risk Assessment 2017, sea level rise, more frequent and higher storm surges and increased winter rainfall and more intense summer rainfall are predicted to add to existing risk. Given these changes, it may not be possible to improve fixed defences sufficiently to maintain or raise protection standards. As such, more work will be needed across the county to decrease the impact of flooding by building resilience in infrastructure, the environment, society and the local economy

Floods are predominantly natural events that result from excessive rainfall which may exceed the capacity of drainage (natural or man-made) which can cause rivers to burst their banks. Tidal storm surges on the coast or in estuaries may cause the level of the sea to rise, all potentially resulting in death and damage.

Some areas are protected from flooding by flood defence measures, which may include flood storage reservoirs, flood walls and bypass channels. These do not eliminate the risk of flooding occurring, they only reduce it. They may though, lead to a false sense of security or complacency in those living or working in the defended areas, who would be unprepared for a flood should one occur. The consequences of flooding are best controlled by avoiding inappropriate development in flood risk areas.

This Plan is an element of the response to potential major and significant flooding in Kent.

In this document, reference to risk implies a function of both the chance or likelihood of a hazard becoming a reality and the consequences or impact of that occurrence. The consequence will depend upon the exposure of people and property to the hazard and their respective vulnerability to harm.

5.3 Climate Change Impacts & Uncertainty

Projected climate change impacts in the South East include, but are not limited to, shifts in seasonal and rainfall patterns; increases in the frequency and magnitude of extreme weather events such as an increasing frequency and intensity of rainfall and storm events, resulting in escalating coastal storm surges and an elevated risk of tidal/coastal flooding events; glacier and ice sheet melting; thawing of permafrost; sea-level rise (which, in relative terms, is predicted to be greater in the South East compared to in other parts of England); acidification of the oceans and average temperature increase, causing drier summers and more frequent drought conditions as well as wetter and milder winters.

However, the ‘scale and magnitude of impact will depend on the pattern of future greenhouse gas emissions’, and it must also be noted that the UK has always been subject to long-term weather variability, which informs the Intergovernmental Panel on Climate Change (IPCC) potential future emission scenarios. (McCoy and Watts, 2014).

The consequences of the direct impacts of heat and extreme weather events may include: a deterioration of access to essentials such as clean water, nutritious food and shelter; forced migration, conflict and societal

disruption; and loss of biodiversity' as well as, increasing physical and mental stress from flooding; cold and heat related mortality and the prevalence of vector-borne diseases, whilst also negatively impacting people with existing respiratory diseases (Haines, 1991; Frumkin et al, 2008; McCoy and Watts, 2014).

In Kent, there are currently approximately 64,000 properties at risk of coastal and fluvial flooding, and 24,000 at risk of flooding from surface water runoff (2019). As a result of climate change, the frequency, distribution and severity of flooding may change, and areas that have not been affected by flooding previously may be at risk from flooding in the future, for example, the risk of severe flooding of coastal areas is likely to increase as a result of rising sea levels and increased storm surges (CCC, 2016; Kent County Council, 2017).

5.4 Flooding Sources

Kent is potentially vulnerable from several flooding sources (as described below). These may occur separately or in combination.

5.4.1 Tidal Flood Risk

5.4.1.1 Tidal Flood Risk General Information

Tidal flooding occurs as a result of a severe storm surge, which raises the level of the sea and can inundate coastal areas directly or by overtopping the flood defences. Flood defences may also be breached during a storm surge, which can occur naturally, or as an accident, failure to close a gate or through a malicious act.

There are defended and undefended tidal floodplains on the Kent Coastline. The tidal defences for the Kent Coastline, a number of which are private, provide varied levels of protection against a storm surge. Further, some areas do not benefit from any formal defences, and are therefore at risk of flooding from small storm surges, while other formal defences deliver protection of only 1 in 5 years. Parts of the Thames Estuary Barrier are designed to withstand a 1 in 1,000-year severe weather event.

The chance of tidal defences overtopping from a storm surge should be evident several hours beforehand. There is continuous monitoring of tide levels, and the Environment Agency aims to issue a warning at least 2 hours in advance. If tidal flood defences are overtopped, floodwater may be trapped behind the defences, even after the storm has passed. This can lead to flood waters several metres deep in places and, close to the site of overtopping, floodwater velocities could be enough to sweep people off their feet. Recovery may necessitate pumping and water could be present in an area for weeks. The water will be brackish as well as polluted which will cause additional damage.

By its nature, a breach in defences is unlikely to be predictable, although it is possible that signs of weakness may be evident prior to failure. No advance warning will be provided. The risk of a breach occurring would increase with the severity of a storm and responders should be alert to the possibility of a breach when a flood warning or severe flood warning has been issued. A breach during a storm surge may result in a torrent of floodwater affecting an area behind the defence which will present a threat to life and possibly cause damage to buildings. An added hazard would result from large objects, such as cars, and other debris carried by the floodwater. Depending on the nature of a breach, some floodwater may drain away as the tide recedes, but it is likely that many areas will remain inundated.

5.4.1.2 Tidal Flood Risk in Kent

- The Kent coastline is some 326 miles long (524.6 km) and poses a potential tidal flooding risk to 369 square miles of land (593.8 km) within the county (excluding Medway's administrative area). A map showing areas within Kent potentially vulnerable to coastal (or tidal) flooding can be found at Figure 1. at the end of Section 5. With a predicted cumulative sea level rise of 1.2m in the south east by 2115 (source: Environment Agency) and an increasing likelihood and severity of stormy conditions the threat from a North Sea storm surge is a key and growing risk to Kent.

5.4.2 Fluvial Flood Risk

5.4.2.1 Fluvial Flood Risk General Information

Fluvial flooding results when freshwater flows within a watercourse exceed the capacity of the channel, or overtop flood defences, or escape through a breach in flood defences. High freshwater flows may result from intense or prolonged rainfall, snowmelt, reservoir dam failure or blockage of a channel.

Larger fluvial flooding events in Kent and Medway are most likely to occur from the autumn through to the spring and there will generally be a warning issued in advance by the Environment Agency when there is the likelihood of flooding.

The standard of protection afforded by defences varies from river to river and, in many cases, along the watercourse itself. Fluvial flood defences take many different forms, in contrast to tidal defences. Many significant fluvial flood defences are provided by flood storage areas, which are designated as reservoirs. A breach of these defences is addressed by the KCC Reservoir Inundation Emergency Plan. Other fluvial flood defences may be breached, but due to the lower water levels there is a lower risk than with tidal flooding. As with a tidal breach, no advance warning of a breach in fluvial defences can be expected.

5.4.2.2 Fluvial Flood Risk in Kent

The landscape of Kent is defined by its river systems. The largest, the catchment of the **River Medway**, covers 930 square miles (2,409 km^2) comprising some 25% of the area of the County. The River Medway flows for 70 miles (113 km) from just inside the West Sussex border to the point where it enters the Thames Estuary in north Kent. The River Medway is tidal downstream of Allington Lock, Maidstone.

Tributaries of the River Medway include:

- **The River Eden** - flows through the Weald of Kent from the border with Surrey, rising from the source in Titsey parish, Surrey and flowing eastward through the Wealden clay to join the River Medway near Penshurst.
- **The River Bourne** - begins its course west of Oldbury Hill on the Greensand Ridge in the parish of Ightham and enters the River Medway upstream of East Peckham.
- **The River Teise** - begins in Dunorlan Park in Tunbridge Wells and flows eastwards through Lamberhurst, passing Bayham Abbey. Here the small River Bewl, on which is the reservoir Bewl Water, joins the Teise. The Teise bifurcates 1.2 miles (2km) south west of Marden, the minor stream flows directly to Twyford Bridge, Yalding, while the major stream joins the River Beult at Hunton, 0.9 miles (1.5km) downstream from Yalding.

- **The River Beult** - has its several sources on the Weald west of Ashford, and then flows through Headcorn, where it is joined by the major stream of the Teise. The river enters the Medway at Yalding.

- **The Shaw and Loose Streams** - The Shaw Stream rises near Langley, south east of Maidstone, and runs towards Boughton Monchelsea where it goes underground and re-emerges at Loose as the Loose Stream before joining the River Medway at Tovil. The Shaw Stream is heavily modified, with a dam structure at Parkwood Farm (TQ 78205 51438) as well as numerous culverts at points where it flows under the local road network. Loose Stream is now a largely urban watercourse with significant modification along most of its length.

- **The River Sherway** - flows from Egerton to the River Beult at Headcorn.

- **The River Len** - has its source at a small watershed south of Lenham. This heavily modified small river flows in a westerly direction and joins the Medway at the Archbishop's Palace Gardens in Maidstone town centre. The Len has been dammed at various points along its course, including Chegworth Mill, Leeds Castle, Mote Park, Turkey Mill and Palace Avenue Mill Pond. A number of tributaries of the River Len rise at the springlines at the foot of the Kent Downs AONB to the north and Greensand Ridge to the south. Some of these tributaries, such as the Lilk Stream at Bearsted and Fair Bourne at Fairbourne Heath, are seasonally swollen by increased surface and groundwater flows.

The second largest catchment in Kent is that of the **River Stour**. The River Stour is the generic name for a group of rivers. The major towns at Ashford and Canterbury have grown up on the banks of the River Stour. The river is tidal downstream of Fordwich.

Its catchment area covers the eastern part of Kent and tributaries include:

- **River Upper Great Stour** - flowing from near Lenham to Ashford.
- **River East Stour** - rising near Hythe to Ashford.
- **River Great Stour** – flowing from Ashford to east of Canterbury.
- **River Little Stour** – from Postling to join the Great Stour at Plucks Gutter, north west of Canterbury.
- **River Wantsum** - part of the old Wantsum Channel separating the Isle of Thanet from mainland Kent.
- **Whitewater Dyke** - running from Shadoxhurst to Ashford
- **Ruckinge Dyke** - from north of Hamstreet to Ashford
- **Aylesford Stream** - its source is north of Sevington to Willesborough

Other Kent rivers include the **River Darent** which rises at Westerham and Limpsfield Chart and joins the **River Cray** at Dartford Marshes before flowing into the tidal Thames at **Dartford Creek**, the **River Fleet** which rises at Springhead Nursery and joins the River Thames at Northfleet, the **River Dour** which flows from Temple Ewell to the sea at Dover and the **River Rother** which forms part of the geographical boundary between the administrative counties of Kent and East Sussex.

In addition, a large number of smaller watercourses persist within the county which can contribute to localised flooding. Significantly, these include the **Brockhill, Mill Lease, Saltwood and Seabrook Streams** all rising at the foot of the scarp of the Kent Downs and flowing into the **Royal Military Canal**. The **Enbrook Stream** and (now heavily modified) **Pent Stream A, B, C and D** have the same origin but flow into the English Channel and Folkestone Harbour respectively. The heavily modified courses of the **Gorrell Stream** at Whitstable, **The Brook** and **Swalecliffe Brook** at Swalecliffe, **West Brook** at Hampton and **Plenty Brook** at Herne Bay have all contributed to historic flooding events as they flow (or are pumped) to the sea.

A map showing areas within Kent vulnerable to fluvial flooding can be found at figure 5.1 at the end of Section 5.

5.4.3 Surface Water/Overland Flow and Sewer Flood Risk

Surface water flooding results from rainfall that exceeds the capacity of the land or drainage infrastructure to receive it.

Sewer flooding occurs when drains and sewers are overwhelmed by rainfall and discharge away from where the rainwater entered them. Where the sewers are combined (that is they convey foul and surface water), contaminated water may be released.

Surface water and sewer flooding generally occur as a result of intense rainfall which is relatively unpredictable and so may result in flooding without any prior warning. Flooding may also result from high river and tide levels preventing the discharge of sewers and drains.

Water depths from surface water and sewer flooding are rarely great, other than in local depressions or unless associated with river or tidal flooding. Local circumstances may give rise to significant water velocities. Surface water flooding, when unaccompanied by fluvial or tidal flooding, is likely to trigger a major incident only when widespread occurrence causes significant traffic disruption or strains the response capability.

An Environment Agency map showing areas within Kent vulnerable to surface-water flooding can be found at figure 5.2 at the end of Section 5.

5.4.4 Groundwater Flood Risk

Groundwater flooding occurs when the water table exceeds the level of the ground and groundwater emerges. Due to the nature of groundwater flooding may flood large areas and it causes a prolonged flood event, leaving areas waterlogged and/or flooded for up to months at a time. In these areas the groundwater levels are monitored by Environment Agency boreholes, and due to the slow onset of groundwater flooding it can be prepared for, but not halted.

Groundwater in Kent is most notably in the chalk catchments in the east of the county (**Little Stour, Nailbourne and Petham Bourne**) and west of the county (**Darent catchment. Including former chalk quarries in northwest Kent)**. Historic records of groundwater flooding also exist for the greensand catchments within the County. An Environment Agency groundwater emergence map showing areas within Kent vulnerable to surface-water flooding can be found at figure 5.3 at the end of Section 5.

The following are not covered by this plan:

- Foul Sewage - the impact is likely to be local: resulting from blockage or surcharging of the sewerage network leading to overflow through manholes etc: responsibility for response lies with the relevant utility company. However, flood water contaminated by foul water sewage may require additional actions by responders. This type of flooding often occurs in conjunction with, or as a result of, other forms of flooding and the source may be difficult to determine. This means that it is dealt with as part of the response the response to other forms of flooding listed above.

- Water Main Burst - the impact is likely to be local: responsibility lies with the relevant utility company.

- Contained Water - this includes statutory and other reservoirs, private lakes and canals. In respect of reservoirs covered by The Reservoirs Act 1975. This planning is addressed through the KCC Reservoir Inundation Emergency Plan.

Figure 5.5 - Map of Kent showing coastal and fluvial (river) flood zones 2 and 3 (source: Environment Agency)

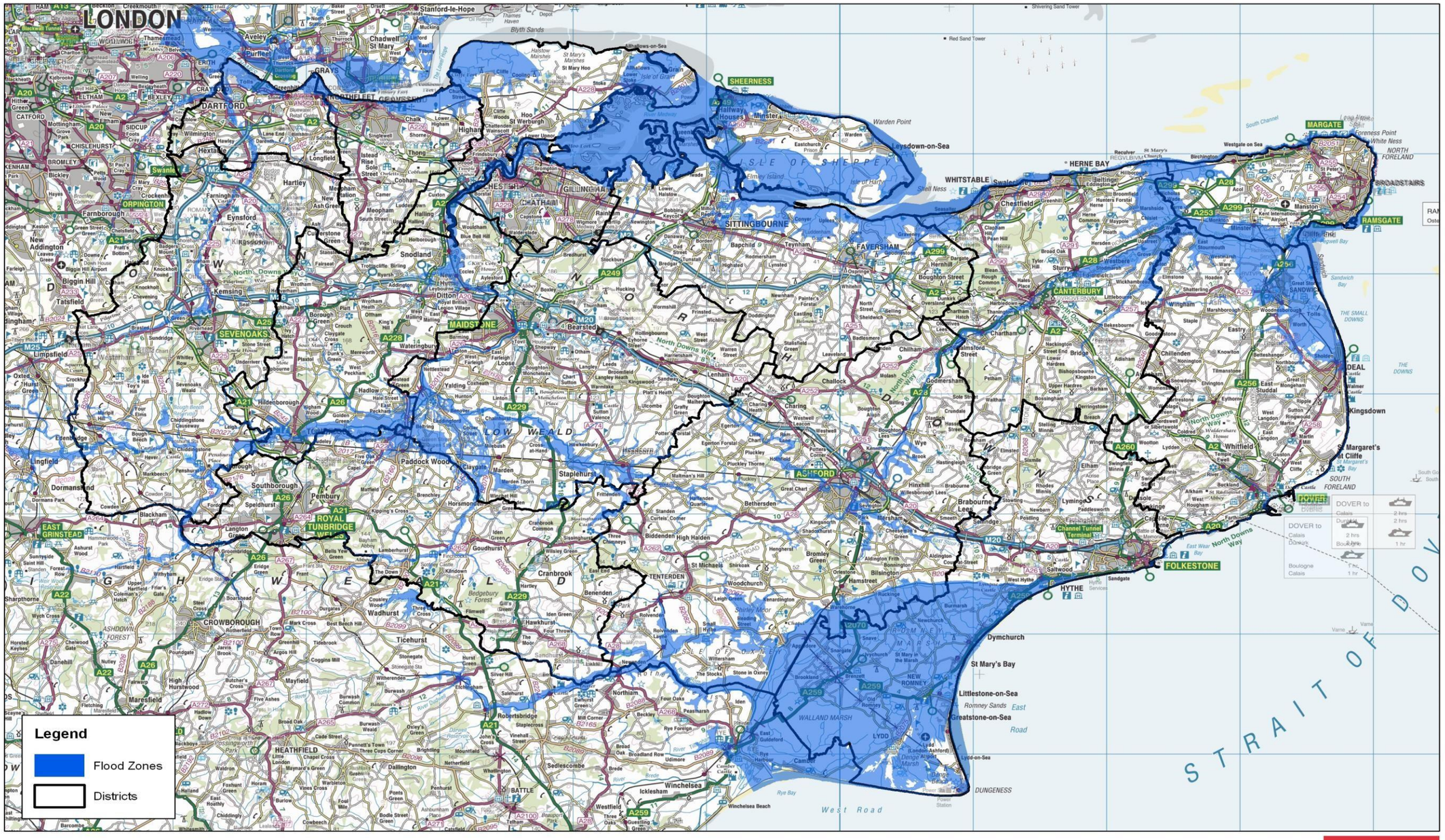

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Figure 5.6 - Map of Kent showing surface water flood risk (source: Environment Agency)

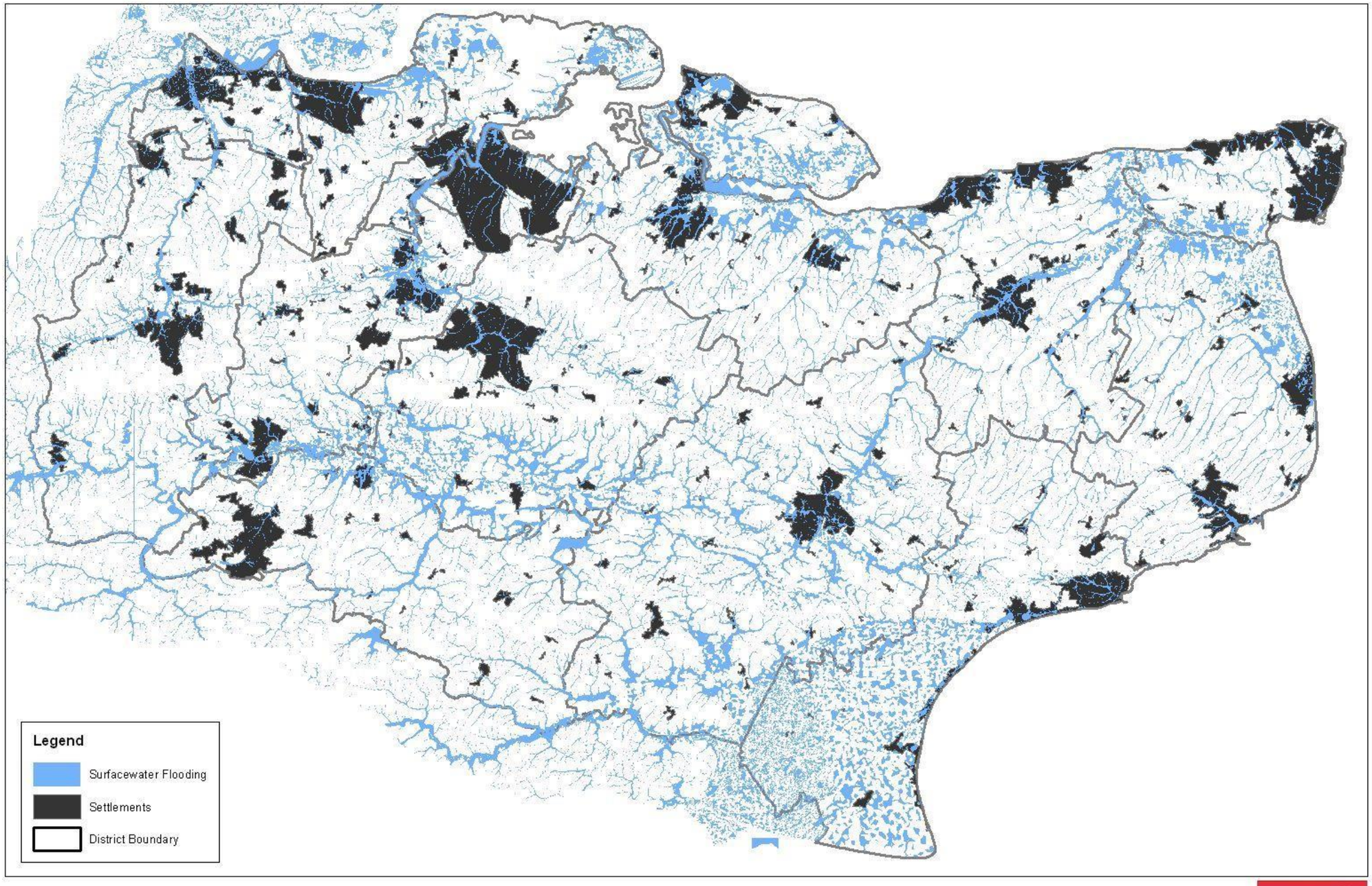

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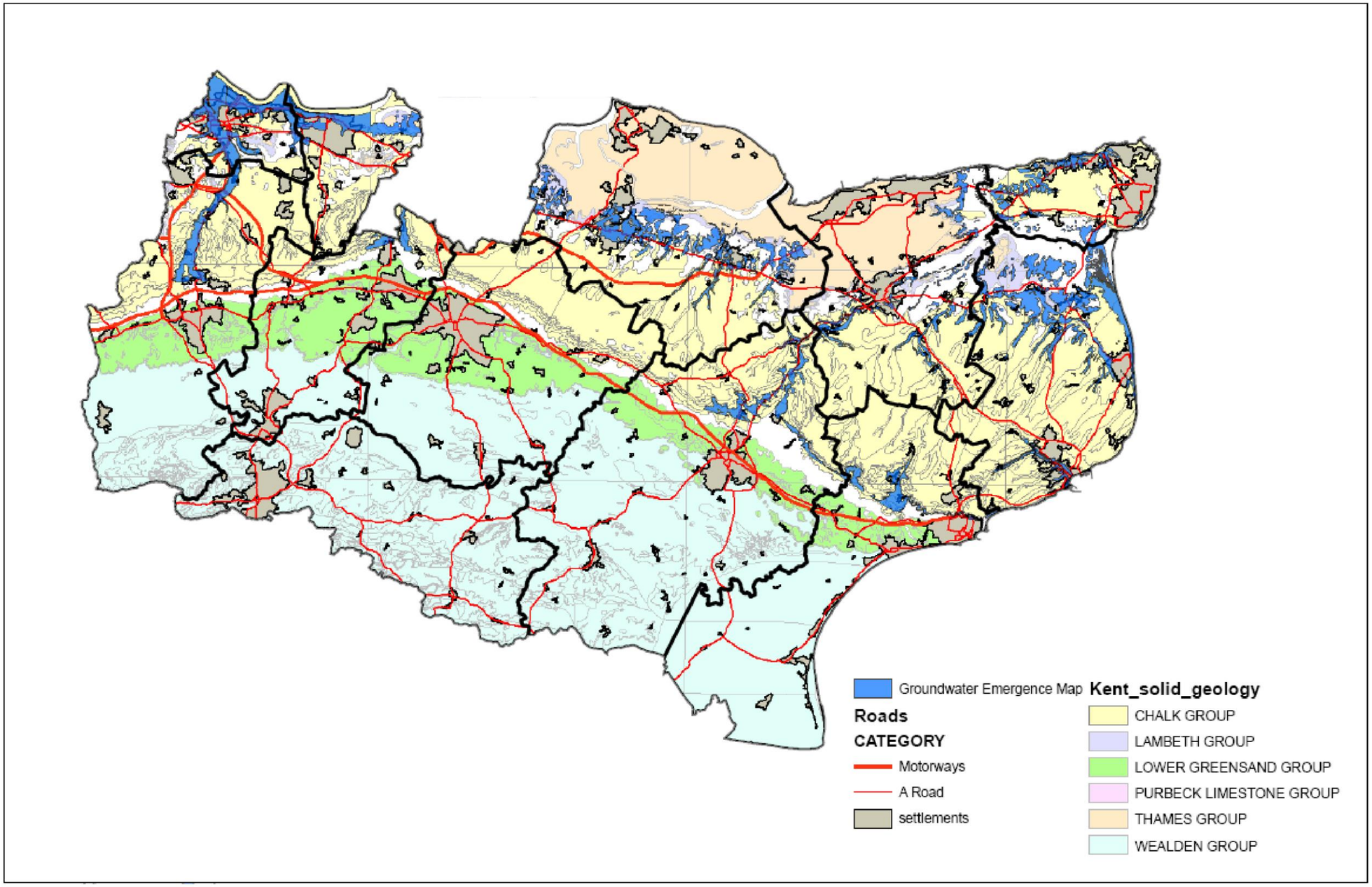
Figure 5.7 - Map of Kent showing ground water flood risk (source: Environment Agency)



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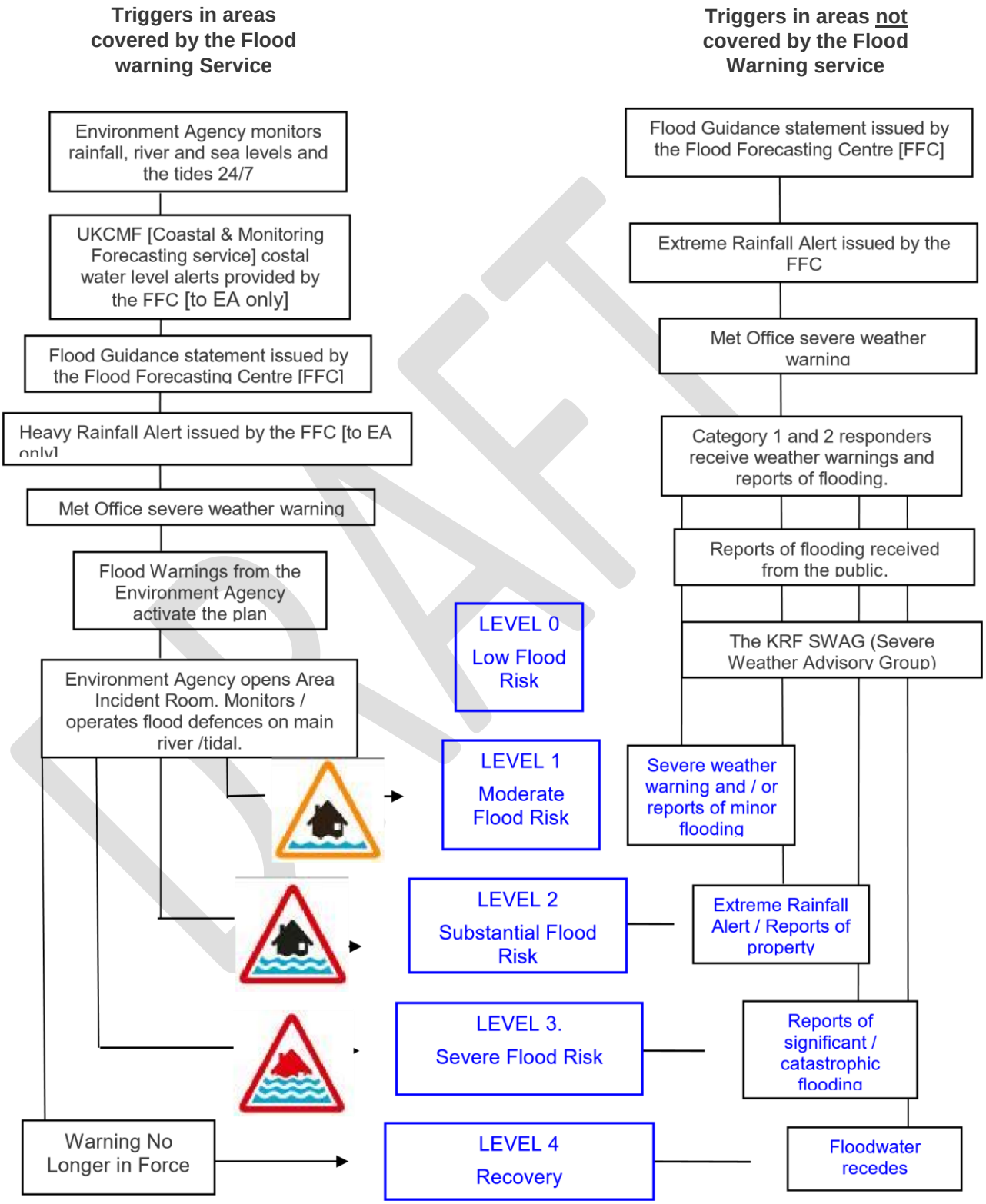
6. Plan Activation

Figure 6.1 - Plan Activation Flow Diagram



***** please refer to Figure 6.2 on next page "Common Triggers and Thresholds" and to the specific actions contained in Part 2 of this plan.

Figure 6.2 - Common Triggers and Thresholds

Warning Level	Action
SWAG called	**EA** will lead Severe Weather Advisory Group (SWAG) for flood events and consider opening their area incident room and monitor the situation closely. **EA** teams will be clearing grills and monitoring or operating their defence assets as necessary.
 Flood Alert Severe weather warning and / or reports of minor flooding	Emergency response unlikely **EA** will keep partners informed either via SWAG, Strategic or Tactical command, and provide info where requested. **EA** will lead Severe Weather Advisory Group (SWAG) if it is still required and consider opening their area incident room. **EA** teams will be clearing grills and monitoring or operating their defence assets as necessary. **EA** will possibly be issuing alerts and monitoring the situation closely.
 Flood Warning Extreme Rainfall Alert / Reports of	Emergency response likely but limited **EA** will keep partners informed either via SWAG, Strategic or Tactical command, and provide info where requested. **EA** will lead Severe Weather Advisory Group (SWAG) if it is still required. Incident Room is likely to be operational. **EA** teams will be clearing grills and monitoring or operating their defence assets as necessary. **EA** will possibly be issuing alerts or warnings dependant on the situation and monitoring the situation closely. Open sandbag stores in Paddock Wood, Five Oak Green and Lamberhurst. Assess when monthly maintenance of culverts was last carried out and possibly carry out additional work.

property flooding	
Severe Flood Warning	
 Reports of significant / catastrophic flooding	Emergency response probable **EA** will keep partners informed either via Strategic or Tactical command and provide info where requested. **EA** will lead Severe Weather Advisory Group (SWAG) if it is still required. Incident Room is likely to be operational. **EA** teams will be clearing grills and monitoring or operating their defence assets as necessary. **EA** will possibly be issuing severe flood warnings and monitoring the situation closely. Contractor on standby for possible assistance with delivering sandbags to householders
Warning No Longer in Force Floodwater recedes	Consider recovery **EA** will keep partners informed either via Strategic or Tactical command and provide info where requested. **EA** Incident Room is likely to be stood down. **EA** teams will be clearing grills and monitoring or operating their defence assets as necessary and begin necessary repair works. **EA** will continue to monitor the situation closely.

NOTE
See also ‘Area Specific Thresholds and Triggers’ for each area in Part 2.

6.3 Flood Warnings

6.3.1 Environment Agency Flood Warnings

1. **Flood Alert**

Flood Alerts are issued earlier than a flood warning, to give customers advance notice of the possibility of flooding.

Rivers will be running bank full and further rainfall is expected. Flooding of property is possible, particularly in low lying and riverside areas. There may be minor flooding of low-lying land, roads and gardens. The alert is issued in order that the public at risk, the emergency services, local authorities and other bodies are aware of increasing chance of flooding and take appropriate preparatory action.

People should: STAY ALERT, STAY VIGILANT, MAKE EARLY LOW-LEVEL PREPARATIONS FOR FLOODING.

2. **Flood Warning**

Flood Warnings are used to warn customers that flooding of property is expected and they should take immediate action to protect themselves and/or their property.

This is issued when flooding of homes and businesses is expected. Property owners, the public at risk, the emergency services, local authorities and other bodies should act to protect life and property.

People should: TAKE ACTION TO PROTECT THEMSELVES AND THEIR PROPERTY

3. Severe Flood Warning

Severe Flood Warnings are used to warn customers of significant risk to life or significant disruption to the community caused by widespread or prolonged flooding. Customers may have already received a Flood Warning, or they may receive a Severe Flood Warning as their first warning of expected flooding depending on the situation.

Significant risk to life caused by:

- deep and fast flowing water (e.g. caused by significant overtopping of defences or sudden onset flooding from dam/defence failure);
- rapid onset of flooding;
- presence of debris in the water that could cause death or injury;
- potential/observed collapse of buildings/structures; and
- the vulnerability of the population or their surroundings (e.g. deep/fast flowing water through a caravan park).

Significant disruption to communities:

- likely to affect whole community;
- community isolated by floodwaters with no obvious means of escape;
- critical resources/infrastructure for communities disabled (e.g. no access to food, water, electricity);
- emergency services and authorities unable to cope with large volumes of evacuees and rest centres at full capacity; and
- mutual aid/military support necessary or called upon.

Property owners, the public at risk, the emergency services and the civil authority should act to protect life and property. This is likely to involve an enhanced response and the commitment of significant resource.

People should: TAKE ACTION TO PROTECT THEMSELVES AND FOLLOW THE ADVICE OF THE EMERGENCY SERVICES.

4. No Longer in Force

To signal stand down and to close communications with people.

6.3.2 Flood Warnings Received by Kent County Council

KCC Resilience and Emergencies Unit, KCC Social Care Health and Wellbeing (via their emergency planning lead) and Kent Highways and Transportation are registered to receive these warnings:

6.3.3 Flood Warning Lead Time

Expected flood warning lead in times:

Fluvial	**2 hours** where possible, but for many areas there may be **little or no** warning.
Surface water flooding	**No** warning likely
Tidal	**9 hours** approximate warning of flooding (this does not take into account breaches in existing defences where there is likely to be **no** warning at all). Note that on the North Kent coast normal flood defence closures of the Thames Barrier are accompanied by Flood Alerts issued to riparian authorities downstream of the Barrier at Woolwich.

* The Environment Agency will endeavour to provide the respective lead times above but this is not always possible and this fact should not be relied upon.

6.3.4 Flood Warning Dissemination Methods

- Flood Warning Service, by registering to this free service Flood Warnings can be received directly by either phone, text or email.

- Floodline - 0345 988 1188 (24 hours)

- Flood Warning service website - https://flood-warning-information.service.gov.uk/warnings

- Floodline Warnings Direct - can be signed up for and automatically sends advance warning of area specific flooding by telephone, mobile, fax, pager, SMS text message or email. The system was designed to replace the Automated Voice Messaging System (AVMS) and gives information on the type of warning, the location, the situation and advice.

- The Environment Agency website – www.environment-agency.gov.uk/flood

- The Media - broadcasting on radio stations across Kent and national and local television news stations.

- Social media.

- Loudhailer - Kent Police/Environment Agency messages.

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7. Communication

7.1 Kent County Council Alerting Responsibilities

The Pan Kent Strategic Emergency Framework document setting out the agreed major incident alerting principles operated within Kent are set out at figure 7.4.

Kent County Council operate a 24 hour, 7 days a week Duty Emergency Planning Officer (DEPO) system and on receiving intelligence of actual or imminent flooding will cascade alerting calls to relevant KCC personnel (potentially including the On Call Duty Director, Tactical Manager and Emergency Response Team) as well as external partner agencies (including district councils and the military). Dependent upon the level of threat or scale of flooding the KCC County Emergency Centre may be mobilised to facilitate effective alerting, communication and command and control over operational response.

7.2 Door Knocking High Risk Properties

Within the Pitt Review of the 2007 floods he recommended the enhancement of Flood Warnings being issued with door knocking in the areas likely to be affected. Kent County Council and the NHS will identify vulnerable people and inform the Police.

As part of this work, Kent Police have a procedure for door knocking which can be used in any emergency situation. They have agreed that this could be enacted, and their manpower used within a flood situation in conjunction with appropriate KCC and affected district council personnel.

During this interim period, those areas possibly requiring door knocking arrangements can be identified on an informed basis by KCC, affected district council(s), Environment Agency and/or Police. Data generated via GIS and RD Mapping can assist in this process.

KCC Community Wardens can assist the door knocking of high-risk properties both physically and by assisting in the identification of vulnerable members of the community and by the use of the Community Warden Support Team to reach outlying areas.

In addition, KCC Community Wardens can assist in the dissemination of severe weather warnings to all areas of their communities and by the identification of community leaders within local communities who have access to possible evacuation centres or have skills or equipment which may be of use during the emergency.

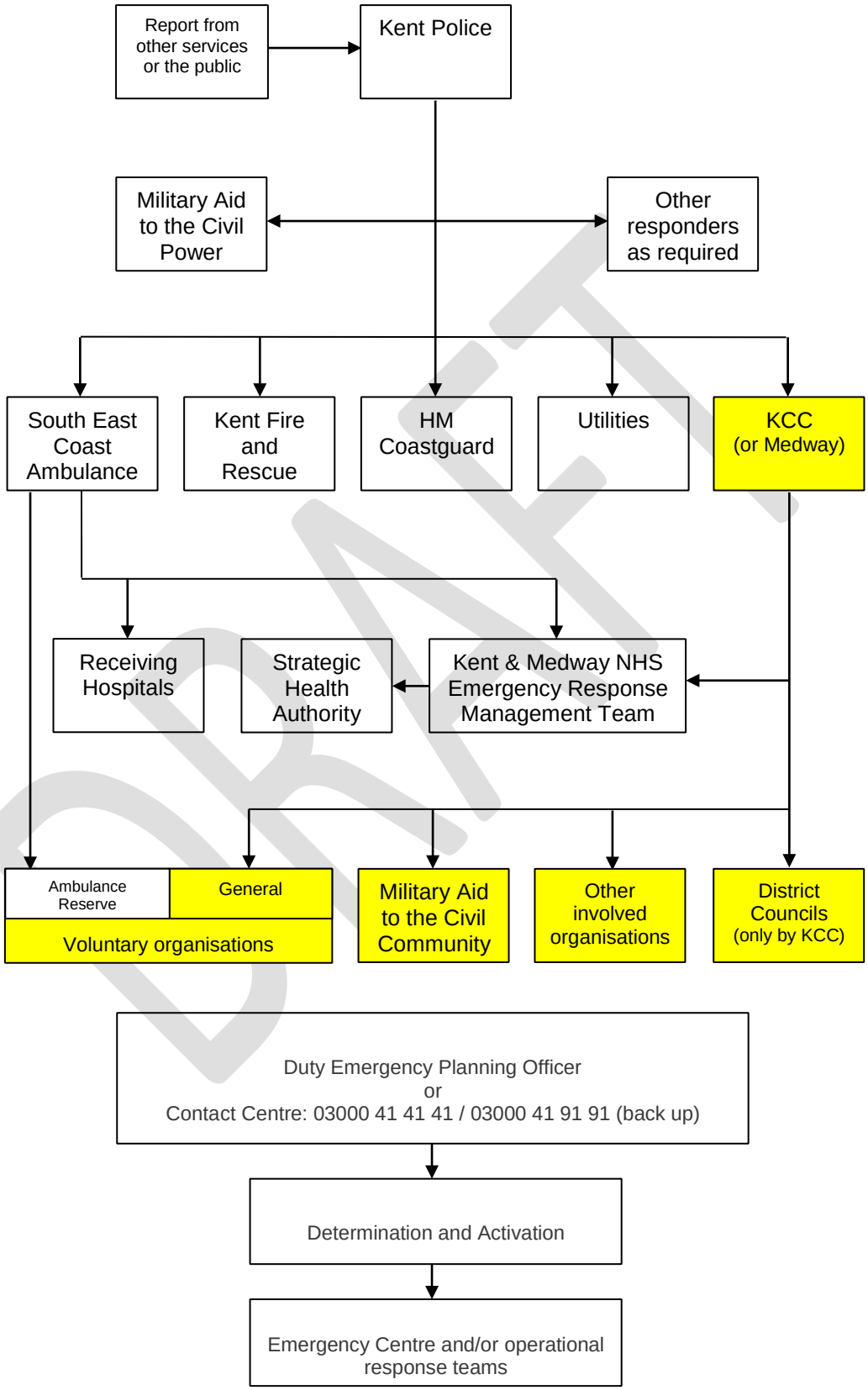
The KCC Community Warden Service can be activated through the KCC Duty Emergency Planning Officer.

7.3 Communicating with the Public Document

The Kent Resilience Forum has a communications strategy document titled; **Kent Resilience Forum Public Warning and Informing Strategy**. Within this document there are appendices relating to the specific information and advice needing to be communicated in a flood incident and the way in which this

information will be communicated. In **Section 8.3.1.4** of this document is an internet link to the Environment Agency website providing messages and advice that should be used during a flood incident. These should be used by all organisations as an agreed set of advice and guidance.

Figure 7.4 - The Pan Kent Strategic Emergency Framework Document: Major Incident Alerting Principles:



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8. Actions, Roles and Responsibilities

Figure 8.1 - Flood Specific Roles and Responsibilities

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Growth Environment and Transportation	**Ensure that all personnel are trained in and aware of emergency planning roles and responsibilities (all Heads of Service)** **Ensure that spatial plans, strategies, guidance and day-to-day working practices incorporate a philosophy of "making space for water" and acknowledge and address surface water, ground water, fluvial and coastal flood risk (all Heads of Service)** **Ensure that Business Continuity Management principles are embedded within Directorate planning and training programmes (all Heads of Service)**	**Receive Environment Agency Flood Warning alert and cascade alert to internal and external partners (Resilience and Emergency Planning Service)** **Receive flooding alert from any other source and cascade alert to internal and external partners (Resilience and Emergency Planning Service)** **Provide co-ordination, co-operation, advice and liaison role for duration of incident (Emergency Planning Group)** **Maintain emergency log for duration of incident (Resilience and Emergency Planning Service)** **(If required) mobilise County Emergency Centre (Resilience and Emergency Planning Service)**	**Provide support and advice in framing the recovery strategy (Emergency Planning Group)** **Mobilise senior management representation to County Emergency Centre recovery group and liaison personnel to partner recovery groups as required (all Heads of Service)** **Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry (all Heads of Service)**

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Growth Environment and Transportation	**Ensure emergency communication and alerting strategy is in place for internal and external service provision (all Heads of Service)** **Ensure that KCC Environment, Highways and Waste Major Emergency Plan is maintained (All Heads of Service)** **Identify vulnerability of critical transport infra-structure (Kent Highway Services)** **Ensure that KCC Environment, Highways and Waste Major Emergency Plan is maintained (All Heads of Service)** **Maintain registration with Environment Agency Flood Warning alert system (Kent Highways and Transportation)**	**Attend and/or facilitate relevant KCC officer attendance of Severe Weather Advisory Group (Resilience and Emergency Planning Service)** **Ensure that critical infra-structure is maintained during flooding incidents (Kent Highways, Transportation and Waste)** **Deploy personnel and internal and external contractor resources and assets to assist the practical emergency response to flooding (Kent Highways, Transportation and Waste)** **Provide intelligence on condition and viability of transport infra-structure – including GIS and Flood Depth Indication System data (Kent Highways, Transportation and Waste)** **Seek to protect highways infrastructure from flooding, using sandbags and other physical barriers (Kent Highways, Transportation and Waste)**	**Accommodate and manage increased demand for services following flooding event (all Heads of Service)** **Deploy personnel and internal and external contractor resources and assets to assist the recovery (Kent Highway Services)** **Mobilise senior management representation to County Emergency Centre recovery group and liaison personnel to partner recovery groups as required (all Heads of Service)** **Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry (all Heads of Service)**

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Growth Environment and Transportation		**Provide intelligence on condition and viability of waste disposal infrastructure during flood event (Kent Highways, Transportation and Waste)** **Provide intelligence on impacts upon the built and natural environment during flood event (all relevant teams)** **Mobilise personnel for operational response including specialist teams (all Heads of Service)** **Ensure that critical services are maintained in compliance with business continuity plans (all Heads of Service)** **Mobilise senior management representation to County Emergency Centre and liaison personnel to Severe Weather Advisory Groups and partner agency emergency centres as required (all Heads of Service)**	**Publicity regarding doorstep and other rogue traders, including promotion of 'BWC' traders (Trading Standards)** **Send Trading Standards Alert messages as appropriate on doorstep and rogue traders (Trading Standards)** **Enhance intelligence focus and collection appropriate on doorstep and rogue traders (Trading Standards)** **Prepare FAQs and briefings for CC/CDSE (Trading Standards)** **Deploy rapid response teams to intervene in live incidents involving doorstep and rogue traders exploiting flooding event (Trading Standards)**

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Growth Environment and Transportation		**Community Wardens can deliver: a uniformed presence at scene, assistance to police with cordon control, assist the police with evacuation, provide local knowledge, supply public information to communities, provide on-the-ground intelligence, provide assistance in operation and security of rest centres.** **Liaise with partner agencies to ensure that care is provided to vulnerable individuals and communities affected by flooding (Community Wardens).** **Liaise with DEFRA, RSPCA and district councils on welfare of livestock, domestic and wild animals threatened or affected by flooding (Trading Standards and Resilience and Emergency Planning Service).** **Liaise with partner agencies to ensure protection and amelioration of adverse impacts upon critical infra-structure and the wider environment during flooding (all relevant teams).** **Provide information and support within welfare centres (Libraries, Registration and Archives)**	**Libraries and other cultural outlets to host publicity and display material and events to assist community recovery from flood event (Libraries, Registration and Archives)**

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Adult Social Care and Health	**Maintain plans for the purpose of ensuring that if an emergency occurs or is likely to occur the Directorate is able to perform its functions so far as necessary or desirable for the purpose of;** **a) preventing the emergency,** **b) reducing, controlling or mitigating its effects, or** **c) taking other action in connection with it.** **Plans must have particular regard to 'the vulnerable' 'who are less able to help themselves in the circumstances of an emergency'.** **Ensure sufficient staff are trained to support a multiagency response including supervising the care of individuals at a Rest Centre, Survivor Reception Centre or Humanitarian Assistance Centre**	**Statutory and non-statutory (voluntary) response activities:** • **Maintain business continuity of Health and Social Care services across the whole system economy (jointly with Health and providers)** • **Command, Control and Co-ordination of Health and Social Care Organisations County-wide at a strategic level (Joint Health and Social Care Accountable Officers)** • **Discharge the Humanitarian Assistance Lead Officer responsibilities** • **Plan a social care response – early assessment of emerging needs** • **Set the standards of care to be provided as part of a statutory and voluntary response** • **Identify vulnerable groups and people** • **Identify critical Health and Social Care infrastructure at risk**	**Managing Recovery – impact assessment, risk assessment and promoting critical and strategic thinking around recovery provision. Directing activity and resources through Task and Finish Groups.** **Work closely with health professionals and police family liaison officers where appropriate to ensure the needs of families and the community are properly met. Manage "hand over" cases from any centralised provision (especially Humanitarian Assistance Centres) to the local authority and local health partners.** **Undertake internal debrief of staff involved in the response phase to inform multiagency debrief, identification of lessons arising from the way the incident was handled, develop and implement action plans as appropriate.** **Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry (all Heads of Service)**

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Adult Social Care and Health	**Through established contract performance monitoring mechanisms ensure that providers Business Continuity arrangements are suitable, sufficient and align with the Authority's requirements.** **Work with strategic partners to ensure flood risk is appropriately reflected in commissioning decisions including the location of critical health and social care infrastructure.**	• **Manage a social care response – against identified needs in crisis in care, emergencies in Health, and safeguarding, community response including providing psychosocial support jointly with health partners** • **Provision of information, advice and guidance** • **Assessment, referral and signposting.**	

KCC Directorate	Pre-planning Roles and Responsibilities	Emergency Roles and Responsibilities	Recovery Roles and Responsibilities
Children, Young People and Education	**Ensure that all personnel are trained in and aware of emergency planning roles, including children's social care and the provision and support to welfare centres (all Heads of Service)** **Ensure that school meals contracts incorporate emergency feeding clause** **Ensure that schools maintain up-to-date emergency and business continuity plans to address flooding** **To ensure that robust plans are in place to support individuals and schools affected by flooding (Educational Psychology Service)** **Ensure Business Continuity Management principles embedded within Directorate planning and training programmes**	**Provide premises, feeding, specialist teams and logistical support for the welfare centre response to flood and other incidents (all relevant teams)** **Provide senior manager representation within County Emergency Centre and liaison personnel to Severe Weather Advisory Groups and partner agency emergency centres as required (all Heads of Service)**	**Ensure cleaning and repair of education premises affected by flooding or emergency use as rest centres** **Provide support to schools and pupils emotionally affected by flood events (Educational Psychology Service)** **Accommodate and manage increased demand for services following flooding event (all Heads of Service)** **Mobilise senior management representation to County Emergency Centre recovery group and liaison personnel to partner recovery groups as required (all Heads of Service)** **Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry (all Heads of Service)**

Strategic and Corporate Services	**Ensure that all personnel are trained in and aware of emergency planning roles and responsibilities (all Heads of Service)** **The Directorate must plan for emergencies involving a risk to public health.** **Ensure that plans, strategies, guidance and day-to-day working practices incorporate a philosophy of "making space for water" and acknowledge and address surface water, ground water, fluvial and coastal flood risk (all Heads of Service)** **Ensure that Business Continuity Management principles are embedded within Directorate planning and training programmes (all Heads of Service)** **Ensure emergency communication and alerting strategy is in place for internal and external service provision (all Heads of Service)** **Ensure Strategy, Economic Development and ICT Major**	**Ensure that critical information communication technology infrastructure is maintained during flooding incidents (ICT)** **Ensure plans are in place to protect the health of the population** **Provide intelligence on condition and viability of ICT infra-structure during flood event (ICT)** **Ensure that Geographical Information Systems (GIS) are corporately available providing mapping and address details to facilitate response (ICT)** **Mobilise personnel for operational response including specialist teams (all Heads of Service)** **Ensure that critical services are maintained in compliance with business continuity plans (all Heads of Service)** **Mobilise senior management representation to County Emergency Centre and liaison personnel to Severe Weather Advisory Groups and partner agency emergency centres as required (all Heads of Service)** **Provide Geographical Information**	**Mobilise senior management representation to County Emergency Centre recovery group and liaison personnel to partner recovery groups as required (all Heads of Service)** **Ensure that key data is maintained to assist debrief, recovery and any subsequent inquiry (ISG and all Heads of Service)** **To bear the cost of recovery for all but the most exceptional flooding events using General Funds. (Finance).** **Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry (all Heads of Service)**

	Emergency Plan is maintained (All Heads of Service) **Ensure sufficient staff trained and support is available to establish a Scientific and Technical Advice Cell.**	**Systems support to corporate response to flooding (ISG)** **Manage a Public Health response to public health incidents and emergencies, including providing scientific and technical advice and intelligence during emergencies**	

Strategic and Corporate Services	**Ensure that corporate ICT systems incorporate capacity to label and record emergency response data including communications and resources mobilised (ISG)** **Ensure that Geographical Information Systems (GIS) are corporately available providing mapping and address details (ISG)** **Ensure that all personnel and Members are trained in and aware of emergency planning roles and responsibilities (all Heads of Service)** **Ensure that Business Continuity Management principles are embedded within Directorate planning and training programmes (all Heads of Service)** **Ensure that plans, strategies, guidance and day-to-day working practices incorporate a philosophy of "making space for water" and acknowledge and address surface water, ground water, fluvial and coastal flood risk (all Heads of Service)**	**Ensure that critical KCC premises are maintained during flooding incidents (Property)** **Deploy personnel and internal and external contractor resources and assets to assist the emergency response to flooding (all Heads of Service)** **Ensure that financial resources are available, and spending logged during emergency response (Finance)** **Ensure that critical services are maintained in compliance with business continuity plans (all Heads of Service)** **Work with Leader, Cabinet and Members to ensure that they are briefed and supported within their community leadership and advocacy roles (Strategic and Corporate Services)** **Provide intelligence on staff deployment and work base selection using Kent View software (HR) Contact Point personnel relay key flood related information from public and partner agencies to relevant teams and individuals (Contact Point)**	

Strategic and Corporate Services	**Ensure Strategic and Corporate Services Emergency Plan is maintained (All Heads of Service)** **Ensure that systems are in place to facilitate and record financial support of emergency response (Finance)** **To maintain General Funds for use in the event of serious flooding or other unforeseen eventualities (Finance)** **Ensure resilience of KCC property portfolio against flood risk (Property and Infrastructure)** **Ensure access to assets and material for emergency** **Ensure Contact Point personnel are aware of alerting protocols in the event of a flooding incident (Contact Point / Agilysis)** **To make sure that that the public are warned and informed through the media, KCC website and other means of communications of the incident. Liaise with partner agencies to agree messages and broadcast of relevant public information (Press Office).**		

Figure 8.2 - Partner Agencies: Flood Specific Roles and Responsibilities

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
District & Borough Council	Tidal, Fluvial, Surface Water flooding	Up to date vulnerable persons and sites shared database arrangements. Pre-determined rest, reception and media centres. Multi-agency preplanning re RVPs, transport routes etc Riparian/Coastal Districts to issue directions to and maintain contact details of flood gate owners/land occupiers (Section 30 County of Kent Act 1981).	Activation of Emergency Centre and Strategic Group and advise leader and ward members. Liaison with Parish Councils. Representation at Silver Control(s) and Strategic Coordinating Group as necessary. Co-operation with emergency services and EA to coordinate the response. Flood warning and gate closure notification dissemination in conjunction with EA	Activation of Emergency Centre and Strategic Group and advise leader and ward members. Liaison with Parish Councils. Establish various LA forward controls as necessary. Representation at Silver Control(s) and Strategic Coordinating Group as necessary. Co-operation with emergency services and EA to co-ordinate the response.	*Early consideration will need to be given to the following: -* • Provision of temporary sanitary facilities. • Provision of catering. Co-ordination of voluntary organisations. • Provide emergency clothing and welfare items.	Provision of temporary or longer-term accommodation or rehousing for residents made homeless by the flooding Structural and condition surveying of council properties damaged by the flooding; remedial action to repair such properties.

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
District & Borough Council		EA, riparian district councils and flood gate owners to ensure closure mechanisms function properly. National Flood Defences Database (NFCDD) is maintained by EA Pre-arranged communication strategy – what should members of the public do/where should they go? Updated information on Council web site Pre-arranged information help line and trained staff.	Where appropriate Riparian/Coastal Districts to ensure Tidal flood gates and sluices are closed in accordance with closure notifications (Section 30 County of Kent Act 1981). Liaison with utility and transport companies especially water company to ensure provision of clean drinking water to residents.	Flood warning and gate closure notification dissemination, warning and informing the public in conjunction with EA. Riparian/Coastal Districts to ensure Thames Tidal flood gates are closed in accordance with closure notifications (Section 30 County of Kent Act 1981). Activation of information helpline for public	• Liaise with Central and Regional Govt. • Arrange for Military Aid. *Local authority would be able to seek mutual aid from other local authorities to help fulfil these functions.*	Invoking council's business recovery plan if council premises are affected Consultation with health authorities on hygiene and environmental health issues in affected areas. Assisting residents in removal of damaged furniture and household goods. Removal of mud/debris from council owned land.

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
District & Borough Councils/		Pre-arranged help line for staff – (should they come in to work or note – is it safe?) Review of council properties at risk Incorporate this risk into the Business Continuity planning process. Advise on development proposals, flood risk assessments, maintain flood management structures.	Provision and staffing of rest/reception centres and associated services. Flood mitigation measures (e.g. sandbags, where appropriate). Advice on clearance of blocked water courses and mitigation measures.	In conjunction with other responders provide information to the public. Activation of business continuity plans as appropriate. Liaison with utility and transport companies especially water company to ensure provision of clean drinking water to residents. In conjunction with Police, provision of information centre/media centre Co-ordinate response from faith and voluntary groups.	*Directorate Business Continuity Management plans may require invocation as many staff will have been diverted to other duties to respond to the incident.*	Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
				Provision and staffing of rest/reception centres and associated services. **Flood mitigation measures (e.g. sandbags). Advice on clearance of blocked watercourses and mitigating measures.** ***It should be noted that not all local authorities provide sandbags, (each council should be contact for further information).***		

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
				Where resources allow assisting EA in repairing river and coastal defences (between high tides) Provision of emergency lighting/generators		
Environment Agency	Tidal, Fluvial, Surface Water flooding Published in the local risk assessment guidance	Prepare and maintain Kent Local Flood Warning Plan; Advise on development proposals; Update flood risk maps; Support Kent Resilience Forum (KRF). Flood risk assessments; Maintain watercourse capacity; Maintain flood management structures	Issue warnings; Monitor catchment; Operate defences; Support LAs and emergency services	[as for minor flood]		Support LAs and community as resources allow; Repair any damaged defences Ensure that key data is maintained and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
Kent Police	Tidal, Fluvial, Surface Water flooding Published in the local risk assessment guidance	Statutory responsibility under the Civil Contingencies Act 2004 to: • Prepare and maintain emergency plans; • maintain business continuity plans; • engage with KRF Severe Weather Group Partners particularly around risk assessment, planning and public warning and informing; • training and awareness; • the testing and exercising of emergency plans.	Save and prevent loss, or further loss, of life in conjunction with the other emergency services and any other relevant organisation Consideration of health and safety and ensure the safety of personnel deployed at the incident Co-ordinate the overall response In so far as saving of life permits, secure, preserve and protect the scene	As for minor flood (scale-able response)	The establishment of the Strategic Co-ordination Group and function for providing command and control through levels of Gold, Silver and Bronze.	Recovery is inbuilt to the response phase of the incident as part of the Strategic Co-ordination Group. The appropriate 'handover' to the responsible LA will be supported as appropriate Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
Kent Police		Identifying, with Cat 1 and 2 partners, areas of critical infrastructure at risk. Mobilisation planning within the Police National Mobilisation Plan (internal and external resources). Engagement with Kent Resilience Forum (KRF) Communications Group on the forming of communication strategy to warn and inform the public.	Investigate the incident, obtaining and securing all available evidence in conjunction with other investigative bodies where applicable Recover the deceased in a dignified manner, which ensures the integrity of their identification. Without undue delay, assist the Coroner to identify victims and inform the next of kin as soon as possible.			.

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
Kent Police			**Reassure survivors and their families, assist in establishing appropriate support systems** **Establish an effective and appropriate family liaison strategy** **Ensure an appropriate response to the media, which is open, factual, accurate and seeks to reassure those directly involved and the public in general.** **Provision of warnings, advice and information to the public.**			

Organisation	Risk	Preplanning	Emergency response			Recovery
			Minor flood (Medium consequence)	Major flood (High consequence)	Notes	
Kent Police			**Strive to minimise the impact on the whole community, working with all relevant agencies to return to normality as soon as possible.**			
Kent Fire & Rescue Service	**Tidal,** **Fluvial,** **Surface Water flooding**	**Standard operational response to a special service** **Maintain business continuity plans** **KFRS Premises at risk to flooding identified**	**Liaise with other agencies and prioritise response and resources** **Provide assistance with pumping water**	**Follow major incident response procedures** **Assisting with evacuation in the event of wide-scale flooding**		**Assist with other agencies to minimise impact on community**

Kent Fire & Rescue Service		**Mutual aid agreements between bordering F&RS in place** **National Mutual Aid Protocol in place** **KFRS holds copies of EA Flood Maps** **Participation in flood exercises with other agencies** **Arrangements for pre-mobilising resources in place** **Recall to duty for officers in place**		**Attend SCG and any provide liaison officers to other Control rooms as appropriate i.e. Environmental Agency** **Activate National Mutual Aid Agreement for additional resources** **Activate Station BC Plans where KFRS premises are at risk to flooding**		

South East Coast Ambulance Service (SECAmb)	**Tidal,** **Fluvial,** **Surface Water flooding** **Published in the local risk assessment guidance**	**Met. Office Weather Warning system in place** **Major Incident Plan** **Contingency Plan for Extreme Weather** **Business Continuity Plans** **Emergency Preparedness Status Board (includes flooding) in place across SECAmb.** **SECAmb premises at risk of flooding identified** **Health on Call system in place**	**Attendance as required upon assessment**	**Attendance as required upon assessment**		**Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry**
Strategic Highways Contractors	**Low**	**Reviewing procedures with** **Highways England.**	**Activate** **Contingency Plan**	**Activate** **Contingency Plan**		

NHS		**Ensure staff training is carried out** **Ensure Emergency Plans are up to date, and exercise tested** **Distribute flood warnings**	**Provide support for vulnerable people who are known to the NHS** **Business Continuity of NHS services** **Provide support to Rest Centres**	**Provide support for vulnerable people known to the NHS in their own homes** **Business Continuity of the NHS** **Provide Support to Rest Centres and Evacuation Points** **Provide Support in the event of evacuation of vulnerable persons** **Ensure representation at Multi Agency Command & Control** **Public Health Advice in conjunction with the Health Protection Agency.**		**Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry**

Port of London Authority		**Promulgation of Flood Response Plans** **Internal briefings & awareness for possible resource provision**	**None**	**Issue appropriate warnings to river users** **Deploy afloat resources and other assets as appropriate** **Impose exclusion zones or river closures where necessary** **Supply detailed local tidal & hydrographic information on request**	**Navigation Authority for tidal Thames**	**Promote restoration of navigation and shipping activity**
National Grid. Gas and electricity distribution/ transmission. **National Grid.**	**Low pressure gas distribution network. Electrical transmission systems.**	**Identify plant and assets in predicted flood zone e.g. substations, cable tunnels, joint bays, regulators – medium to low pressure.** **High pressure gas installations COMAH sites – storage.** **Vulnerable Persons Database – use system to pull off all addresses in a predicted area by post code.**	**Set up Bronze Command at site. Work with blue lights to isolate supplies. Make safe.** **Wait for water to recede.** **Re-establish supplies.**	**As previous with additional Silver and Gold level** **Command within company.** **Possible reconfiguration of supplies where possible.** **Possible lock-out of**		**Ensure that key data is maintained, and relevant data entered into SWIMS to** **assist debrief, recovery and any subsequent inquiry**

Gas and electricity distribution/ transmission.		**Contact local authorities use agreements for mutual aid.**		**regulators to maintain pressures in gas mains. Invoke mutual aid and resource plans. Prepare for recovery.**		
Southern Gas Networks	**Gas distribution systems operating at high, intermediate, medium and low pressure.**	**Receive detailed flood assessment information for all at-risk MAJOR sites (supplying >50,000 consumers) from EA / SEPA. Review annually.** **Receive 48 hours warning from EA / SEPA for MAJOR sites.**	**Instigate E/3 procedures for incident response.** **Set up Bronze Command / Site Main Controller at site. Work with Category 1** **Responders to isolate supplies if required. Make safe.**	**As previous with additional Silver and Gold level Command within company.** **Possible reconfiguration of supplies where possible.**		**Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry**

Southern Gas Networks		**Identify other plant and assets in predicted flood zone using EA flood data and Flood Outlook Statements. Consider all offtakes from the national transmission system (including odorization and gas quality equipment), pressure reduction stations, other gas governing equipment, high- and low-pressure storage installations (including top and lower tier COMAH sites).** **Review sectorisation plans for isolation of specific areas. Locate sectorisation valves and confirm operation.**	**Identify location of siphon tankers, water pumps and other equipment. Prepare resource plans and mobilise as necessary.** **Extract and copy asset records and plans for on-site use identifying siphons, low points etc.** **Wait for water to recede.** **Re-establish supplies.**	**Possible lock-out of regulators to maintain pressures in gas mains. Invoke mutual aid and resource plans. Prepare for recovery.**		

Southern Gas Networks Page 82		**Identify consumers at risk from 'Vulnerable Persons Database' – extract all relevant addresses in the predicted flood risk area.** **Contact local authorities, use agreements for mutual aid.**				

EDF Energy Networks	**Tidal,** **Fluvial,** **Surface Water flooding** **Published in the local risk assessment guidance**	**EDF Energy Networks Flood Plan.** **Environment Agency indicative flood plains mapped into Company GIS system.**	**Monitor EDF Energy Networks substations and plant and equipment.** **Protect substations by temporary works if practicable.** **Disconnect electricity supplies if the public are at risk or if substations or plant and equipment cannot be protected from inundation.**	**Monitor EDF Energy Networks substations and plant and equipment.** **Protect substations by temporary works if practicable.** **Disconnect electricity supplies if the public are at risk or if substations or plant and equipment cannot be protected from inundation.**		**Restore electricity supplies.** **Ensure that key data is maintained, and relevant data entered into SWIMS to assist debrief, recovery and any subsequent inquiry**

8.3 Operational Response Activities

8.3.1 Response – Supplementary Information

8.3.1.1 Voluntary Sector

Emergency Preparedness, the Civil Contingencies Act Guidance, refers to the generic support that the Voluntary Sector can provide. The nature, range and scale of services offered by the Voluntary Sector may alter depending upon the context of the emergency situation but would be provided in both emergency response and recovery related activities. They will be activated under normal existing activation protocols with Kent County Council Emergency Planning Group and will be directed by the relevant activating organisation but work to their own organisational structure. Organisations have access to mutual aid on a cross-border basis. In a flooding incident the Voluntary Sector can provide support to both responders and those affected by the incident.

8.3.1.2 Mutual Aid

KCC have a Mutual Aid arrangement with all local authorities in Kent and Essex. Mutual Aid may be mobilised through Kent County Council.

8.3.1.3 Military Aid

Military Aid may be mobilised through Kent County Council Emergency Planning Group.

8.3.1.4 Public Health

Floodwater Public Health Risks

The following section deals with the following public health risks arising from floodwater inundation:

- Chemical Contamination
- Sewage/ Waste Water Contamination
- Electrical/ Fire Hazards

Chemical Contamination

Flooding can lead to disruption of water purification and sewage disposal systems, inundation of waste disposal sites, and contamination from chemicals stored in commercial, industrial, agricultural and domestic settings. This can be hazardous to human health and the wider environment. Contact with flood water should therefore be avoided and where unavoidable protective clothing should be worn. While different chemicals cause different health effects, the signs and symptoms most frequently associated with chemical poisoning are headaches, skin rashes, dizziness, nausea, excitability, weakness, and fatigue.

Sewage/ Waste Water Contamination

Flooding can cause the disruption of water purification and sewage and other waste water disposal systems. A key risk arising from contamination of floodwater with sewage is risk to human and animal health from harmful microbes. Water-borne infections associated with flood events include Gastroenteritis, Escherichia Coli (E. Coli), Botulism, Salmonella, Cryptosporidiosis, Hepatitis and Tetanus.

It may be assumed that any floodwater affecting property and land could contain sewage. Contact with flood water should therefore be avoided and where unavoidable protective clothing should be worn.

Contamination of the aquatic environment with sewage and other organic pollutants, including milk and other foodstuffs, may lead to de-oxygenation through microbial blooms and requisite adverse impacts upon aquatic wildlife.

Electrical / Fire Hazards

Areas affected by floodwater inundation may contain electrical or fire hazards connected with power lines, sub-stations and other electrical infra-structure. The following precautions should be taken where electricity infra-structure is affected by floodwater:

- Never enter flooded areas containing electrical equipment unless you are certain that the power supply is off.
- If water has been present anywhere near electrical circuits and electrical equipment, turn off the power at the mains.
- Don't assume that any part of a flooded electrical installation or appliance is safe, do not turn on their power supply.

More guidance can be found in the KRF Public Warning and Informing Strategy Document and from the following Environment Agency link:

www.environment-agency.gov.uk/homeandleisure/floods

8.3.1.5 Kent Fire and Rescue Services Water Safety Aid Memoir

Hazards	Risks	Control Measures
Water		**Pre-planning!** Equipment, training, procedures, command arrangements and site familiarisation
Current, flow, under-tow, whirlpools, eddies- hydraulic features + force of water	Entrapment, drowning	**KEEP OUT!** Correct PPE= Lifejackets/PFDs, defensive swimming, early rescue- downstream throw lines, never work alone, never put feet down in flowing water if swept away.
Depth of water/ mud	Entrapment, drowning	**KEEP OUT!** Probe ground, correct PPE=Life-jackets
Water temperature	Cold water shock causing drowning, hypothermia	**KEEP OUT!** Early rescue, never work alone, PPE=Life-jackets/boots/waders/dry suit + thermal suit etc
Water clarity	Entrapment, drowning	**KEEP OUT!** Probe ground ahead
Pollution	Infection/health	**KEEP OUT!** PPE=boots/waders/dry suit (barrier protection), hand and face washing, discipline (no smoking, eating, drinking in risk area)

Debris	Impact injuries	**KEEP OUT!** Upstream spotters, agreed warning signals- whistles

Hazards	Risks	Control Measures
Weather/ Environment / Specialised Operations		Pre-planning! Equipment, training, procedures, command arrangements and site familiarisation
Weather	Fatigue/ hypothermia or hyperthermia	Relief crews, welfare, rest & recuperation (R&R) arrangements
Riverside/ shoreline conditions- cluttered/ slippery/ silt traps, onlookers	Slipping, tripping and falling, silt traps and additional casualties	Enforced 3 metre risk zone, lighting, safety brief, minimum level of PPE (Lifejackets, boots, gloves etc.), never work alone, site familiarisation
Inadequate lighting	Disorientation, getting lost	Personal torches, scene lighting, personal issue light sticks, tight command & control over personnel
Background noise	Warnings not heard- failure of communication	Whistles and hand signals.
Overhead power lines	Electrocution	Risk assess, safety brief
Specialised operations	Fatigue of specialised personnel/unsafe personnel in risk area	Relief crews, adequate resources, R&R, 3 metre risk zone
Work equipment Falling into water	Cessation of work/delays/impact injuries	Adequate resources, safety observers, safety brief

Surface vessel movements	Impact/unguarded props	Safety brief, command and control, safety observers (upstream and downstream spotters-throw line operators)

8.3.1.6 Welfare of Livestock and Other Animals

Kent Fire and Rescue Service have a dedicated animal rescue unit based at Faversham Fire Station. The unit has specially trained personnel and dedicated equipment such as a crane and cradle with lifting capacity to move trapped livestock.

The KCC Duty Emergency Planning Officer will liaise with the RSPCA and DEFRA on the welfare of livestock and other animals that may require rescue or feeding on site.

The Kent Resilience Forum has published an Animal Evacuation and Shelter Plan which can be found from the following link:

https://www.kent.gov.uk/__data/assets/pdf_file/0003/47919/Kent-Resilience-Forum-KRF-Kent-andMedway-animal-evacuation-and-shelter-plan.pdf

https://collaborate.resilience.gov.uk/RDService/documents/PR-16%20Kent%20and%20Medway%20Animal%20Evacuation%20and%20Shelter%20Plan%20V0.7.pdf?id=7a720edf-e6a3-4e75-a3df-5631c67188fb

The RSPCA also offer advice on preparedness and looking after pets in an emergency; this can be found from the following RSPCA link:

http://www.rspca.org.uk/in-action/issuesindepth/floods

8.3.1.7 Water Rescue

In addition to its wider statutory duties, Kent Fire and Rescue Services provides strategic leadership for water rescue and pumping operations and acts as specialist operations adviser during the flood response stage.

Kent Fire and Rescue Services use High Volume Pumps (HVPs), which are 150mm in diameter and can pump water up to 3km in distance, assuming there is a suitable discharge point.

8.3.1.8 Guidance for Working Near to Flood Water

The following is offered as a supplement to normal practice, it is not necessarily exhaustive, and individuals must make their own risk assessments on the situation facing them.

Dangers:

- Shallow ponded water can cover ditches, manholes, access to hatches to basements etc. Covers to manholes and access hatches are frequently lifted off by the power of the water, leaving a deep hole into which the unsuspecting can fall or drive into;
- Flowing water can exert strong, lateral forces and will typically build up on the upper stream side to a height half as high again as the flowing depth;
- Flood water may be contaminated. There may be overflows from Sewage Treatment Plants, or the water may have been contaminated with chemicals from industrial or agricultural premises; and

- Water will conduct electricity. If the power has not been turned off there is a possibility of electric shock. One indication of the presence of live electricity flood water is the sense of vibration. If you experience this, you should withdraw.

Considerations:

- Pre-existing organisations rules and qualifications needed;
- Having the necessary equipment to enter water;
- Other alternatives to entering water and what purpose would be served;
- Whether the visit could wait till the flood water recedes;
- Depth of the water, whether the tide is rising, speed of flow and pull of the water;
- Whether you should inform someone of your actions or be accompanied;
- Proceeding with caution, to avoid ditches, manholes and access hatches as well as electricity; and
- Avoiding driving into flood water without a suitable vehicle (and proceed with caution, ensuring the vehicle is not submerged and minimise bow waves flooding properties or submerging other vehicles).

9. Vulnerable People & Communities

9.1. Identification

Identifying, planning for and providing for the needs of vulnerable groups involves a large number of partners and compiling a large amount of changing information. For this reason, it is unrealistic to expect a central list of potentially vulnerable individuals to be maintained. Rather the approach is to maintain a list of partners and contact telephone numbers that can be used to gather relevant information in the event of an emergency.

Records of vulnerable people are held and kept up to date by KCC Social Care, Health & Wellbeing, Education & Young People's Services, NHS and some other utilities companies and organisations, each organisation will hold records of its own clients. During a flood incident this information will be supplied to the SCG (Strategic Coordinating Group) and other partner organisations as required.

We are currently awaiting further guidance from the Humanitarian Welfare Group of the Local Resilience Forum with regard to the classification of group of vulnerable people types.

Due to the nature of the changing situation during a flooding event the status of any persons' vulnerability can change at any time, this is a fact to be aware of in all situations.

Those who may be considered potentially vulnerable include: -

- Children
- Older People
- Mobility Impaired
- Mental/cognitive impaired
- Sensory Impaired
- Individuals supported by Health or local authorities
- Temporarily or permanently ill
- Individuals cared for by relatives
- Homeless
- Pregnant women
- Minority language speakers
- Tourists
- Travelling community
- Static and holiday caravan parks

Please see Kent Resilience Forum Identifying Vulnerable People in an Emergency Plan: https://collaborate.resilience.gov.uk/RDService/documents/PR-19%20KRF%20Identifying%20Vulnerable%20People%20in%20an%20Emergency%20Plan.pdf?id=6b5a532c-dbb9-4e7c-9564-cb1293bf1349

9.2. Background, Analysis and Horizon Scanning

The County Council's recent recognition of the UK Environment and Climate Emergency has helped highlight the increasing risk and severity of flooding resulting from global heating. It poses a significant health risk to the population in flood prone areas and may lead to increased deaths, injuries and mental health issues, as well as exacerbating rural isolation issues producing direct and indirect implications for the health and social care sectors. (Climate South East, 2012; HPA, 2012; CCC, 2017).

Vulnerability to flooding includes more than just the physical risk; political, social and economic factors constrain the ability of the population to respond and their ability to adapt. These factors can have implications on people's health and wellbeing, and therefore extends to the wider health and social care sectors (England & Knox, 2016).

Within Kent, such socially vulnerable communities are often located in or near areas of high flood risk, including low-lying coastal areas. Kent & Medway are some of the most at-risk local authorities in the UK in respect of surface water flooding, as are many low-lying coastal areas, which are at risk of fluvial & coastal flooding. Nationally, two of Kent's districts (Swale and Folkestone & Hythe) are in the top 10 most flood vulnerable districts in the UK, this issue is compounded in areas where the population is generally older and have lower incomes as well as in flood-risk areas with many social care facilities such as care homes and GP surgeries, which may negatively impact social care provision during the response and recovery phases of a flood event, see figures 9.3, 9.4 and 9.5 (Climate Just, 2019).

Severe inland flooding threatens several urban settlements across Kent, such as in West Kingsdown, Wrotham, Maidstone, Ashford and Canterbury, along with some more isolated rural hamlets near Maidstone, Tonbridge and Tunbridge Wells. This is because many settlements were historically built alongside rivers and other watercourses, these places now have significant amounts of impermeable hard surfaces which inhibit natural infiltration of water.

Analysis has indicated that flood disadvantage is greater from surface water flooding than from fluvial & coastal flooding in most areas, and that the areas of highest social & flood vulnerability are concentrated around Kent's coast. Data analysis also suggests that climate change will not increase the geographic area of Kent that is disadvantaged from flooding but will increase the severity where it is already present, particularly in areas such as Romney Marsh and the Isle of Sheppey.

Social vulnerability to the impacts of flooding involves a combination of factors including:

- **Susceptibility to flooding** – how likely someone is to experience a loss of wellbeing due to a flood;
- **Ability to prepare** – personal actions someone can take to reduce the harm suffered if a flood occurs;
- **Ability to respond** – why some people may act more effectively during a flood event;
- **Ability to recover** – how much someone can aid their own recovery from a flood; and
- **Community support** – the availability and quality of emergency and healthcare systems (Sayers *et al*, 2017).

For example, anecdotal evidence form past flood events has highlighted that; 'some sections of the older population [...] were reportedly bewildered and frightened by people banging on their front doors to alert them to imminent flooding'; families with young children were more vulnerable, as children became distressed, or because of 'adults being unable to take necessary action with youngsters in tow'; and disabilities were also 'said to impede effective response, deaf people were [at] risk of not receiving telephone warnings'. Those with greater wealth are able to protect themselves, which has important

implications when discussing the impacts of flooding on communities and for identifying vulnerable geographic hotspots (Defra/Environment Agency, 2005).

Other factors such as social isolation, language barriers and cultural background may also make people more vulnerable and less able to cope in an emergency (England & Knox, 2016; Defra, 2014). Those who are less able to adapt are more likely to rely on services provided by local authorities, the health and social care sector, and health services, especially in the case of an illnesses exacerbated by the incident.

Gypsy, Traveller and itinerant agricultural worker communities on the Weald and in other low-lying areas are geographically disproportionately vulnerable to flooding. Caravans and amenity blocks are often uninsured and flooding frequently results in irreparable damages, making the caravan a ‘total loss’. Such problems can be exacerbated because such communities are often on the margins of society, separated from mainstream communities and subsequent relief services. In some areas of Kent, there are other communities which may be more affected by flooding due to language barriers or as they are new to the area or to the country. These residents may not have any experience of flooding and therefore not know how to prepare or respond appropriately.

Figure 9.3 - Kent and Medway Flood Vulnerability Map

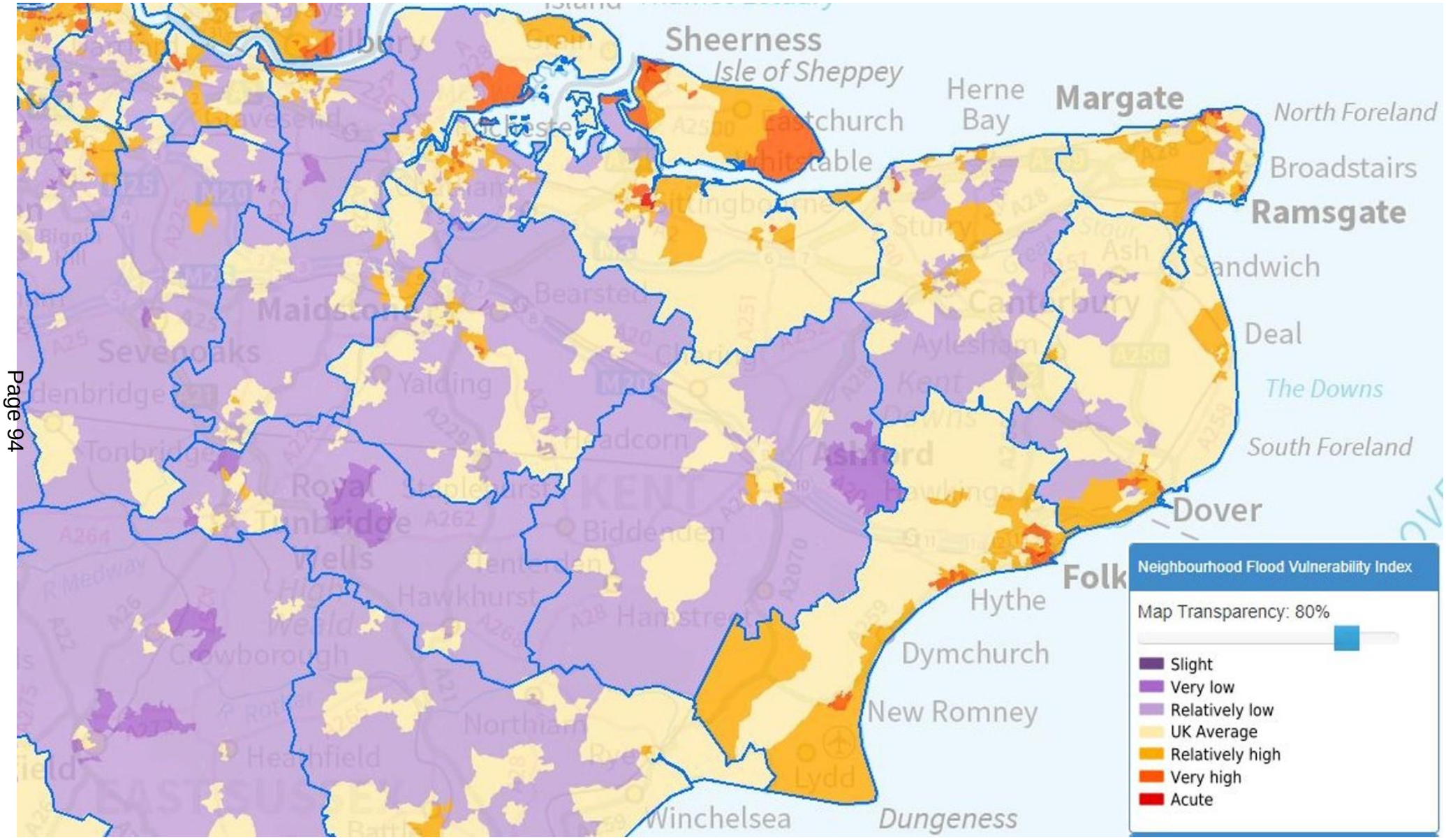


Figure 9.4 - Kent and Medway Surface Water Flood Disadvantage Map

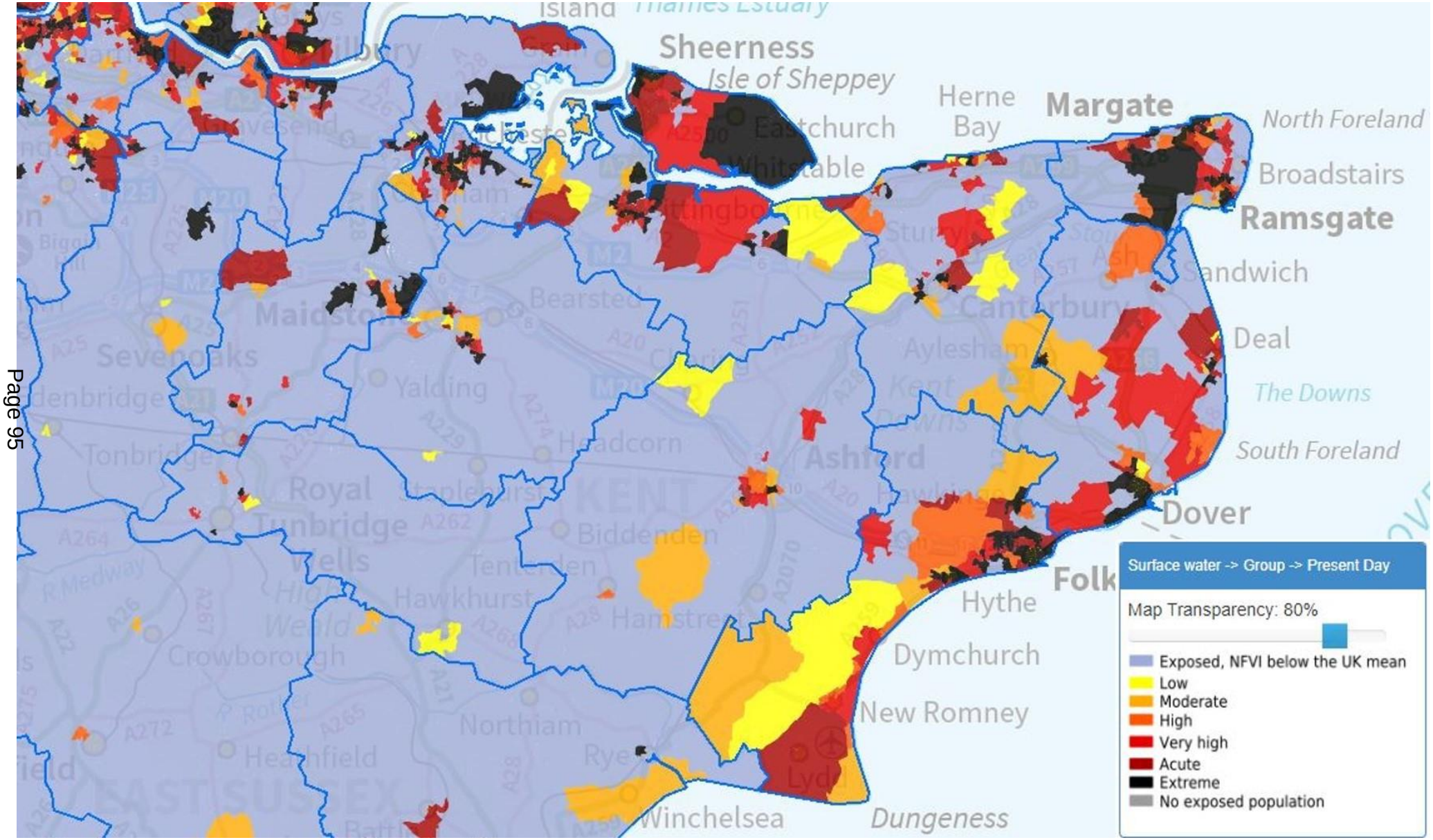
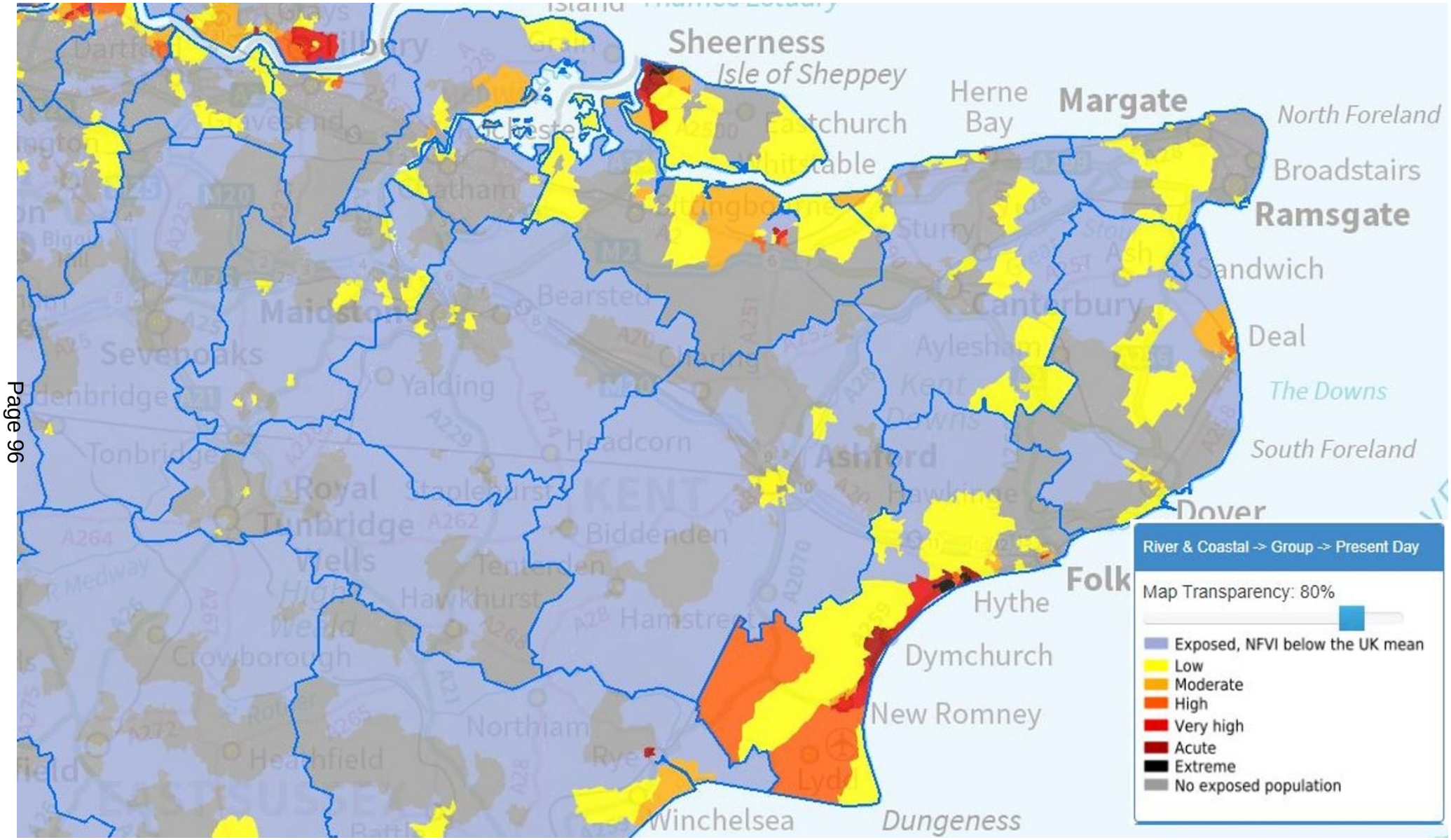


Figure 9.5 - Kent and Medway Fluvial and Coastal Flood Disadvantage Map



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10. Key Infrastructure

Information regarding key infrastructure can sometimes be sensitive information, this information can be obtained from the utility provider or the Police for use by the multi-agency SCG (Strategic Coordinating Group) – which will set overall policy for the response to a major flooding event.

Details of contacts can be found in **Appendix A** of this document.

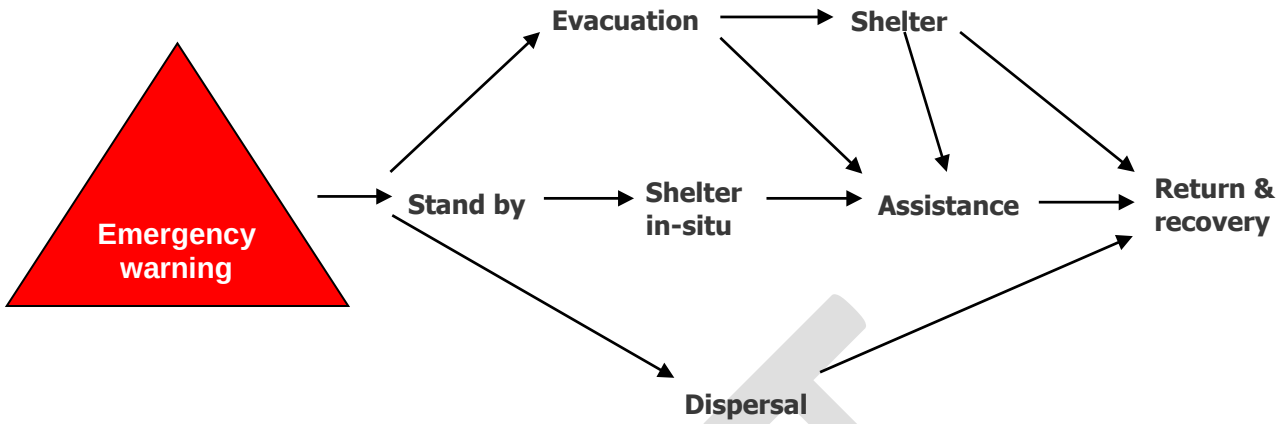
Locations for key infrastructure within flood vulnerable areas are listed within District Local Multi-Agency Flood Plans, Pan Kent and Medway Flood Plan and identified on the GIS system.

11. Evacuation and Shelter

- Statutory legislation informs roles and responsibilities in relation to evacuation, shelter and homelessness. The National Assistance Act 1948 places duties upon county councils to provide services for vulnerable individuals, including children under 16, people with a disability, frail elderly and refugees. In addition, Chapter 52, paragraph 189, Part VII of the Housing Act 1996 imposes a statutory duty upon district and unitary councils to give a priority need for accommodation to “a person who is homeless or threatened with homelessness as a result of an emergency such as flood, fire or other disaster”. Significantly, the Children Act 2004 informs all caring services for children under 16. It must further be remembered that legislation and regulation covering day-to-day operation of residential and public premises also applies to survivor reception and rest centres - including health and safety, food hygiene and licensing.

- Non statutory Evacuation and Shelter Guidance has also been produced by the Civil Contingencies Secretariat of the Cabinet Office. This guidance states at paragraph 1.5. "The Purpose of Evacuation and Shelter" that: "The purpose of evacuation is to move people, and where appropriate other living creatures, away from an actual or potential danger to a safer place. For this to happen safely there need to be plans not just for alerting people and moving them, but also plans to shelter and support them through to their eventual return and recovery. "The need to provide humanitarian and other assistance, particularly to those with special requirements, requires careful consideration and planning. The diagram below shows the stages of evacuation and includes "dispersal - a form of evacuation in which people are simply directed to move away from a particular location without the need for temporary accommodation. The activity of warning and informing the public should also run throughout the process."

Figure 11.1 - Evacuation and Shelter Methodology



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12. Rescue

- Nobody currently has a statutory duty for rescue during a flood emergency.

- Information regarding the equipment available within Kent County Council administrative area is detailed in **Appendix B.**

- Information regarding equipment available within Kent can be found in Appendix B of the Pan Kent Flood Plan.

13. Recovery

- Kent County Council is likely to lead the Recovery phase of a major flooding event affecting the administrative county of Kent and maintains a detailed KCC Recovery Plan. Further, the Kent Resilience Team maintains the Pan Kent Emergency Recovery Framework, on behalf of the Kent Resilience Forum, which will inform recovery and clean-up interventions by relevant agencies following a major flooding event.

- Recommendation 83 of the Pitt Review states that "Local authorities should continue to make arrangements to bear the cost of recovery for all but the most exceptional emergencies". KCC maintains General Funds for such unforeseeable eventualities. It is vital that excellent records are maintained for response and associated expenditure.

- In line with the KRF Severe Weather Framework, if there are significant impacts from flooding, the Kent Resilience Team, on behalf of the Kent Resilience Forum, will log an event of the Severe Weather Impacts Monitoring System (SWIMS). The SWIMS system should be used by all members of the KRF (including specific services within KRF member organisations) to record how they are affected by severe weather events. This will help to inform future resilience planning and form part of the evidence for risk analysis undertaken by the Risk Assessment Group (RAG). More information on SWIMS can be found www.kent.gov.uk/SWIMS

- A model recovery agenda for a flooding event can be found at **Appendix E** of this plan.

14. Training and Exercising

- The Civil Contingencies Act 2004 Regulations require Kent County Council as a “Category 1 Responder” to include provision for training and exercises in their emergency plans.

- The corporate nature of the council’s emergency response requires that all personnel should have an understanding of emergency planning and business continuity principles. Regular training and exercise events will raise staff awareness of potential risks and provide an understanding and confidence in the council and their partners’ emergency response procedures.

14.1 Training

Emergency planning and business continuity training events are invaluable tools to raise awareness, pass on best practice and instil confidence in emergency response plans and procedures. Major emergency response can be very different from day-to-day activity in terms of management principles, pressures upon the organisation (and individual members of staff) and levels of public and media interest. It is therefore vital that all staff with a potential role in the emergency response have an understanding of emergency planning and business continuity principles. A rolling training program will be needed to account for staff turn-over, and also to ensure all staff are regularly refreshed and practiced in emergency response.

14.2 Exercising

Exercises perform a distinct training role and enhance emergency preparedness. Exercises have three main purposes: to validate plans; to develop staff competencies and provide practice in carrying out roles in emergency plans. It is important that personnel taking part in exercises should be trained beforehand. Participants should have an awareness of the council's emergency response and that of their key partners their own role within it, before they are subject to the stresses of an exercise.

There are three main exercise types comprising: seminar, table-top and live exercises.

Figure 14.3 - Training and Exercising Programme

Organiser	Title of training / exercise	Type	Date
Ashford Borough Council	Exercise Nutmeg – Local Multi-agency Flood Plan validation	Table-top	3rd February 2010
Kent Resilience Forum	Exercise Decem flooding exercise	Table-top	25th March 2010
KCC Emergency Planning / Tunbridge Wells Borough Council	Exercise Frey - Local Multi-agency Flood Plan validation	Live / Table-top	26th March 2010
KCC Emergency Planning / Shepway District Council	Exercise Wade – Local Multi-agency Flood Plan validation	Live / Table-top	15th June 2010
KCC Emergency Planning / Dartford and Gravesham Borough Council	Exercise Welund	Live / Table-top	7th October 2010
KCC Emergency Planning / Dover District Council	Exercise Eastre	Live / Table-top	14th February 2011
KCC Emergency Planning / KF&RS / Sevenoaks DC	Exercise Baldr	Live / Table-top	16th February 2011
KCC Emergency Planning / Swale Borough Council	Exercise Loki	Live / Table-top	18th February 2011

Defra / EA / Kent Resilience Forum	Exercise Watermark	Live	10th March 2011
KCC Emergency Planning / EA / Shepway District Council	Shepway District LMAFP validation exercise	Table-top	28th March 2011
KCC Emergency Planning / EA / Tonbridge and Malling Borough Council	Exercise Sigrun	Training exercise	30th January 2012
KCC Emergency Planning / EA / Maidstone Borough Council	Exercise Skuld	Training exercise	14th March 2012
KCC Emergency Planning / EA / Shepway District Council	Exercise Valkyrie	Training exercise	4th April 2012
KCC Emergency Planning / EA / Shepway District Council	Exercise Friia	Training exercise	26th April 2012
KCC Emergency Planning / EA / Canterbury City Council	Exercise Idun	Training exercise	9th May 2012
KCC Emergency Planning / EA / Ashford Borough Council	Exercise Ran	Training exercise	17th May 2012
KCC Emergency Planning / EA / Dartford Borough Council / Gravesham Borough Council	Exercise Sunna	Training exercise	22nd May 2012
KCC Emergency Planning / EA / Swale Borough Council	Exercise Skadi	Training exercise	23rd May 2012
KCC Emergency Planning / EA / Thanet District Council	Exercise Kara	Training exercise	30th May 2012
KCC EP / EA / Sevenoaks District Council	Exercise Atla	Training exercise	6th June 2012
KCC Emergency Planning / EA / Swale Borough Council	Exercise Sol	Training exercise	8th June 2012
KCC / EA	Kent Flood Summit	Conference	26th June 2012
KCC Emergency Planning / EA / Defra	East Coast Flooding Exercise	Table top exercise	April 2013
KCC Resilience and Emergencies Unit	KCC Flood Response Plan Validation Training Exercise	County Emergency Centre	October 2014
Defra / EA / Kent Resilience Forum	East Coast flooding exercise	Multi-agency exercise	February 2015

Kent Resilience Forum	Exercise Ragnarok (Coastal flooding)	Multi-agency exercise	March 2015
KCC	Exercise Thor (Surface Water Flooding)	County Emergency Centre	X3 December 2015

KCC	Exercise Eastre (Surface Water Flooding)	Training exercise	(x12) April 2016 – March 2017
Kent Resilience Forum	Exercise Surge (Coastal Flooding)	Multi- agency Exercise	September 2016
Kent Resilience Forum	Exercise Surge Recovery Exercise	Multi- agency Exercise	November 2017
KCC	Exercise Tethys (Reservoir Inundation)	Table-top	November 2017
KCC / Kent Resilience Forum	Met Office Emergency Responders	Training	28th September 2018
KCC / Kent Resilience Forum	Oil Pollution (SCAT)	Training	28th September 2018

Appendix A - Resources [Assets]

Resource	Who / Where	Contact Number
Sandbags	**KCC Approx. 10k filled bags at Highways Depots in Kent.** ***Some District and Borough Councils may hold stocks of sandbags, contact the council concerned for more information.***	
Boats	**Boats – Non tidal** • **2 x 4 metre rigid inflatable craft (powered), capable of carrying a crew of 3, and rescuing up to 5 people. These boats are based at Larkfield and Whitstable Fire Stations (1 at each).** • **2 x 3.8 metre fully inflatable craft, (non-powered) capable of carrying a crew of three and rescuing up to 5 people. These boats are based at Strood and Sheppey Fire Stations (1 at each).** **Boats – Tidal** • **1 x 8.5 metre (tidal) rigid inflatable craft (powered), capable of carrying a crew of 2, and rescuing up to 16 people. This boat is based at Sheppey Fire Station.** • **Kent Police: 2 inflatable crafts and an aluminium flood boat on wheels; 2 crew all trained to advanced power boat/rescue boat** • **Environment Agency: 2 aquapeche (1 large 1 small), 2 Dory's, 2 Avon inflatable. All these craft are powered and although the EA have no trained personnel at present these resources could be made available for use by trained personnel from other organisations.** • **Port of London Police: 1 x 6.5 metre delta rigid inflatable boat, with road going trailer, fitted with 150bhp outboard engine. (10 crew trained to RYA power boat level 2) 10 Crew all trained to RYA level 2.**	

Pumps	• **KFRS: 86 front line appliances capable of pumping in flooding situations.** • **KFRS: 1 High Volume Pump (HVP) capable of pumping between 7-8000 litres per minute. This is located at Whitstable Fire Station. National assets may also be available.** • **KFRS: 2 water management units which have 1.8km of hose each, for pumping water. These can be used alone and/or in conjunction with the HVP. These units are based at Tonbridge and Faversham Fire Stations.**	
Transport	**Kent County Council / Kent Resilience Team can procure coaches and other transport. Assets.** ***Some District and Borough Councils may have access to transport, contact the council concerned for more information.***	
Plant and Vehicles	**Kent Highways and Transportation can procure a range of plant and other assets.** ***Some District and Borough Councils may have access to plant and vehicles, contact the council concerned for more information.***	
Temporary Defences	**Some temporary defence is held by the Environment Agency in Kent. Additional national assets may also be available.**	
Catering	**KCC School Meals Contractors / Social Care catering contractors School Kitchens.**	
Waste	**Districts / KCC Waste Management (and their contractors) will lead on collection and disposal of waste**	
Specialist Advice on Structures	**KCC Kent Highways and Transportation District / Borough Council Building Control**	
Civil Air support	**Via Kent Resilience Team**	
Voluntary Sector Involvement	**Various Organisations County wide – mobilised through KCC Resilience and Emergencies and/or Kent Resilience Team**	

Military Support	**Assets and personnel: Military Aid to the Civil Community mobilised via KCC Resilience and Emergencies and/or Kent Resilience Team**	
Personal Protective Equipment (PPE), Bedding and Other Resources	**KFRS: 45 life jackets, 45 pairs of waders and other ancillary PPE as a non-mobile special. These are based at Maidstone, Canterbury and Medway Fire Stations** **KFRS: 10 x 5 metre air track paths capable of being towed by a rescue boat, these have a capacity of rescuing 10 members of the public, these are based at Strood, Sheppey, Whitstable and Larkfield Fire Stations** **Some councils hold supplies of bedding and other supplies on behalf of KCC Emergency Planning Group**	
Rescue and Feeding of Livestock and other Animals	**KFRS: Animal Rescue Unit based at Faversham Fire Station. RSPCA and DEFRA resources.**	
KCC Emergency Contact Directory	**Refer to this**	

Appendix B - Business Continuity Management

Under the Civil Contingencies Act 2004, Kent County Council, as a Category 1 Responder, have a duty to put in place Business Continuity Management arrangements.

Business Continuity Management (BCM) provides a framework for building in resilience to an organisation and delivering a capability for an effective response to events that might threaten its business operations.

Kent County Council Directorate Business Continuity Plans include the following documents (an overview of Business Continuity Management in Kent can be found at Section 9 of the KCC Major Emergency Plan):

- Business Continuity Management Policy;
- Business Continuity Programme Management;
- Business Impact Analysis (BIA);
- Plan Scope;
- Activation Plan;
- Response Plan or Action Plan;
- Alternative Response Strategies; and
- Recovery Requirements for critical services.

Appendix C - Health and Safety

It is crucial that managers and staff prioritise health and safety when mobilised as part of an emergency response and do not place themselves or colleagues in potentially dangerous situations. Indeed, the Health and Safety at Work Act 1974 applies to all elements of the local authority response to a major incident and covers:

- safety of staff and contractors;
- safe systems of work;
- safe equipment;
- manual handling; and
- electricity at work.

Managers should ensure that a risk assessment, in compliance with current Health and Safety Executive guidance (Five Steps to Risk Assessment), is undertaken for the various elements of the Council's emergency response and that findings and actions are recorded and acted upon. Expert advice from the Council's Professional Health and Safety Officer should be sought as a matter of urgency. Health and Safety Executive Risk Assessment Guidance is held by all KCC Health and Safety Officers.

At an Operational level responding personnel should considered risks and undertake dynamic risk assessments. Potential hazards arising from major incidents could include:

- slips, trips, falls;
- debris on roads and footways and severe weather implications on all travel modes;
- extremes of temperature arising from weather emergencies;
- floodwaters and concealed risks;
- risk from fumes and noxious substances;
- explosion risk and / or unstable structures;
- acts of violence, working or travelling alone; and
- injury from traffic.

Access to safety equipment

A range of professional officers routinely carry generic protective equipment on day-to-day business including hard hats, steel toe cap boots, high visibility clothing, throw-lines, rigid and self-inflating lifejackets.

Stocks of water safety equipment, comprising throw-lines, rigid and self-inflating life-jackets, are held at District Council offices for issue to personnel working on or close to water or mud. Lone working is discouraged when working close to water and mud and all personnel likely to be involved in the operational response to flooding or aquatic pollution incidents should have attended Kent County Council / Kent Fire and Rescue water safety awareness training session.

Appendix D - Risk Assessments

Kent Resilience Forum – Individual Risk Assessment (IRA)

Hazard / Threat Category	Kent Risk Ref	LRMG Risk Number(s)
SEVERE WEATHER **Local fluvial flooding**	**17**	**HL19** **3.10**
Date of Revision	Next review date	
2015		
Overview of hazard or threat:		
'The flooding event would have a sub-regional impact and is a real threat to lives. Localised economic damage and need between 6- and 18-months recovery before business as usual conditions are restored. The depth and velocity of water flows will vary. Significant mutual aid would be deployed from neighbouring counties, but the response effort could be contained within a region. Assumes: See H21 - Many of the assumptions are the same for a significant local fluvial flood as they would be for a major regional flood. However, the impact may be specific to one area rather than several sites. Consequence management will be achievable within a regional level response capability.'		
Key historical evidence (last 5 years or of particular note):		

- October - November 2000 - Many communities throughout Kent affected by the severe rainfall which fell on areas of Kent during the winter and spring of 2000/2001
- December 2002 / January 2003 – Over 100mm of rain fell over Southern Region resulting in flooding to around 126 properties in the Kent area.
- Summer 2007 – Exceptionally heavy rain in June and July 2007 resulted in fluvial and surface water flooding. The worst affected areas were Thames Valley, Gloucestershire, Humberside and South Yorkshire.
- Winter 2013-14 Between 17 December 2013 and 17 January 2014 more than 320mm of rain fell across the upper reaches of the Medway. The ground was saturated, and rivers were high when a further 65 - 70 mm of rain fell during the severe weather on 23 and 24 December, leading to flooding in many areas. The flows in the Upper Medway were the highest ever recorded resulting in more than 700 flooded homes and businesses being flooded throughout the River Medway catchment. The worst affected locations included Tonbridge, Hildenborough and Yalding in the River Medway catchment.

Likelihood	
Hazard	Likelihood
SEVERE WEATHER - Local fluvial flooding	**Medium High (4)**
Impact:	
Summary:	
Hazard	Impact
SEVERE WEATHER - Local fluvial flooding	**Moderate (3)**
Details:	

Impact associated with risk

Primary:

- Drowning of people, pets and livestock
- Major damage to property and surrounding land
- Closure, or washing away, of roads, bridges, railway lines
- Loss of (and possible damage to) telephone, electricity, gas and water supplies
- Pollution/health risks from sewerage systems, chemical stores, fuel storage tank
- Evacuation and temporary/long-term accommodation needs

Secondary

- Need for recovery strategy in aftermath of major flood
- Disruption of economic life and major costs of rebuilding infrastructure
- Public need for information, advice, benefits/emergency payments
- Insurance implications, including help for the uninsured
- Safety assessments/possible demolition of damaged buildings and structures
- Shortage/overstretch of key resources (equipment and personnel) and agencies
- Overstretch of normal communication links, including mobile phones.

Overall assessment:			
Category:			
SEVERE WEATHER			
Likelihood	Impact		Risk Rating
Medium High (4)	Overall	3	**High**
	Fatalities	1	
	Casualties	1	
	Economic	3	
	Social Disruption	3	
	Psychological	3	
Controls in place			

Kent Resilience Forum – Individual Risk Assessment (IRA)

Hazard / Threat Category	Kent Risk Ref	LRMG Risk Number(s)
SEVERE WEATHER **Local / urban flooding (fluvial or surface run-off)**	**18**	**HL18** **3.9**
Date of Revision	Next review date	
2015		
Overview of hazard or threat:		
'The flooding event would have a regional impact, possibly translating into loss of lives, localised economic damage and need between 6- and 18-months recovery before business as usual conditions are restored. *The depth and velocity of water flows will vary.* *Significant mutual aid would be deployed from neighbouring regions, although other regions are also likely to be at risk or impacted at the same time.* *Assumes:* *See H21 (Many of the assumptions are the same for a major regional fluvial flood as they would be for a major national incident.* *Consequence management will not be achievable with in a regional response capability.'*		
Key historical evidence (last 5 years or of particular note):		

- October - November 2000 - Many communities throughout Kent affected by the severe rainfall which fell on areas of Kent during the winter and spring of 2000/2001
- December 2002 / January 2003 – Over 100mm of rain fell over Southern Region resulting in flooding to around 126 properties in the Kent area.
- Summer 2007 – Exceptionally heavy rain in June and July 2007 resulted in fluvial and surface water flooding. The worst affected areas were Thames Valley, Gloucestershire, Humberside and South Yorkshire.
- Winter 2013-14 - Between 17 December 2013 and 17 January 2014 more than 320mm of rain fell across the upper reaches of the Medway catchment, the ground was saturated and rivers were high when a further 65 - 70 mm of rain fell during the severe weather on 23 and 24 December, leading to flooding in many areas.
- With these amounts of rainfall, flooding from all sources, surface water, groundwater, drainage systems and river systems is inevitable.

Likelihood	
Hazard	Likelihood
SEVERE WEATHER - Local / urban flooding (fluvial or surface run-off)	**Medium (3)**
Impact:	
Summary:	
Hazard	Impact
SEVERE WEATHER - Local / urban flooding (fluvial or surface run-off	**Moderate (3)**
Details:	
Impact associated with risk	
Primary:	

- Drowning of people, pets and livestock
- Major damage to property and surrounding land
- Closure, or washing away, of roads, bridges, railway lines
- Loss of (and possible damage to) telephone, electricity, gas and water supplies
- Pollution/health risks from sewerage systems, chemical stores, fuel storage tanks
- Evacuation and temporary/long-term accommodation needs
- Rescue of people
- Loss of key services due to key office in flood zone • Rescue using boats

Secondary

- Need for recovery strategy in aftermath of major flood
- Disruption of economic life and major costs of rebuilding infrastructure
- Public need for information, advice, benefits/emergency payments
- Insurance implications, including help for the uninsured
- Safety assessments/possible demolition of damaged buildings and structures
- Shortage/overstretch of key resources (equipment and personnel) and agencies
- Overstretch of normal communication links, including mobile phones.

Overall assessment:

Category:

SEVERE WEATHER

Likelihood	Impact		Risk Rating
Medium (3)	Overall	3	**High**
	Fatalities	1	
	Casualties	2	
	Economic	3	
	Social Disruption	4	
	Psychological	4	

Controls in place

Kent Resilience Forum – Individual Risk Assessment (IRA)

Hazard / Threat Category	Kent Risk Ref	LRMG Risk Number(s)
SEVERE WEATHER **Flooding: Major coastal and tidal flooding affecting more than two UK regions** **(This is the national picture to provide context for local risk assessment)**	**24**	**H16** **3.5**
Date of Revision	Next review date	
2015		

Overview of hazard or threat:

Assumes:

- Up to 4 days of advanced severe weather alerts from the Met Office
- Severe Flood Warnings issued up to 24 hours in advance by the Environment Agency
- Storm tide forecasting service shows risk of over-topping (up to 8hrs lead time).
- Rescue can only be by boat, helicopter or high-clearance vehicles.
- Emergency services affected if located in the flood zone.
- Evacuation warnings given to emergency services (as little as 1 hour)
- Multiple failure (breaches) of flood defence systems and significant overtopping.
- Damage or failure at: several sites of telecommunications, electrical sub-stations, water and sewage treatment works, road bridges and rail embankments, rendering these essential services inoperable for up to 14 days.
- Closure of key and essential transport routes for up to 5 days leading to national disruption to commuters and supplies of goods and services.
- There are hospitals, schools, shops and industrial/ commercial premises in the flooded area (& possibly rest centres).
- 'Properties' includes occupied mobile homes and caravans' sites in low-lying coastal zones (summer tourists).

Key historical evidence (last 5 years or of particular note):

- January 1953 - Severe flooding caused by a massive surge tide devastated North and North East coastal areas of Kent, having taken the lives of 300 people in East Anglia and then continued onto Holland and took a further 1,800 lives.
- December 2013 - The storm that hit the UK, on Thursday 5th and Friday 6th December 2013 resulted in the most serious tidal surge in over 60 years.
- Record sea levels were recorded in a number of locations. In some places levels were higher than the destructive floods of 1953. 58 properties (42 residential, 16 commercial) were flooded during the tidal surge in the Kent and South London Area.
- At Dover the tide was the highest seen since 1905 and flooding was experienced in Strood, Conyer, Faversham and Sandwich.
-

Likelihood

Hazard	Likelihood
SEVERE WEATHER Flooding: Major coastal and tidal flooding affecting more than two UK regions	**Medium (3)**

Impact:

Summary:

Hazard	Impact
SEVERE WEATHER Flooding: Major coastal and tidal flooding affecting more than two UK regions	**Moderate (3)**

Details:

Impact associated with risk

Primary:

- Drowning of people, pets and livestock
- Major damage to property and surrounding land
- Closure, or washing away, of roads, bridges, railway lines
- Loss of (and possible damage to) telephone, electricity, gas and water supplies

Secondary

- Pollution/health risks from sewerage systems, chemical stores, fuel storage tanks
- Evacuation and temporary / long-term accommodation needs
- Disruption of economic life and major costs of rebuilding infrastructure

Overall assessment:

Category:

SEVERE WEATHER

Likelihood	Impact		Risk Rating
	Overall	3	**High**
	Fatalities	2	
	Casualties	3	
	Economic	3	
	Social Disruption	3	
	Psychological	4	

Controls in place

Appendix E - Kent County Council Flooding Event Model Debrief Agenda

Incident:

Date of Debrief:

Chair:

Secretary:

Present:

1. Introductions and apologies (Chair / All)

2. Background (Chair)

3. Effectiveness of alerting and mobilisation (by Team)

4. Command and control
   - what went well (by Team)
   - what went badly (by Team)

5. Recovery
   - what went well (by Team)
   - what went badly (by Team)

6. Recovery
   - what went well (by Team)
   - what went badly (by Team)

7. Did any best practice emerge during response and/or recovery (Chair / All)?

8. Are changes required to KCC Flood Response Emergency Plan (Chair / All)

9. Implications for future training and exercising (Chair / All)

10. Run through and refinement of recommendations arising from Debrief (Chair/All)

11. Outline next steps and close meeting (Chair)

Kent County Council Flood Response Plan

Issue 7 (July 2019)

Plan owner: Director of Environment, Planning & Enforcement

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To: Kent Flood Risk Management Committee

From: Mike Whiting - Cabinet Member for Planning, Highways, Transport and Waste

Subject: Flood Risk Management Policies

Classification: Unrestricted

Summary: KCC undertakes a number of functions as the Lead Local Flood Authority for the County. These include acting as a statutory consultee for surface water in planning, regulating ordinary watercourses and undertaking investigations into flooding. KCC is planning to consult on new and revised policies for these functions that clarify our role and ensure our policies are up to date with current guidance and best practice.

Recommendation:

That Members:

- Note the paper and the three draft policies, the Drainage and Planning policy, the Land Drainage Policy and the Section 19 Investigation policy;
- Provide any comments or feedback prior to these policies going to public consultation.

1. Background

1.1 Kent County Council (KCC) is the Lead Local Flood Authority (LLFA) for Kent under the Flood and Water Management Act 2010 (the Act). As Lead Local Flood Authority, Kent County Council has a strategic overview of local flooding. Local flooding is defined by the Act as flooding which is caused by:

- Surface water,
- Groundwater, and
- Ordinary Watercourses

1.2 As LLFA, KCC has a number of powers and duties for the management of local flood risk in the county. These powers and duties include:

- The duty to act as a statutory consultee for surface water in planning
- The power to regulate works in ordinary watercourses, and
- The duty to undertake investigations into flooding

1.3 KCC is revising or bringing forward new policies that set out how we undertake these powers and duties. This paper introduces these policies.

2. Drainage and Planning Policy Statement

2.1 Introduction

2.1.1 As a LLFA, we have been acting as a statutory consultee for surface water within the planning process since April 2015. As a statutory consultee we are required to provide the Local Planning Authority technical advice and guidance on surface water management proposed

in major planning applications. A consultation response is required to be returned to the local planning authority within 21 days.

2.1.2 Our consultation responses are based on guidance from existing planning policies, National Planning Practice Guidance, and the published national Non-Statutory Technical Standards for Sustainable Drainage which was published by DEFRA in 2015.

2.1.3 KCC adopted a Drainage and Planning Policy Statement in 2015 that sets out our requirements for surface water management in major developments. The Drainage and Planning Policy Statement is consistent with the Non-Statutory Technical Standards and National Planning Policy Framework (NPPF).

2.1.4 The Drainage and Planning Policy Statement is used by the following groups:

- developers when considering their approach to development on new sites or redevelopment of brownfield sites in preparing submissions;
- professionals involved in developing drainage schemes including engineering and urban and landscape professionals;
- local authorities when developing local planning and land-use policy.

2.1.5 Following recent changes to the NPPF and the publication of DEFRA's 25-Year Environment Plan, we have revised our Drainage and Planning Policy Statement to be consistent with them.

2.1.6 The revised Drainage and Planning Policy is attached in Appendix 1.

3. Revised Drainage Policy

3.1.1 From our experience of performing our role as statutory consultee we have found that the information submitted with planning applications regarding surface water management does not always comply with our Drainage and Planning Policy and that applications do not always contain sufficient information to support a decision. Consequently, we often have to request more information from the applicant, which causes planning delays.

3.1.2 Additionally, we cannot be certain that the drainage system what was approved in the planning application has been delivered by the developer's contractors. We have found in some cases that important features of the drainage system have not been constructed as approved.

3.1.3 One of the primary intentions of the revised Drainage and Planning Policy Statement is to create a more concise document which provides greater clarity on our requirements for surface water management. In Section 4.3 of the Drainage and Planning Policy Statement 'Consultation submission requirements' we have included a clear table (Table 1) detailing the information required at each stage of planning. The previous version only displayed our minimum requirements for full planning stage. This addition

should enable developers to submit the correct level of information at each stage to support approval of planning applications.

3.1.4 The revision also includes requirements for a verification report, as a post construction condition that is recommended for all major planning applications KCC is consulted on. The intention of the verification report is to confirm if the drainage system has been constructed in accordance with the approved designs and to identify any changes that have been made to the design and whether there would be any impact on the performance of the system as a result of these changes. As the Lead Local Flood Authority, it is important that we understand how drainage systems work and especially if proposed systems have been changed. We are also required to maintain a record of structures and features in the county, this verification report will support us in keeping this record up to date.

3.1.5 The details and format of the verification report has been developed in consultation with the development community in Kent and their consultants. The intention is that a responsible person in the developer's organisation will sign-off the report and submit it to KCC, which can be done on-line.

3.1.6 The policy requirements set out in the Drainage and Planning Policy have not significantly changed. They have been reorganised to be easier to follow and the formatting has been revised to make them easier to read. More attention has been given to promoting amenity and open space to encourage more multifunctionality in sustainable drainage systems. It is our intention to promote sustainable drainage measures in open space to provide the opportunity for improved water quality, biodiversity and amenity as well as drainage.

4. Land drainage Policy

4.1 Introduction

4.1.1 Kent County Council as the Lead Local Flood Authority has powers as a Land Drainage Authority, under the Land Drainage Act 1991, to regulate ordinary watercourses in Kent. An ordinary watercourse is a watercourse that is not a main river, it may be a small river, stream, ditch or drain and does not always need to flow.

4.1.2 As a land drainage authority KCC has powers to provide consent for any works within an ordinary watercourse. In exercising this role, we must ensure that the works do not increase the risk of flooding, we are also obliged to ensure that there is no loss of habitat or pollution to the watercourse.

4.1.3 Land drainage consent is separate to planning permission, some works may be subject to both a planning application and land drainage consent. Granting of one does not automatically mean the other will follow or that the other is not required. We generally advise applicants to get planning permission first, as it may alter the location etc, of the structure being

consented, whereas land drainage consent is more concerned with design details.

4.1.4 KCC also has enforcement powers to ensure that ordinary watercourses are maintained to pass ordinary flows and to remove unconsented structures. KCC's preference with enforcement is to work with the relevant landowner to avoid the need to undertake formal enforcement. Our powers of enforcement only allow us to undertake the necessary works and to charge the landowner the costs. We do not have the power to compel landowners to undertake works.

4.1.5 The Land Drainage policy, attached in Appendix 2, sets out how KCC proposes to exercise these powers and gives guidance to applicants for land drainage consent.

4.2 **Land Drainage policy**

4.2.1 The Land Drainage policy statement is new, previously KCC has undertaken this Land Drainage function according to the Land Drainage Act, best practise, based on Environment Agency guidance, who performed this role prior to it being passed to KCC, and other relevant legislation, including the Habitats Regulations.

4.2.2 The new policy consolidates our requirements into one statement, revised over the years of undertaking this role. It particularly focusses on Land Drainage consent for culverts. Culverts represent a significant portion of the applications for consents we receive.

4.2.3 As a general rule KCC's preference is not to use culverts, but we accept them where they are unavoidable, principally for access to new developments. Culverting watercourses for the purpose of facilitating new development is not a sustainable policy. Culverting watercourses removes habitat and prevents fish migration and increases flood risk. Many flood risk issues in Kent are associated with culverted watercourses, as they are expensive and difficult to inspect and maintain, they prevent direct entry for water, they reduce the connectivity of the watercourse to its natural floodplain, which often gets developed on, and if they are constructed over they present a long-term maintenance liability.

4.2.4 The Land Drainage Policy sets out the requirements for applicants to demonstrate that the proposed works, including culverts, are appropriate for the proposed watercourse and do not increase flood risk.

5. Section 19 investigations

5.1 **Introduction**

5.1.1 KCC has is to undertake investigations into flood events in Kent under Section 19 of the Flood and Water Management Act 2010 and to publish a report of the investigation. The purpose of an investigation is to determine which risk management authorities have relevant flood risk management

functions and whether those risk management authorities have exercised those functions in response to the flood.

5.1.2 Clearly, a flood investigation is only needed when no risk management authority has exercised or is proposing to exercise its functions in respect of the flood or if there is no clear relevant risk management authority, otherwise the investigation only repeats the work of other risk management authorities.

5.1.3 It should be noted that the Flood and Water Management Act does not require the report of the investigation to set out the causes or circumstances of the flood. Some explanation of the causes, however, is necessary in an investigation report in order to provide background to the flooding, to identify the appropriate risk management authorities and to determine what, if anything, could be done in response to the flooding.

5.1.4 A policy for investigating flooding incidents was set out in the first Kent Local Flood Risk Management Strategy that was adopted by the County Council in 2012.

5.1.5 The current flood investigation policy is:

Flood investigations will be undertaken where no other risk management authority is exercising or is proposing to exercise its functions in respect of the flood and where the flood is significant.

Where the definition of a significant flood event is one that causes:

- internal flooding to one or more properties;
- external flooding of five or more properties;
- flooding of roads, rail and other transport infrastructure to an extent that they become impassable by vehicles;
- flooding of or near locally important services or infrastructure, for example health centres and electricity substations, to an extent that they cannot function normally.

5.1.6 The Kent Local Flood Risk Management Strategy was refreshed in 2018. The new Strategy did not include policies regarding how KCC would exercise its duties as LLFA, as it focussed on the broad strategic issues of local flood risk management.

5.1.7 The policy for investigating flooding needs revising.

5.2 **Background**

5.2.1 The current policy for investigating flood events sets the threshold for an investigation quite low. Our experience of exercising this power is that for flood events that meet the minimum requirements for triggering an investigation a formal report of the flood event is often not necessary or useful.

5.2.2 Producing the report of the investigation is time consuming and resource intensive, which can delay the delivery of actions to mitigate future floods. The evidence for the report must be compiled from a number of sources and written into a report which needs to be consulted on with the parties referenced in it. This process can take several months, typically nine to twelve months from the flood to publishing the report, sometimes longer.

5.2.3 For smaller flood events, the formal report is not necessary, nor does it lead to any particular outcome. The report itself does not provide KCC any powers to require risk management authorities to undertake works, it is only a public statement of the circumstances. Formal, public reports of flood investigations are often not wanted by the victims of the flooding either, simple statements of the issues are usually all they require.

5.2.4 Reports of flood investigations remain valuable for flood events where a public statement of the flood event is useful. This includes occasions where several properties have been flooded and there is no recent memory of flooding and where the flooding is complex and a public report is useful for explaining the causes.

5.3 **Proposed policy**

5.3.1 KCC proposes to investigate events that flooded residential properties internally or that disrupted local services but proposes that not all of these flood events should be followed by a public report.

5.3.2 In carrying out these investigations, KCC officers will continue to liaise with the subjects of the flooding and report to them the findings of the investigation, though not necessarily publicly.

5.3.3 KCC proposes to increase the threshold for publishing reports of flood investigations so that they are used when they add value. The proposed policy for publishing reports of flooding is set out below:

Section 19 Flood Investigation Policy
KCC will undertake an investigation into a flood event and publish a report of the findings where no other risk management authority is exercising or proposing to exercise its risk management functions and where:

- the flooding causes internal flooding to five or more properties or critical infrastructure assets in a localised area; or
- The flood mechanism is complex, for instance there are two or more sources of floodwater involved or the source or mechanism of the flooding is unclear and there is a public interest to explain this mechanism; or
- KCC determines that a report of the flooding is merited.

6. Consultation

6.1 These policies will be consulted on publicly this summer. Once this has been completed they will be taken to the Environment and Transportation Cabinet Committee prior to adoption by the county.

4 Recommendations

That Members:

- Note the paper and the three draft policies, the Drainage and Planning policy, the Land Drainage Policy and the Section 19 Investigation policy;
- Provide any comments or feedback prior to these policies going to public consultation.

Mike Whiting, Cabinet Member for Planning, Highways, Transport and Waste

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July 2019

Kent County Council

DRAFT Drainage and Planning Policy Statement

Local flood risk management strategy guidance

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Date	Revisions details
Oct 2016	Clarification on technical matters; submission summary form.; pre-application advice; post-construction verification reports; standard advice.
June 2017	Further clarification of technical matters and amendments to general wording including revised M5-60, 50% reduction for brownfield sites, runoff control per soil type, discharge to highway systems, off-site drainage improvements and developer contributions.
July 2019 v1	Clarification of drainage submission requirements and revised drainage policies to reflect latest changes in NPPF and include the requirements for a verification report.

1 Role of this Policy Statement

This policy statement sets out how Kent County Council, as Lead Local Flood Authority and statutory consultee, will review drainage strategies and surface water management provisions associated with applications for major development. It is consistent with the Non-Statutory Technical Standards for Sustainable Drainage (as published by Defra in March 2015), and sets out the policy requirements Kent County Council has for sustainable drainage. It should be read in conjunction with any other policies that promote sustainable drainage, specifically:

- the National Planning Policy Framework and,
- any specific policy set out by the relevant Local Planning Authority

This policy is also supported by KCC guidance and policy provided in:

- Kent Design Guide Technical appendices ('*Making It Happen*') 2019
- Water. People. Places- a guide for Masterplanning sustainable drainage in developments

The aim of this policy document is to clarify and reinforce these requirements. It also includes references to other design considerations which impact sustainable drainage design and delivery.

This policy statement should be used by:

- Developers when considering their approach to the development of new sites or redevelopment of brownfield sites,
- Developers or their consultants when preparing submissions to support a planning application for major development,
- Professionals involved in developing drainage schemes including engineering and urban and landscape professionals,
- Development management officers when considering development applications,
- Local Authorities when developing local planning and land-use policy.

With this current update, we seek to ensure that multifunctionality of open space is now emphasised within development master planning. This provides an opportunity for Kent to look to wider benefits of sustainable drainage and strengthen policies for the delivery of drainage systems which are fully sustainable, thus providing quantity control, quality improvement, biodiversity enhancement and amenity. Changes to the National Planning Policy Framework (NPPF) in 2019 and Defra's 25-Year Environmental Plan[1] promote a stronger approach to sustainable development.

[1] 25-year Environment Plan, published January 2018 on www.gov.uk/government/publications/25-year-environment-plan.

2 Introduction

2.1 Background

Kent County Council was made Lead Local Flood Authority for Kent by the Flood and Water Management Act 2010 (the Act). As Lead Local Flood Authority, Kent County Council has a strategic overview of 'local flooding'. Local flooding is defined by the Act as flooding which is caused by:

- **Surface water,**
- **Groundwater, and**
- **Ordinary Watercourses**

The management of surface water within new development is a key factor in managing local flooding.

Since commencement of the Act in 2010, the Government has assessed various means of promoting sustainable drainage systems. In April 2015, Lead Local Flood Authorities were made statutory consultees in planning for surface water. Our understanding of local drainage and local flood risk presents a strong platform from which to provide advice and guidance to Local Planning Authorities on the management of surface water.

In undertaking this role Kent County Council coordinates with the 12 local authorities as well as Kent's own planning department and the Ebbsfleet Development Corporation. Where appropriate we will also liaise with other relevant flood risk management authorities, such as the Environment Agency, sewerage undertakers and the county's Internal Drainage Boards.

2.2 Legislative Framework

As Lead Local Flood Authority within Kent, Kent County Council is required under Article 18 of the Town and Country Planning (Development Management Procedure) (England) Order 2015 ('the Development Management Procedure Order') to provide consultation response on the surface water drainage provisions associated with major development.

Major development is defined within the Development Management Procedure Order as development that involves any one or more of the following:

(a) the winning and working of minerals or the use of land for mineral-working deposits;
(b) waste development;
(c) the provision of dwelling houses where:
  (i) the number of dwelling houses to be provided is 10 or more; or
  (ii) the development is to be carried out on a site having an area of 0.5 hectares or more and it is not known whether the development falls within sub-paragraph (c)(i);

(d) the provision of a building or buildings where the floor space to be created by the development is 1,000 square metres or more; or
(e) development carried out on a site having an area of 1 hectare or more.

As a statutory consultee, Kent County Council must provide a substantive response within 21 days of consultation (Article 22 of the Development Management Procedure Order). A substantive response is one which:

(a) states that the consultee has no comment to make;
(b) states that, on the basis of the information available, the consultee is content with the development proposed;
(c) refers the consultor to current standing advice by the consultee on the subject of the consultation; or
(d) provides advice to the consultor.

The Planning and Compulsory Purchase Act 2004 describes the duty to respond as a consultee, including the duty to report to the Secretary of State on compliance with the provision of substantive responses.

The Town and Country Planning (General Development Procedure Amendment No. 2, England) Order 2006 introduces the concept of Critical Drainage Areas as ‘‘*an area within Flood Zone 1 which has critical drainage problems and which has been notified [to] the local planning authority by the Environment Agency*’’. However, no Critical Drainage Areas have yet been defined within Kent and will not require further consultation.

2.3 Sustainable Drainage in Planning

Sustainable drainage systems are designed to control surface water as close to its source as possible. Wherever possible they should also aim to closely mimic the natural, pre-development drainage across a site. Well-designed sustainable drainage systems also provide opportunities to:

- reduce the causes and impacts of flooding,
- remove pollutants from urban run-off at source,
- combine water management with green space with benefits for amenity, recreation and wildlife.

The purpose of the planning system is to contribute to the achievement of sustainable development and deliver the requirements of the National Planning Policy Framework (NPPF). The use of sustainable drainage systems helps to achieve the sustainability objectives of the NPPF.

2.4 Design Strategies

Development has the potential to change surface water and ground water flows, depending upon how the surface water is managed within the development proposed. Planning applications for major development should therefore be accompanied by a site-specific **drainage strategy** that demonstrates that the drainage scheme proposed is in compliance with Kent County Council's sustainable drainage policies, as outlined within this document.

The drainage strategy must also demonstrate that the proposed surface water management proposal is consistent and integrated with any other appropriate planning policy and flood risk management measures that are required.

2.5 Strategic Consultation

As Lead Local Flood Authority, Kent County Council has a consultation role in relation to the preparation of local plans, neighbourhood plans, strategic flood risk assessments and other planning instruments produced by Local Planning Authorities[2].

Kent County Council will provide advice and guidance on local flood risks and appropriate policy for any area upon request.

Kent County Council will also provide information to individuals and other organisations with respect to drainage and local flood risk for use in the preparation of other relevant planning documents upon request.

[2] National Planning Policy Guidance, Flood Risk and Coastal Change, paragraph 2.

3 Planning policy and guidance for drainage

This section sets out the sources of planning policy relevant to the management of surface water. These policies will form the basis of Kent County Council's assessment of any submitted drainage strategy. The drainage strategy will need to demonstrate how the development meets these requirements.

3.1 NPPF

The National Planning Policy Framework (NPPF) was published on 27 March 2012 with further revisions in 2019; it sets out the Government's planning policies for England and outlines how these are expected to be applied. Planning law requires that applications for planning permission must be determined in accordance with the relevant Local Planning Authority's development plan, following public consultation and with due regard for other material considerations.

The NPPF is a material consideration in the determination of planning applications. At the heart of the NPPF is a presumption in favour of sustainable development, excepting where adverse impacts significantly outweigh the benefits (or where specific policies indicate that development should be restricted). Flooding and drainage may also be considered material considerations in the determination of planning applications as their management contributes to sustainable development.

Paragraphs 155, 157, 163,165 and 170 of the NPPF (Appendix A) have particular relevance to flooding and drainage. These paragraphs include consideration for area of flood risk, incorporation of sustainable drainage systems, taking account of advice from LLFA, operational standards, maintenance requirements and multifunctionality.

The NPPF is supported by the **Planning Practice Guidance**[3] which provides further advice on how planning can take account of the risks associated with flooding in plan-making and the application process.

3.2 Water Environment Regulations 2003

The Water Environment Regulations 2003 make provision for the purpose of implementing in river basin districts the Water Framework Directive (Directive 2000/60/EC of the European Parliament) which established a framework for Community action in the field of water policy. These regulations will remain in place until such time that UK law is revised to reflect changes in EU membership. These Regulations require a new strategic planning process to be established for the purposes of managing, protecting and improving the quality of water resources.[4]

Therefore this provides an opportunity to plan and deliver a better water environment, focusing on ecology. The WFD aims for the water environment to reach 'good'

[3] The Planning Practice Guidance is a web-based resources which can be accessed from the Planning Portal at: http://planningguidance.planningportal.gov.uk/?s=Drainage&post_type=guidance

[4] This framework became UK law in December 2003

chemical and ecological status in inland and coastal waters by 2015. Planning and programmes are continuing in six year cycles until 2027.

The WFD drives water quality improvement planning along total river catchment areas, with the production of River Basin Management Plans. The directive puts a duty on public bodies to have regard to river basin management plans (and associated supplementary plans) when exercising their functions where it may affect a river basin district.

Controlling water is inherent in the WFD's objectives, as uncontrolled surface flow or flooding can cause unmanageable water quality problems. Sustainable drainage principles are key to meeting the objectives of the WFD in its continuing cycles.

3.3 Habitats Regulation 2017

The Conservation of Habitats and Species Regulations 2017 consolidate the Conservation of Habitats and Species Regulations 2010 with subsequent amendments. The Regulations transpose Council Directive 92/43/EEC, on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive[5]), into national law. They also transpose elements of the EU Wild Birds Directive in England and Wales.

The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European Sites.

Under the Regulations, competent authorities i.e. any Minister, government department, public body, or person holding public office, have a general duty, in the exercise of any of their functions, to have regard to the EC Habitats Directive and Wild Birds Directive.

The sites where habitats and species are legally protected due to their exceptional importance are known as Natura 2000 sites; this network protects rare, endangered or vulnerable habitats and species. The Natura 2000 network includes Special Areas of Conservation (SACs, identified under the Habitats Directive), Special Protection Areas (SPAs, identified under the Birds Directive) and Ramsar sites (wetlands of international importance designated under the Ramsar Convention). All Natura 2000, or 'European', sites are also classified as Sites of Special Scientific Interest (SSSIs) but not all SSSIs are Natura 2000 sites.

[5] More information on the Habitats Directive can be found at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm

3.4 Defra's 25-Year Environment Plan

The 25 Year Environment Plan was published in January 2018; it sets out government action to tackle the growing problems we face in the environment and aims to deliver cleaner air and water in our cities and rural landscapes, protect threatened species, reduce risk of environmental hazards and promote sustainable development.

The plan is supported by the concept of natural capital, meaning it places value on natural assets, which includes geology, soils, water and all living organisms. Specific components of the Environment Plan are introduced in current updates of the NPPF.

The Environment Plan will need to be underpinned by law and enforced by a new legal framework for the environment to replace the system the EU currently provides. It is beneficial to be aware of the changes in legislation and policy indicated in this plan as it provides government direction to sustainable development.

3.5 Non-statutory technical standards for sustainable drainage

To support the Lead Local Flood Authority's statutory consultee role, Defra published the '**Non-Statutory Technical Standards for Sustainable Drainage Systems**' on 23 March 2015. These standards provide advice and guidance for the design, maintenance and operation of sustainable drainage systems.[6]

Further guidance on the application of the Non-Statutory Technical Standards will be provided by Defra and associated stakeholders.

A summary of the requirements of these non-statutory standards in provided in Appendix B. The policies in this policy statement are consistent with the Non-Statutory Technical Standards.

3.6 Local Authority Guidance

Local Planning Authorities are ultimately responsible for determining planning applications and have numerous planning and policy documents to support the delivery of sustainable development within their districts.

3.6.1 Local Plans and Neighbourhood Plans

National planning policy places Local Plans at the heart of the planning system. Local Plans set out a vision and a framework for future development of the area. Local Plans should be based upon and reflect the presumption in favour of sustainable development. They should also address housing provision, the economy, community

[6] The Non-statutory Technical Standards are published at: https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards

infrastructure and environmental issues such as adapting to climate change and ensuring high quality design.

The management of flood risk and surface water can be dealt with through policies for sustainable construction, flood risk, open space, landscape character and green infrastructure. These policies may be supported by further Supplementary Planning Documents or guidance notes.

Neighbourhood planning is a right for communities introduced through the Localism Act 2011. Communities can shape development in their areas through the production of Neighbourhood Development Plans. These plans become part of the Local Plan and the policies contained within them are then used in the determination of planning applications.

Any drainage strategy should make reference to relevant Local Plan and Neighbourhood Plan policies. It may also have to provide evidence which supports delivery of biodiversity, amenity and other benefits.

3.6.2 Supplementary planning documents

Some local authorities in Kent have specific drainage guidance, policies and standards for development within their district areas, which may include specific surface water discharge rates. Other local authorities may introduce similar guidance. These documents provide substantive guidance on how drainage should be delivered.

3.6.3 Strategic Flood Risk Assessments (SFRA)

Strategic Flood Risk Assessments are required to inform the development of Local Plans, as stated within the NPPF. A SFRA assesses the risk to an area from flooding from all sources, taking into account the effects of predicted climate change. They should also assess the impact that land use changes and development will have on flood risk within the district in question. Each Local Planning Authority in Kent has prepared and referenced a SFRA within their planning documents. These documents provide key information on the potential sources and magnitude of flooding and may provide information for specific site allocations.

3.7 Kent County Council Guidance

The Local Flood Risk Management Strategy (the Local Strategy) for Kent sets out a countywide strategy for managing the risks from local flooding. One of the five objectives set out in the Local Strategy specifically states the importance of '*ensuring that development in Kent takes account of flood risk issues and plans to effectively manage any impacts*'.

To support delivery of this objective, Kent County Council has developed guidance to define the approach to planning and design of drainage. When considering surface water drainage within new developments in Kent, it is therefore recommended that reference is made to:

3.7.1 Water. People. Places – a guide for masterplanning sustainable drainage into developments

This guidance outlines the process for integrating sustainable drainage systems into the masterplanning of large and small developments[7]. This guidance should be used as part of the initial planning and design process for all types of development, with specific reference made to the relevant development typologies.

3.7.2 Kent Design Guide Technical Appendices: Making It Happen

The Kent Design Guide was produced to ensure that all new development results in vibrant, safe, attractive, liveable places. '*Making It Happen*' comprises technical appendices that provide advice and guidance on the design and construction of drainage systems which Kent County Council may be adopting.

The sustainability chapter (drainage systems) has been revised in May 2019 and contains specific technical guidance for drainage design.

3.7.3 Surface Water Management Plans

Surface Water Management Plans (SWMPs) have been prepared by Kent County Council (in partnership with other relevant stakeholders) to identify specific local actions to manage local flood risk. They have been undertaken in areas which were identified as a potential risk from local flooding in the Preliminary Flood Risk Assessment. These studies may provide a greater understanding of the current flood risk. Any proposed development should include consideration of any findings and recommendations of the relevant SWMP for the area. The areas covered by SWMPs are regularly being updated and can be found on the Kent County Council website[8].

3.7.4 Kent Environment Strategy

As part of a county wide partnership, Kent County Council has produced a Kent Environment Strategy– *A strategy for environment, health and economy* (KES) setting out how Kent and their partners propose to address significant opportunities and challenges from environmental change and development pressures (such as a need for improved air and water quality, decline in biodiversity and the impacts of climate change)[9]. It is accompanied by an implementation plan and includes partnership actions that will deliver against the priorities set out in the strategy. Kent County

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[7] The document can be found at: http://www.kent.gov.uk/waste-planning-and-land/flooding-and-drainage/sustainable-drainage-systems

[8] SWMPs can be found at: http://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/flooding-and-drainage-policies/surface-water-management-plans

[9] The Strategy can be found at: http://www.kent.gov.uk/about-the-council/strategies-and-policies/environment-waste-and-planning-policies/environmental-policies/kent-environment-strategy

Council adopted the strategy in January 2016 and has invited the District Councils to also adopt it to provide a basis for co-ordinated action.

The KES recognises that the environment is a key part of the infrastructure supporting the Kent economy. The strategy aims to make the most of environmental opportunities whilst addressing challenges arising from development pressures, need for improved air and water quality, decline in biodiversity and the effects of climate change.

3.8 Other Guidance & Tools

In approaching or reviewing design, technical aspects may need clarification and specification in order to satisfy Kent County Council that it meets the required standard. Kent County Council will make reference to good practice presented within the following documents, and would recommend that any designer also refers to:

3.8.1 CIRIA *SuDS Manual* (C753), 2015

This guidance document provides comprehensive information on the all aspects of the life cycle of sustainable drainage from initial planning, design through to construction and management including landscaping, waste management and costs.

3.8.2 Building Regulations

Building Regulations exist to ensure the health, safety, welfare and convenience of people in an around buildings. Part H of the Building Regulations specifically covers drainage. The consultation with the LLFA addresses flood risk to and from developments and does not replace any requirement for Building Regulation approval.

3.8.3 BS 8582:2013 Code of practice for surface water management for development sites

The British Standard gives recommendation on the planning, design, construction and maintenance of surface water management systems for new development and redevelopment sites in minimizing and/or mitigating flooding and maximizing the social and environmental benefits.

3.8.4 UK Sustainable Drainage Guidance

The UK Suds Tools website which provides estimation tools for the design and evaluation of surface water management systems. The website has been developed and is supported by HR Wallingford. The web site can be accessed at http://www.uksuds.com/drainage-calculation-tools/greenfield-runoff-rate-estimation. The website provides estimated for greenfield runoff and storage analysis.

3.8.5 Long Term Flood Risk Information

In 2013 the Environment Agency, working with lead local flood authorities (LLFAs), produced the Long Term Flood Risk map, which depicts the risk associated with

surface water flooding. The Risk of Flooding from Surface Water maps show flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets): 1 in 30 (3.3%), 1 in 100 (1%), and 1 in 1000 (0.1%).

The Risk of Flooding from Surface Water map is published on the Gov.UK website on the “Long Term Flood Risk Information” pages.[10]This mapping is key to assessing overland flow routes and to identifying any locations at high risk of surface water flooding.

[10] https://flood-warning-information.service.gov.uk/long-term-flood-risk

4 Drainage Consultation

4.1 Introduction

A drainage strategy should be submitted to the relevant Local Planning Authority along with any planning application for major development. It may either form part of a wider Flood Risk Assessment, or it can be submitted as a separate and dedicated standalone document.

Whilst consultation is not undertaken with Kent County Council for minor development, applicants should be aware that the NPPF priorities for sustainable drainage to apply to all development, irrespective of scale (NPPF, Paragraph 163). Developers of sites for minor development are encouraged to consider the policies outlined in this document with respect to site drainage design. Applicants for these smaller developments are directed to guidance and standing advice on best practice to help minimise flood risk.

It is important that any consultation request we receive reflects the level of risk to a site (or the risk that may result from its development). Consequently, consultation may also occur for development, other than major development in areas of higher local flood risk, as described in Section 4.3.

Consultation on flood risk will also occur with other risk management authorities. For example, the management of tidal and fluvial flood risk and the prevention of inappropriate development in the associated flood-plain remains the responsibility of the Environment Agency. The Environment Agency is also responsible for the management of permitting regulations which may affect discharge to water bodies or the ground. Similarly, if any drainage scheme requires connection to a public sewer, additional approval will be required from the appropriate sewerage undertaker.

Within Flood Zones 2 or 3 (areas of medium/high tidal or fluvial flood risk), a Drainage Strategy should be a component of a wider Flood Risk Assessment and should outline how the management of runoff will not exacerbate the existing flood risk to/from the development proposed.

A Flood Risk Assessment should also be submitted with any application for planning permission on sites in excess of 1 ha in Flood Zone 1 (low flood risk); in these instances the Flood Risk Assessment/Drainage Strategy should be primarily concerned with the management of surface water within the proposed development site.

Other third parties, including but not limited to the Environment Agency, The Highways Authority, the Sewerage Undertaker and adjacent landowners, could have an effect on the design of a drainage system. Consultation with relevant third parties is recommended early in the design process. This information should be provided as part of the consultation process.

4.2 Consultation Process

4.2.1 Overview

Consultation with Kent County Council will occur through the planning process. Kent County Council will be notified of the submission of a major planning application by the Local Planning Authorities within Kent (as defined in Section 2.5).

A substantive response to the LPA is legally required from Kent County Council within 21 days of consultation.

4.2.2 Pre-application Advice

Incorporating appropriate drainage is easier and more sustainable if it is planned and designed in from the start of a development. Kent County Council encourages pre-planning consultation to ensure that the issues are appropriately addressed at an early stage.

Pre-planning advice from KCC can provide the following benefits:

- background information to identify constraints and matters in relation to flood risk and drainage pertinent to the application;
- an indication of whether a proposal would be acceptable in principle, saving time and cost within the planning process;
- reduced time to prepare the proposal;
- provides clarification of the guidance and policies that will be applied to the development proposal;
- identifies whether specialist input is required; and,
- identification and engagement of other key stakeholders.

Kent County Council's pre-application planning advice in relation to new development is discretionary and is provided as a chargeable service. Details and forms for pre-application advice is found on kent.gov.uk. Standing advice for specific development scenarios and types is also available on Kent's website. [11]

We provide free advice to:

- individual home owners who have specific drainage or flood related issues which may impact their own house for development;
- Local community groups, Parish councils or Flood Forums on works proposed to improve local communities.

[11] http://www.kent.gov.uk/waste-planning-and-land/flooding-and-drainage/sustainable-drainage-systems#tab-3

4.2.3 Planning application submission

The Local Planning Authority will confirm that a Drainage Strategy has been submitted with the planning application and pass it to Kent County Council for consultation. Kent County Council will review the submitted material for adequacy and, depending upon the submission, may request further information. This will be communicated to the applicant via the Local Planning Authority.

The drainage strategy submitted to support a planning application must reflect the development proposal, including site, area, type of development, general arrangement and layout.

All elements of the proposed drainage strategy should be within the defined planning application boundary as defined by the development's "red-line" boundary. This ensures that planning approval and any subsequent conditions will apply to the entirety of the drainage measures. It would not be acceptable to have any drainage measures, most notably attenuation basins or soakaways outside of the planning application site boundary.

In reviewing a drainage application, Kent County Council will, in the first instance, confirm compliance with this policy statement, national planning policy (as defined in the NPPF), and compliance with the Non-Statutory Technical Standards. Local planning requirements (as set out in Local Plans or other local planning documents) and other site-specific land-use factors that affect surface water management will also be referenced, where appropriate. Additionally, Kent County Council will consider adherence to wider environmental principles of the NPPF that may have a bearing on drainage design (for example, water quality, biodiversity and landscape).

A consultation response will be prepared and returned to the Local Planning Authority within the required 21 days following receipt of a suitably detailed submission. The consultation response may result in a request for further information or for planning conditions for subsequent determination.

4.3 Consultation Submission Requirements

4.3.1 Introduction

Detailed information may be required to demonstrate that a drainage design is appropriate and will operate effectively. This information may be required for all drainage measures, including (but not limited to) pipe networks, attenuation features, ponds and soakaways.

Key design information must be evidenced and assessed. Key information which may be needed to demonstrate the feasibility or applicability of a design philosophy includes:

- Ground investigation information and infiltration rates
- Condition and connectivity surveys of receiving watercourses and sewers
- Ground level and topographical survey
- Deliverability of discharge destination and right to connect

The lack of detailed technical information may increase the level of uncertainty we may have about the effectiveness of a drainage strategy. If the degree of uncertainty is great, (that is) that the proposal cannot clearly demonstrate a functioning system in line with requirements, then KCC will have grounds to object to the drainage proposal or may delay return of a substantive comment to the planning authority.

We therefore encourage pre-application discussion to identity any areas which may need further investigation or clarification to reduce any uncertainty with respect to the functioning of the system.

The detail provided in the submission will reflect the type of planning application submitted, whether ‘outline’ (Surface Water Management Strategy) or ‘full’ (Detailed Drainage Strategy) or discharge of condition (detailed design). The submission requirements are provided in Table 1 and are read as minimum requirements. It is expected that later stages of planning submissions will provide greater detail (such as estimates of storage vs modelled network calculations).

Kent County Council recommends the inclusion of a summary sheet which contains pertinent information to assist in ensuring sufficient detail is submitted and to simplify the review process. A Drainage Strategy Summary Form is included in Appendix E.

We recommend that applicants confirm the submission requirements through pre-application discussion with Kent County Council, particularly to identify any needs for ground investigation.

Table 1- Submission Requirements for stages of planning

Information required	Outline	Full	Reserved Matters	Discharge of Condition	Verification condition [12]
Identification of discharge destination		✓			
Development information including location plan, site layout, and drainage schematic	✓	✓		✓	
Surface water drainage strategy report or statement	✓	✓		✓	
Calculation assumptions and results including impermeable areas, infiltration rates, network calculations and models	✓	✓		✓	
Existing and proposed drainage arrangements	✓	✓	✓[13]	✓	
Existing and proposed discharge rates	✓	✓	✓	✓	
Ground investigation reports/survey and soakage testing results		✓	✓	✓	
Maintenance programs and access arrangements				✓	✓
As built drawings				✓	✓
Exceedance plan		✓		✓	
Catchment plans		✓		✓	
Water quality index		✓		✓	
Watercourse condition and connectivity			✓	✓	
Proposed detailed drainage network plans and cross-sections including cover and invert levels, locations of flow controls				✓	
Attenuation device details including cross-sections				✓	
Landscape Plan				✓	
Discharge agreements, consents and/or evidence of third-party agreement for discharge to their system				✓	
Phasing plan				✓	✓

[12] specific requirement for confirmation of drainage*. Please see section 4.3.5*
[13] as required, where not already demonstrated in the original application
✓ Large ticks = require **greater** design detail than previous planning stage

4.3.2 Large scale development

Surface water management strategies for large developments (with multiple phases) will require the submission of an overall drainage strategy at outline planning stage that provides the overall site drainage strategy and a framework for the delivery of the drainage in each phase of the site.

The Surface Water Management Strategy should set out the following for the whole site, and each phase:

- discharge destination(s);
- discharge rate and volume;
- catchment areas;
- estimated impermeable areas per phase and per catchment; and,
- phasing plan with timing of construction

This Surface Water Management Strategy should act as an overall **drainage masterplan** for all phases of the development.

A Surface Water Management Strategy will be tied to a planning condition at the outline stage. Pre-application discussions are encouraged in the case of phased development to agree the level and detail of any strategic Surface Water Management Strategy and subsequent Drainage Strategies that will be required for each phase.

Depending upon the level of detail submitted at outline planning, it may be necessary to submit additional drainage information to accompany reserve matters associated with the layout to demonstrate that Surface Water Management Strategy can be delivered within the proposed layout.

Further details regarding the surface water management proposals for each phase of development should then be provided within a detailed Drainage Strategy. Each phase must remain consistent with the overall site strategy and drainage masterplan.

Supporting information must be submitted to demonstrate that any variations can be accommodated within the site without exacerbating flood risk. The overall site Surface Water Management Strategy may be reviewed as different phases are delivered.

Large sites in close proximity or in one catchment are encouraged to cooperate or consult concurrently as there may be opportunities for combined solutions with mutual and greater benefit.

Any strategic drainage features that are required for the wider site's drainage strategy to function properly must be identified and delivered prior to the connection of the drainage from any phase or sub-phase. If a single site within a wider development (e.g. school or commercial site) is reliant upon the strategic trunk system, this must be clearly indicated within the phasing plan.

4.3.3 Consultation for minor and low risk development

Minor development will not normally be reviewed by KCC, unless specifically requested by the LPA due to local drainage concerns, existing or mapped surface water flood risk, or other matters identified by the LPA in relation to delivery of sustainable drainage.

In some instances, due to the size of the development or proposal, construction for drainage provision is not needed or substantial and therefore considered low risk. Low risk development for the purposes of consultation would be regarded as those which are limited to: change of use; limited external building envelope alterations; or which results in less than 200 m^2 of additional impermeable area and which is not located in an area of existing flood risk or drainage problems.

4.3.4 Easements and rights of way

If any surface water flows off site and is required to cross third party land, then information must be submitted which demonstrates that the applicant has the ability to deliver the outfall from the site.

4.3.5 Verification and maintenance

The design of any drainage system must take into consideration the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any personnel, vehicle or machinery access required to undertake this work.

The continued operation of any drainage system is dependent upon ongoing maintenance, which may be undertaken by an adopting authority or management agent. Any drainage strategy must include details of the intended adopting authority or agent and details of appropriate and sufficient maintenance.

Developers will be required to demonstrate that the drainage was constructed according to the approved plans through post-construction verification reports. These reports will also include maintenance and requirements specific to the drainage system constructed. Detailed drainage layouts will be required which also identify "critical drainage assets[14]"

[14] KCC's definition of critical drainage assets would be those items of interest in relation to Section 21 (1A) of the Flood and Water Management Act (2010), namely any assets that are "likely to have a significant effect on a flood risk in its area" and could include items such as inlets, outlets, controls, attenuation structures etc.. Further clarification can be provided by contacting KCC's Flood and Water Management team.

4.4 Adoptable highways and drainage

Most major development would normally include some aspect of highway improvement, which may be adopted or require approval by Kent County Council as the Highway Authority. The provision of drainage to adopted highways is normally subject to Section 38 Agreement, with approval and inspection by Kent County Council as the Highway Authority.

Highway matters may be reviewed within the consultation by Kent County Council as Lead Local Flood Authority. Kent County Council will endeavour to seek internal consultation on such matters; however, the detail provided within a planning submission may not be sufficient. The response from Kent County Council as Lead Local Flood Authority does not commit Kent County Council as Highways Authority for any particular highways arrangement. The nature and extent of adoption should be confirmed with the Highways team at an appropriate time within the planning and design process.

Any review provided by KCC as LLFA within the planning process does not constitute a technical approval; however LLFA approval may be required prior to any further adoption by KCC as the Highways Authority.

5 Policies for Sustainable Drainage

5.1 Introduction

A range of sustainable drainage techniques may be utilised across a site to manage the surface water runoff from the planned development; the use of more than one technique will often be appropriate to achieve the objectives of sustainable development on any given site (notwithstanding situations which may still arise where a conventional solution may be the most appropriate).

Given the range of design options to provide a drainage solution, Kent County Council has defined:

- **Drainage Policies** (SuDS Policy 1 through 6) that set out the requirements for a drainage strategy to be compliant with the NPPF and guidance within the Non-Statutory Technical Standards for Sustainable Drainage
- **Environment Policies** (SuDS Policy 7 through 9) that set out expectations to be considered within a drainage strategy in response to environmental legislation and guidance that Kent County Council and the Local Planning Authorities have a duty to comply with.

These policies, summarised in Table 2, reflect the requirements of the Local Flood Risk Management Strategy, Surface Water Management Plans and Local Planning Authority Local Plans. Sufficient information must be submitted to demonstrate that the drainage proposals comply with these policies.

Table 2: Kent County Council SuDS Policies

Policy	Summary
SuDS Policy 1	Follow the drainage hierarchy
SuDS Policy 2	Deliver effective drainage design
SuDS Policy 3	Maintain Existing Drainage Flow Paths & Watercourses
SuDS Policy 4	Seek to Reduce and Avoid Existing Flood Risk
SuDS Policy 5	Drainage sustainability and resilience
SuDS Policy 6	Sustainable Maintenance
SuDS Policy 7	Safeguard Water Quality
SuDS Policy 8	Design for Amenity and Multi-Functionality
SuDS Policy 9	Enhance Biodiversity

5.2 Drainage policies

These policies are specified from the NPPF and the guidance within the Non-Statutory Technical Standards for Sustainable Drainage, as published by Defra.

SuDS Policy 1: Follow the drainage hierarchy

Surface runoff not collected for use must be discharged according to the following discharge hierarchy:

- to ground,
- to a surface water body,
- a surface water sewer, highway drain, or another drainage system, or
- to a combined sewer where there are absolutely no other options, and only where agreed in advance with the relevant sewage undertaker.

The selection of a discharge point should be clearly demonstrated and evidenced.

When development occurs, the urbanisation process within a catchment affects the natural hydrology; if the destination of the water is altered this may result in:

- a reduced supply of rainfall to groundwater,
- an accelerated passage of flow to the receiving watercourses, and
- water directed away from existing receiving catchments.

In order to maintain the natural balance of the water cycle, the above discharge hierarchy must be adhered to. Where development results in changes in runoff destinations, the design must account for how the surface flows are managed and demonstrate it does not exacerbate off-site flood risk.

Any development application would need to be accompanied by evidence from appropriate authorities indicating the acceptability of a discharge location and consent to connect.

The proposed point of connection and discharge rate to any receiving system must be agreed with the relevant owner or responsible body including internal drainage boards, highway authorities, sewerage undertakers, riparian owners, Environment Agency, Canals and River Trust and others.

Any connection or discharge must be compliant with regulations or guidance governing the operation of the existing drainage system (e.g. IDB bye-laws or standard specifications for public sewers). Correspondence with the relevant owner or responsible body should be submitted to demonstrate agreement in principle to the discharge and connection point as early in the development planning process as possible.

If we are aware of a capacity issue or a sewer flooding issue that a sewer connection is likely to exacerbate, we will inform the Local Planning Authority and the sewerage undertaker. We may oppose any such proposal until it can be adequately demonstrated that the receiving authority has confirmed the acceptability of the intended rate of discharge.

Discharge to ground

The drainage strategy may be constrained if the drainage discharges to the ground via infiltration in a source protection zone (specifically SPZ 1), area of low permeability or area with high groundwater. Consultation with the Environment Agency early in the planning process is recommended to identify any constraints or specific requirements in these areas. We recommend reference to the EA's latest policy guidance on groundwater protection[15].

Discharge to a sewer

An existing connection to a sewer does not automatically set a precedent and it must be demonstrated why infiltration and/or a connection to a watercourse cannot be utilised. There is a presumption against any discharge of surface water to a foul sewer.

Combined sewer systems, which carry both foul and surface water, have limited capacity and are more likely to lead to foul flooding. In our commitment to ensuring development is sustainable, we will therefore seek to reduce surface water discharges to combined sewer systems.

We will encourage developers to look for available surface water systems within 90 m of the development site boundary to discharge into before we accept discharges to combined sewers.

Where a surface water connection to an existing combined sewer is unavoidable, it must be undertaken in such a manner and at such a location so as to facilitate future separation of the surface water from that combined system.

Discharge to Highway Drains

KCC may consider surface water discharges into highway drainage sewers in the following circumstances:

a) the developer/property owner is prepared to upgrade the entire system to the outfall point to accommodate any increased flows
b) there is a proven existing connection to the highway drainage system s.

[15] The Environment Agency's approach to groundwater protection, February 2018 or latest version as published.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692989/Envirnment-Agency-approach-to-groundwater-protection.pdf

Highway drainage connections should be raised in pre-application discussion with Kent County Council to ensure there will be appropriate arrangements in place for highways and drainage adoption, where appropriate. Highways advice for planning applications is provided on the County's website. Please refer to Kent Design Guide- '*Making it Happen'*.

Other Consents

Other consents by regulation may be required in relation to the discharge location (e.g. Environmental Permit Flood Defence consent and Ordinary Watercourse consent). Kent County Council may recommend consultation with other authorities in these instances.

SuDS 2: Deliver effective drainage design

Any proposed new drainage scheme must manage all sources of surface water and should be designed to match greenfield discharge rates, and volumes as far as possible.

Development in previously developed land should also seek to reduce discharge rates and volumes off-site and utilise existing connections where feasible.

Drainage schemes should provide for exceedance flows and surface flows from offsite, ensure emergency ingress and egress and protect any existing drainage connectivity, so that flood risk not increased on site or off site.

Design Criteria

The drainage system must be designed to operate without any flooding occurring during any rainfall event up to (and including) the critical 1 in 30 year storm (3.33% AEP). The system must also be able to accommodate the rainfall generated by events of varying durations and intensities up to (and including) the critical, climate change adjusted 1 in 100 year storm (1% AEP) without any on-site property flooding and without exacerbating the off-site flood-risk. Sufficient steps are to be taken to ensure that any surface flows between the 1 in 30 and 1 in 100 year events are retained on site. The choice of where these volumes are accommodated may be within the drainage system itself or within other areas designated within the site for conveyance and storage.

Flooding of the highway **may** be permitted in exceptional circumstances for rainfall events between 1 in 30 year and 1 in 100 year events provided:

- Depths do not exceed the kerb height
- No excessive or prolonged ponding, so that the highway primarily operates as a conveyance route to another attenuation feature (not a highway system)
- Emergency ingress and ingress is not impacted, i.e. not all intersections are impacted
- Flood extents are within site boundaries

Rainfall Simulation

Kent County Council will generally require the use of the more detailed and up-to date FEH dataset within detailed drainage design submissions. Where FSR data is used to determine the extreme rainfall intensity values for a site, we would expect the FSR/FEH ratios depicted in Appendix 1 of the ‘Rainfall runoff management for

developments' report[16] (Environment Agency, 2013) to be used to adjust the calculated attenuation requirements. For a typical present day 6 hour, 100 year rainfall event, the FSR values are around 80-90% of the FEH value.

If FEH is unavailable (and unless otherwise calculated), we will accept a rainfall depth M5-60 of **26.25 mm** to be utilised in appropriate modelling software to account for this variation.

Runoff Rates

Greenfield runoff rates may be calculated by any method (FEH, FSR or IoH124) but the rates must reflect soil conditions specific to the site and applied to an appropriate drainage area consistently through the drainage strategy.

- ### Local District or Parish Greenfield Runoff Rates

Local planning policy may identify preferred discharge rates to be utilised in place of greenfield rates based upon a strategic flood risk assessment. In these areas, the preferred discharge rates should be utilised in the design.

KCC may also set strategic discharge rates to contribute to flood risk management within a district or parish council area; or to provide a more efficient calculation and approach to surface water management within a local area. If a strategic assessment of greenfield runoff rates have been undertaken by KCC, these rates must be utilised in design.

- ### Minimum discharge rates

Small sites are associated with low greenfield runoff rates. Given advances in technology and design of flow controls, it is now possible to achieve controlled flow rates of 2 l/s. This should be considered the minimum rate to be set for small sites, unless agreed with Kent County Council.

- ### Capacity constraints

If the proposed development contributes to an area or network with known local flood risk issues or capacity constraints then discharge rates and volume control specific to the local conditions will be specified. For those watercourses where no flood mapping exists, developers may be required to provide flood risk modelling/assessment to identify potential constraints.

- ### Previously developed land

Redevelopment on previously developed land or "brownfield land" has the potential to rectify or reduce flood risk. For developments which were previously developed, the peak runoff rate from the development must be as close to the greenfield runoff rate

[16] http://evidence.environmentagency.gov.uk/FCERM/Libraries/FCERM_Project_Documents/Rainfall_Runoff_Management_for_Developments_-_Revision_E.sflb.ashx

from the development as reasonably practicable for the same rainfall event, but must not exceed the rate of discharge from the development prior to redevelopment for that event. As a minimum we would expect to see evidence that a 50% reduction in the peak runoff rate from the existing site has been sought. Within all accompanying calculations, the post-redevelopment discharge rate must take account of the predicted effects of climate change.

Runoff characteristics for a previously developed site can be estimated by methods as described within the Ciria SuDS Manual (Chapter 24.5). It should be noted that if a simulation model for any existing network is utilised, the operation of the network must be confirmed by a network survey to establish the network arrangements, contributing areas and network condition.

Runoff Volumes

Runoff volumes from the developed site will usually increase in comparison to the site in its natural condition; this may increase flood risk in natural receiving systems. Controlling the volume of runoff from the site is therefore vital to prevent flood risk in natural systems. Within Kent, the need and type of volume control will vary according to the soil type experienced, which can be broadly broken down into the following categories:

- **Highly permeable soils** – in areas underlain by chalk, we will expect that use of infiltration will be maximised. With no off-site discharge, additional volume control will not be required
- **Intermediate permeability soils** - in these areas infiltration should still be maximised, with any residual discharge to watercourses or sewers requiring the provision of long-term storage; offsite discharge should be limited to QBAR, (the mean annual flood flow rate, equivalent to an approximate return interval of 2.3 years).
- **Low permeability soils** - areas underlain by largely impermeable soils (e.g. Weald clay and London clay) will require “staged” discharge to mimic existing greenfield runoff rates from corresponding storm events, with long-term storage provided for any additional volume above the pre-development volume

Where surface water is discharged to any outfall other than infiltration, the total run-off volume discharged in the 1 in 100 year, 6 hour rainfall event should not exceed the pre-development runoff volume for the same event. Where it is not reasonably practicable to constrain the volume of runoff discharged, the runoff volume must be discharged at a rate that does not adversely affect flood risk as noted above.

Exceedance

Exceedance flows that cannot be contained within the drainage system shall be managed in flood conveyance routes. The primary consideration shall be risks to people and property on and off site.

Access arrangements

Access should be maintained into and through the site for emergency vehicles during all storms up to (and including) the critical, climate-change adjusted 1 in 100 year event. The drainage application must give consideration to flood risk vulnerability classifications (as defined through Planning Practice Guidance to the National Planning Policy Framework), as specific measures or protections may be assessed and need to be agreed with the appropriate authority.

Draw down

The time required for the storage to accept further storm flows should be considered, especially if downstream flood levels can affect the outfall. Attenuation storage volume[17] provided by any drainage area should half empty within 24 hours so that it can receive runoff from subsequent storms. If the drain down time (full to empty) is more than 24 hours, then long duration events should be assessed to ensure that drainage is not compromised by inundation (e.g. periods of wetting on vegetation or slope failure).

Discharge Capacity

If the proposed system connects to an existing drainage system, whether it is a sewer, highway drain, water body or sustainable drainage system, consideration must be given to the operational capacity and functionality of the existing system to ensure that no adverse impacts result or flood risk is increased on-site or off site. This would relate specifically for public surface water sewers 1 in 30 year design criteria.

If the proposed system discharges to a watercourse or main river, consideration must also be given to any requirements due to high water levels in the receiving watercourse due either to tide (i.e. tide-locking) or flood flows. Attenuation volumes may be required onsite to manage flows for the peak events within the waterway.

If the proposed site is immediately adjacent to a watercourse or main river, there may be instances where direct discharge to the waterway is promoted without attenuation. This is only likely to be a recommendation on or immediately upstream from tidal areas. Direct discharge to a main river must be agreed in consultation with KCC and the Environment Agency.

Phased Delivery

If a proposed development is to be delivered in phases, a commitment should be made for a site-wide sustainable drainage scheme to be delivered with the first phase of development, designed to be capable of accommodating the runoff from each of the subsequent phases. If this is not possible, the runoff from each separate phase must

[17] The requirement to comply with half-drain times applies to infiltrating measures as well as drainage measures which provide attenuation only without infiltration.

be controlled independently. Whichever approach is taken, the control of surface water runoff during construction should be considered.

Temporary works may be required to accommodate phased construction. Any temporary drainage measure must he identified and clearly shown on a drainage layout drawing.

SuDS Policy 3: Maintain Existing Drainage Flow Paths & Watercourses

Drainage schemes should be designed to follow existing drainage flow paths and catchments and retain where possible existing watercourses and features.

By mimicking the natural drainage flow paths and working within the landscape, more effective and cost-efficient design can be developed. Working with existing natural gradients also avoids any reliance on pumped drainage, with its associated energy use and failure risk. The natural environment including woods, trees and hedgerows can play a part in water management.

Kent County Council encourages maintenance of the existing flow paths and drainage connectivity. Where this is the case the following conditions apply:

a) If the proposed development is reliant on an existing discharge point, then it is recommended that the condition and conveyance capacity is confirmed through CCTV or other survey and has its discharge capacity confirmed.
b) that discharge outfalls to ordinary watercourses should not occur to “blind-ended” ditches and should be part of a wider and contiguous drainage network.

Some sites may lie in or near more than one hydrological catchment. Surface water flows should be continued through the pre-development catchments and not diverted to adjacent catchments, in order to preserve the hydrology of catchments and prevent an increase in flood risk.

Ordinary Watercourses

An 'ordinary watercourse' is defined as any channel capable of conveying water that is not part of a ‘main river’; it need not have a permanent water level. Small rivers, streams, ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) can all be classified as ‘ordinary watercourses’.

When considering the development/redevelopment of any site, existing ordinary watercourses should be identified and accommodated within any drainage strategy and site masterplan. They should be preferably retained as an open feature within a designated corridor, and ideally retained within public open space. Any outfall to an ordinary watercourse should be designed to ensure there is adequate erosion protection for the receiving channel and its banks.

It is not sufficient to undertake earthworks to the top of the bank of a boundary ditch. Any site improvements should include the channel itself. The land owner has riparian responsibilities for these ditches and new development provides an opportunity to address any existing ditch issues such as excessive vegetation, channel clogging, culvert improvements or bank stability.

It is recommended that any discharge to an ordinary watercourse or any modification to an ordinary watercourse be identified and agreed in principle with Kent County Council prior to the submission of any planning application. The ability of a watercourse to convey water (and to function as an effective exceedance flow route, where appropriate) will always need to be maintained.

Flood risk

For those watercourses where no flood mapping currently exists, developers should fully consider the potential flood risk arising from them. Where a risk from flooding has been identified, appropriate flood risk mitigation should be identified and agreed with the Local Planning Authority/Kent County Council; development should be avoided in any area likely to be affected by exceedance of the channel's capacity.

Culverts

Culverting of open watercourses will not normally be permitted (except where demonstrably essential to allow highways and/or other infrastructure to cross). In such cases culverts should be designed in accordance with CIRIA *C689: Culvert Design and Operation Guide*, (2010).

If a culverted watercourse crosses a previously developed site, it should be reverted back to open channel, wherever practicable. In any such case, the natural conditions deemed to have existed prior to the culverting taking place should be re-instated.

Measures should be in place to ensure that any future owner of a property through which a watercourse passes is aware of their maintenance responsibilities as a riparian owner.

Under the terms of the Land Drainage Act 1991, any works within an ordinary watercourse will require consent under Section 23 of the Act. This will be either from Kent County Council or from an Internal Drainage Board (in the areas where they operate). Consents are unable to be amended once granted so any changes to design will need to apply for Land Drainage consenting again. Consents cannot be granted retrospectively if works are undertaken prior to approval.

If land drainage consent is required in relation to the proposed development, we recommend that the submission of any application for consent is delayed until planning permission is granted, (excepting instances when consents are required to construct or upgrade site access) as the proposed site layout may be subject to further change. Please refer to Kent County Council web pages for guidance on ordinary watercourse consents. [18]

Overland flow paths

Account should be taken for any overland flow routes which cross the site for adjacent areas. Flow routes may be indicated by reference to the EA's surface water flow

[18] http://www.kent.gov.uk/waste-planning-and-land/flooding-and-drainage/land-drainage-consent

mapping however the magnitude of the contribution from upstream catchments should be assessed to determine flow volumes and rates. It is usually preferred that these flow routes would be accommodated within the development layout; however, flood assessment or more detailed modelling may be undertaken if these routes are to be modified or channelised. It is not acceptable to culvert overland flow routes.

SuDS Policy 4: Seek to Reduce and Avoid Existing Flood Risk

New development should be designed to take full account of any existing flood risk, irrespective of the source of flooding.

Where a site or its immediate surroundings have been identified to be at flood risk, all opportunities to reduce the identified risk should be investigated at the masterplanning stage of design and subsequently incorporated at the detailed design stage.

Remedial works and surface water infrastructure improvements may be identified in the immediate vicinity of the development as works associated with the proposed development to enable surface water discharge from the proposed development site.

Paragraph 165 of the National Planning Policy Framework outlines how flood risk management bodies should seek to manage flood risk through using opportunities offered by new development to reduce the causes and impacts of flooding, taking the predicted effects of climate change into account.

As Lead Local Flood Authority, Kent County Council will endeavour to ensure that this principle is applied across the County. Where a developer's Drainage Strategy has identified that there are existing flood risks affecting a site or its surroundings, there would be an expectation that the developer manages the identified risk appropriately to ensure that there are no on/off site impacts as a result of any development. Similarly, where there are opportunities to reduce the off-site flood risk through carefully considered on-site surface water management, we will encourage developers to explore these fully.

Avoiding areas of flood risk

All development should be preferentially located in the areas of lowest flood risk, irrespective of the source of flooding. At the earliest stages of masterplanning, an appropriate flood risk or drainage impact assessment should be undertaken to ensure that any vulnerable forms of development are located outside Flood Zones 2 or 3 and/or those areas identified as being at medium to high risk of surface water flooding. The Environment Agency's Flood Map for Planning and Long Term Flood Risk pages should be referred to for this information.

Residential buildings should in the first instance not be located within any area indicated to be at high risk from surface water flooding, according to the Long Term Flood Risk[19] maps or any local flood maps.

[19] https://flood-warning-information.service.gov.uk/long-term-flood-risk

If development is unavoidable within a surface water flood risk or flow route, then the land use should be water compatible; designed and constructed to be flood resilient; or have consideration of the estimated flow depths and be designed accordingly.

Remedial works and infrastructure improvements

Local flood risk “hot spots” may be known to KCC or the local council in the vicinity of the proposed development. If the receiving system is in a poor condition and unable to convey flow effectively, remedial works may be required prior to the commencement of the approved development. A condition survey of the receiving system within any associated discharge of conditions submission, along with a statement of works will be required to be submitted with any planning application. These works may be recognised as part of the development description for the proposed development as would occur for any infrastructure improvement to accommodate strategic growth, new connections and new local development.

SuDS Policy 5: Drainage Sustainability and Resilience

The design of the drainage system must account for the likely impacts of climate change and changes in impermeable area over the design life of the development. Appropriate allowances should be applied in each case.

A sustainable drainage approach which considers control of surface runoff at the surface and at source is preferred and should be considered prior to other design solutions.

Drainage infrastructure normally has a defined design life. This varies depending upon the nature of the system's components. The drainage must be designed to function properly to protect the development and downstream from flooding over this timeframe. This includes accommodating predictable changes, including climate change and urbanisation.

Climate Change

In 2016, the Environment Agency published new guidance on how to use climate change allowances in flood risk assessments. The guidance can be found at: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

KCC require that the drainage design accommodates the 1 in 100 year storm with a 20% allowance for climate change, with an additional analysis undertaken to understand the flooding implication for a greater climate change allowance of 40%.

This analysis must determine if the impacts of the 40% allowance are significant and lead to any unacceptable flood risks (it is not normally expected that the site would not flood in this scenario, only that if this storm were to occur the impacts would be minimal). The design may need to be modified to avoid any unacceptable risks, but may also need additional mitigation allowances, for example a higher freeboard on attenuation features or provision of exceedance routes. This will tie into designing for exceedance principles.

Sustainability

Design of drainage systems utilising a sustainable drainage design approach and reducing reliance on below grade systems in pipes and tanks, provides greater flexibility to accommodate change in the peak and volumes of surface runoff. Sustainable measures which control flow rates near to the source and which maximise natural losses through infiltration and evaporation are preferred. Operation of surface systems is also more easily observed and maintained.

Urban Creep

A recent trend in development has also been the conversion of permeable surfaces to impermeable over time (e.g. surfacing of front gardens to provide additional parking spaces, extensions to existing buildings, creation of large patio areas). The consideration of urban creep should be assessed on a site by site basis but is limited to residential development only.

The appropriate allowance for the increase of impermeable area from urban creep must be included in the design of the drainage system over the lifetime of the proposed development. The allowances set out in Table 3 must be applied to the impermeable area within the property curtilage according to the proposed development density.

Table 3: impermeable area allowances for urban creep

Residential development density (Dwellings per hectare)	**Change allowance (% of impermeable area)**
≤ 25	10
30	8
35	6
45	4
≥ 50	2
Flats & Apartments	0

SuDS Policy 6: Sustainable Maintenance

Any proposed drainage schemes must be designed to be maintainable to ensure that that the drainage system continues to operate as designed and must be accompanied with a defined maintenance plan.

The drainage system must be designed to take account of the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any personnel, vehicle or machinery access required to undertake this work. Without maintenance, the function of drainage systems may alter. Increased leaf litter, sediments and colonisation of vegetation may clog drainage measures or impact the characteristics of operational controls.

Design to be maintainable

The drainage strategy must demonstrate that adequate access is available and practicable for personnel and equipment either through an appropriate layout or legal agreement to provide agreed access arrangements in perpetuity. Consideration should also be given to the Construction Design and Management regulations for health and safety purposes.

Wherever possible, it is preferable that drainage schemes should be designed at the surface to allow easy inspection and maintenance. Drainage maintenance can usually be incorporated as part of a typical landscape maintenance specification.

KCC recommends that shared drainage measures or drainage measures serving the wider development are located within common land or public open space to facilitate easy access and maintenance. Drainage measures which serve more than one property should not be located within back gardens or other private areas.

If the proposed development incorporates existing field ditches or ordinary watercourses, we would normally require a minimum setback of 5 m to 8 m (depending upon the location, and whether the ditch/watercourse falls within an IDB regulated area). This will allow the safe access and operation of any tracked machinery that may be required to undertake any maintenance works to the banks or channels, and provides a reasonable buffer for any flora and fauna within the watercourse.

We would generally recommend that new development is designed to facilitate the maintenance of existing watercourses, with roads or walkways being provided alongside at least one bank for access. Closed fence-lines to the rear of properties bordering a watercourse should be avoided owing to the maintenance difficulties and the potential for the inappropriate depositing of material beyond property boundaries.

With surface water drainage systems, a careful balance must be struck over the creation of habitats. The encouragement of certain protected species or creation of

protected habitats may conflict with the regular maintenance works essential to ensuring long term functionality of the drainage measures. An awareness of any biodiversity objectives should be considered as part of a maintenance plan for the drainage measures, specifically timing of vegetation cuts and silt removal to ensure no conflict with nesting or specific life stages of biota.

Where, in particular circumstances, underground techniques are used, more extensive inspection processes will be necessary, for example where longer pipe runs are used, CCTV surveys may be required. All inlet, outlet and control structures must be indicated and known to the appropriate adopting authority to be protected from blockage and located near the surface, to allow for easy management during routine maintenance visits.

Maintenance Plan

An operation and/or maintenance plan should be provided which indicates a schedule and time of activities, as well as critical controls or components of the drainage scheme. This plan should include an indication of the roles and responsibilities for each authority or organisation which may have a responsibility for maintenance activities. Any inter-connectivity with or reliance upon other drainage systems should be indicated. Where automatic systems form part of the operational functionality of a drainage system, then processes should be in place to allow immediate action in terms of restoration of performance.

Kent County Council may work with LPAs to ensure that the drainage schemes associated with large, strategic, potentially problematic or sensitive sites have been established and are able to function in accordance with the approved plans and specifications.

Verification report

Information on maintenance requirements will be required in early stages of planning submissions to demonstrate that sufficient access is available (see Appendix D). KCC may also require the submission of a Verification Report after development completion. This report will include the identification of “critical drainage assets” and will outline specific maintenance requirements and obligations for each drainage measure.

As Lead Local Flood Authority, Kent County Council has a duty to maintain a register of structures or features which are likely to have a significant effect on flood risk. Drainage schemes within new developments may include structures or features that will be required to be included within the register. Critical drainage assets which are not adopted by others will be recorded.

SuDS Policy 7: Safeguard Water Quality

When designing a surface water management scheme, full consideration must be given to the system's capacity to remove pollutants and to the cleanliness of the water being discharged from the site, irrespective of the receiving system.

Interception of small rainfall events should be incorporated into the design of the drainage system.

Paragraph 170 (e) of the National Planning Policy Framework states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to (or being put at unacceptable risk from) unacceptable levels of water pollution or land instability. Development should whenever possible help improve local environmental conditions.

Additionally, the Water Framework Directive has been established to improve and integrate the way water bodies are managed throughout Europe. It provides a legal framework to protect and restore clean water throughout Europe to ensure its long-term sustainable use. In particular it will help deal with diffuse pollution which remains a big issue following improvements to most point source discharges.

The design of any drainage proposal should therefore ensure that surface water discharges do not adversely impact the water quality of receiving water bodies, both during construction and when operational. Sustainable drainage design principles have the potential to reduce the risk of pollution, particularly through managing the surface water runoff close to the source and on the surface. Below grade pipes and tanks which are efficient for drainage purposes may not provide appropriate water quality treatment.

Runoff from small rainfall events can pose a particular problem for water quality. The 'first flush' of runoff contains the initial flush of pollutants that has built-up on surfaces during the preceding dry period. It is possible to get a high initial pollution concentration for relatively small rainfall events.

Rainfall events that are less than or equal to 5mm in depth also comprise more than half of the rainfall events across the UK. The volume of runoff from these small events therefore can cumulatively contribute significantly to total pollutant loadings from the site over a specified period of time. Interception of an initial rainfall depth of 5 mm would mimic greenfield response characteristics in that small rainfall event do not generally produce any run-off.

Kent County Council would expect that developers demonstrate that the first 5 mm of any rainfall event can be accommodated and disposed of on-site, rather than being discharged to any receiving watercourse or surface water sewer. This can easily be achieved through the inclusion of sustainable drainage measures such as infiltration systems, rain gardens, bioretention systems, swales, and permeable pavement.

Where it proves exceptionally difficult to achieve this principle, it must be demonstrated that any water leaving the site has been appropriately treated to remove any potential pollutants.

When discharging to the ground, ground conditions and locations of any source protection zones should be confirmed.

Discharge shall only occur within clean, competent, natural and uncontaminated ground and information should be provided to demonstrate that a sufficient unsaturated zone has been provided above the highest occurring groundwater level. Advice may need to be sought from the EA Groundwater team in relation to these matters, particularly in SPZ 1. **Infiltration into Made Ground will not be accepted.**

Construction Management Plan

The management and control of erosion and sediment should be considered throughout design and construction, operation and maintenance to ensure that no impact to offsite watercourses occurs.

Sedimentation can cause the loss of aquatic habitat, decreased fishery resources and can lead to increased flooding due to reduction in hydraulic capacity of the watercourse

Any sites larger than 150 units or within a sensitive receiving catchment may require additional information to demonstrate that appropriate management controls are in place to protect off-site water quality.

SuDS Policy 8: Design for Amenity and Multi-Functionality

Drainage design must consider opportunities for inclusion of amenity and multi-functionality objectives and thus provide multi-functional use of open space with appropriate design for drainage measures within the public realm.

Local environmental objectives may identify other benefits which can be agreed to be delivered through appropriate design of the drainage system.

Amenity and Open Space

Where land performs a range of functions it affords a far greater range of social, environmental and economic benefits than might otherwise be delivered (Landscape Institute Position Statement, Green Infrastructure). Open spaces are often multifunctional, fulfilling several different valuable roles; for example, in the main they may be for recreational use, but they may also provide valuable wildlife habitat, an attractive landscape, paths for walking and cycling and space for community events.

Well-designed, open, sustainable drainage measures may also provide this degree of opportunity, optimising all of these functions in a way which fits with the surrounding landscape. For example, park areas which can be used as temporary flood storage during heavy rainfall events, and wetlands being used to deliver amenity value and habitat as well as water treatment. The aim should be to create networks of high quality open space which adapt for attenuation of surface water, sports and play and enhancement of biodiversity.

The integration of sustainable drainage measures into open spaces can introduce open water and variable ground surfaces into the public realm with associated risks of: drowning; slips, trips and falls; waterborne disease; and bird strike if near airports. In the majority of situations these potential risks can be assessed and removed through good site design. Reference should be made to best practice for appropriate design is provided in CIRIA's 'SuDS Manual'.

Multi-functional Design Benefits

Multi-functional design may also deliver other benefits as summarised in Table 4 (BS 8582 Code of Practice for Surface Water Management for Development Sites). New evaluation tools (B£ST Benefits Estimation Tool, CIRIA) may enable a full accounting of benefits to demonstrate economies and efficiencies to including specific design elements within the drainage provision. Simple elements such as inclusion of trees, or rain gardens within kerb build-outs may deliver other priorities being sought by the local authority.

Table 4: Multi functional surface water management design (Source: BS 8582:2013)

Infrastructure objective	**Multi-functional surface water management system design and associated environmental value**
1. Recreational opportunities	• Subsurface attenuation storage systems can be sited below permeable surfaces used for recreation • Infrequently flooded detention zones can also serve as recreational/amenity areas • Vegetated conveyance and/or storage systems can be designed to promote education, play and amenity value • Intensive green roofs can provide amenity landscape in dense urban settings • Surface water management components can be integrated with sustainable transport corridors (e.g. cycle routes) to maximize benefits
2. Water resources conservation	• Surface water run-off from roofs and uncontaminated paved surfaces, can be captured and stored for use • Rainwater harvesting systems can be designed to deliver surface water management benefits in addition to water supply (see BS 8515)
3. Habitats/ biodiversity enhancement	• Vegetated surface water management components, which store or convey water either temporarily or permanently, can often deliver locally important habitat • Such areas can contribute to urban “corridors” and “networks” of green (vegetated) and blue (water) spaces that support the movement of species
4. Traffic management	• Appropriately designed roads can provide, during times of extreme rainfall, short-term effective management of flood waters, either for conveyance or storage • Local road surfaces and pavements can often be designed to be pervious and allow run-off to infiltrate into the sub-base • Bioretention/biofilter zones can be integrated within pavement design to provide both traffic calming and stormwater management units • Vegetated swales running alongside roads can be designed to treat and control road run-off • Tree pits can be included to intercept run-off (with additional subsurface storage included within or adjacent to the pit)
5. Car parking	• Where the car parking surface is designed to be pervious, surface water can be stored and treated within the sub-base, prior to either controlled discharge, infiltration to the ground, or use. • Car parks can store additional volumes of floodwater above the surface during extreme events. • Vegetated strips, swales, bioretention systems and basins can be designed adjacent to the car park to treat and control run-off
6. Public education/ awareness	Local community engagement strategies can deliver: • an understanding of the functionality and environmental importance of the surface water management system in mitigating human impacts • a commitment towards contributing to the management of the drainage components • an understanding of the health and safety risk management strategy for the site in relation to surface water • ideas as to how the system could be used to promote children’s education strategies and increased local amenity benefits
7. Air temperature / urban heat island mitigation	• Urban cooling can be promoted via the return of moisture to the air through evaporation and evapotranspiration from vegetated surface water management features • Direct cooling can be provided by trees integrated within the surface water management system providing shade • Green roofs and vegetative surfaces reflect more sunlight and absorb less heat
8. Reduced energy use	• Green roofs provide good building insulation
9. Air quality improvement	• Trees, larger shrubs and vegetated surfaces used as part of the surface water management strategy can filter out airborne pollutants
10. Landscape character	• Well designed and integrated SuDS features can enhance aesthetic appeal and local landscape and townscape character and distinctiveness
11. Health benefits	• Green and blue space within developments promotes health benefits linked to increased outdoor recreation and a feeling of well being

SuDS Policy 9: Enhance Biodiversity

Drainage design must consider opportunities for biodiversity enhancement, through provision of appropriately designed surface systems, consideration of connectivity to adjacent water bodies or natural habitats, and appropriate planting specification.

Biodiversity is defined as the variety of life on Earth; designing to protect and enhance biodiversity is therefore essential. As a direct result of human activity, the rate of species extinction over the last 200 years is far higher than in any period of the preceding 65 million years. In the UK, freshwater ecosystems are at the most risk and populations of key species have declined significantly.

The NPPF requires that Local Planning Authorities set out a strategic approach to plan positively for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure (NPPF para 171). Maximising the ecological value of drainage systems is consistent with national and local policies which aim to conserve and enhance biodiversity. This is underpinned by a variety of legislation including the biodiversity 'duty' for public bodies which is enshrined in the Natural Environment and Rural Communities (NERC) Act 2006.

Working with the landscape to provide drainage may promote other opportunities with greater benefits for biodiversity but also provide greater attractiveness. The linear nature of many SuDS features can help create green corridors through developments; these are important for wildlife and ensure that the associated development is connected with its surrounding environment.

Kent County Council's 'SuDS and Biodiversity' project (2014) has demonstrated that drainage schemes within residential areas contribute to the biodiversity of the local area and provide important habitats for animals and plants that would otherwise be absent. In some cases invertebrate species of significant nature conservation value have been found.

A number of key factors were identified to strongly influence the biodiversity value of the sustainable drainage features. These included:

- connectivity with other waterbodies and habitats,
- planting assemblage and cover,
- waterbody design,
- retained water,
- fish/wild fowl presence, and
- water quality.

When assessing drainage design, particularly surface systems, it is important to consider the drainage scheme in the context of the surrounding landscape character

area. Effective integration will also require carefully researched and selected plants, which work to improve the local green infrastructure.

The design of any drainage scheme can provide an opportunity for increasing biodiversity value by including surface vegetated systems with some retained water and through ensuring appropriate edge treatments and gradients. Review of engineering design by an ecologist may identify simple improvements in pond design and planting specification that would maximise the biodiversity potential.

Glossary

Aquifer	**A source of groundwater compromising water-bearing rock, sand or gravel capable of yielding significant quantities of water.**
Adopting authority	General term utilized in this guidance and relates to the authority that will ultimately manage the proposed drainage system
Attenuation	Attenuation is the process of water retention on site and slowly releasing it in a controlled discharge to a surface water or combined drain or watercourse. The amount of discharge will vary depending whether it is a brown or greenfield site. For brownfield sites the developer must determine the likely run off and agree an acceptable discharge with the LLFA, environment agency or water authority.
Brownfield site	Any land or site that has been previously developed.
Catchment	The area contributing surface water flow to a point on a drainage or river system.
CIRIA	Construction Industry Research and Information Association. www.ciria.org
Climate change	Long-term variations in global temperature and weather patterns both natural and as a result of human activity (anthropogenic) such as greenhouse gas emissions
Culvert	A structure which fully contains a watercourse as it passes through an embankment or below ground.
Development	The undertaking of building, engineering, mining or other operations in, on, over or under land or the making of any material change in the use of any buildings or other land.
EA	Environment Agency. Government Agency responsible for flooding issues from main river, and strategic overview of flooding.
Flood event	A flooding incident usually in response to severe weather or a combination of flood generating characteristics.
Flood risk	The combination of the flood probability and the magnitude of the potential consequences of the flood event.
Flood Risk Assessment	An appraisal of the flood risks that may affect development or increase flood risk elsewhere
Flood Zones	Flood Zones provide a general indication of flood risk, mainly used for spatial planning.
Floodplain	An area of land that would naturally flood from a watercourse, an estuary or the sea.
Freeboard	A vertical distance that allows for a margin of safety to account for uncertainties.
Flood and Water Management Act	The Flood and Water Management Act clarifies the legislative framework for managing surface water flood risk in England.
Flow control device	A device used to manage the movement of surface water into and out of an attenuation facility.
Geocellular storage systems	Modular plastic systems with a high void ratio, typically placed below ground which allow for storage of storm water to infiltrate or discharge to another system.
Gravity drainage	Drainage which runs through pipework installed to a fall, and not therefore under pressure.

Greenfield	Undeveloped land.
Greenfield runoff rate	The rate of runoff which would occur from a site that was undeveloped and undisturbed.
Groundwater	Water that exists beneath the ground in underground aquifers and streams.
Groundwater flooding	Flooding caused by groundwater rising and escaping due to sustained periods of higher than average rainfall (years) or a reduction in abstraction for water supply.
Highway Authority	Body responsible for the management and maintenance of public roads
Impermeable	Will not allow water to pass through it.
Impermeable surface	An artificial non-porous surface that generates a surface water runoff after rainfall.
Infiltration	Infiltration or soakaway is the temporary storage of water to allow it to naturally soak away into the ground. Because water soaks into the ground gradually, reduces the risk of flooding downstream. Infiltration may be used where there is no surface water sewer or where existing systems are at full capacity. Infiltration helps to recharge natural ground water levels.
Lead Local Flood Authority	Under the terms of the Flood and Water Management Act 2010, LLFAs are responsible for developing, maintaining and applying a strategy for local flood risk management in their areas and for maintaining a register of flood risk assets. They also have lead responsibility for managing the risk of flooding from surface water, groundwater and ordinary watercourses. Kent County Council are the LLFA within Kent.
Local Flood Risk Management Strategy	Strategy outlining the Lead Local Flood Authority's approach to local flood risk management as well as recording how this approach has been developed and agreed.
Main River	A watercourse designated on a statutory map of Main rivers, maintained by Department for Environment, Food and Rural Affairs (Defra).
Mitigation measure	A generic term used in this guide to refer to an element of development design which may be used to manage flood risk to the development, or to avoid an increase in flood risk elsewhere.
National Planning Policy Framework	Framework setting out the Government's planning policies for England and how these are expected to be applied. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.
Overland Flow	Flooding caused by surface water runoff when rainfall intensity exceeds the infiltration capacity of the ground, or when the soil is so saturated that it cannot accept any more water.
Permeability	A measure of the ease with which a fluid can flow through a porous medium. It depends on the physical properties of the medium.
Pitt Review	An independent review of the 2007 summer floods by Sir Michael Pitt, which provided recommendations to improve flood risk management in England.
Rainwater harvesting	Collection and Re-use or recycling of rainwater for the purpose of garden irrigation, car washing, toilet flushing etc.
Runoff	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable, is saturated or if rainfall is particularly intense.
Source Protection Zone	Defined areas showing the risk of contamination to selected groundwater sources used for public drinking water supply.
Strategic Flood Risk Assessment	A study to examine flood risk issues on a sub-regional scale, typically for a river catchment or local authority area during the preparation of a development plan.

Surface water flooding	Flooding caused by the combination of pluvial flooding, sewer flooding, flooding from open channels and culverted urban watercourses and overland flows from groundwater springs
Surface Water Management Plan	A study undertaken in consultation with key local partners to understand the causes and effects of surface water flooding and agree the most cost effective way of managing surface water flood risk for the long term.
SUDS	Sustainable (urban) drainage systems. A sequence of management practices and control structures that are designed to drain surface water in a more sustainable manner.
Watercourse	A term including all rivers, streams, ditches drains cuts culverts dykes sluices and passages through which water flows.

Appendix A. National Planning Policy Framework (Extract)

155	Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.
157	All plans should apply a sequential, risk-based approach to the location of development – taking into account the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by: a) applying the sequential test and then, if necessary, the exception test as set out below; b) safeguarding land from development that is required, or likely to be required, for current or future flood management; c) using opportunities provided by new development to reduce the causes and impacts of flooding (where appropriate through the use of natural flood management techniques); and d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.
163	When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment[50]. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that: a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location; b) the development is appropriately flood resistant and resilient; c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate; d) any residual risk can be safely managed; and e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.
165	Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should: a) take account of advice from the lead local flood authority; b) have appropriate proposed minimum operational standards; c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and d) where possible, provide multifunctional benefits.

170	Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan); b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland; c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate; d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures; e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

Appendix B. Non-Statutory Technical Standards for Sustainable Drainage

Flood risk outside the development
S1 Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6 below) need not apply.
Peak flow control
S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.
S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.
Volume control
S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.
S5 Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.
S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.

Flood risk within the development
S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.
S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.
Structural Integrity
S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.
S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.
Designing for maintenance considerations
S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.
Construction
S13 The mode of construction of any communication with an existing sewer or drainage system just be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.
S14 Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.

Appendix C. Drainage Strategy Summary Form

Drainage Strategy Summary

1. Site details		
Site/development name		
Address including post code		
Grid reference	E	N
LPA reference		
Type of application	Outline ☐ Full ☐ Discharge of Conditions ☐ Other ☐	
Has pre-application advice been sought from KCC? Yes ☐ No ☐ If so, KCC Reference Number: Pre-application Meeting Date:		
Site condition	Greenfield ☐ Brownfield ☐	

2. Existing drainage			Document/Plan where information is stated:
Total site area (ha)			
Impermeable area (ha)			
Final discharge location	Infiltration ☐ Watercourse ☐ Sewer ☐ Tidal reach/sea ☐		
Where applicable specify catchment runoff rates:	Greenfield runoff rates (l/s)	Existing brownfield runoff rates (l/s)	
QBAR (l/s)			
1 in 1 year (l/s)			
1 in 30 year (l/s)			
1 in 100 year (l/s)			

3. Proposed drainage areas			Document/Plan where information is stated:
Impermeable area (ha)	Roof		
	Highway/road		
	Other paved areas		
	Total		
Permeable area (ha)	Open space		
	Other permeable areas		
	Total		
Final discharge location	Infiltration ☐ Infiltration rate _____m/s Watercourse ☐ Sewer ☐ Tidal reach/sea ☐		

Climate change allowance included in design	20% ☐ 30% ☐ 40% ☐		
4. Post-Development Discharge rates, with mitigation			**Document/Plan where information is stated:**
Describe development drainage strategy in general terms:			
(a) Soil type and discharge	Permeable ☐ No off-site discharge i.e. infiltration ☐	Semi-permeable ☐ Infiltration maximised, QBAR off-site ☐	Impermeable ☐ Staged discharge ☐
(b) Controlled developed discharge rates (l/s)	1 in 1 year		
	1 in 30 year		
	1 in 100 year		
	1 in 100 year + CC		

5. Discharge Volumes			**Document/Plan where information is stated:**
	Existing volume (m^3)	Proposed volume (m^3)	
1 in 1 year			
1 in 30 year			
1 in 100 year			
1 in 100 year + CC			

6. Plans/Drawings	**Document/Plan where information is stated:**
A schematic of the drainage <u>strategy</u> has been included? Yes ☐ No ☐ A schematic of the drainage <u>network model</u> has been included? Yes ☐ No ☐	

All information presented above should be contained within the attached Flood Risk Assessment, Drainage Strategy or Statement and be substantiated through plans and appropriate calculations.

Form completed by	
Qualifications	
Company	
Telephone	
Email	
On behalf of (client's details)	
Date	

Appendix D: Drainage Asset Record Sheet for Verification Report

Identification	Type of Structure or Feature	
	Location Name	
	Drawing Identifier	
MANAGEMENT/ OWNERSHIP	Owners Name / Company	
	Address of owner	
	Owners Contact Number	
	Maintained By	
	Adoption proposed	Yes ☐ No ☐
	Name of Adopting Authority	
	Estimated Date of Adoption	
ASSET DETAILS	National Grid Reference (NGR)	
	Cover Level	
	Invert Level	
	Max volume	
	Height	
	Diameter/Width	
	Length	
	Depth	
	Designed Flow Rate	
	Any Additional Uses	

Land Drainage Policy

1 Introduction

Kent County Council as the Lead Local Flood Authority has powers as a Land Drainage Authority to regulate watercourses in Kent.

Watercourses fulfil many roles in today's environment. They are important features of the landscape, providing habitats for a wide variety of wildlife, drainage for developed and agricultural land, water resources and recreational value. It is therefore important that watercourses and associated habitat are protected and enhanced for the benefit of present and future generations.

This policy sets out how we exercise these land drainage functions.

2 Legislative context

The Flood and Water Management Act 2010 transferred existing powers in the Land Drainage Act 1991 to regulate the proper function of ordinary watercourses to KCC. These powers consist of two parts:

- Maintaining the free flow of land drainage, including the enforcement of riparian responsibility to maintain flow in an ordinary watercourse and to maintain structures in an ordinary watercourse; and
- The power to consent and enforce structures in ordinary watercourses and changes to the alignment of ordinary watercourses.

These are permissive powers, not duties, and KCC can choose to exercise them.

These functions only relate to ordinary watercourses that are outside of Internal Drainage Districts. Within Internal Drainage Districts, it is the responsibility of the Internal Drainage Board to exercise these powers. Similarly, the Environment Agency is responsible for exercising similar powers in relation to main rivers.

Additionally, KCC has a duty as a competent authority under the Conservation Habitats and Species Regulations 2017 to ensure that there is no detriment to habitats and protected species, through the destruction of habitat or vertebrates or from pollution of the watercourse. Similarly, KCC must also consider apply the Water Framework Directive, which aims to prevent further deterioration and protect and enhance the status of aquatic ecosystems and associated wetlands. In order to fulfil these duties KCC this will require evidence, in the form of ecological assessments appropriate to the local habitats, to demonstrate that no ecological harm will result from the works.

3 Riparian rights

Land drainage and the maintenance of flow in ordinary watercourses is the duty of riparian owners. Riparian owners are the owners of the land that a watercourse flows through. If the land on each side of a watercourse is owned by different landowners, they are each riparian owners and are responsible for the watercourse from their side to the middle.

Much of KCC's land drainage role involves providing advice to land owners and neighbours about riparian rights and responsibilities, advising them of whether they need to undertake maintenance, what they need to do with any spoil from maintenance and contacting neighbours on their behalf it they need to undertake maintenance to inform them of their riparian rights.

4 Maintaining flow

KCC has powers undersections 21 and 25 of the Land Drainage Act 1991 (as amended) to enforce riparian owners to maintain the proper flow of ordinary watercourses outside of Internal Drainage Districts.

In KCC's experience, the need to undertake formal enforcement of land drainage is rare. In most cases we are able to work with land owners to achieve the desired works.

Enforcement can only be undertaken where the riparian owner has not undertaken sufficient maintenance to maintain the watercourse in a condition that can freely pass ordinary flow or has placed an obstacle in the watercourse that has not been consented. Enforcement cannot be undertaken to improve the capacity of an ordinary watercourse beyond its ordinary capacity, even if it would reduce flooding.

KCC's powers for enforcement entitle it to undertake works that are believed to be necessary if the riparian owner does not undertake such works themselves within a reasonable time. KCC can recharge any reasonable costs incurred to do this. KCC does not have the power to require a riparian owner to undertake any works themselves.

Enforcement is a complex, lengthy process and is only entered into if all other options are exhausted. Prior to undertaking enforcement, KCC will advise the riparian owners of their riparian duties and recommend that they undertake the necessary work themselves. Enforcement will be undertaken in the following circumstances.

LD Policy 1: Maintaining flow of ordinary watercourses

KCC will undertake enforcement of the maintenance of watercourses where there is an obvious need to prevent significant flooding from the ordinary flow in a watercourse and after the riparian owner has refused to undertake the necessary work themselves within a reasonable timeframe.

5 Land drainage consent

5.1 Consenting works

KCC has powers under Section 23 of the Land Drainage At 1991 to consent works in an ordinary watercourse and to enforce the removal of unconsented works.

Consent is required for any works within the channel of an ordinary watercourse. These works can be permanent features such as culverts and headwalls, and temporary works to block or divert a watercourse to facilitate other activities in the watercourse. If temporary works are required to install a permanent feature, two consents will be required (one for the temporary works and one for the features that will be installed). If there are a number of permanent features to be installed, a

consent is required for each feature (they may or may not require separate temporary consents, depending on how the construction works are planned).

KCC will apply the following policy in determining whether to issue a consent for a structure in an ordinary watercourse:

LD Policy 2: Consenting of works in ordinary watercourses

KCC will consent works where all of the following conditions are met:

- A fully complete application is received with the appropriate fee;
- The proposed works are appropriate for the watercourse such that they do not increase the risk of flooding or damage habitats or vertebrates; and
- Appropriate pollution and erosion control measures will be employed

Design and environmental considerations for land drainage consents are provided in Appendix 1.

5.2 Culverts

A culvert is defined as 'a covered channel or pipe which prevents the obstruction of a watercourse or drainage path by an artificial construction' (Flood and Water Management Act 2010). Culverts may be used to convey a watercourse under a road and they have been used to cover significant lengths of watercourse to facilitate urban development over them. It should be noted that a bridge, that is a clear span across a watercourse, is not considered a culvert.

Installing a culvert in an ordinary watercourse requires land drainage consent.

Kent County Council considers it beneficial for watercourses to remain open wherever possible for both flood defence and environmental purposes. This maintains a flood channel and retains a valuable environmental feature which can enhance the site and be easily maintained. Whereas, culverting can exacerbate the risk of flooding, increase maintenance requirements and create difficulty with pollution detection. It also destroys wildlife habitats, damages natural amenity and interrupts the continuity of a watercourse.

In considering any development proposals, our objective is to retain open watercourses with a corridor of open land on both sides. Nevertheless, we understand there may be cases where culverting is unavoidable for example, short lengths for access purposes or where highways cross watercourses. Culverting will not be considered until other options have been thoroughly explored, for example:

- Clear open span bridges with existing banks and bed retained;
- Revision of site layout to incorporate an open watercourse;
- Diversion of the watercourse in an environmentally sympathetic channel and corridor.

Where culverts are unavoidable, KCC will expect them to be restricted to a minimum and to see evidence of the hydraulic and environmental impacts of the culvert on the watercourse, and appropriate mitigation for any negative impacts. Culverts must be designed so they do not cause a restriction to flow. They must not increase the risk

of flooding or prevent maintenance of the adjacent open watercourse. Consideration must also be given to overland flow paths in the event of a culvert becoming obstructed. It should be ensured that flows will not affect property or cause unreasonable nuisance or harm.

5.3 Other permissions

The requirement for ordinary watercourse consent is independent of the need for planning permission and the granting of planning permission does not imply or guarantee that consent will be granted.

If planning permission is required it should be sought prior to land drainage consent, as the planning application may alter the site layout and consequently the nature of any ordinary watercourse works. Any consent is for the works specified in the application, including the location, if any of these details change a new consent will need to be sought. Please provide the planning application reference.

Consent is also required for any works within 8m of a Main River or within 15m of a coastal defence structure in accordance with the Environment Agency Byelaws. If land drainage works are proposed within these boundaries, even if they are not to a main river or coastal structure, consent from the Environment Agency will need to be sought separately. The requirement for this can be checked here: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits. This document explains about working alongside a main river: https://www.gov.uk/guidance/flood-risk-activities-environmental-permits#check-if-your-activity-is-regulated

Works either within or which would affect a designated site, for instance a Ramsar site, SPA etc, as a result of changes in flow regimes, or water levels also require the approval of Natural England.

6 Unconsented works

Section 24 of the Land Drainage Act 1991 (as amended) also gives KCC the power to have unconsented works removed. If KCC considers unconsented works in an ordinary watercourse to be detrimental, it will commence enforcement proceedings.

LD Policy 3: Enforcement of unconsented of works in ordinary watercourses

KCC will commence enforcement of unconsented works where the works cause a significant risk of flooding or lead to the significant detriment of aquatic habitats.

There is no provision in the Land Drainage Act 1991 to issue a consent after a structure has been constructed. If the structure is otherwise acceptable and would have been issued a consent, KCC will not request that it is removed, however we cannot issue a consent for these works.

Details of how to apply for consent for works is published on the KCC website:

www.kent.gov.uk/land_drainage_consent

It is advised that anyone considering any works in or near a watercourse contact the relevant authority to discuss the need for consent. KCC also has powers to undertake enforcement of structures that are constructed in a watercourse but have

not been given consent. KCC will consult with local risk management authorities about consent applications that we receive or enforcement action we will take for works that do not have consent.

Appendix 1

Design Guidance

Detailed design plans will need to be submitted with your consent application that consider the following:

- The application should demonstrate that they have considered the environmental implications of all options, and preferably settle on the least environmentally damaging option.
- If no other alternative is feasible, any proposed culvert length should be as short as possible and the diameter as large as possible. Depending on local circumstances, Kent County Council expects culverts to have a minimum diameter of 600mm. We would recommend using the Ciria culvert design and operation guide (C689) as a reference.
- All culverts should be designed to safely convey the 1 in 100 year flood event, but with a 20% allowance for climate change, with an additional analysis undertaken to understand flooding implication for greater allowance of 40%
- Where possible designs should incorporate a specified amount of freeboard to allow for floating debris, minor blockage and variations on the 'design' water surface.
- The responsibility for future maintenance and clearance of a culvert must be agreed and details of those responsible submitted with your application for consent. The responsibility for the maintenance of a culvert lies with the landowner or the person who owns the culvert unless otherwise arranged.
- Appropriate inlet and outlet structures should be provided in order to ensure smooth hydraulic transition and avoid erosion. Headwall arrangements at the upstream and downstream ends of a culvert should be suitably keyed into the bed and banks of the watercourse and should be appropriate to the local environment.
- Suitable access arrangements for maintenance should be included in the design. Access chambers must be provided at each change of direction if the culverting is not straight. Other access/inspection chamber should be installed at suitable intervals to ensure suitable access for maintenance.
- Inlet and outlet screens should not be used unless absolutely necessary. An appropriate risk assessment must be submitted with your application to demonstrate when a trash screen is necessary, and a formal maintenance regime must be agreed prior to approval. The FRMRC: Culvert design & operation guide supplementary technical note on understanding blockages can help determine where a screen will be appropriate with the EA Security and Trash Screen Design Guide sets out the current best practice their operation and design.

- Multiple small culvert arrangements are prone to blockage by accumulation of waterborne debris at the inlet. Where multiple culverts are unavoidable, a minimum number of culverts should be used and cutwaters should be provided between pipes at the culvert inlet.

Environmental Considerations

Environmental mitigation measures may be appropriate if any open watercourse is being removed.

- In most situations it is appropriate for the inverts of culverts to be set below the existing bed level to provide a natural bed and passage for invertebrates, whilst allowing for future maintenance.
- The height of the invert should not pose an obstruction to fish movement.
- Environmental enhancements may be necessary to account for the loss of habitat caused by the culvert, for example opening up a length of previously culverted watercourse elsewhere on the site, enhancing other lengths of the watercourse etc.
- KCC will not consent concrete bag-work headwalls within a watercourse, as they are prone to leaking contamination to the watercourse. They also age poorly.

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To: Kent Flood Risk Management Committee – 22nd July 2019

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 water resources situation, Environment Agency and Met Office Warnings, and flood response activity since the last meeting of the Committee on 11th March 2019.

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1. Background

1.1 KCC Resilience and Emergency Planning Service Duty Emergency Planning Officer (DEPO) and Contact Point receive Environment Agency and Met Office alerts and warnings 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 to the DEPO and/or Kent Highways.

1.2 Some 85,500 residential and commercial addresses across Kent are located within areas identified as at risk from fluvial (river) or tidal flooding. Where possible, these properties are offered a Flood Warning Service by the Environment Agency. Early warning of flood risk to communities (including areas outside floodplains) is delivered through Flood Guidance Statements, Severe Weather Warnings and mobilisation of Severe Weather Advisory Group (SWAG).

2. Latest situation

2.1 Kent received 124% of long-term average rainfall in March, 38% in April, 72% in May and 181% in June 2019. All river catchments in Kent are currently within their 'normal' ranges, except for the Rivers Eden at Penshurst and Medway at Teston which are at 'above normal'.

2.2 Between 10th June and 12th June at least two locations in Kent received more than 100 mm of rain, leading to surface and ground water flooding in parts of North West Kent. Eynsford received 112.3 mm and Ham Hill received 111.5 mm of rain.

2.3 Gauges across Kent indicate that groundwater is within 'normal' ranges, except for the Dover area where it is 'below normal'.

2.3 Reservoir levels are within normal ranges for the time of year.

2.5 6 flood alerts were issued by the Environment Agency since the last meeting in March (2 fluvial and 4 coastal)[1]. This contrasts with 20 flood alerts (18 fluvial and 2 coastal) in the corresponding period last year.

[1] Please see appendix 1

2.6 10 Met Office severe weather warnings were issued (5 yellow warnings for wind, 1 amber warning for rain and 4 yellow warnings for thunderstorms)[2]. This compares with 15 Met Office severe weather warnings in the corresponding period last year (6 yellow warnings for snow and ice, 2 yellow warnings for ice, 6 yellow warnings for rain and 1 yellow warning for a thunderstorm).

2.7 The Thames Barrier was closed on 6 occasions since the last meeting (5 for test and 1 for operational purposes)[3]. The figure for the corresponding period last year was 4 (all for test purposes).

2.8 The most significant period of flood response activity for both the KCC Emergency Planning and Highways teams since the last meeting was the period of intense rainfall experienced in North West Kent between 10th and 12th June. Hardest hit were communities at Snodland on the 10th and Swanley on the 12th. Some 170 residential and commercial premises were affected, with some properties flooded to a depth of 1.5 metres, with St. Katherine's School and Nursery in Snodland now out of action until the start of the new academic year in September.

2.9 SWAG teleconferences took place between 10th and 19th June. The SWAG was chaired initially by the Environment Agency, with KCC taking the lead during the recovery phase. The County Emergency Centre was mobilised for the duration of the flooding event and its aftermath to co-ordinate information gathering and KCC response and recovery.

3. Looking forward

3.1 The Met Office forecast for the next 3 months suggests above-average temperatures are more likely than below-average temperatures. For July, wetter-than-average conditions are marginally more likely. For July-August-September as a whole, the chances of above and below average precipitation are similar.

3.2 The Environment Agency continuously runs surge forecasts, informed by astronomical tide calculations. If a risk of coastal flooding is forecast this information is communicated to partners. Elevated tides with a corresponding higher risk of coastal flooding, if in combination with high winds, are forecast between 28th September and 3rd October and 26th and 31st October.

3.2 Kent Flood Risk Management Committee will continue to receive regular updates on water resources, flood alerts, severe weather warnings and response.

4. Recommendations

4.1 That Members:

- Note the current water resources situation and warnings received since the last meeting of the Committee; and
- Contribute to planning and response policy and practice through oversight and debate.

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[2] Please see appendix 2
[3] Please see appendix 3

Appendix 1: Environment Agency Flood Alerts issued since 10th March 2019		
Date issued	**Flood Zone**	**Status**
23/03/2019	Coast from Whitstable to Herne Bay	Alert
23/03/2019	Tidal River Medway	Alert
23/03/2019	Coast from Dartford to Allhallows	Alert
13/06/2019	Rivers Shuttle and Cray	Alert
24/06/2019	Rivers Shuttle and Cray	Alert

Appendix 2: Kent Severe Weather Warnings issued since 10th March 2019				
	March	**April**	**May**	**June**
Wind	4	1	0	0
Rain	0	0	0	1
Thunderstorms	0	0	0	4

Appendix 3: Environment Agency Thames Barrier closures since 10th March 2019		
Thames Barrier closures	**Date**	**Status**
Thames Barrier closed	12/03/2019	Test
Thames Barrier closed	23/03/2019	Operational
Thames Barrier closed	08/05/2019	Test
Thames Barrier closed	06/06/2019	Test
Thames Barrier closed	07/07/2019	Test

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