Kent and Medway Structure Plan
mapping out the future

Working Paper 14

Flooding and Flood Risk

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Medway Council

Kent County Council

WORKING PAPER ON FLOODING AND FLOOD RISK

Working Paper on Flooding and Flood Risk

1.0 Introduction

1.1 Flooding of land adjacent to rivers and the coast is a natural process but it can have far reaching effects on people, property and features of important cultural and natural heritage importance. In extreme conditions it can isolate communities, lead to injury and loss of life and place extra demands on the emergency services. Flooding affects farming, industry, housing and transport. It can also lead to an overloading of sewerage and drainage systems increasing the risk of pollution and nuisance.

1.2 Development on flood plains may reduce their ability to fulfil their natural function, that is to absorb excess water during periods of heavy rainfall/storms. It can also expose occupiers to potential flood risk and may inhibit flood defence solutions.

1.3 Kent and Medway Councils are concerned to safeguard flood plains so that they can perform their natural function and reduce the risks from flooding to people, property and the natural environment. Government also looks to local authorities to ensure that flood risk is properly taken into account in the planning of developments by adopting a sequential approach to risk management that takes into account the level of risk with the type of development proposed.

2.0 Causes and Types of Flooding

Climate Change

2.1 Climate change is predicted to give rise to more extreme weather conditions, particularly increased storminess and wetter winters. Climate change will also contribute to rising sea levels. It is expected that there will be an increase in the relative sea level of 6mm per year, exacerbated by "tilting" in the South East, an annual increase in rainfall of up 10 per cent by 2050 and a 20% increase in peak river flows.

River Flooding

2.2 Flooding from rivers occurs following excessive rainfall (or snow melt), within a limited period, that overwhelms the drainage capacity of land, particularly when the ground is already saturated or when channels become blocked.

Coastal Flooding

2.3 Inundation by the sea is largely due to combinations of high tide, storm surges and wave activity. However, it may also result from structural failure of flood defences. Coastal defences may deteriorate at a faster rate as a result of increasing severity of sea storms.

Other Flooding

2.4 Flooding can take place away from the coast and rivers. It can occur where water courses are overwhelmed by surface water run-off reaching rivers too quickly. Increasing urbanisation can increase surface water run off and reduce the ability of aquifers to absorb run off. Intense rainfall may cause localised flooding where surface flows exceed the capacity of the existing drainage systems. Flooding can also occur where the local geology is unable to absorb of water and land becomes saturated. Roads can also transfer floodwater into areas beyond the floodplain.

2.5 The impact of flood risk can be aggravated by:

- Building in flood plains which may expose new occupiers to risk, reduce natural flood storage, obstruct flood flow and increase the rate or volume of run off thus creating additional risk elsewhere
- Inadequate maintenance of flood defence systems,
- Inadequate maintenance of watercourses, culverts and road gullies leading to channel blockage
- Modifying and diverting watercourses
- Agricultural practices such as deforestation and ploughing at right angles, rather than parallel to land contours.

3.0 Responses to flooding

Flood risk assessment

3.1 Assessment of risk should take account of:

- the probability of flooding occurring, both now and over time;
- the standard of existing flood defences and their effectiveness over time;
- the likely depth of flooding;
- the rates of flow likely to be involved;
- the likelihood of impacts to other areas, properties and habitats;
- the effects of climate change; and
- the nature and currently expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

Flood risk mapping

3.2 To assist local authorities in their control of development the Environment Agency has developed flood plain maps. The limits of the flood plain are indicative of the area that could be affected by 1 in 100 year river floods and 1 in 200 year tidal floods. The maps represent the best available information on the extent of flood risk at a given point in time. They are however, only indicative. They do not, for example, make any allowances for flood defences, as these are not infallible. The maps are produced as a basis for consultation and are not intended to be the sole basis for decisions as applications need to be assessed on a case by case basis. They do not address the risk of flooding outside of the coastal and fluvial flood plains (see para 2.4).

Flood risk advice

3.3 For all development proposals that raise flooding or run-off issues, local authorities should undertake appropriate consultation with the Environment Agency and, where appropriate, with other bodies such as Internal Drainage Boards, sewerage undertakers and navigation authorities.

Flood Defences

3.4 Flood defences seek to reduce the risk of flooding in order to protect life and property and sustain economic activity. They can take a number of forms including providing sea walls; building up riverbanks; out-falls and storage reservoirs and sluices. Flood defences can exacerbate the problems of erosion or lead to flooding elsewhere, for example, the operation of the Thames Barrier can have an affect in North Kent.

3.5 The combined impact of sea level rise, changing wave patterns, coastal erosion and storm frequency will have far reaching implications for both commercial and residential property. Saline intrusion of coastal aquifers can also affect water quality and damage property. Hard sea-defences can improve flood protection but they can have a significant visual impact, exacerbate the process of erosion to adjacent coastlines and can be uneconomic to maintain. They can also inhibit the natural migration of habitats. In some cases sea walls can have positive environmental benefits such as protecting valuable fresh water grazing marsh.

3.6 In terms of fluvial flooding, defences may include building up riverbanks, providing storage reservoirs and sluices and providing river barriers that allow designated land to flood while protecting developed areas. Softer engineering solutions may include channel deepening and widening, creating meadows, swales and washlands into which river flows can be diverted. Infiltration basins and porous surfaces can help to recharge groundwater and reduce run off to watercourses. These measures can help to supplement flood plain capacity and create diverse habitats. Retaining rainfall in the upper-catchment of rivers is also important in moderating peak flows.

3.7 There are limited resources available to fund new flood defences which means that work has to be prioritised to focus on those area which pose the greatest threat and where the greatest benefit/cost can be derived. The Department for Environment Food and Rural Affairs (DEFRA) produces strategic guidance on flood defences and grant aids capital projects. Its priorities are set out in Flood and Coastal Defence dated 2001 which states that action is taken where it is technically sound, environmentally acceptable and economically viable to do so. Further details are given in appendix A.

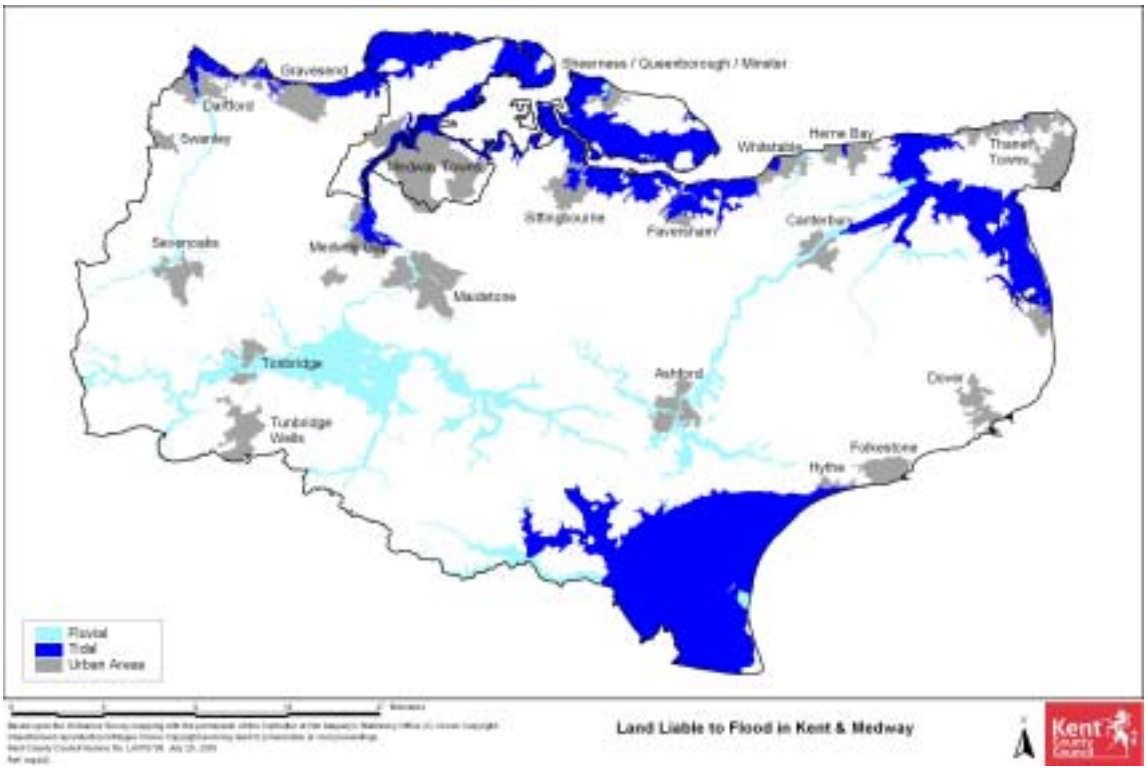
Mitigating flood risk

3.8 Where it is essential for development to take place in areas at risk of flooding, or where redevelopment is supported for regeneration purposes, it is important to minimise the impact of potential flood risk. This can be done through improving existing defences (see para 4.3) and/or through detailed design such as raising ground levels or building on stilts. Planning conditions can also help to reduce the impact of flooding by controlling occupation, removing “Permitted Development” rights or ensuring prospective occupiers are given information about flood risk.

3.9 In order to reduce the risk of flooding from surface run-off it is important that all developments are adequately drained. The key test for a drainage system is its ability to cope with intense storms. Drainage systems should avoid culverting as this can contribute to flood risks. Sustainable drainage systems, which mimic the natural drainage of a site by allowing water to percolate into the ground, can help to recharge groundwater and possibly reduce the need for defence works elsewhere. Water attenuation ponds, infiltration basins and porous surfaces/soakaways can all help to reduce run off. In some cases these features can have a benefit to water quality and wildlife. Sustainable drainage systems may, however, raise maintenance issues that need to be resolved at the application stage.

4.0 Current position in Kent

4.1 Significant parts of Kent are potentially affected by both fluvial and coastal flooding. The main fluvial flood plains in Kent are associated with the Rivers Darent, Medway and Stour. Flooding is also associated with more minor watercourses, for example, around Canterbury. Coastal flooding affects large parts of the North Kent and East Kent Coast (see map).



4.2 A number of Kent's towns and villages are located within the fluvial or coastal flood plains. The proposed development strategy is focused on the concentration of development at the major urban areas. In some instances this will involve further peripheral expansion (Ashford) and the redevelopment of extensive tracts of previously used land (North Kent). In taking forward the proposed development strategy, including the design and location of development, through Local Development Documents it will be important to take into consideration local flood risk. It will also be important to ensure that local catchment and coastal flood management strategies are influenced by specific development proposals and that the recommendations coming forward in flood management strategies, are reflected in Local Development Documents, particularly where required to enable development to proceed.

4.3 Many developed areas in Kent are already protected by flood defences, for example by sea walls along the coast at Dymchurch, and in river plains by flood defence barriers, such as at Leigh on the Medway in Tonbridge and Aldington and Hothfield, upstream of Ashford.

4.4 It is predicted that climate change and isostatic rebound (land tilting) will lead to an increase in sea level of around 6mm per year around the Kent coast. Changes in rainfall patterns, more unpredictable weather conditions and the increased frequency and severity of storms suggests that defences may be overwhelmed and give rise to flooding.

4.5 While flood defences reduce the risk of flooding they do not remove the risk completely and, over time, the protection offered will diminish unless defences are improved. New defences may also be needed to protect currently undefended communities and to allow regeneration to take place in areas at risk of flooding e.g. in North and East Kent. Assessing the need for further defences in Kent is an ongoing

process as part of the Environment Agency's work on Catchment Flood Management Strategies.

5.0 Review Current Kent Structure Plan (KSP) 1996

5.1 Policy NR5 of KSP 1996 states:

Where development is proposed on land with particular drainage problems, or is at risk from river or tidal flooding or would be likely to increase the risk of flooding elsewhere, the local planning authority will consult and take the advice of the Environment Agency. Residential development in such areas will not normally be permitted unless the risk of flooding is alleviated to the satisfaction of the local planning authority after consultation with the environment agency.

6.0 Reasons for Policy Changes

6.1 As a result of the severity of recent floods and growing public concerns about flood risk, there has been a step change in National Planning Policy towards flood risk. In particular there is an increasing emphasis on the need to adopt a more sophisticated approach to assessing risk, to limit the exposure of property and people to risk and to give appropriate protection to the environment. This change needs to be reflected in strategic policy.

PPG 20 Coastal Planning (1992) This states that development should not be permitted in areas, which need expensive engineering works for protection against erosion/flooding.

PPG 25 Flooding (2001) This advocates an integrated approach to flood risk management, (see below), and confirms that flood risk is a material planning consideration. It introduces a sequential approach to development in flood risk areas whereby the level of risk is balanced against the type of development. The approach seeks to avoid all but essential development in areas of high risk. It advocates a precautionary approach to climate change when considering whether areas are adequately protected and to ensure that development is flood resistant. It also states that developers should fund the need for additional infrastructure. See appendix B for further details of PPG 25.

Regional Planning Guidance RPG9 (2001) This emphasises that development strategies should take account of flood risk and plan for new infrastructure while identifying the best practical environmental options.

Environment Agency Kent Area Planning Guidance (March 2001) This states that new defences to protect proposed development are not generally supported as they alter natural river and coastal processes. It also states that development should be avoided in areas of flood risk and that integrity of flood defences and the ability of watercourses and flood plains to convey and store water should be safeguarded.

7.0 Promoting an Integrated approach to flood risk management

7.1 PPG 25 advocates an integrated approach to flood risk management and this is being taken forward by the preparation of the following plans in particular:

7.2 Shoreline Management Plans. These are produced on behalf of DEFRA and set out the preferred options for lengths of coastline. They are intended to promote more sustainable solutions for coastal protection, considering natural coastal processes

and environmental features as well as the need to protect industrial development and residential property and respond to future needs.

7.3 Catchment Flood Management Plans. These are produced on behalf of the Environment Agency. They examine existing river processes, determine existing and potential flood risk, consider future scenarios e.g. climate change and development/regeneration strategies. They identify and consult on opportunities and priorities for improving flood defences.

7.4 Coastal Defence Strategy Plans. These are produced by operating authorities and take a strategic view of technical, economic and environmental issues seeking to balance the costs and benefits of flood defence schemes. These are likely to encourage the more widespread adoption of environmentally sensitive approaches, such as managed retreat, with less emphasis on hard engineering solutions.

7.5 The Structure Plan has a leading role to play in developing an integrated approach to flood risk management. The Flood Management plans referred to above will be the key mechanisms for identifying the appropriate response to flood risk for a particular area. This may include proposals for new or improved defences or land use changes. The Structure Plan should provide the policy framework for taking forward the relevant recommendations where they relate to land use planning matters.

8.0 Policy Directions

a) New Defences

- Reduce the impact of flooding on existing properties as far as is practical by ensuring that, where appropriate, defences are maintained, enhanced and safeguarded and water courses are kept free flowing.
- Promote integrated/area wide flood defence strategies, which respond to existing and future needs e.g. Catchment Flood Management Plans and Shoreline Management Plans.
- Ensure the design of new defences take environmental impacts into account including landscape, wildlife and natural processes and provide mitigation.
- Promote the provision of new defences e.g. through development contributions, and grant funding.
- Ensure development does not preclude comprehensive solutions to flood defence

b) Development in Flood Risk Areas

- Flooding should be treated as a key constraint in planning for new development and in relocating existing uses.
- The sequential approach to flood risk assessment should be adopted to prevent development in areas of high risk and plan carefully in areas of lesser risk.
- Flood risk should be considered outside of the specific zones identified in the sequential test.
- Where development needs to take place in flood risk areas ensure it is managed to reduce exposure to risk, designed to be flood resistant, does not exacerbate the risk of flooding elsewhere and avoids the need for new defences. Where new defences are necessary these should be identified in sufficient time to allow them to be planned and should be funded by the developer.
- There is a need to strike a balance between promoting the reuse of urban sites within the flood plain against flooding/erosion considerations.
- Secure the provision of appropriate drainage systems.

APPENDIX A: KEY PLAYERS

A1 DEFRA

A1.1 DEFRA produces strategic policy on flood and coastal issues and sets investment priorities. It administers flooding legislation and grant aids some capital projects. In 1999 this amounted to £400m of which £275m was channelled through the EA, the other £125m went to local authorities and other operating authorities expenditure on non main rivers and some coastal areas. Funding is due to increase but competition for funds is very high. Its aims are:

- To reduce risk to peoples and the developed and natural environment
- To encourage provision of adequate and cost effective warning systems
- To encourage economically and environmentally sound flood defences
- To discourage inappropriate development in areas at risk from flooding and coastal erosion.

A1.2 DEFRA has issued High Level Targets for flood and coastal defences to ensure more certain delivery of its stated policy aims and objectives. The targets include a requirement for operating authorities to produce policy statements setting out their plans for meeting the governments aims and objectives. Its current targets for the incidence of flood risk are related to density of development from low density rural areas, 1 in 20 years, through to high density urban areas, 1 in 200 years.

A1.3 In addition its priorities, in order, are:

- Flood warning systems
- Urban coastal and tidal defences; environmental assets of international importance
- Urban flood defence
- Rural coastal and tidal defence and replacing rural flood defence and drainage schemes; environmental assets of national significance
- Building new rural flood defence and drainage schemes; environmental assets of local significance.

A1.4 The cost benefit analysis used to allocate grants may skew investment towards higher priced areas. DEFRA is considering a more consistent standard including developing strategies for poorer regions. It can be particularly difficult to make a case for defences where there are only a small number of properties because of the emphasis on property value. Defences are expected to be environmentally sustainable that is designed to minimise environmental impact.

A2 Environment Agency

A2.1 The Environment Agency (EA) provides advice on flood risk and the condition of flood defences. Under Section 6(4) of the Environment Act 1995, a duty is imposed on the Agency, in relation to England and Wales, “to exercise a general supervision over all matters relating to flood defence”. The Agency’s principal remit is concerned with designated main rivers for which they have permissive powers to carry out maintenance and improvement works. Under the Water Resources Act 1991, the Agency’s consent is required for works in, over or under main rivers or works that affect the flow of a river. They also have powers to restrict activities close to main rivers and to provide a flood warning system for main rivers.

A2.2 Under section 105 of the Water Resources Act 1991 the Agency is required to carry out surveys of main rivers to establish the extent of flood risk. The Agency keeps

records of historic flood levels on main rivers and has some limited information on ordinary water courses.

A2.3 The Agency has produced indicative 1 in 100 year floodplain maps for all main rivers and some ordinary watercourses. The Agency is currently producing 1 in 1000 flood plain maps for main rivers that are expected to be published shortly. On coastal areas the Agency has mapped the probable extent of flooding from a 1 in 200 year event and advises on the level of a 1in 1000 year tide. The Agency also carries out surveys of flood defences.

A2.3 The EA has permissive powers to maintain sea defences. The Agency monitors and encourages other authorities to maintain and inspect defences and to assess flood risk and the means by which it might be reduced.

A3 Flood Defence Committees

A3.1 The EA's flood defence operations are exercised through these committees, which include representatives from DEFRA, EA Local Authority councillors. Local Authorities provide funding to match DEFRA grants.

A4 Internal Drainage Boards (IDBs)

A4.1 The IDBs are responsible for critical ordinary watercourses in low-lying rural areas. They secure money from drainage levies/levies on Local Authorities. The IDBs pay the Environment Agency for works on main rivers that protect IDB areas.

A5 Local Authorities

A5.1 Maritime local authorities have responsibilities relating to the management of coastal erosion and flood risk. They carry out routine maintenance, provide new or upgraded sea defences. They also monitor and advise the public on local sea conditions when tidal surge warnings are issued.

A6 Riparian Owners

A6.1 Defences may also be privately provided e.g. power generators and owners of land near rivers. At the present time riparian owners also have responsibility for keeping water courses clear but poor maintenance particularly in urban areas can exacerbate the risk of flooding. Rochester Oyster Fisheries and Bridge Wardens Trust also have responsibility for some flood defences.

APPENDIX B: **SUMMARY OF PLANNING POLICY GUIDANCE 25 - Development and Flood Risk**

B1 General Principles

- The susceptibility of land to flooding is a material planning consideration;
- The Environment Agency has the lead role in providing advice on flood issues, at a strategic level and in relation to planning applications;
- Policies in development plans should outline the consideration which will be given to flood issues, recognising the uncertainties in the prediction of flooding and climate changes;
- Planning decisions authorities should apply the precautionary principle to the issue of flood risk, using a risk-based search sequence to avoid such risk where possible and managing it elsewhere;
- Planning decisions authorities should recognise the importance of functional flood plains, where water flows or is held at times of flood, and avoid inappropriate development on undeveloped and undefended flood plains;
- Developers should fund the provision and maintenance of flood defences and warning measures that are required because of the development;
- Planning policies and decisions should recognise that the consideration of flood risk and management needs to be applied on a whole-catchment basis and not be restricted to flood plains.

B2 Applications relevant to flood risk

Applications likely to require particular consideration of flood risk issues include those for development:

- within a river flood plain or washland shown on the indicative flood map
- within a coastal flood plain, including that adjacent to the tidal length of a river,
- within or adjacent to any watercourse, particularly where there might be potential for flash flooding;
- adjacent to or including any flood bank or other flood control structure;
- situated in an area where the Agency have indicated that there may be drainage problems
- likely to involve the culverting or diverting of any watercourse; or
- of such a site or nature could increase in surface water run-off .

B3 Risk-based approach and the sequential test

Local planning authorities should adopt a risk-based approach to proposals for development in or affecting flood-risk areas. The assessment of risk should take account of:

- the area liable to flooding;
- the probability of it occurring, both now and over time/
- the extent and standard of existing flood defences
- the likely depth of flooding;
- the rates of flow likely to be involved;
- the likelihood of impacts to other areas, properties and habitats;
- the effects of climate change; and
- the nature and currently expected lifetime of the development proposed and the extent to which it is designed to deal with flood risk.

Flood Zones	Appropriate Planning Response
Little or no risk Annual probability River/tidal/coastal less than 0.1%	No constraint
Low to medium risk River 0.1-1.0% Tidal and coastal 0.1-0.5%	Suitable for most development except some essential civil infrastructure e.g. fire services (flood risk assessment may be appropriate).
High risk River 1.0% or greater Tidal and coastal 0.5% or greater	a) Developed areas - may be suitable for residential, commercial and industrial development provided appropriate standard of defence. Avoid areas that may be needed for flood defence works. b) undeveloped areas – not generally suitable for development unless a particular location is essential. c) Functional flood plain – may be suitable for some recreation, sport or amenity use providing adequate flood warning and that they remain operational even at times of flood.

B4 Policy Development

Regional Planning Guidance
Identify principal areas where flooding likely to be of regional significance and setting out policies to discourage inappropriate development in flood risk areas.

Role of Structure Plans

- should identify those areas of coastal land and river basins where flooding is likely to be a risk in the short and long term;
- should set out requirements and restrictions regarding the type and form of development that will be acceptable;
- should consider long-term changes in land use or managed retreat of flood defences to enable flood plains to flood more naturally/extensively, providing storage/subsequent gradual release of flood water;
- in drawing up their policies, authorities preparing structure plans should apply the principles of the sequential test.

Local Plans
These should show individual areas of flood risk where specific policies apply, apply the principles of the sequential test and review allocations of land for development against risk based criteria. They should also identify sites where managed realignment of coastal defences or restoration of functions to flood plain is appropriate.

B5 Other Issues

Caravan parks - avoid in areas of high flood risk;
Previously developed land - aim for balanced approach that addresses the risk of flooding whilst recognising the benefits of urban regeneration;
Promote the use of sustainable drainage systems –River Catchment Planning Environment agency - to provide plans of flood zones and with Local authorities identify those areas protected by flood defences and the standard of protection provided.