Cambridge City Council

To:	Executive Councillor for Planning and Sustainable Transport
Report by:	Director of Environment
Relevant scrutiny committee:	Environment Scrutiny Committee 21/6/2011
Wards affected:	All Wards

Cambridge and Milton Surface Water Management Plan

1. Executive Summary

1.1 Cambridge City Council obtained a grant from The Department for Environment, Food and Rural Affairs (Defra) of £100,000 to undertake a Surface Water Management Plan (SWMP) for Cambridge and Milton. It will provide an evidence base for developing policies in the Local Development Framework (LDF) and will also be a material consideration in the determination of planning applications. The information contained within the assessment is also used for emergency planning purposes and as a starting point for the strategic surface water flood risk management of Cambridge. It will also be used as an evidence base to obtain further funding and prompt spending priorities amongst the partner organisations that participated in the SWMP

1.2 The SWMP was undertaken by the Cambridgeshire Flood Risk Management Partnership (CFRMP). The partnership includes Cambridge City Council, Cambridgeshire County Council, South Cambridgeshire District Council, The Environment Agency, Anglian Water and Cambridgeshire Horizons. Consultants, Hyder - Eden Vale Young were appointed to undertake the SWMP, which involves complex surface water computer modelling.

1.3 The SWMP computer models the study area and identifies the areas at greatest risk known as ‘wetspots’, then a more refined and detailed computer modelling exercise is undertaken of these areas. The models are then used to assess the financial damages caused by surface water flooding to properties. Theoretical measures for mitigating the risk are explored to find the most economical options of reducing the flood risk.

2. Recommendations

2.1 This report is being submitted to the Environment Scrutiny Committee for prior consideration and comment before decision by the Executive Councillor for Planning and Sustainable Transport.

2.2 The Executive Councillor is recommended:

a) To endorse the content of the Cambridge and Milton Surface Water Management Plan for use as an evidence base for the Local Development Framework and as a material consideration in planning decisions.
b) To endorse the content of the Cambridge and Milton Surface water Management Plan for use as an evidence base for obtaining funding and to influence maintenance priorities.

3. Background

Purpose of a Surface Water Management Plan

3.1 SWMPs are a relatively new concept originating from a recommendation in the Pitt Review following the flooding in 2007 and are referred to in Planning Policy Statement 25: Development and Flood Risk (PPS25) (2010). Guidance on the production of SWMPs was published in March 2010 and was informed by the Integrated Urban Drainage pilot studies carried out under the Government's 'Making Space for Water' strategy (2004). Surface water flooding is away from large rivers and is flooding from highway drains, small watercourses and ground water during and after an extreme rainfall event.

3.2 A SWMP outlines the preferred long-term strategy for the management of surface water in a given location and is carried out in consultation with local partners having responsibility for surface water management and drainage in that area. The goal of a surface water management plan is to establish a long-term action plan and to influence future strategy development for maintenance, investment, planning and engagement.

3.3 SWMPs are also used for emergency planning purposes to identify areas of potential flooding and to ensure all potential flooding is taken into consideration when creating emergency plans and planning the location of emergency centres.

3.4 SWMPs alongside Strategic Flood Risk Assessments (SFRAs) are the starting point for local flood risk management, providing information that feeds into other studies. Cambridgeshire is developing a

comprehensive approach to sustainable water management. This incorporates broad consideration of some aspects of water management (including County-wide Surface Water Management Plans and Preliminary Flood Risk Assessment, Water Cycle Strategies and Level 1 Strategic Flood Risk Assessments), guidance for developers (the City Council's Cambridge Sustainable Drainage Design and Adoption Guide) and examples of best practice (Lamb Drove, Cambourne). Much of this work is being coordinated by the Cambridgeshire Flood Risk Management Partnership (CFRMP), led by the County Council and which the City Council are a full partner of, which was set up to respond to the requirements of the Flood and Water Management Act (2010) and the Government's response to the Pitt Review (2008). Under the Act, the County Council will lead in managing local flood risk. The Cambridgeshire Flood Risk Management Partnership will manage local flood risk, and although this is led by the County Council, the Act allows the delegation of many of their functions to the lower tier authorities such as the City Council.

3.5 There are four principle phases of a SWMP:

Phase 1 - Preparation: which includes scoping the study and the formation of a partnership of all the identified stakeholders.

Phase 2 - Risk Assessment: undertake a strategic assessment, an intermediate assessment, then a detailed assessment of the risks and map and communicate the risks. This phase includes significant computer modelling of existing infrastructure.

Phase 3 - Options: a range of options, which seek to alleviate the risk from surface water flooding are identified through stakeholder engagement and assessed. The purpose of this phase is to identify the most appropriate mitigation measures, which can be agreed and taken forward to the next phase.

Phase 4 - Implementation and Review: preparing an implementation strategy and the monitoring of the implementation and subsequent regular review.

3.6 Surface water flooding in the context of a SWMP includes:

- Surface water runoff; runoff as a result of high intensity rainfall when water is ponding or flowing over the ground surface before it enters the underground drainage network or watercourse, or cannot enter it because the network is full to capacity, thus causing flooding (known as pluvial flooding).

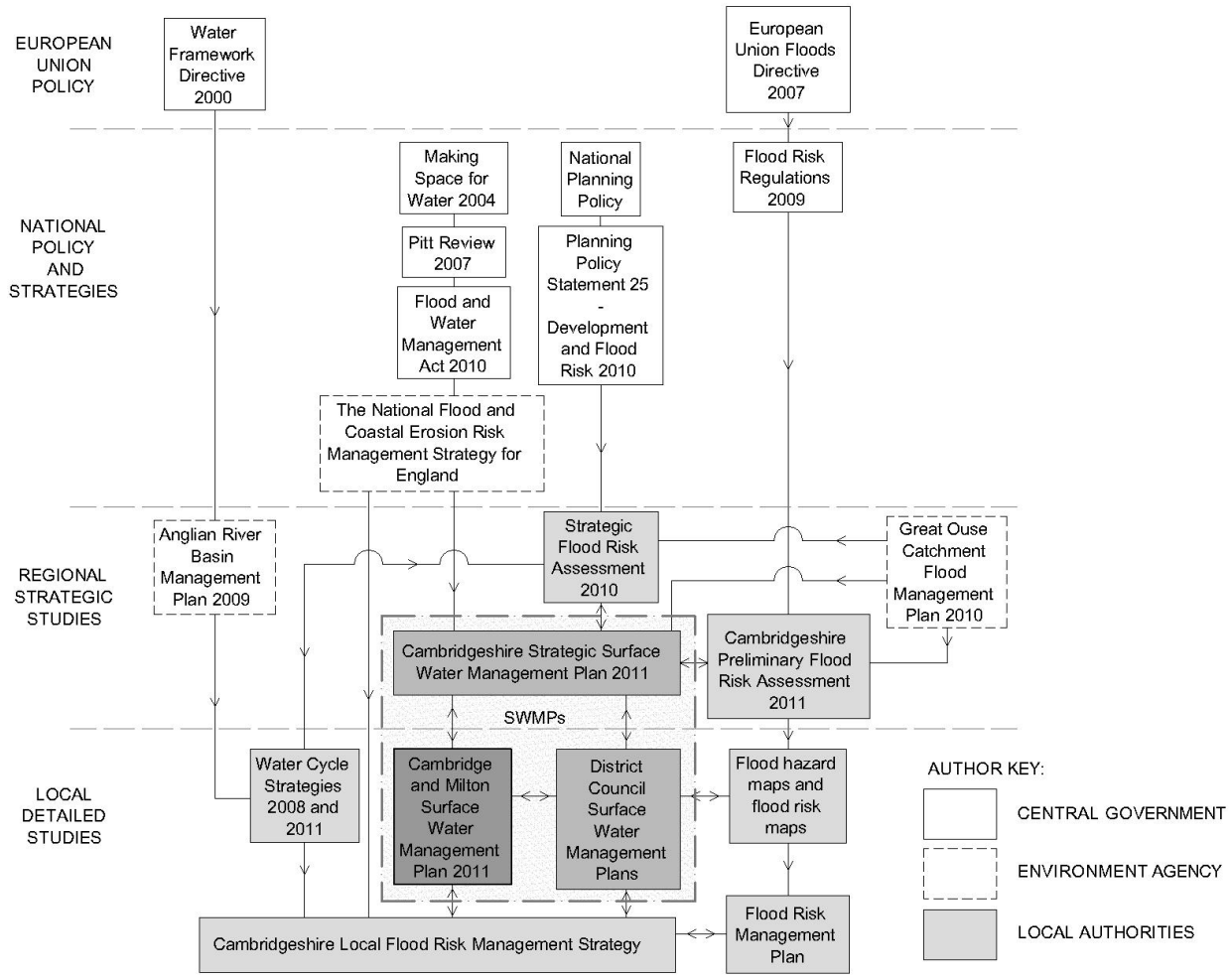
- Flooding from groundwater where groundwater is defined as all water that is below the surface of the ground and in direct contact with the ground or subsoil.
- Sewer flooding which occurs when the capacity of the underground system is exceeded due to heavy rainfall, resulting in flooding inside and outside of buildings.
- Flooding from open-channel and culverted watercourses that receive most of their flow from inside the urban area and perform an urban drainage function.
- Overland flows from the urban urban/rural fringe entering the built up area.
- Overland flows resulting from groundwater sources.

Surface water flood risk and Cambridge

3.7 The Department for Environment, Food and Rural Affairs (Defra) announced in August 2009 that new funding of £16m was to be allocated to local authorities across the country to take action to tackle the problems from surface water flooding. Initially £9.7m was awarded to 77 local authorities for areas where the evidence shows that the risk and potential impact of surface water flooding could be highest. The remainder of the £16m was divided into an early action fund of £5.3m and £1m to aid with building skills and capacity within local authorities. Bids were open to local authorities in England for individual works or studies between £20k-£100k aiming to achieve quick wins to manage and alleviate local surface water flood risk. Cambridge City Council's bid for £100k to undertake a SWMP for Cambridge and Milton was successful.

3.8 To determine the areas of highest risk Defra divided England into 4350 settlements, Cambridge and Milton was considered one settlement. Modelling was undertaken on these settlements, which indicated areas that had a potential for surface water flooding and maps of these areas were provided to the local resilience forums to assist with emergency planning. The settlements were ranked with regard to their possible susceptibility to surface water flooding. Cambridge and Milton was ranked at 87 out of the 4350 settlements, which puts Cambridge and Milton in the top 2% of settlements at risk, with a potential 3500 properties at risk.

Cambridgeshire and National Context



3.9 There is a great deal of interconnectedness between studies at both regional and local level, with updates taking into consideration and utilising data in reports that have already been published. The diagram above provides a simplified representation of the current relationship between European, national and local policy and studies.

Preliminary Flood Risk Assessment (PFRA) for Cambridgeshire

3.10 The Flood Risk Regulations (2009) implement the European Floods Directive (2007/60/EC) that seeks to provide a consistent approach to managing flood risk across Europe, through a six-year cycle. The approach is in four stages, and the first stage is to undertake a 'Preliminary Flood Risk Assessment' (PFRA). Further stages include identifying Flood Risk Areas, preparing flood hazard and risk maps and preparing flood risk management plans.

3.11 An Environment Agency guidance document on the production of PFRAs was published in February 2011, and the guidance has been adhered to in the development of a PFRA for Cambridgeshire. This was also produced by the Cambridgeshire Flood Risk Management Partnership (CFRMP) and utilised the same consultant as the

Cambridge and Milton SWMP. It was finalised in May 2011 and has been approved by Cambridgeshire County Council at the Cabinet meeting on 24th May 2011. It can be found in Appendix C.

Cambridgeshire Strategic Surface Water Management Plan

3.12 Concurrent with the Cambridge and Milton SWMP, CFRMP and the appointed consultant produced a strategic SWMP for the whole of Cambridgeshire. The final version has been approved by Cambridgeshire County Council at the Cabinet meeting on 24th May 2011 and can be found in Appendix B.

3.13 The Strategic SWMP also sought to identify links to other local and regional delivery plans such as 'Water Cycle Studies', 'Catchment Flood Management Plans' and 'Strategic Flood Risk Assessments', which may influence or be influenced by the SWMP. The SWMP seeks to integrate and align these plans and processes to provide a clear and robust path to delivering flood risk management objectives throughout Cambridgeshire. Information from the SWMP and future' Local Flood Risk Management Strategy' can be used to inform any updates to these studies.

3.14 Data came from a variety of sources including, but not limited to: historical flooding information provided by stakeholders and members of the public as part of the 'Flooding Memories' public consultation project; the Environment Agency's National Receptor Database (NRD) and Flood Maps for Surface Water (FMfSW); information from City and District Councils, Town and Parish Councils, Internal Drainage Boards, the County Council's Highways team, and Emergency Management Teams.

3.15 Once the data collection stage was complete, the surface water flooding information was analysed to identify 'wetspots' that have a history of flooding incidents or potentially could be at risk of future flooding.

3.16 The prioritisation of the 'wetspots' was calculated after considering what receptors could be affected in the event of a flood. For example housing; critical infrastructure, such as a wastewater treatment works; vulnerable sites, such as a residential care home; and traffic infrastructure.

Content of the Cambridge and Milton SWMP

3.17 The final Cambridge and Milton SWMP can be found in Appendix A. This includes a report and several appendices containing maps and data collected as part of the assessment.

3.18 Because of the existence of CFRMP the initial phase of the SWMP, formation of a partnership of stakeholders, was already complete prior to the appointment of the consultant. Once appointed the initial works was around collation of data to form a historical evidence base, in line with the work undertaken for the Countywide SWMP as detailed above. Members of the public were invited to consultation events to relate their memories of flooding. Also the results of previous consultations with resident associations that were undertaken as part of the SFRA were also included.

3.19 The next step in the process was the development of computer model of the surface water, which utilised the latest industry standard modelling packages and techniques, which are discussed in detail within the SWMP (see section 7).

3.20 To progress the SWMP the areas of highest risk or 'wetspots' were required to be identified. These were identified by combining the modelling with the historical database. This produced a list of 11 wetspots, which were then scored using a multi criteria analysis (MCA) method by which the impact of flooding on a wide range of receptors can be evaluated. MCA allows for the comparison of severity of flooding between geographical regions based on the perceived value of buildings.

3.21 The 11 wetspots ranked after the MCA are:

1. King's Hedges and Arbury
2. Cherry Hinton (North and South)
3. North Chesterton
4. Bin Brook
5. South Chesterton
6. Milton
7. Castle School area
8. Cambridge Historic City Centre
9. Cherry Hinton Village
10. Vicar's Brook
11. Coldham's Common

3.22 The top two wetspots were then subjected to further more detailed computer model development and engineering options were devised.

Due a limited budget and the complicated time consuming computer modelling involved in the detailed assessment of individual wetspots, only two were able to be taken to the next stage of the SWMP.

3.23 Theoretical engineering measures to reduce the surface water flood risk were introduced into the models of each wetspot. Based on national guidance and best practice, open spaces within the existing urban environment were identified as potential areas where attenuation features could be utilised. These attenuation features could be basins, ponds, wetlands, swales etc. Measures within highways, such as permeable paving and rain gardens were also identified as potential ways of controlling the surface water and reducing the flood risk.

3.24 The engineering options are a combination of features; there is not a single solution that will mitigate all of the risk identified. The engineering options are also indicated within open space, regardless of constraints and land ownership. These options are not definite proposals, but are an indication of the extent of works that would be required to reduce the surface water flood risk. If one feature was not achievable for any reason, another of similar size in the vicinity would be required.

3.25 These modelled engineering option combinations were then subjected to an economic appraisal and assessed in relation to whole life costs, and flood damages in accordance with nationally recognised guidance.

3.26 The preferred options for Kings Hedges and Arbury and Cherry Hinton are:

1. Increased maintenance of ordinary watercourses (i.e. First Public Drain, Cherry Hinton Brook, East Cambridge Main Drain, Daws Lane Ditch, Walpole Road Ditch, Gunhild Way Ditch and the ditches between Kelvin Close and Walpole Road) and surface water drains (i.e. road gullies) within the wetspot. The watercourses maintained by the City Council are maintained to a high standard with the focus on maintaining flow and the increased maintenance recommended is to a standard that is currently undertaken.

2. Engineering option combinations that includes attenuation features, such as swales, basins and wetlands and source control elements such as permeable paving and rain gardens in various location throughout the wetspots (detailed within the SWMP).

3. Planning policy recommendations regarding, further limiting peak flow and volume of discharge by the attenuation of surface water in wetspot areas above and beyond standard practice, based on the evidence the SWMP provides.

Implications and benefits of the SWMP for Cambridge and Milton

3.27 The SWMP for Cambridge and Milton is a long-term management plan (80 years) for surface water flood risk and as such policies and measures will take time to make a significant reduction in surface water flood risk. This will be dependent on the availability of funding, opportunities arising and current and future local priorities.

3.28 The modelling results, assessments and maps created during the Cambridge and Milton SWMP, with emphasis on the eleven identified wetspots, can be used as follows:

- As an indication of potential development constraints and opportunities to reduce the predicted surface water flood risk.
- To highlight broad scale risk and provide evidence as to whether a developer should be required to undertake further investigation of their site and what mitigation measures may be appropriate.
- To inform maintenance and emergency response, so that this can be focused on areas of greatest risk.
- As an evidence base in the development of future planning policies and future local flood risk management policies.
- To explore the possibility and the feasibility of the engineering options for the two detailed wetspots, Kings Hedges and Arbury and Cherry Hinton.

4. Implications

4.1 There are no direct financial, staffing, procurement, or community safety issues arising from this report, but capital investment would be required to implement any of the engineering options identified.

5. Background papers

5.1 These background papers were used in the preparation of this report:

- Defra (2010) Surface Water Management Plan Technical Guidance

6. Appendices

- Appendix A: Cambridge and Milton Surface Water Management Plan
- Appendix B: Strategic Surface Water Management Plan for Cambridgeshire
- Appendix C: Preliminary Flood Risk Assessment for Cambridgeshire

7. Inspection of papers

To inspect the background papers or if you have a query on the report please contact:

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