Milton Keynes Drainage Strategy – Development and Flood Risk Supplementary Planning Guidance May 2004

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Glossary

Attenuation:	To reduce the rate of flow through a system, which has the effect of reducing the peak flow and increasing the duration of a flow event.
Balancing lake/	
Pond/lagoon:	A feature designed to attenuate flows by storing runoff during the storm and releasing it at a controlled rate during and after the storm. These can either be on line, ie the watercourse continues to flow through the storage area, or offline, ie the water is elsewhere and discharged at a point into the watercourse.
Catchment:	The area contributing flow to a point on a drainage system.
DEFRA	Department of the Environment, Food and Rural Affairs
Design criteria:	A set of standards agreed by the developer, planners and regulators that the proposed system should satisfy.
Flood estimation	
handbook (FEH):	Produced by the Institute of Hydrology (now Centre for Ecology and Hydrology), Wallingford. It estimates the run-off expected from various land use types for differing flood return periods.
First flush:	The initial runoff from a site/catchment following the start of a rainfall event. As runoff travels over a catchment it will pick up or dissolve pollutants and the "first flush" portion of the flow may be the most contaminated as a result. This is especially the case for intense storms and in small or more uniform catchments; however, in larger or more complex catchments pollution wash-off may contaminate runoff throughout a rainfall event.
Floodplain:	Land adjacent to a watercourse that would be subject to regular flooding under natural conditions.
Freeboard:	Height above which a flood defence is built above a predicted flood level. This provides an additional safety margin for circumstances such as climate change, uncertainties of modeling \ predicting flood levels and unusual events.
Groundwater:	Water that has percolated into the ground. It includes water in both the unsaturated zone and the water table.
Impermeable	
Surface:	A non-porous surface that generates a surface water runoff after rainfall.
Main river:	A watercourse shown as such on the statutory maps held by the Environment Agency and DEFRA and can include any structure or appliance for controlling the flow of water into, in or out of the channel which is not vested in or controlled by an Internal Drainage Board.
Ordinary	
Watercourse:	A watercourse which does not form part of any main river.
Piped sewerage:	location for treatment and/or disposal.
Pond:	Permanently wet depression designed to retain storm water for several days, and permit settlement of suspended solids.

- Porous surface: A surface that infiltrates water across the entire surface of the material forming the surface, such as grass and gravel surfaces, porous concrete and porous asphalt.
- Proper outfall: An outfall to a watercourse, public sewer and in some instances an adopted highway drain. Under current legislation and case law, having a proper outfall is a prerequisite in defining a sewer.

Public sewer: A sewer that is vested in the sewerage undertaker.

- Retention pond: A pond where runoff is detained for a sufficient time to allow settlement and biological treatment of some pollutants.
- Return Period: The risk of flooding to floodplain areas and property is often described in terms of a return period

Statistical return periods relate to the long-term average time interval between events of a particular magnitude. The 1 in 100 year return period flood has a 1% chance of occurring in any one year i.e. the odds of it happening are 100 to one.

It must be emphasised that return periods are averages. It should not be assumed that it would be exactly 100 years before a 1 in 100 year event reoccurs. It is statistically possible for such events to occur in successive years or even more than once in a year. Equally, such events may be several hundred years apart.

The 1 in 1000 year return period (or 0.1% probability) is also referred to as giving the extreme flood line

- Riparian Owner: The proprietor of land on the banks or under the bed of a watercourse. Under common law they have rights and responsibilities.
- Runoff: Water that flows over the surface of the ground. This can occur if the ground is impermeable or if permeable ground is saturated.

Section 106

- TCPA 1990:A section within the Town and Country Planning Act 1990 which allows
a planning obligation to a local planning authority to be legally binding.
- Sewerage: A pipe or channel taking domestic foul and/or surface water from buildings and associated paths and hard-standings from two or more curtilages and having a proper outfall.

Sewerage

Sewer /

- Undertaker: This is a collective term relating to the statutory undertaking of water companies that are responsible for sewerage and sewage disposal, including surface water from roofs and yards of premises draining through public sewers.
- Sewers for
- Adoption: A guide agreed between sewerage undertakers and the House Builders Federation specifying the standards to which private sewers need to be constructed to facilitate adoption.
- Soakaway: A sub-surface structure to promote the infiltration of surface water to ground.
- Source control: The control of runoff or pollution at or near its source.

Sustainable	
drainage systems	
(SuDS):	A sequence of management practices and control structures designed to drain surface water in a sustainable way. [Note: in some situations, consideration of environmental, economic and social benefits may indicate that conventional surface water drainage techniques may be the most sustainable option.]
Suspended solids:	Undissolved particles in a liquid.
Treatment:	Improving the quality of water by physical, chemical and/or biological means.
Watercourse:	Any natural or artificial channel that conveys or is capable of conveying surface and/or groundwater.

Preamble

Flooding can have severe social, economic and environmental impacts. Within England about 1.7 million homes and 130,000 commercial properties are at risk of flooding. Nationally, the frequency and scale of flooding appears to be worsening. Climate change is predicted to increase flood risk. The River Ouse regularly inundates its floodplain. The most severe recent flood event in the district occurred in Easter 1998. This resulted in some properties within the older areas of the Borough being flooded. Emergency planning procedures necessitated the consideration of the evacuation of large parts of Newport Pagnell.

Government is acting through a variety of measures to reduce flood risk. Milton Keynes is a City that is likely to continue to grow much larger. It is therefore sensible that planning for this growth seeks to minimise the potential threat of increased flood risk to new and existing properties.

Status of Document

This Supplementary Planning Guidance (SPG) supports and amplifies the policies of the Milton Keynes Local Plan. The Local Plan provides a framework for the control of development in Milton Keynes. The SPG was prepared and endorsed by a partnership comprising:

Environment Agency (EA)	English Partnerships (EP)
Milton Keynes Council (MKC)	Milton Keynes Parks Trust (MKPT)
Buckingham and River Ouzel Internal Drainage Board (IDB)	Anglian Water Services (AWS)

As adopted SPG, the advice contained in this document is a material consideration in the determination of planning applications.

Consultation

A draft of the SPG was widely disseminated to a variety of organisations, including Parish Councils, developers, landowners, environmental groups and individuals. The document was made available on the Council's website. The consultation period lasted 6 weeks ending on 5th March 2004. Comments, officer responses and proposed changes were reported to Cabinet on 18th May 2004 and the SPG subsequently adopted.

Purpose of this Supplementary Planning Guidance

Those who planned Milton Keynes city recognised that its development could create additional flood risk. Planned strategic flood control measures have ensured that the risk has been reduced. The measures comprise a series of lakes along the rivers into which Milton Keynes drains. The original aim of the flood control measures was to not increase the risk of flooding in Newport Pagnell. The growth of Milton Keynes is now reaching a level beyond that originally envisaged. In addition, Government through the planning system is seeking to reduce the risk of flooding, particularly to property. It is therefore necessary to review the effectiveness of existing measures and develop a new strategic approach for the management of flood risk for the further expansion.

The SPG aims to implement in Milton Keynes the requirements of Planning Policy Guidance Note 25 'Development and Flood Risk' (PPG25). The majority of the growth planned will be associated with the expansion of the city. However, the Guidance is also applicable to other areas contained within the administrative area of the Council. Specifically, its purpose is to promote a strategic approach to mitigating the impact of development on flood risk. It aims to guide developers on the following aspects of drainage and flood risk in Milton Keynes:

- zones of risk from river flooding and the constraints they impose on development;
- what further strategic measures are appropriate to allow further development to • go ahead and how they might operate in conjunction with more local measures using modern practice in sustainable drainage; and
- what consideration should be given to conservation and amenity, funding and the securing of reliable arrangements for long term maintenance

The approach advocated in the SPG also should help to reassure residents and businesses of the Borough. It shows that the Council and its partners contributing to the SPG are promoting a co-ordinated response to the issue of flood risk management, surface water drainage and the water environment in dealing with development proposals in Milton Keynes.

Structure and Content

Part 1 of the SPG provides general guidance on development and flood risk in line with PPG25. Part 2 describes the setting of Milton Keynes and its vulnerability to flooding. Part 3 explains relevant planning policies and provides information to guide development.

1 Planning Policy Guidance on Development and **Flood Risk**

1.1 Planning Policy Guidance Note 25 - 'Development and Flood Risk'

1.1.1 Government has given guidance on how the issue of flooding should be addressed in new development in Planning Policy Guidance Note 25 - 'Development and Flood Risk' (PPG25). Flood risk is a material consideration in development planning.

1.2 The Precautionary Principle

- 1.2.1 PPG25 advocates the 'precautionary principle' to managing flood risk. It seeks to avoid development vulnerable to flooding or which would increase flood risk elsewhere. The allocation of land for development should be done on a risk based search sequence. This gives priority to development on land with little or no flood risk. Flood risk zones for areas susceptible to river flooding and appropriate development types within them are set out in Table 1 (this is a summary of Table 1 in PPG25). Uncertainties exist in the estimation of flood risk and the potential effect of climate change. These factors should be taken into account in the assessment of zones and development proposals. It is estimated that climate change could lead to increases in peak flow of up to 20% for a given return period within the next 50 vears.
- 1.2.2 The PPG25 zones relate to flood risk from rivers. They do not take account of the flooding of local drainage such as main sewers.

1.3 Development within the Floodplain

1.3.1 The PPG states that Planning Authorities should recognise the importance of floodplains. Inappropriate development on undeveloped and undefended floodplains should be avoided. Development on land liable to flooding should only take place where there are no other reasonable options.

1.4 Sustainable Drainage Systems

1.4.1 The PPG also promotes the use of Sustainable Drainage Systems (SuDS). There are many types of SuDS that can be used in a variety of ways. SuDS can overcome problems often associated with conventional piped sewerage drainage into rivers. They can create run-off scenarios more akin to those prior to development. Generally, SuDS control surface runoff close to its source. Run-off volumes and speed can be reduced. Quality of water that reaches rivers can be improved. SuDS also allow opportunities for enhancing amenity. An example might be through the creation of wildlife habitats. (For more detailed guidance - see 'Sustainable Urban Drainage Systems – Design Manual for England and Wales, Report C522, CIRIA 2000.)

1.5 The Role of the Drainage Authorities

1.5.1 The EA, the IDB and the MKC are permitted to act as drainage authorities. However, PPG25 states that the EA has the lead role in the provision of flooding issues advice to local planning authorities ('LPAs'). This is both at a strategic level and in relation to planning applications.

Flood zone	Probability of annual flood		Risk and appropriate planning response
Zone 1	Less than 0.1%	Risk:	Little or none
			No constraints on development
Zone 2	Between 0.1% and	Risk:	Low to medium
	1%		Exclude essential infrastructure ⁽¹⁾
		Limi	t of floodplain
Zone 3	Greater than 1%	Risk:	High
		a)	Developed areas
			May develop, provided that minimum standard of flood defence is provided
		b)	Undeveloped and sparsely developed areas
			Generally unsuitable for residential, commercial and industrial development
		c)	Functional floodplain (floodplain subject to more regular flooding).
			Development wholly exceptional and limited too essential transport and utilities infrastructure that has to be there, or uses that do not undermine floodplain function such as linear parks ⁽²⁾

Table 1: Summary of PPG25 flood zones and permitted development

- a. Examples of what PPG25 regards essential civil infrastructure are hospitals, fire stations and emergency depots.
- b. PPG25 envisages that such development would be only essential transport and utilities infrastructure.

1.6 Strategic Flood Risk Assessment

- 1.6.1 The EA strongly suggests that a Strategic Flood Risk Assessment (SFRA) is carried out by LPAs in support of their Local Plans. It should address the following points:
 - 1. an overview of the hydrology and drainage of the area
 - 2. the provision of maps showing the extent of flood risk areas
 - 3. the identification of areas protected by flood defences and the standard of protection which they provide
 - 4. the identification of factors which may change the risk of flooding including; planned flood defence works, land use change and climate change
 - 5. standards for the control of runoff in order to ensure that new development does not increase the risk of flooding elsewhere.

1.6.2 Together with other sources of information, the Milton Keynes Drainage Study March 2000 and the Milton Keynes Drainage Strategy July 2003 are likely to form the SFRA for Milton Keynes City.

1.7 Site Specific Flood Risk Assessment

1.7.1 PPG25 requires developers to produce a Flood Risk Assessment (FRA) in support of planning applications. This SPG provides a framework on which a developer can base an FRA for development in Milton Keynes. Figure 1 outlines the process to be followed by a developer.

1.8 The Association of British Insurers

1.8.1 PPG25 paragraph 32 advises developers to seek the views of insurers on the insurability of their proposed developments at an early stage. The most up to date position statement of the ABI with regards to the level of cover in flood-affected areas can be found at www.abi.org.uk. (See appendix G)

Development and Flood Risk in Milton Keynes 2

2.1 Significant Watercourses that affect Milton Keynes

- 2.1.1 Milton Keynes lies within the Great Ouse's catchment. The river flows into the Borough in the west near Calverton and Stony Stratford. It exits in the north east near Cold Brayfield, ultimately draining into The Wash at King's Lynn.
- 2.1.2 Milton Keynes city is immediately upstream of the Great Ouse's confluence with the River Ouzel at Newport Pagnell. Run off generated by the city primarily flows via the principal tributaries of the Loughton Brook and the River Ouzel.
- 2.1.3 Clays dominate the soils. This creates a relatively high natural percentage runoff. Alluvium and gravel deposits dominate the river valleys. These have been exploited for mineral extraction in numerous areas.

2.2 The Development of Milton Keynes

Setting and Background

- 2.2.1 The development of Milton Keynes was planned by the Milton Keynes Development Corporation (MKDC) to take place within a Designated Area (DA). This covered 88.8km². Prior to its development, the area covered by the DA was largely rural. The setting of Milton Keynes is shown in Figure 2.
- 2.2.2 The planned drainage of urban development was by piped sewers discharging directly to the rivers, which would intensify storm runoff. It was recognised that this, together with development that would have to occupy the floodplain, would lead to the exacerbation of flood risk around rivers and particularly to Newport Pagnell. To avoid increasing flood risk through development, the MKDC introduced strategic flood control lakes. The lakes have, subject to certain conditions being met, a capacity sufficient for the long-term development of Milton Keynes within the DA. The design standard was the 1947 flood that was, and remains, the most severe on record. The lakes would be less effective in controlling floods which exceed the design standard. The lakes have a strategic function in controlling downstream flooding.
- 2.2.3 The locations of the lakes are shown in Figure 2.

Control over Development and Drainage

- 2.2.4 The Milton Keynes Council is the local planning authority for the majority of the Borough: it plans the development of Milton Keynes in the Local Plan and is responsible for determining the majority of planning applications within the Borough.
- 2.2.5 *Milton Keynes Partnership Committee* is the planning authority from 3rd June 2004 for major applications in a number of Urban Development Areas located on the edge of Milton Keynes urban area where it is anticipated that large-scale urban expansion will take place.
- 2.2.6 English Partnerships has been given powers act as the planning authority for its land holdings that comprise most of the land identified for development within the DA.

- 2.2.7 The **Environment Agency** has a supervisory duty over flood defence matters and is responsible for the drainage functions of the main rivers through Milton Keynes - the Great Ouse and River Ouzel. It can provide advice on areas liable to flooding (Main River) and flood risk assessments.
- 2.2.8 The Buckingham and River Ouzel Internal Drainage Board is the drainage authority within its drainage district that covers the tributaries of the Great Ouse and the River Ouzel into which Milton Keynes drains. It can provide advice on areas liable to flooding (non-main river); flood risk assessments; maintenance and adoption of surface water drainage facilities.
- 2.2.9 Milton Keynes Parks Trust is the riparian owner charged with the care of the parkland, much of it within the floodplain, in Milton Keynes.
- 2.2.10 Anglian Water Services provides water services to Milton Keynes. It will adopt sewerage, subject to a number of safeguards. It is responsible for the management, maintenance and operation of flood control structures at the balancing lakes.
- 2.2.11 More detailed information on these authorities is in Appendix A.

Development Planning

- 2.2.12 There is a hierarchy of advice and plans that influence the consideration of flood risk issues related to the development of Milton Keynes:
 - at national level: 'Planning Policy Guidance Note 25: Development and Flood Risk' (PPG25) (DTLR, July 2001)
 - at regional level: 'Regional Planning Guidance for the South East' (RPG9, March 2001) which currently sets out policies to 2016. This will be subject to review with a new document known as a Regional Spatial Strategy being adopted towards the end of 2004.
 - at sub-regional level: A sub-regional spatial strategy reflecting the recommendations of the report of the Milton Keynes and South Midlands planning study for growth options to 2031 will be adopted towards the end of 2004.
 - at local level: The Milton Keynes Local Plan (currently the Second Deposit Version dated 2002). This will be adopted in late 2005.
- 2.2.13 Overall the planning context for Milton Keynes is one that will see the city continue to expand. This is currently envisaged in the Local Plan to 2011 to be through infill development within the DA and urban extensions through the Eastern, Western and Northern Expansion Areas and Newton Leys south of Bletchley.
- 2.2.14 As a result of the Milton Keynes and South Midlands Study and the Sustainable Communities Plan: Building for the Future, Regional (RSS) and Sub-Regional Spatial Strategies (SRSS) are likely to promote a substantial amount of additional development in association with the City. The draft SRSS proposes and additional 15000 dwellings more than that identified in the 2nd Deposit Local Plan for the period to 2016. The location of the additional proposed development will be addressed in future development documents. The MK and Aylesbury Growth Area Studies Final

Report March 2003 gives some indication of possible areas where growth can be accommodated. The principal locations are likely to be:

- On the east of the City, south of the MKLP DV2 Eastern Expansion Area between the A421, Wavendon and Woburn Sands;
- On the west of the City, land to the north of the MKLP DV2 Western Expansion Area, west of V4 (Watling Street) between Stony Stratford and Calverton Lane; and
- On the south west of the City, land west of the Chepstow Drive area between the A421 and the Bletchley to Oxford railway. This area is in Aylesbury Vale district adjacent to the Milton Keynes boundary.

2.3 Flood Risk in Milton Keynes

Introduction

- 2.3.1 Halcrow on behalf of the Milton Keynes Drainage Strategy Steering Group (MKC, EP, EA, IDB, AW and the Parks' Trust) has recently developed a mathematical river model for investigating the risk of river flooding in Milton Keynes. It simulates flood flow along the Great Ouse and its right bank tributaries – the Calverton and Loughton Brooks, the River Ouzel and its tributary, the Broughton Brook. The existing strategic mitigation and its effect on flooding are represented. Model output can be used, in conjunction with ground topography, to estimate flood extents. In its current state of development, the model is limited to simulating floods no worse than the flood of annual probability 1%. It does not allow for climate change and cannot simulate the flood of annual probability 0.1% at this time.
- 2.3.2 More information about the river model is given in Appendix E.

The river model was used in the following investigations to support this SPG:

- An investigation of design standards using current methods of hydrological analysis
- The verification of the EA's indicative flood maps

Design Standard

- 2.3.3 The river model shows that:
 - The 1947 flood, which formed the original design standard, was less severe through most of Milton Keynes than the flood of annual probability 1%.
 - The existing strategic mitigation is effective in ensuring that flooding, up to at least the annual probability of 1%, would be less severe when the DA is developed to the 2011 scenario than it would have been before the DA was developed. This does not include an allowance for climate change.
- 2.3.4 Along with DEFRA guidelines, the flood of annual probability 1% taking into account the effects of climate change is adopted as the design standard to be applied to any future flood defences and mitigation constructed in association with new development.

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Flood Maps

- 2.3.5 The EA's flood map depicts the extent of the flooding through Milton Keynes. Currently this is an Indicative Floodplain Map (IFM) compiled from several sources and is shown in Figures 3a and 3b at reduced scale. The river model was used to verify the map, firstly, by comparing peak water levels throughout the modelled rivers and, secondly, by comparing flood extents on two short river reaches - one on the Great Ouse and one on the River Ouzel. Only relatively minor discrepancies were revealed at these locations.
- 2.3.6 The EA can provide tabulations produced with the current river model of flood level, depth and duration. However, some minor discrepancies may be noted when flood level is reconciled with the flood extent shown on the IFM. This may be due to a number of reasons, including changes in topography, model calibration and the fact that the model is for a 1% flood event, rather than the highest recorded flooding event. The model could be used to provide flows, which show what impact climate change might have on river levels. Reference should be made to these levels by those proposing to develop close to the published floodplain.
- 2.3.7 Flood maps can be found on the EA's web site (www.environment-agency.gov.uk) and are regularly updated.
- 2.3.8 The EA has put in hand at a national level the estimation of the extent of the flood of annual probability 0.1%. The results of this work are expected during 2004. There will also be a series of maps for differing purposes to replace the IFM.

Policy Guidance for Development in Milton 3 **Keynes**

General guidance applying to the whole of the Borough 3.1

A strategic approach

- 3.1.1 All the planning and drainage authorities will promote an integrated and sustainable approach to flood risk management, surface water drainage and the water environment in dealing with development proposals in Milton Keynes Borough
- 3.1.2 The strategic approach does not necessarily mean that the only acceptable solution is strategic balancing lakes. It is more that drainage in large developments is dealt with in a strategic manner, rather than each plot being dealt with independently. For each expansion area there could be a number of different solutions including where appropriate source control.

Key Local Plan policies

3.1.3 Development proposals will be assessed against all relevant Local Plan policies, including those relating to flood risk, surface water management and amenity. In the adopted Local Plan this is:

Policy DS18: The Ouse Floodplain:

In the 2nd Deposit Local Plan October 2002, these are:

Policy S12: Linear Parks: objective of policy:

To protect and enhance the river valleys running through and adjoining the City

Policy S13: Areas liable to flooding: objective of policy:

To maintain existing floodplains and ensure that flood risk is not materially increased as a result of new development

Policy D3: Canalside Development: objective of policy:

To maximise the potential of canalside locations

Policy D4: Sustainable construction: objective of policy:

- To reduce the resource consumption of new development and to achieve zero carbon growth.
- 3.1.4 The full policy wording is in Appendix C.
- 3.1.5 In addition, the Milton Keynes Local Plan requires that developers preparing proposals for the development of the expansion areas must submit a development framework for the proposed development. The development framework is to set out, in addition to other issues, the proposed land use, the associated drainage infrastructure, the contribution to strategic flood control and the proposed timing of implementation.
- 3.1.6 See also Appendix C for the wording of policies in relation to these expansion areas.

Areas of flood risk

- 3.1.7 Areas at risk of flooding are defined on the Local Plan Proposals Map. These are primarily based on the Indicative Floodplain Maps produced in 1999.
- 3.1.8 The EA has flood maps for Milton Keynes as referred to in Section 2.3.7 and 8 above, which are regularly updated and a more up to date source of flood risk areas than the Local Plan proposals map.

Development within or adjacent to flood risk areas

- 3.1.9 As a result of the precautionary approach being adopted within the Local Plan in accordance with PPG25, development within areas liable to flooding is only likely to be acceptable in exceptional cases. It is likely to be either essential infrastructure required to enable new development or the redevelopment of previously developed land, or development that can be shown to not have an adverse effect on the functioning of the floodplain e.g. park infrastructure. Development proposals within or adjacent to areas at risk should:
 - Be accompanied by an accurate topographical survey of the site, showing existing ground levels.
 - Be designed so that a building's ground floor levels are at least the recommended 600 mm above the 1% flood level (not including the impact of climate change). The level of freeboard provides additional safety to address uncertainty associated with climate change and model predictions.
 - Provide for safe pedestrian access and escape and for access by the emergency services
 - Incorporate features, particularly where the 600mm freeboard cannot be achieved, contained within DTLR guide 'Preparing for Floods: interim guidance for improving the flood resistance of domestic and small business properties' (Feb 2002) and the EA's publication 'Damage Limitation: How to make your home flood resistant'. Following this advice will reduce the cost and disruption caused by flooding and the subsequent repairs.

Requirements for flood risk assessments

- 3.1.10 Where flood risk either on or off site could be a material consideration, developers will be required to submit a flood risk assessment with their planning application. The requirements of the FRA will depend on the scale, nature and location of the proposed development.
- 3.1.11 Flood risk assessments should show that development proposals address the following criteria:
 - 1. No increase in flood risk in the local area
 - 2. No increase in flood risk in the wider catchment area
 - 3. Flexibility in the way in which surface water can be stored and released in times of flood

- 4. Adequate provision for adoption and long term maintenance of new surface water management facilities
- 3.1.12 A strategic approach to major proposals will increase the opportunity for achieving these criteria and should be adopted at the master planning stage. Any developer that submits a planning application where flood risk is a material consideration without an appropriate flood risk assessment runs a very high risk that the drainage authorities will object due to lack of information. The Council is likely to refuse an application if this necessary information is not submitted. Appendix F contains fuller guidance on the contents of Flood Risk Assessments as outlined in PPG25. The EA is developing further guidelines for the scoping of flood risk assessments in different situations.
- 3.1.13 Developers and LPAs should refer to the EA for further guidance on flood risk assessment. It is in the developers' interests to deal with these matters, since they may well affect the value of land and the cost of developing it. It is then for the LPA, advised as necessary by the EA and other relevant organisations, to determine an application for planning permission. The LPA takes into account all material considerations, including the issue of flood risk and how it might be managed or mitigated.
- 3.1.14 The developer may make use of the river model in determining the effectiveness of any proposed measures for strategic flood control.
- 3.1.15 Applications for development which lie within the planned areas of the DA and which conform to the general pattern and intensity of land use shown in the development plan can usually rely upon the existing strategic mitigation, subject to considering local drainage issues. The accompanying FRA should refer to this fact.
- 3.1.16 Where the proposed development does not conform to the development plan, the provisions of the SFRA may be inapplicable. In such circumstances, the LPA will look to the FRA submitted by the developer for assurance that the proposed development will be adequately protected against flooding and that any adverse impacts are adequately mitigated.

Consultation on development proposals

- 3.1.17 The Council will consult the EA on development proposals that lie within the floodplain (Zone 3) of or may increase flood risk on the Rivers Ouse and Ouzel
- 3.1.18 The Council will consult the IDB on development proposals that lie within the floodplain or may increase flood risk on the watercourses that drain into these rivers, including those within or adjoining the City – i.e. the Broughton, Calverton, Loughton and Water Eaton brooks and their tributaries
- 3.1.19 Advice on development proposals from the EA will vary depending on
 - a) the degree of flood risk in a particular area and
 - b) the nature and scale of the development proposed.

Development proposals, which are considered to be of a high risk in terms of flood risk and drainage, will be assessed by the Agency. The Agency will also supply

standing advice to Milton Keynes Council on the appropriate response to lower risk proposals.

Control of Surface Water Runoff

- 3.1.20 Developers should ensure that the rate and volume of surface water runoff is not increased as a result of their proposals. Runoff control design should aim to
 - Manage run-off rates to not increase peak flows in the receiving watercourse as agreed with the drainage authority,
 - Ensure that there is no increase in runoff volume from the site through the use of SuDS techniques where appropriate,
 - Avoid altering the time run-off takes to reach the receiving watercourse
 - Include measures to capture pollutants within an overall design package to ensure that there is no detriment to water quality.
- 3.1.21 This will ensure that the cumulative effects of development do not worsen catchment flood risk and water quality. It can be achieved in a number of ways. The preference will be for strategic solutions, utilising appropriate SuDS.
- 3.1.22 Appendix D provides more detail on methods and design parameters for the control of surface water runoff.
- 3.1.23 Initiatives by developers that would further reduce the risk of flooding by providing attenuation measures reducing the volume of run-off to a level below Greenfield runoff rates where it will not have an adverse impact on the watercourse's biodiversity will be welcomed. Opportunities for this approach may for example exist in association with landscape features that could enhance the setting of the development, or where a developer may want to increase the sustainable credentials of their development inline with Local Plan policy D4.

Design for Multi-purpose Use

- 3.1.24 Balancing lakes and other sustainable drainage features should also be appropriately designed in line with SuDS best practice to meet recreational, amenity, nature conservation and water quality objectives. All such provision should be made within open space to which the public has access. This will facilitate objectives of the Local Plan, such as those contained in Policy S12: Linear Parks.
- 3.1.25 To reduce pollution of watercourses, the system should capture the 'first flush' of 10 mm of runoff. Pollutants can therefore be kept on site or taken for treatment. In nonindustrial areas, roads and car parking areas will generally be the greatest sources of pollutants.

Adoption and Maintenance of new Surface Water Management Facilities

3.1.26 Arrangements for the maintenance of the entire surface water drainage system should be clear. It is anticipated that responsibility should rest with one or more publicly accountable bodies. There may be opportunities where the private management of facilities is considered appropriate. However, MKC and its partners will have to be assured that a management regime is in place to ensure that longterm maintenance of the facilities will ensue.

- 3.1.27 Adoption by a publicly accountable body will often necessitate the payment of a commuted sum to cover maintenance for a 30-year period or a legal agreement possibly backed up by the deposit of a financial bond. The adopting organisation will probably wish to approve the design prior to construction. This is likely to influence the design just as much as technical considerations.
- 3.1.28 AWS will adopt below ground infrastructure. The AWS, IDB, MKPT and MKC will consider adopting new surface water drainage facilities. The Council and the Parks Trust will consider adopting areas of public open space surrounding new surface water drainage facilities.
- 3.1.29 To allow access for essential maintenance, a 9 metre strip of land should be kept free of development alongside watercourses, lakes and other surface water drainage facilities which are subject to Environment Agency or Internal Drainage Board byelaws. Any works within the byelaw distance require the prior consent of the drainage authority. In addition, any culverting or works affecting the flow of a watercourse requires the prior written Consent of the Drainage Authority under the terms of the Land Drainage Act 1991/Water Resources Act 1991. For watercourses other than those subject to EA or IDB byelaws, adequate provision doe maintenance and access should be incorporated into the design.

3.2 General Guidance applying to Development within MK City

- 3.2.1 For these purposes, 'Development within MK City' excludes the City Expansion Areas identified in the Local Plan (refer to Section 3.4). At catchment level the existing drainage infrastructure within this area can accommodate development that conforms to that shown in the Local Plan.
- 3.2.2 Proposals that involve a change from the pattern of land uses shown on the Local Plan Proposals Map, or intensification through higher densities than originally envisaged may need to make additional provision to control surface water run-off particularly where such development involves a significant increase in the area of hard surfaces (e.g. from open space to built development).
- 3.2.3 At sub-catchment level, there may be localised flooding problems along tributary watercourses that will require local solutions as part of any development proposals in that sub-catchment.

3.3 Guidance applying to the City Expansion Areas

City Expansion Areas are as defined in the MK Local Plan Second Deposit Version 3.3.1 (2002) - for these purposes, they are EA3-EA6 the Northern, Western and Eastern Expansion Areas and KS1 Newton Leys to the south west of Bletchley. None of these sites is owned by English Partnerships. The City's existing drainage infrastructure does not extend into the Expansion Areas. Therefore developers should expect to provide new drainage infrastructure. Peripheral expansion if inadequately mitigated has the potential to have an adverse impact on flood risk. This can be through a variety of sources:

- Either on site within the proposed new development areas:
- Within the tributaries of the Ouze and Ouzel, such as the Calverton and Loughton Brooks in the case of the Western Expansion Area, or the Broughton Brook in the Eastern Expansion Area; and
- Further downstream at the confluence of the Ouse and Ouzel at Newport Pagnell

To reduce flood risk:

- Developers should adopt a strategic approach to surface water drainage management in each of the expansion areas.
- 3.3.2 Strategic flood mitigation should be part of the master plan / development framework required for each expansion area. The development framework should provide a approach to land drainage, nature conservation, coordinated landscape management and open space provision. It should take into account the wider context of the catchment as a whole, including the implications for flood risk downstream of the site. It should also deal with the timing and implementation of the surface water drainage measures required, including the phased provision of new facilities where appropriate, and subsequent adoption and maintenance.
- 3.3.3 In view of the likely expansion of MK as identified in the Sustainable Communities Plan, be mindful of the need to accommodate potential development post 2011 when designing new drainage facilities to serve either the Eastern or Western Expansion Area.
- 3.3.4 Proposals for the Western Expansion Area should:
 - include measures to mitigate the increased risk of flooding on Calverton • Brook, locally known as Whaddon Brook and on those watercourses that drain east to the Loughton Brook through Great Holm and Two Mile Ash / Hodge Lea/Stacey Bushes
 - reduce the risk of flooding in Calverton/Lower Weald.
- 3.3.5 Proposals for the Eastern Expansion Area should include measures to mitigate the increased risk of localised flooding on the Broughton Brook and downstream at Newport Pagnell.
- 3.3.6 Where storage ponds are proposed as an attenuation measure, the EA's, IDB's and MKC's general preference is that they are 'off-line' facilities.

3.4 Sources of Further Advice

- 3.4.1 MKC Environment Directorate: advice on planning policy (including Local Plan policies and proposals); information required with planning applications; design, maintenance and adoption of public open space; nature conservation
- 3.4.2 Environment Agency: advice on areas liable to flooding (main river); flood risk assessments: use of the MK river model

- 3.4.3 Buckinghamshire, Bedford and Ouzel Group of IDBs: advice on areas liable to flooding (non-main river); flood risk assessments; maintenance and adoption of surface water drainage facilities
- 3.4.4 *MK Parks Trust*: advice on design, maintenance and adoption of public open space; nature conservation
- 3.4.5 English Partnerships: can provide information on the development proposals on their land.
- 3.4.6 Anglian Water Services: advice on and adoption of sewerage.
- 3.4.7 Appendix A contains more information about these organisations and Appendix B contains details of how they can be contacted.

APPENDICES

A Control Over Development and Drainage

A.1 Milton Keynes Council

As the local planning authority, MKC controls the planning of the development of Milton Keynes. It prepares and adopts the Local Plan. The 2nd Deposit Version of October 2002 is the most up to date. Planning is largely concerned with the scale and location of development. In terms of location, MKC is now mainly concerned with the planning of development in the expansion areas, which lie outside the DA at the planning horizon of 2011 and beyond. The development planned for 2011 is shown in Figure 4, which is reproduced, from the Local Plan.

A.2 English Partnerships

EP inherited from the former Development Corporation most of the land identified for development within the DA. EP currently acts as a planning authority in relation to their land holdings according to the terms of the New Town Act (1981). EP ownerships are shown on Figure 5a.

EP can grant detailed permission for development on the land it owns. This is provided the development is in line with outline consents granted by the Secretary of State to the Milton Keynes Development Corporation before 1992. Departures from the outline consents must be approved by MKC. Developers wishing to revise proposals for development on land sold by EP must seek permission from MKC.

A.3 Milton Keynes Partnership Committee

The Committee has the responsibility for determining major planning applications (10 or more dwellings and 1000 sq.m. or more of non-residential developments) within the Urban Development Area designated at Milton Keynes under S.170 of the Leasehold Reform, Housing and Urban Development Act 1993. MKPC's role is to plan, co-ordinate and implement the delivery of future growth of sustainable development in the area and will play a role in ensuring that the community facilities are available to support growth.

A.4 Drainage Authorities

Control of the drainage functions of the watercourses through Milton Keynes is divided between the EA and the IDB. However, MKC can also control drainage through the powers vested upon them by the Land Drainage Act. Essentially, the Rivers Great Ouse and Ouzel are main river for which the EA is responsible but brooks, which drain into these rivers –principally the Calverton, Loughton, Caldecotte and Broughton Brooks –, are ordinary watercourses lying within the drainage district of the IDB which accordingly has control of their drainage function.

The planned development of Milton Keynes is expected to drain mainly into watercourses which are controlled by the IDB but which are tributaries of the main rivers controlled by the EA. In such cases, the MKC looks to the IDB for advice on drainage and flood risk issues.

The IDB is the operating authority, in the terms of PPG25, within its drainage district but also has influence, and can choose to undertake works, beyond the district on matters, which would affect the watercourses within its district. Additionally, the IDB applies its byelaws to these watercourses and to the floodplains of main river within the drainage district. The IDB's drainage district is shown on Figures 5b and 5c.

Internal Drainage Boards are local statutory drainage authorities established historically in low-lying areas which benefit from land drainage and flood defence works. The Boards' powers and duties are set out in the Land Drainage Act 1991 (amended 1994). Additionally powers of control over watercourse are established in the Boards' Byelaws.

The Boards exercise general supervision over all matters relating to drainage of land within their Drainage District (excluding Main River) and are an "operating authority" as defined in PPG25.

Drainage Boards have statutory permissive powers to maintain watercourses and undertake improvement works for the protection and betterment of their districts. Whilst utilising these powers the Boards have certain duties relative to conservation and the environment.

The Environment Agency has a supervisory duty for all matters relating to flood defence. It is the principal operating authority, with responsibility for main rivers and sea defence. It has the lead role for managing the dissemination of flood warnings. Under Section 105 of the Water Resources Act 1991, the EA has a duty to survey matters relating to flooding, including the identification of areas where flood defence problems are likely. Section 105 surveys should help to identify the extent of flood plains, washlands and other land liable to flood. As part of its pollution control duties, the EA is also responsible for drainage consents from premises under Part II of the Environmental Protection Act 1990. Any culverting or works affecting the flow of a watercourse requires the prior written Consent of the Drainage Authority under the terms of the Land Drainage Act 1991/Water Resources Act 1991.

A.5 Milton Keynes Parks Trust

The river corridors form an important amenity for Milton Keynes and are included in the parkland, which is leased by the MKPT. MKPT, a charitable trust, has the rights and responsibilities of riparian owners and is charged with the care of the parkland. The Trust manages some balancing lakes within the linear parks. The MKPT land interests are shown on Figure 5d.

A.6 Anglian Water Services

AWS adopts piped drainage (sewerage), provided that it is constructed to standards set out in the current edition of 'Sewers for Adoption', and does not seek a funding arrangement with the developer.

To qualify for adoption, the sewer must be continuous to its outfall. If the outfall is into a balancing pond, AWS's responsibility ends at the inlet into the pond. It would not adopt the outlet. AWS would also adopt the inlet to an off-line pond. In both cases, AWS requires the right to discharge into the pond in perpetuity. AWS expects the pond to be adopted by a body which is publicly accountable and which, by taking responsibility for maintenance, can ensure that the performance of the AWS sewerage will not be compromised. AWS regards the vesting of the ponds with MKPT to be a satisfactory arrangement.

Current AWS policy is not to adopt drainage systems other than traditional piped sewers. There are legal reasons, which rule out the adoption of infiltration systems.

B Sources of Information and Advice

Indicative flood maps are available on the EA's web site (<u>www.environment-agency.gov.uk</u>).

'Development and Flood Risk' Planning Policy Guidance Note 25 (PPG25), DTLR, July 2001

'Sustainable Urban Drainage Systems – Design Manual for England and Wales, Report C522, CIRIA 2000

'Sustainable Drainage Systems – Best practice Manual', Report C523, CIRIA 2001

'Sewers for Adoption' A design and construction guide for developers.' 5th Edition Water Research Centre 2000

'The Design of Field Pipe Drainage Systems', Reference Book 345, ADAS 1982

'Flood Estimation Handbook', CEH, 1999

'Damage Limitation – How the make your home flood resistant', Environment Agency, December 2001

Organisation	Address	'phone	Fax
Environment Agency	Environment Agency, Bromholme Lane, Brampton, Huntingdon, Cambridgeshire, PE28 4NE	01480 414581	01480 413381
Milton Keynes Council	Milton Keynes Council, Planning Department, PO Box 112, Civic Offices, 1 Saxon Gate East, Milton Keynes, MK9 3HQ www.milton-keynes.gov.uk	01908 691691	01908 252599
Buckingham and River Ouzel Drainage Board	Buckingham and River Ouzel Drainage Board, Cambridge House, Cambridge Road, Bedford, MK42 0LH www.idbs.org.uk	01234 354396	01234 328196
Anglian Water Services	Anglian Water Services, Cottonvalley STW, Pineham, Milton Keynes, Bucks www.anglianwater.co.uk	01908 453142	
English Partnerships	English Partnerships, Central Business Exchange, 414-428 Midsummer Boulevard, Central Milton Keynes, MK9 2EA	01908 692692	

	www.englishpartnerships.co.uk		
Milton Keynes	Milton Keynes Park Trust Ltd,	01908	01908
Parks Trust	Campbell Park Pavilion, 1300	233600	233601
	Silbury Boulevard, Campbell Park,		
	Milton Keynes, MK9 4AD		
	www.mkparks.co.uk		

C Planning Policies

Milton Keynes Local Plan January 1995

Policy most relevant to development and flood risk.

POLICY DS17 THE OUSE FLOODPLAIN

PLANNING PERMISSION WILL BE REFUSED FOR DEVELOPMENT IN THE FLOODPLAIN OF THE RIVER OUSE AND ITS TRIBUTARIES IF IT WOULD BE LIKELY MATERIALLY TO:

- I. IMPEDE THE FLOW OF FLOOD WATER
- II. RESTRICT THE CAPACITY OF THE FLOODPLAIN, OR
- **III. INCREASE THE NUMBER OF PROPERTIES OR PEOPLE AT RISK**

2nd Deposit Version October 2002.

Selected policies most relevant to development and flood risk. The full document can be viewed at www.milton-keynes.gov.uk

Policy S13

AREAS LIABLE TO FLOODING

Objective of policy

- To maintain existing floodplains and ensure that flood risk is not materially increased as a result of new development.

AREAS LIABLE TO FLOODING POLICY S13

Areas adjoining the River Ouse and its tributaries are identified on the Proposals Map as liable to flooding. Planning permission will be refused for development if it would be likely materially to:

- (i) Impede the flow of flood water
- (ii) Restrict the capacity of the floodplain to store flood water, or
- (iii) Increase the number of people or properties at risk from flooding

The final version of PPG25 was published in July 2001 and was taken into account in discussions with the Environment Agency in considering objections to the first deposit plan.

Policy S12

LINEAR PARKS

Objective of policy

To protect and enhance the main river valleys running through and adjoining the City

LINEAR PARKS	
POLICY S12	

The following areas are defined as Linear Parks on the Proposals Map:

- 1 The Ouse Valley, from the Borough boundary at Passenham to the M1 motorway
- 2 The Ouzel / Lovat valley, from Water Eaton to the River Ouse, including the valleys of the Broughton and Caldecotte Brooks within the city
- 3 The Loughton Brook valley
- 4 Emberton Country Park

Development proposals in the Linear Parks should contribute to achieving the following objectives:

- (i) Protecting and improving the landscape
- (ii) Protecting and enhancing features of nature conservation value
- (iii) Retaining and improving public access to land and water areas for countryside recreation
- (iv) Flood control
- (v) Minimising any adverse impact on local residents and agriculture
- (vi) Protecting and interpreting areas of archaeological interest

Policy D3

CANALSIDE DEVELOPMENT

Objective of policy

To maximise the potential of canalside locations

CANALSIDE DEVELOPMENT POLICY D3

Development alongside the Grand Union Canal should help meet the following objectives:

- (i) Improved public access to and enjoyment of the waterway, including those with impaired mobility.
- (ii) The protection and enhancement of wildlife habitats
- (iii) The retention and enhancement of significant waterside buildings and their settings
- (iv) Within employment areas, the provision of wharf facilities for freight transfer

New buildings should present a public face to the canal and be in keeping with local character in terms of scale, design and materials.

Development proposals in the vicinity of the Canal should also take into account the potential for localised flooding from the Canal.

Policy D4

SUSTAINABLE CONSTRUCTION

Objective of policy

- To reduce the resource consumption of new development and to achieve zero carbon growth.

SUSTAINABLE CONSTRUCTION POLICY D4

Developments that exceed the thresholds below will be required to include:

- (i) improved energy efficiency through siting, design and orientation, to achieve an energy rating equivalent to 10 on the NHER scale
- (ii) An element of renewable energy production
- (iii) Water conservation measures
- (iv) Sustainable urban drainage systems such that there is no increase in flood risk and no significant impact on local hydrological conditions
- (v) The significant use of building materials that are renewable or recycled
- (vii) An element of construction waste reduction or recycling.

(viii) Carbon neutrality or financial contributions to a carbon offset fund to enable carbon emissions to be offset elsewhere.

CITY EXPANSION AREAS AND KEY SITES

EXPANSION AREAS

Objective of policies (EA1 & EA2)

To set out the Council's requirements that apply to all the City Expansion Areas

EXPANSION AREAS POLICY EA1

Planning permission will only be granted for development in an Expansion Area following approval by the Council of a comprehensive master plan for the whole Expansion Area.

Development briefs will also be required for each phase or site, to be prepared by the developer and approved by the Council.

The Council will adopt the master plans and development briefs as supplementary planning guidance.

POLICY EA2

In addition to the normal requirements covered by other policies in this Plan, proposals for the Expansion Areas must include:

- (i) Environmental impact and transport assessments
- (ii) Effective measures to give priority to non-car modes of transport
- (iii) Design, land use and transportation measures that integrate the Expansion Areas with the existing built up area and do not preclude further expansion
- (iv) Good transport links to adjoining areas, including footpaths and cycle ways and land reserved for potential transport links to future development
- (v) Community facilities, local shops, other small scale employment development and reserve sites in the form of local centres

- (vi) A landscape and open space strategy to improve biodiversity, provide advance structural planting, extend the "forest city" concept, and incorporate public art and leisure and recreation facilities
- (vii) A strategic and sustainable approach to urban drainage systems to control surface water flows
- (viii) Design and layout measures that help to create a high density development with its own sense of place
- (ix) Planning obligations relating to the phasing of development and the early provision of on-site and off-site infrastructure and facilities, to include land, capital and initial running costs.

EASTERN EXPANSION AREA

Objective of policy

- To set out the Council's requirements for the Eastern Expansion Area

EASTERN EXPANSION AREA (SITE MK1) POLICY EA3

Proposals for the Eastern Expansion Area must include:

- (i) Large footprint employment development at Fen Farm (80 ha)
- (ii) Housing and ancillary uses at Broughton Manor Farm (50 ha)
- (iii) A new M1 Junction 13a and/ or equivalent improvements to Junctions 13 and 14
- (iv) Improvements to the A421 and A5130, including Kingston roundabout
- (v) A secondary school about 10 ha
- (vi) A first / combined school, or contributions to upgrading existing or planned schools nearby

- (vii) Continuation of the linear park along Broughton Brook, to include any new balancing lakes to serve the new development
- (viii) A continuation of the urban village concept at Broughton / Atterbury, including links to existing and planned facilities within the urban village
- (ix) 30% affordable housing



PLAN EA1: EASTERN EXPANSION AREA (Illustrative -not to scale)

NORTH OF BROUGHTON BROOK, EAST OF A5130

Objective of policy

- To explain the status and purpose of a strategic reserve area, east of the City.

NORTH OF BROUGHTON BROOK, EAST OF A1530 POLICY EA4

Land north of Broughton Brook and east of A5130 is identified as a strategic reserve area (115ha) on the Proposals Map.

This area will only be considered for additional housing, employment or other development in a review of or alteration to this Plan in order to meet exceptional future development needs.

WESTERN EXPANSION AREA

Objective of policy

- To set out the Council's requirements for the Western Expansion Area



PLAN EA2: WESTERN EXPANSION AREA (Illustrative - not to scale)

WESTERN EXPANSION AREA (SITE MK2) POLICY EA5

Proposals for the Western Expansion Area must include:

- (i) Housing and ancillary uses (about 200 ha)
- (ii) B1 employment uses (10-20ha)
- (iii) A secondary school about 10 ha
- (iv) A local centre, including first / combined schools
- (v) Open space adjoining Watling Street (20ha), to include land for a burial ground and remembrance garden (about 10ha)
- (vi) Protection and enhancement of Oakhill Wood and the wildlife corridor along the North Bucks Way
- (vii) Retention of the Listed Buildings at Whitehouse Farm
- (viii) A landscape / open space buffer zone east of Upper Weald
- (ix) 30% affordable housing
- (x) Measures to reduce the risk of flooding in Lower Weald
- (xi) Proposals for public transport, pedestrian and cycle routes that will provide convenient, direct, safe and clear routes to CMK and Westcroft District Centre.

NORTHERN EXPANSION AREA

Objective of policy

- To set out the Council's requirements for the Northern Expansion Area

Proposals for the northern expansion area shall include:

- (i) Housing in the west of the area (about 13 ha to be developed at 35 dws/ ha net)
- (ii) Employment in the east of the area (about 7 ha)
- (iii) A contribution to achieving linear park objectives on adjoining land at Linford Lakes
- (iv) The main vehicle access from Giffard Park roundabout
- (v) A financial contribution to upgrading local schools
- (vi) Noise attenuation measures adjoining the M1
- (vii) A landscape and open space strategy which pays particular attention to the boundary treatment of the site.

An element of commercial leisure development, compatible with the Linear Park, will also be acceptable.



PLAN EA3: NORTHERN EXPANSION AREA (Illustrative - not to scale)

OTHER KEY SITES

NEWTON LEYS



PLAN EA4: NEWTON LEYS - LOCATION AND ROAD PROPOSALS (Illustrative - not to scale)

Newton Leys is identified as a special area on the Proposals Map. The Council supports the principle of comprehensive development for this area for B2 and B8, employment uses, including uses related to the waste disposal and recycling operations on the landfill site.

Development proposals for the Newton Leys area shall include:

- Provision of a new link road between the proposed development and the A4146 Fenny Stratford bypass, including a new road bridge across the mainline railway, as part of the initial phase of development
- (ii) Within the site, the safeguarding of a route for a link road between the A4146 Fenny Stratford bypass and the A421 Buckingham Road / H8 Standing Way, part of which will be provided by the spine road for the proposed development
- (iii) A landscape and open space buffer, between 50 and 250 metres wide, around the southern and eastern boundaries of the land-fill site
- (iv) A building design strategy for the whole site
- (v) A feasibility study into a new rail link into the site

The Council will also seek:

- (vi) The revocation of all outstanding mineral planning consents (without compensation) and the granting of a new planning permission and waste disposal licence for a revised landfill programme, alongside and linked with the granting of outline planning permission for the comprehensive development of the area
- (vii) Submission of an environmental statement with any planning application for comprehensive development of the area
- (viii) To enter into legal agreements with the landowner or developer to ensure that appropriate improvements to the physical and social infrastructure of the area are provided at the relevant time
- (ix) Planning obligations that relate to measures to help unemployed people back into the workforce, encourage local recruitment and improve the skills of the local workforce.

(Proposals will also be assessed against the approved planning brief, which has the status of supplementary planning guidance)

D The Control of Runoff from Development Sites in Milton Keynes

D.1 Purpose of this Note

The purpose of this note is to provide guidance to the designers of runoff control systems on the standards which are appropriate when controlling runoff from new developments.

This note is primarily concerned with the control of runoff at the point of discharge into a watercourse. It does not cover design standards for surface water sewer systems.

Proposals for the control of runoff may form part of a Flood Risk Assessment as required by Planning Policy Guidance Note 25 (PPG25) 'Development and Flood Risk' (ref.1).

D.2 The Objectives of Runoff Control Systems

Developers should ensure that the rate and volume of surface water runoff is not increased. Runoff control design should aim at

- Manage run-off rates to not increase peak flows in the receiving watercourse as agreed with the drainage authority,
- Ensure that there is no increase in runoff volume from the site through the use of SuDS techniques where appropriate,
- Avoid altering the time run-off takes to reach the receiving watercourse,
- Include measures to capture pollutants within an overall design package to ensure that there is no detriment to water quality

This will ensure that catchment flood risk is not increased and water quality is not made worse by the cumulative effects of development.

There are a number of ways in which this can be achieved, utilising a variety of sustainable drainage techniques as appropriate to the site, ranging from infiltration systems to flow balancing reservoirs. Different methods will be appropriate for different scales of development.

D.3 Adoption and Future Maintenance

In the early stages of design, consideration should be given to the arrangements for adoption and future maintenance of the system. This is likely to influence the design just as much as technical considerations. Arrangements for the maintenance of the entire surface water drainage system should be clear. For elements of the system where failure could impact on others, responsibility should rest with one or more publicly accountable bodies, unless these bodies are satisfied that the appropriate private management systems will provide a suitable alternative. This will often necessitate the payment of a commuted sum (covering a period of at least 30 years) or a legal agreement possibly backed up by the deposit of a financial bond. The adopting organisation will probably wish to approve the design prior to construction.

Within the areas covered by this guidance, Anglian Water will adopt below-ground infrastructure. The IDB, MKPT and the Council will consider adopting new surface water drainage facilities. The Council and the Parks Trust will consider adopting areas of public open space surrounding new surface water drainage facilities.

D.4 Infiltration

The objectives of runoff control can most readily be achieved by the incorporation of infiltration techniques into the system wherever possible. Where soil conditions allow, infiltration is much more effective in preventing rapid drainage to the watercourse than piped systems. A revised version of Part H of the Building Regulations came into effect on 1 April 2002. The revision requires that small urban catchments (of up to 2 ha) should discharge surface water to soakaways or other infiltration devices wherever possible. However, in the Milton Keynes area most of the soils are of relatively low permeability and there will be limited opportunities for infiltration systems of a significant size.

Infiltration may be possible even in low permeability soils if the areas drained to the infiltration devices are small. Providing that the arrangements for long-term maintenance are secure it may be a practical means of reducing runoff rates on small sites, where surface water flow constrictions have lower limits because of the likelihood of blockage.

D.5 Flow Balancing

Flow attenuation through storage can be applied at all scales, ranging from facilities within individual developments to large-scale facilities which serve large areas. However, currently it is considered that runoff control objectives are most likely to be met if drainage systems are planned strategically and constructed on a large scale. In addition, opportunities to build in flexibility through some form of dynamic control system are more likely and arrangements for adoption and maintenance are likely to be simplified. This guidance therefore encourages developers to consider runoff control systems as part of the strategic infrastructure at the earliest possible stage. It may be appropriate for lead developers to construct strategic drainage works and recover the costs as the land is sold on.

D.6 Diffuse pollution control

To reduce pollution of watercourses, on site methods of pollution prevention should be incorporated where possible. In non-industrial areas, roads and car parking areas will generally be the greatest source of pollutants.

D.7 Storage Design

Whatever form of sustainable drainage system is used, the aim should be to meet the design objectives described above in D2. These objectives apply in events (of any duration) up to a probability of exceedance of 1% (ie. a return period of one 1 in 100 years). Local circumstances may necessitate an even higher standard. It is important to appreciate that this standard applies to the control of flows into or within a watercourse, which is different to that which applies to the design of surface water sewers (usually designed for a 1 in 30 year event

In order to meet the objective of no increase in peak flows in the receiving watercourse at any return period up to the design standard and at any location downstream, it would be necessary to carry out a catchment hydrological analysis. For smaller developments it may be more appropriate to use a simpler approach of regulating flows to a permitted runoff as specified by the Environment Agency or the Bedford Group of Drainage Boards.

D.8 Estimation of Runoff Rates

This simple approach is based on restricting flows to a rate equivalent to that which would run off from the pre-development site in the 'mean annual flood'. It is appropriate to use this figure because;

- The mean annual flood equates to bank full capacity in a natural river.
- It is the figure used when estimating the peak flow to be expected from drained agricultural land.
- If flows are regulated to this value there will be no increase in flooding at any point downstream.

Estimates of the 'permitted' runoff rate/Greenfield run-off rates from a site can be made using a variety of methods;

- Sites up to 30 hectares. The method presented in the ADAS Reference Book 345, '*The design of field pipe drainage systems*' (1982) reference 5.
- Sites between 30 hectares and 50 hectares IH Report 124 '*Flood estimation for small catchments*' (1994), but with a check of the results against ADAS 345 and the lower calculation used.
- Sites between 50 hectares and 20 km² IH Report 124 '*Flood estimation for small catchments*' (1994).
- Site area of 20 km²-25 km² The applicant's choice of IH Report 124 'Flood estimation for small catchments' (1994) or the 'Flood Estimation Handbook' (1999)
- Site area greater than 25 km² the *'Flood Estimation Handbook'* (1999)

Allowances should be made for the relative proportion of 'greenfield' and 'impermeable' surfaces on the pre-development site. Where alternative results are obtained by different methods, or by using alternative parameter values, the lower flow value should normally be assumed.

The Environment Agency or IDB may be able to help by providing estimates based on one or more of the above and based on local information.

If the intention is to design a system which is capable of regulating flows at all return periods, permitted runoffs of higher return periods could be estimated using the Flood Studies Report regional growth curves (FEH pooling group procedures could be used but these are much more complex, and the simple approach will give results of acceptable accuracy). The runoff control system should be designed so that for any given return period event, the peak flow from the developed site does not exceed the peak flow from the pre-developed site, for any design rainfall event. Designing a system based on storage ponds or tanks that can make use of the higher discharges in higher return period events, whilst not exceeding allowable discharges at lower return periods will be difficult if it is not possible to incorporate infiltration techniques or to utilise dynamic control systems.

The developed site drainage should be designed using FEH rainfall statistics.

D.9 Local circumstances

Local circumstances (downstream flooding problems, groundwater quality issues, surface water quality issues, likely future development, limitations of the site or catchment, flood plain development issues, etc) may require modifications to this general advice. As part of the Flood Risk Assessment, developers should seek out local knowledge (eg. from Parish Councils, MKC, the Beds Group of Drainage Boards or the Environment Agency).

D.10 Climate Change

Any designs should allow for the future impact of climate change. The latest climate change scenarios suggest that annual rainfall is likely to increase due to wetter winters and autumns. It is also suggested that there will be increased storminess, with higher average rainfall intensity. Although the impact upon runoff and river flows is less certain, initial research has suggested that increases in peak flows of up to 20% may be experienced within 50 years.

E The Milton Keynes River Model

Urban development, as in Milton Keynes, increases the rate and volume of runoff. Discharging urban runoff directly into watercourses tends to increase the risk of flooding from the watercourse. Flood risk from watercourses can also be increased where development occupies floodplain and consequently displaces flood storage. In Milton Keynes, lakes were introduced with the development to counter the effect of the urban development.

The risk of flooding in Milton Keynes arising from flood flows in rivers was assessed through the use of a hydrodynamic river model. The model was developed for the Milton Keynes Drainage Study (Halcrow, 2000) and up-dated for the Milton Keynes Drainage Strategy (Halcrow, 2002).

The modelled river reaches and floodplains are represented by data obtained from various methods of survey.

The model simulates floods in the catchment of the Great Ouse between a point immediately downstream of its confluence with the Ouzel, where the catchment area is about 1240km², and a point immediately upstream of Milton Keynes. It also simulates flood flow in the right bank tributaries along this reach of the Great Ouse – the River Ouzel (and its tributary, the Broughton Brook), Loughton Brook and Calverton Brook. The model simulates the operation of the flood control gates at Willen and Caldecotte.

The model simulates the contribution to flooding made by the urban development of Milton Keynes and the effect on flood flows of the lakes along the Ouzel and the Loughton Brook.

The up-dating done for the Milton Keynes Drainage Strategy comprised principally the :

- incorporation of more recent models of Loughton Brook and Broughton Brook (the latter developed by HR Wallingford).
- revision of the hydrological analysis to the methods of the Flood Estimation Handbook (FEH)
- up-dating of the development scenarios for 2011 and the introduction of the development scenario for post 2011

The model is written in the ISIS software suite.

A feature of the model is the method of representing different extents of urbanisation in the development scenarios. The development area – comprising the DA and the WEA and EEA – is schematised into catchments identified in the FEH database of catchments. The FEH provides values of an urbanisation index which is used in the models of the urban catchments to represent the effect of urbanisation. In the model up-dating, a relationship was derived between this urbanisation index and an index which represented the development within each urban catchment. Development indices were derived for each development scenario through the use of the MKC GIS. The derived relationship enabled the prediction of future urbanisation index for each urban catchment. Through this means, the model was used to simulate the increasing flood risk attributed to the continuing development of Milton Keynes.

The linking of the urbanisation index to the development scenarios held in the GIS presents a ready method of up-dating the modelling to represent any future development scenarios which might be considered.

The model report should be referred to for more detailed information about the development of the model and its use in the investigations which support this SPG. The model and report is available from the Environment Agency.

F PPG 25 Appendix F - Guidance On Requirements For Undertaking A Flood Risk Assessment

F1. This guidance relates only to the commissioning and undertaking of flood risk assessment studies at particular sites or over particular areas

Flood Risk Assessments

- **F2.** Flood risk assessments may be of a relatively minor nature, evaluating a small development on a low risk site with minimal secondary effects, or may comprise major basin-wide studies for significant infrastructure developments. On occasions, preliminary or scoping studies may be undertaken prior to a fuller assessment. Developers should consult the Environment Agency and other relevant operating authorities to determine what information is already available on flood risk potentially affecting or affected by their site and its proposed development. They should also take full account of the local knowledge of flooding in the community.
- **F3.** The detail and technical complexity of a flood risk report will reflect the scale and potential significance of the study but, in all cases, whenever a flood risk assessment is undertaken for any location, the resulting report should address, as a minimum, the following requirements:
 - 1. A location plan at an appropriate scale that includes geographical features, street names and identifies all watercourses or other bodies of water in the vicinity. This should include drainage outfalls and, if necessary, cross-refer to their operational arrangements in the body of the report.
 - 2. A plan of the site showing levels related to Ordnance Datum, both current and following development.
 - 3. A more detailed indication, if appropriate, of flood alleviation measures already in place, of their state of maintenance and their performance.
 - 4. An assessment of the source of potential flooding rivers, tidal, coastal, groundwater, surface flow or any combination of these..
 - 5. A plan of the site showing any existing information on extent and depth of flood events or on flood predictions. Information may be anecdotal, photographic, survey results or model estimates. The events should be identified with date/time, source of the data and supporting information provided on rainfall and/or return period, or probability of occurrence of the flood or storm surge event, or combination. Recorded data are particularly valuable and, if available, should be highlighted along with evidence of any observed trends in flood occurrence. Any changes that have taken place since the last event should be identified.
 - 6. A plan and description of any structures which may influence local hydraulics. This will include bridges, pipes/ducts crossing the watercourse, culverts, screens, embankments or walls, overgrown or collapsing channels and their likelihood to choke with debris.
 - 7. An assessment of the probabilities and any observed trends and the extent and depth of floods for the location and in the catchment context and, if appropriate, routes and speed of water flow. At this stage best estimates, based on the most up-to-date findings, should also be made of

climate change impacts on probabilities. The assessment should ensure that the development meets an acceptable standard of flood defence for the design life of the development.

- 8. A cross-section of the site showing finished floor levels or road levels, or other relevant levels relative to the source of flooding, and to anticipated water levels and associated probabilities.
- **9.** An assessment of the likely rate or speed with which flooding might occur, the order in which various parts of the location or site might flood, the likely duration of flood events and the economic, social and environmental consequences/impacts of flooding.
- 10. An assessment of the hydraulics of any drains or sewers, existing or proposed, on the site during flood events. The methodology for assessment must be clearly stated.
- 11. An estimate of the volume of water which would be displaced from the site for various flood levels following development of the site and of the run-off likely to be generated from the development proposed.
- 12. An assessment of the likely impact of any displaced water on neighbouring or other locations which might be affected subsequent to development. This should address the potential for change of the flooding regime both upstream and downstream of the site due to ground raising or flood embankments.
- 13. An assessment of the potential impact of any development on fluvial or coastal morphology and the likely longer-term stability and sustainability.
- 14. Because of the uncertainties in flood estimation and expected climate change impacts, hydrological analysis of flood flows and definition of defence standards should include the allowances for increased flows and sea-level rise in MAFFs project appraisal guidance for flood defence cited in Appendix A.
- 15. An assessment of the residual risks after the construction of any necessary defences. Where new or modified flood defence arrangements are provided, consideration should always be given to their behaviour in extreme events greater than those for which they are designed and information should be provided on the consideration given to minimising risks to life in such circumstances.

G ABI STATEMENT OF PRINCIPLES ON THE PROVISION OF FLOODING INSURANCE 1ST JANUARY 2003.

http://www.abi.org.uk/Display/File/78/Statement_of_Principles.doc

General policy

It is the intention of ABI members that flood insurance for domestic properties and small businesses should continue to be available for as many customers as possible. The premiums charged and other terms - such as excesses - will reflect the risk of flooding but will be offered in a competitive market.

This statement of principles will apply from 1 January 2003 but is subject to review in the event of significant external shocks such as withdrawal of flood reinsurance. Successful operation of the principles is dependent on planned information on risk levels and investment being available from the relevant flood defence authorities.

Areas currently defended to DEFRA standards

The majority of properties in flood risk areas are already protected to the Department of Environment, Food and Rural Affairs' indicative minimum standard of 1 in 75 years for urban areas, or better. The level to which properties are defended above this will vary considerably and premiums will reflect different degrees of risk; but flood cover will be available as a standard feature of household and small business policies.

High risk areas where improved defences are planned by 2007

In a number of locations the risk of flooding is unacceptably high. Existing flood defences provide less protection than the Department of Environment, Food and Rural Affairs' indicative minimum standard of 1 in 75 years for urban areas. Where improvements in flood defences sufficient to meet these standards are scheduled for completion within the next 5 years, insurers will maintain flood cover for domestic properties and small businesses which they already insure. The premiums charged and other policy terms - such as excesses - will reflect the risk.

If a domestic property in this category is sold the current insurer will continue to provide cover, subject to satisfactory information about the new owners of the property, especially their previous claims record.

Where a small business is sold the current insurer will consider whether to continue to provide cover; this will depend heavily on the proposed new use of the premises and the previous claims record of the new owner.

High risk areas where no improvements in defences are planned

There are other locations where the risk of flooding is unacceptably high - and in some cases they have been shown to flood frequently - and no improvements in flood defences are planned. Here insurers cannot guarantee to maintain cover, but will examine the risks on a case by case basis, use their best efforts to continue to provide cover and will work with the owners of domestic properties and small businesses which they currently insure to see what action could be taken by the property owner, the Environment Agency and the local authority, which might make the property insurable in some form. This action might include the use of accredited products, flood resilient materials and temporary defences to defend the property.

Action from Government

The implementation of these principles will depend on action from Government as detailed below with an annual review of progress:

- actual expenditure on flood defences to meet or exceed that set out in the 2002 Spending Review;
- implementation of the improvements in the system of flood defence planning set out in DEFRA's consultation "Flood and coastal defence funding review";
- full implementation of PPG25 (Planning Policy Guidance on Development Planning and Flood Risk), with full reporting of the level of compliance by local authorities and consideration of administrative processes in the planned review of PPG25 in 2004;
- the Environment Agency's flood asset database to be available to insurers by the beginning of 2003, and publicly available as soon as possible;
- early improvements in the flood warning system, and implementation of the Cabinet Office's recent emergency planning review;
- full and detailed consideration, including a benefit/cost analysis, to be given to integrated drainage management for England and Wales, similar to that in operation in Scotland;
- implementation of realistic solutions to sewer flooding including increased investment in improvement programmes and adoption of water companies and sewerage undertakers as statutory consultees in the development planning process.