



Planning Policy
Statement 15
(PPS 15)

Planning and Flood Risk



An Agency within the Department of the

Environment

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Planning Policy Statement 15 (PPS 15)

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Planning Policy Statements (PPSs) set out the policies of the Department of the Environment on particular aspects of land-use planning and apply to the whole of Northern Ireland. Their contents will be taken into account in preparing development plans and are also material to decisions on individual planning applications and appeals.

This PPS sets out the Department's planning policies to minimise flood risk to people, property and the environment. It embodies the Government's commitment to sustainable development and the conservation of biodiversity. It adopts a precautionary approach to development and the use of land that takes account of climate change and is supportive to the wellbeing and safety of people.

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June 2006



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Preamble

The Department of the Environment is responsible for planning control in Northern Ireland. The Planning Service, an Agency within the Department, administers its planning functions.

The Department has a statutory duty, laid down in Article 3 of the Planning (Northern Ireland) Order 1991, to formulate and co-ordinate policy for securing the orderly and consistent development of land and the planning of that development. The Department is required to ensure such policy is in general conformity with the Regional Development Strategy.

The Department's planning policies are normally issued through Planning Policy Statements and PPS 1 'General Principles' advises that:

"Planning Policy Statements set out the policies of the Department on particular aspects of land-use planning and apply to the whole of Northern Ireland. Their contents will be taken into account in preparing development plans and are also material to decisions on individual planning applications and appeals."

This Planning Policy Statement, PPS 15 'Planning and Flood Risk' sets out the Department's planning policies to minimise flood risk to people, property and the environment. It embodies the Government's commitment to sustainable development and the conservation of biodiversity. It adopts a precautionary approach to development and the use of land that takes account of climate change and is supportive to the wellbeing and safety of people.

The policies of this Statement supersede Policy PSU 10 'Development at Risk' of the Planning Strategy for Rural Northern Ireland insofar as this policy relates to flood risk. Where this matter is referred to elsewhere in the Planning Strategy the policies of this Statement take precedence.

The policies of this Statement also take precedence over the provisions of existing development plans in relation to flood risk. Future development plans will take account of and be consistent with this Statement.

This Policy Statement has been subject to an equality impact screening exercise in line with the statutory obligation contained in Section 75 of the Northern Ireland Act 1998. The outcome of this exercise indicates that the PPS is unlikely to have any significant adverse implications for equality of opportunity or community relations.

Nothing in this document should be read as a commitment that public resources will be provided for any specific project. All proposals for expenditure by the Department are subject to economic appraisal and will also have to be considered having regard to the overall availability of resources.

Because our understanding of climate change is evolving as new evidence and experience of implementing flood risk policy is gained, it is intended that this PPS will be reviewed within 5 years of publication.

1.0 Introduction

- 1.1 Flooding from rivers and coastal waters is a natural phenomenon that cannot be entirely prevented. It occurs when the capacity of a watercourse to convey water through an area is exceeded or when the volume of sea water arriving on land exceeds its capacity to discharge it. It may also result simply from the accumulation of rainfall on low-lying ground. The man-made environment can exacerbate the consequences of flooding, for example, where development in a flood plain places buildings and people at risk or by building in areas where existing drainage infrastructure is inadequate.
- 1.2 The effects of flooding on human activity are wide ranging, impacting on the economy, social wellbeing and the environment. For individuals and communities the impact can be significant in terms of personal suffering and financial loss and, even where flooding has natural causes, it can have damaging effects on the environment.
- 1.3 Much of Northern Ireland is low-lying and many of our rivers and streams have gentle gradients in their lower reaches. With lowland soils that are mostly clay rich and of low permeability there is the widespread potential for localised flooding, a situation reflected in the Region's long history of arterial land drainage.
- 1.4 Climate change is expected to increase flood risk, indeed the experience of recent years suggests that the incidence of flooding in the Region, as at national and global level, is already increasing.
- 1.5 The primary aim of this PPS is therefore to prevent future development that may be at risk from flooding or that may increase the risk of flooding elsewhere.

2.0 Policy Context

Regional Development Strategy

- 2.1 The Regional Development Strategy for Northern Ireland 2025 (RDS) sets out the strategic planning framework for the promotion of sustainable development in the region. It acknowledges that the effects of climate change will have implications for lifestyles and the form of development in the future and indicates that strategic planning to deal with key impacts that may arise from climate change will be more cost effective than taking retrospective action.
- 2.2 The RDS underlines that climate change is expected to impact on issues such as water resources, weather patterns, river and storm water management, flooding and coastal management, ferries and ports, business, biodiversity, ecological change and human health. However, recognising the uncertainty inherent in predictions of climate change and their impacts, the RDS advises that a precautionary approach to potential development problems such as flooding is desirable where scientific evidence cannot offer clear direction.
- 2.3 A number of specific measures are highlighted and these include:
- considering the implications of climate change (ENV 5.1);
 - promoting an approach to building development and the use of land which is supportive to the wellbeing and safety of people (ENV 6.4); and
 - taking a precautionary approach and minimising building developments in areas considered to be at risk from flooding, coastal erosion, and land instability (ENV 6.4).

Implications of Climate Change for Northern Ireland

- 2.4 The Scotland and Northern Ireland Forum for Environmental Research (SNIFFER) published the findings of a study on the potential impacts of climate change on Northern Ireland's environment, economy and natural resources in 2002¹. This independent technical report concluded that

¹ *Implications of Climate Change for Northern Ireland: Informing Strategy Development (SNIFFER, 2002)*

there was a generally low state of awareness and concern about climate change and its impacts across all sectors in the Region. In the construction, infrastructure and transport sectors it advised that this was reflected in a reactive approach to climatic variation, such as flooding, rather than a planned long-term strategy.

- 2.5 The SNIFFER Report represents a first step towards the development of a regional strategy to address the impacts of climate change in Northern Ireland. Together with the report of the UK Climate Impacts Programme², the Government's Foresight Report³ and recent climate change publications prepared by the Department's Environment and Heritage Service⁴, it has assisted the formulation of the policies to deal with flood risk in this PPS.

The EC Water Framework Directive

- 2.6 The EC Water Framework Directive (WFD) came into force in December 2000 and established a set of common principles for the protection and improvement of all of the EU's rivers, lakes, estuaries and coastal waters, groundwater and reservoirs.
- 2.7 The WFD requires the completion of management plans for all river basins (including estuarine and coastal waters and groundwater) in Northern Ireland by the end of 2009. Among the objectives of these management plans is the protection and improvement of the ecological and chemical water quality of the Region.
- 2.8 The Directive consequently has implications for decision-making in the development sector. New development may increase flood risk and alter the pattern of flood events by changing the depth of floodwater, the duration of its residence, or the footprint of the flood. As such, it has the potential to adversely affect the ecology and chemical quality of the water environment.

² *Climate Change Scenarios for the UK (UKCIP02)*. Further information on the UK Climate Impacts Programme is available at www.ukcip.org.uk

³ *Foresight: Future Flooding (Office of Science and Technology, 2004) (3 Vols)*

⁴ *Climate Change Indicators for Northern Ireland (2004) and Guidance for Public Bodies on Climate Change Impacts in Northern Ireland (2005)*. Available at www.ehsni.gov.uk

Other Government Strategies

- 2.9 The policies in this Statement are consistent with the guiding principles of sustainable development expressed in the recently published Northern Ireland Sustainable Development Strategy (2006). In addition they take cognisance of climate change, natural resource protection and sustainable community matters which are identified as priority areas for action in the Strategy.
- 2.10 In preparing the PPS, consideration has also been given to a number of other Government Strategies. These include the Northern Ireland River Conservation Strategy (2001) published by the Environment and Heritage Service and the Northern Ireland Biodiversity Strategy (2002) published by the Northern Ireland Executive.
- 2.11 The River Conservation Strategy seeks to expand the traditional focus of attention from water quality to encompass the conservation of river and river corridor “naturalness”. Its primary objective is to protect, conserve and enhance the natural and built heritage of our rivers and facilitate their sustainable use. The key aim of the Biodiversity Strategy is to protect and enhance landscape, wildlife habitat and species.
- 2.12 Account has also been taken of the Policy and Practice for the Protection of Flood Plains in Relation to Development formulated by the Department of Agriculture and Rural Development’s Rivers Agency and the Agency’s Flood Management Strategy. Amongst the objectives of these documents are:
- to maintain and enhance the role of flood plains in the conveyance and storage of flood water;
 - to prevent development which would be at risk from flooding;
 - to restrict development that would directly or indirectly increase the risk of flooding to other properties; and
 - to ensure a strategic approach on issues such as flood defence asset management, emergency planning and response, and dealing with flood risk.

3.0 Flood Risk – Raising Awareness

- 3.1 While the scale of flood plain development in Northern Ireland is not comparable to that in England, there are a number of areas throughout the Region where development is at risk from flooding. Notably Strabane, Omagh, Castlederg and Newcastle have all suffered from river flooding in recent years. Estuarine flooding has occurred on the Roe at Limavady and on the Lagan at Belfast, while Portrush, Rostrevor and Newtownards have experienced coastal inundation. In addition, localised flood events caused by intense and/or prolonged rainfall and local conditions have been experienced across the Region with increasing frequency.
- 3.2 The SNIFFER Report (see paragraph 2.4) suggests that there is a generally low level of awareness among the population of Northern Ireland about the potential implications of climate change and increased flood risk. The Environment and Heritage Service Climate Change Indicators Report identifies 13 indicators intended to assist in monitoring how the Region's climate is changing and increase awareness of the effects of such change at a local level. This PPS aims to assist in improving public understanding about the risks of flooding and locating human activities in areas susceptible to flood risk by providing background information on the causes of flooding (see Annex A), the consequences of flooding and an explanation of the concept of flood risk (see Annex B). Information is also provided about the principles underpinning Sustainable Drainage systems (SuDs) and the potential these may offer in alleviating flood risk in the Region (see Annex C).

4.0 Policy Objectives

4.1 The main objectives of this Statement are to:

- adopt a precautionary approach by ensuring that both the available scientific evidence and the scientific uncertainties which exist in relation to flood risk are taken into account when determining planning applications;
- ensure that new development is not exposed to the direct threat of flooding and that it does not increase flood risk elsewhere;
- secure and promote the natural role of flood plains as a form of flood defence and an important environmental and social resource and ensure that this is recognised in the decision making process; and
- promote an integrated and sustainable approach to the management of development and flood risk which contributes to:
 - the safety and wellbeing of everyone;
 - the prudent and efficient use of economic resources; and
 - the conservation and enhancement of biodiversity.

5.0 A Precautionary Approach

5.1 The development of land susceptible to flooding carries with it the potential to increase risks to the safety and well being of people, to property and the infrastructure necessary for a healthy economy together with the threat of irreversible environmental damage.

5.2 Because of these risks and the uncertainties associated with climate change and flood estimation the Department considers that actions to address these matters through the planning system should be based upon a precautionary approach. This approach is embodied in the policies set out in this Statement.

5.3 Proceeding from the known facts and taking a precautionary approach to the uncertainties inherent in the decision-making process, will enable more open and better informed decisions to be made. This will improve the safety of people, the protection of property, reduce adverse environmental impacts and help avoid the need for costly retrospective action in the future.

6.0 The Role of Development Plans

- 6.1 The preparation of a development plan provides an opportunity to consider the direct and indirect flood risks that may affect the plan area. The Department will therefore work closely with the Rivers Agency on this matter and liaise with other interested bodies such as the Environment and Heritage Service where appropriate.

Achieving Sustainable Patterns of Development

- 6.2 To assist in meeting the sustainability objectives of the Regional Development Strategy and the Northern Ireland Sustainable Development Strategy new development proposals brought forward through the development plan process should be in harmony with the water environment and avoid working against it.
- 6.3 The strategic flood risk information and advice provided by the Rivers Agency at development plan preparation stage will take account of climate change which is expected to worsen future flooding. Development plans will therefore adopt a precautionary approach to development in areas that may be subject to flood risk.
- 6.4 Consequently development plans will not bring forward sites or zone land that may be susceptible to flooding, now or in the future, unless the most exceptional circumstances exist. Where, exceptionally, a plan brings forward such a site, it will explain the reasons why it has done so and set out the measures necessary to mitigate the risk.
- 6.5 As part of a precautionary approach, development plans will also need to examine the potential to remove undeveloped areas which are, or may be at future risk of flooding from within settlement limits where it is appropriate to do so, for example at the fringe of towns or villages.

Promoting a 'Joined-up' Approach

- 6.6 A 'joined-up' approach by Government is necessary to deal with flooding and flood risk because the implications of choices made in this area can be diverse and have a high level of interconnectedness. Issues as wide ranging as public safety, confidence in a local economy and the enhancement of biodiversity may be raised by the risk of flooding. These are important matters in the preparation of development plans and

will often require plan preparation to address the implications of other statutory and non-statutory plans and strategies such as the Northern Ireland Rivers Conservation Strategy and the Northern Ireland Biodiversity Strategy.

- 6.7 In addition, development plans may also need to consider the potential trans-boundary implications of flood risks. This may be necessary where:
- (a) development in locations beyond the boundary of a plan has the potential to impact upon flood risk within the plan area; or
 - (b) plan proposals could result in the creation or increase of flood risk in locations beyond the boundary of the plan.
- 6.8 In the future, development plans will also need to take account of the Flood Management Strategies to be published by Rivers Agency, the Environment and Heritage Service River Basin Management Plans due by 2009 and other emerging strategies such as Coastal Zone Management Plans.

Strategic Environmental Assessment

- 6.9 The Environmental Assessment of Plans and Programmes Regulations (NI) 2004 require that development plans be subject to Strategic Environmental Assessment (SEA). Where SEA identifies and describes the likely significant effects of the draft plan on natural drainage systems, it may be necessary for the environmental report to acknowledge and evaluate impacts that extend beyond the geographical boundaries of the plan.

7.0 Development Control Considerations

- 7.1 The susceptibility of all land to flooding is a material consideration in determining planning applications. Development proposals may be directly at risk from flooding and/or may increase the risk elsewhere. The consequences for occupiers in such cases, both in terms of personal safety and damage to property, can be serious. Where a flood risk is known to exist, the Department will pay particular regard to these considerations when determining planning applications. **It should be noted however that the Department's responsibility in this respect does not affect the liability position of developers or owners.**
- 7.2 Climate change is also a material planning consideration and its impact on flood risk over the expected lifetime of the proposed development will be assessed. All planning applications, including those for the renewal of planning permission, will be determined with reference to the most up to date flood risk information available to the Department.
- 7.3 Planning Service will consult Rivers Agency for advice on the nature and extent of flood risks where the circumstances are appropriate. Such circumstances will include:
- where, exceptionally, development is considered appropriate within riverine or coastal floodplains,
 - beyond floodplains on land with a known history of flooding;
 - proposals which may affect a flood bank or other flood control structure;
 - where a proposal is likely to involve the alteration or diversion of a watercourse; and
 - where a proposal is of a size or nature that could significantly increase surface water run-off. These will normally be developments of ten or more dwellings; where buildings or hardsurfacings exceed 1000 square metres; or where the application site comprises an area of 1 hectare or more.
- 7.4 Planning Service will also consult the Environment and Heritage Service where the circumstances set out in the final two bullet points prevail.

- 7.5 Water impounding structures such as reservoirs or other man made ponds and lakes may constitute a source of flood risk and serious flooding can occur if they are overwhelmed or if a dam or bank fails. This type of flood event can also trigger ground stability problems, for example landslides in adjacent areas. Where development is proposed near a reservoir, man made pond or lake it will be necessary for the applicant to provide up to date information on the integrity of the impounding structure concerned.
- 7.6 Generally, it is unlikely that applications to extend or alter individual buildings will raise flood related issues unless it is anticipated that a proposal may have a direct adverse effect on a watercourse, a flood defence structure or impede their maintenance or management. It may however be necessary to consider flood risk where changes of use involve intensification or could have implications for the safe evacuation of people from the development.
- 7.7 For large development schemes (i.e. those that require an assessment of flood risk or the submission of a drainage assessment), it may be necessary to consider the removal of permitted development rights. This may also be appropriate where run-off carries the potential to adversely affect a sensitive area⁵. Guidance on the assessment of flood risk and the preparation of a drainage assessment is set out in Annex D.
- 7.8 Where the risk of flooding is a material consideration good practice dictates that applicants should identify potential flood risk and/or run-off issues as early in the development process as possible. To facilitate the identification and consideration of flooding or drainage issues and enable proper scoping of potential risks, early consultation with the Planning Service and Rivers Agency is recommended.

Environmental Impact Assessment

- 7.9 For certain types of project an Environmental Assessment determination will be made under the Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 1999. In such cases the Department will expect flood risk assessment and drainage assessment to be addressed in the Environmental Statement.

⁵ *Sensitive areas will include areas within, or upstream of, a conservation site designated under national or international legislation, for example Areas of Special Scientific Interest.*

8.0 Planning Policies

In exercise of its responsibility for planning control in Northern Ireland the Department assesses development proposals against all planning policies and other material considerations that are relevant to it.

The planning policies of this Statement must therefore be read together and in conjunction with the relevant contents of the Department's development plans and other planning policy publications, including the Regional Development Strategy. The Department will also have regard to the contents of published supplementary planning guidance documents.

The following policies set out the main planning considerations that the Department will take into account in assessing proposals for development that may be at risk from flooding or that may increase the risk of flooding elsewhere.

The provisions of these policies will prevail unless there are other overriding policy or material considerations that outweigh them and justify a contrary decision.

Policy FLD 1 Development in Flood Plains

Within flood plains the Department will not permit development unless it falls within one of the following exceptions or it is demonstrated that the proposal is of overriding regional importance.

- (a) development of previously developed land which is protected by the appropriate minimum standard of flood defence or where such a defence is under construction or where public funding for planned flood defence works has been committed. This does not include proposals involving essential civil infrastructure or accommodation / facilities for vulnerable groups;
- (b) the replacement of a building in the countryside where this will not materially increase flood risk;
- (c) development where location within a flood plain is essential for operational reasons for example, navigation and water based recreation uses or transport and utilities infrastructure which has to be there;
- (d) the use of land for sport and outdoor recreation use, amenity open space or for nature conservation purposes where this will not materially increase flood risk;
- (e) the extraction of mineral deposits and the ancillary development necessary to facilitate such extraction where this will not materially increase flood risk; or
- (f) the use of land for seasonal occupation by touring caravans and/or camp sites where this will not materially increase flood risk.

To inform the consideration of proposals that fall within the exceptions specified above, such applications will need to be accompanied by an assessment of the flood risk that may affect the development, or result elsewhere because of it. Where appropriate, this assessment shall include details of measures to mitigate any increase in flood risk.

As part of the Department's precautionary approach to dealing with flood risk, measures such as flood compensation storage works or new hard-engineered flood defences will not be acceptable as justification for development in a flood plain.

Justification and Amplification

8.1 New development within a flood plain will not only be at risk of flooding itself but it can add to the risk of flooding elsewhere. Cumulative effects will arise from proposals that individually may seem of little consequence. These serve only to undermine the flood plain's natural function of accommodating and attenuating flood flows. Accordingly, to minimise flood risk and help maintain their natural function it is necessary to avoid development within flood plains wherever possible.

Definition of a Flood Plain

8.2 Flood plains are the generally flat areas adjacent to watercourses or the sea where water flows in time of flood or would flow but for the presence of flood defences. For planning purposes, and taking into account present scientific evidence, the limits of flood plains are currently defined as follows:

- Rivers – the extent of a flood event with a 1% annual probability of exceeding the peak floodwater level.
- The Coast – the extent of a flood event with a 0.5% annual probability of exceeding the peak floodwater level⁶.

8.3 The Rivers Agency advises the Department on the extent of riverine and coastal flood plains in Northern Ireland. However, because of the uncertainty inherent in predicting the magnitude of flood events, arising from climate change, and the improvement in the quality and coverage of information on flood risk expected to derive from the Rivers Agency ongoing Flood Mapping Strategy 2005 – 2010, the extent of flood plains may change over time.

Defended Areas

8.4 The development of previously developed land protected by existing flood defences will generally be acceptable where the defences provide an appropriate standard of protection from flooding. However, even previously developed land within defended areas may be unsuitable for certain types of development. This is because flood defences, whilst reducing the probability of flooding, cannot eliminate it entirely

⁶ *A lower annual probability of occurrence is appropriate in defining coastal flood plains where flooding can mean rapid inundation by fast flowing water and a consequently greater risk to life*

and because flooding can have particularly serious consequences for the vulnerable in our society – children, older people and those with disabilities and others whose mobility is impaired.

- 8.5 Flood defences protect land against a specific height of floodwater (often referred to as ‘the design flood’) and a flood greater than this may overwhelm the defence and flood the defended area. Additionally, should a floodwall or embankment be breached, land, buildings and their occupants can be very vulnerable to the rapid inundation that can result.
- 8.6 Because of this, essential civil infrastructure such as hospitals, fire stations, emergency depots and ground based telecommunications equipment will be unacceptable in locations where access and uninterrupted operation in time of emergency cannot be guaranteed.
- 8.7 In addition planning permission will only be granted exceptionally for the development of schools and nurseries, care homes, sheltered housing or accommodation/facilities for other vulnerable groups in defended areas and a presumption against the extension of such facilities will operate in these areas.
- 8.8 Facilities such as storage sites for hazardous substances, fuel storage depots and sewage treatment works are a potential source of pollution if located within an area at risk from flooding. While it may be possible to permit their location in defended areas where it is demonstrated that an alternative lower risk location is not available, their approval will be conditional on the provision of pollution containment measures designed to prevent a pollution incident in the event of flooding.
- 8.9 Even when afforded a level of protection from flood defences, the development of green field sites and areas of open space⁷ within a flood plain can increase flood risk. This is because adding to or intensifying the use of the developed area at risk increases the potential consequences of a flood event. The Department will therefore operate a presumption against the grant of planning permission in such circumstances to ensure that ad hoc proposals do not increase flood risk and/or lead to a need for new hard flood defences. Decisions on the future development of such sites will normally only be taken through the development plan process.

⁷ *PPS 8 ‘Open Space, Sport and Outdoor Recreation’ advises that open space of public value does not fall within the definition of ‘brownfield / previously developed sites’*

Undefended Areas

- 8.10 Undefended flood plains perform an invaluable function in mitigating the natural fluvial and tidal processes important in the wider flood management system. Increasing the amount of development within them not only places the property constructed and its occupiers at risk, but also impairs the flood plain's natural function and erodes its ecological integrity. It is also important that piecemeal reduction of undefended flood plains is avoided because of the cumulative effects on their storage and conveyancing capacity.
- 8.11 Built development will therefore only be permitted in undefended areas in exceptional cases. This may include infrastructure works where it is demonstrated that a specific flood plain location is essential for operational reasons and that an alternative lower risk location is not available.
- 8.12 Replacement of an existing building will generally be acceptable where it is demonstrated that the proposed redevelopment will not materially increase flood risk.
- 8.13 Where, exceptionally, built development is permitted, flood prevention or mitigation measures will normally be required. Such measures might include proposals to mitigate loss of flood storage capacity, the adoption of design and construction measures to minimise the impact of flooding (such as the introduction of a freeboard for new buildings) or the provision of safe means of evacuation in the event of a flood occurring.
- 8.14 Land raising, i.e. the raising of ground levels in association with building works or as an operation in its own right is not considered for the purposes of this PPS to be a flood prevention measure. It can adversely affect drainage systems and it removes flood storage capacity and interferes with the conveyance of floodwater. This can create or increase the risk of flooding elsewhere. It can also damage visual amenity and impair the natural functioning of the floodplain with consequent adverse effects on the natural and built heritage. Accordingly, proposals to raise ground levels in undefended flood plains will not be permitted.

Open Space and Nature Conservation Uses

- 8.15 Floodplains may be acceptable for some sporting, outdoor recreation, open space and nature conservation uses provided adequate warning and evacuation procedures are in place. However where proposals would encourage people to congregate in a location susceptible to rapid inundation by floodwater, public safety will be the paramount consideration and approval will generally not be granted.
- 8.16 The development of synthetic sports surfaces or buildings ancillary to a recreation or open space use, for example changing facilities or accommodation for operational staff, can increase flood risk, both directly and indirectly, and will only be permitted in undefended flood plain in exceptional circumstances. However, they will generally be acceptable in areas where an appropriate standard of flood defence exists.
- 8.17 Where a residential development proposal is required to provide public open space it may be possible to meet part of the need generated by using land within a flood plain. This will only be acceptable where there is no risk to the safety and well-being of the public and when the proposal satisfies all other necessary planning criteria, including the requirements of PPS 7 and PPS 8.

Camping and Touring Caravan Sites

- 8.18 Camping, caravan and other temporary or permanently occupied sites that use similar structures, for example mobile homes, give rise to particular problems in relation to flooding. They have often been located on coastal or riverside sites that are attractive for holiday accommodation but carry with them a significant risk of flooding. It is important to recognise that the instability of these structures can place their occupants at special risk. Because they are particularly vulnerable to the adverse consequences of rapid inundation it can be difficult to operate an effective flood warning system.
- 8.19 Because of their vulnerability, proposals for static holiday caravans, residential caravans and mobile homes and the extension or intensification of use of such sites will not be permitted within river or coastal flood plains.

8.20 However, it is acknowledged that camping facilities and touring caravan sites can be less vulnerable when their occupation is restricted to times of the year when flood events are less likely to occur (usually the summer months). Proposals for the seasonal use of such sites may therefore be acceptable within flood plains where the accompanying flood risk assessment indicates that there is no risk of rapid inundation and it is confirmed that appropriate flood warning arrangements can be put in place. In all cases approval will be subject to planning conditions identifying the extent of seasonal occupation permitted and requiring the erection of suitable warning notices to inform people entering the site of the risk of flooding.

Assessing Flood Risk

8.21 An assessment of flood risk will be expected to accompany all development proposals in flood plains. This assessment may be of a relatively minor nature where the development proposed is small with minimal secondary effects or may entail a major study covering catchment wide issues, for example where a major infrastructure project is envisaged. Further information on this matter is set out in Annex D.

Policy FLD 2 Protection of Existing Flood Defences

The Department will not permit development that would impede the operational effectiveness of flood defences or hinder access to enable their maintenance.

Justification and Amplification

8.22 Flood defences are critical in protecting people and property in areas at risk from flooding. Accordingly, any building operations or other works on or near flood defences or other flood control structures that would reduce their effectiveness or impede their proper maintenance will not be granted planning permission.

Policy FLD 3 Development beyond Flood Plains

Beyond coastal flood plains and the flood plains of rivers the Department will not permit development which is known to be at risk from flooding, or which would be likely to increase the risk of flooding elsewhere.

An exception to this policy will only be permitted where an application is accompanied by measures to mitigate the risk of flooding and it is demonstrated that such measures:

- will not increase flood risk elsewhere;
- will not result in an adverse impact on visual amenity or the character of the local landscape; and
- will not result in an adverse impact on features of importance to nature conservation, archaeology or the built heritage.

As part of the precautionary approach to dealing with flood risk the Department will, where appropriate, require a drainage assessment to accompany planning applications (see Annex D).

Justification and Amplification

8.23 Flood risk can arise from sources other than natural drainage systems (watercourses) and the sea, for example, from overland flow, which occurs when rainwater flows over saturated ground. Flood events can also arise when modified or artificial drainage systems cease to function. This may occur where they are overwhelmed by an extreme weather event or where they are blocked by debris.

8.24 Although generally localised, these types of flooding can cause significant damage. Where drainage infrastructure fails inundation may be rapid. A flood event caused by an artificial drainage system surcharge can pose public health risks from foul water contamination. Overland flow floods may be extended in duration causing more damage to property and greater hardship to the people affected, than a short duration event.

- 8.25 The Department will therefore operate a presumption against development in areas known to be directly at risk from flooding or where it would increase the risk of flooding elsewhere unless acceptable flood mitigation measures accompany the proposals.
- 8.26 Appropriate flood mitigation measures may enable a development to take place that would otherwise be unacceptable. Where such measures are proposed, the applicant must demonstrate that they will prevent any increase in direct and indirect flood risk over the lifetime of the proposed development. Accordingly their design will need to address the impact of the more frequent or extreme weather events likely to arise from climate change.
- 8.27 Where planning permission is granted subject to the undertaking of mitigation measures⁸, a planning agreement to facilitate their long-term management may be required.
- 8.28 Where a drainage assessment is required it should evaluate the impact of the proposal on the drainage regime in the locality and identify any measures necessary to ensure that the development does not add to the risk of flooding at the site or elsewhere.

⁸ *Flood mitigation measures accompanying applications for built development should also make provision for the protection of proposed parking areas, garaging and bin and fuel storage areas*

Policy FLD 4 Flooding and Land Drainage

The Department will only permit the culverting or canalisation of a watercourse in exceptional circumstances. Examples of such circumstances will include:

- where such works are necessary as part of a flood relief scheme;
- where the culverting of a short length of a watercourse is necessary to provide access to a development site or part thereof; or
- when it is demonstrated by the applicant that there is no practicable alternative to the culverting of the watercourse.

Justification and Amplification

8.29 Culverting and/or canalisation of watercourses, whether undertaken as an operation in its own right, or as works associated with the development of land requires planning permission.

8.30 The modification or disturbance of natural drainage systems can increase flood risk. The continuous culverting of watercourses is normally accompanied by the installation of protective grilles at inlets. The blockage of such inlets is a common cause of localised flooding particularly during periods of high rainfall intensity. Similarly, the canalisation of a natural watercourse can contribute to flooding where, for example it speeds up the flow of water through a catchment leading to surcharging and inundation downstream.

8.31 Culverting and canalisation can also impair amenity in the built environment and damage the landscape quality, ecological integrity and biodiversity of watercourses. Such impacts are generally inconsistent with a commitment to sustainable development and the adoption of a precautionary approach to flood risk. Culverting and/or canalisation will therefore only be acceptable in exceptional cases.

8.32 It is also important to recognise that each new culvert adds to an already substantial network of covered drains throughout Northern Ireland, much of which is now aged and in need of attention. Continuing to permit culverting in association with development therefore not only increases the potential of flood risk and adverse impacts on the environment but serves to increase the future burden of maintenance commitments.

- 8.33 Accordingly, new development should aim to be in harmony with the water environment and not attempt to work against it. Adopting a sustainable approach to building development requires the recognition of the importance of accommodating natural features such as open watercourses. Good layout and design will avoid relegating open watercourses to the backs of properties where they are difficult to maintain, can become a dumping ground that contributes to the risk of flooding and can cause other amenity problems.
- 8.34 Consistent with the requirements of PPS 7 on Quality Residential Environments, incorporating existing watercourses into the open space requirements for new residential development will be preferred to locating them to the rear of properties or culverting them. Where it is necessary to achieve a quality design solution to a development problem the diversion of a watercourse will be acceptable on planning grounds where it keeps the watercourse open and it is demonstrated that it will not adversely affect the drainage of the area⁹.
- 8.35 It is acknowledged however that, exceptionally, culverting may be unavoidable. This may occur where the proximity of existing development has caused the degradation of a watercourse and where an attendant risk of flooding could be alleviated by culverting the affected section, or where it is necessary to provide access to a development site. In the latter circumstances permission will only be granted to culvert when it is demonstrated that alternative measures such as open span bridges or diversion of the watercourse cannot be employed and where the length of culvert involved is the minimum necessary to facilitate the development proposed.
- 8.36 For the purpose of this PPS a flood relief scheme is defined as works undertaken by the Rivers Agency in pursuance of its statutory responsibilities under the Drainage (NI) Order 1973 intended to prevent or reduce the incidence of flooding.

⁹ *Works that affect a watercourse require prior written consent from Rivers Agency under Schedule 6 of the Drainage (Northern Ireland) Order, 1973*

Annex A: The Causes of Flooding and the Impacts of Climate Change

Causes of Flooding

River Flooding

- A1 River flooding is typically the result of heavy or prolonged rainfall causing high volumes of run-off into a river system. When run-off exceeds the capacity of the receiving watercourse to convey it downstream then water spills out of the river channel onto the flood plain. Flood plains are generally flat low-lying areas adjacent to the watercourse and their flooding plays an important role in moderating flood conditions within a catchment by conveying and/or storing flood water.
- A2 Northern Ireland has one of the largest run-off per unit areas in the British Isles, soils of low permeability and a substantial number of river systems with flat lower reaches. River flooding, though limited in scale when compared to the rest of the UK, is thus likely to continue as a primary source of flood risk affecting the Region. Although rivers are prominent in the public's perception, as a primary source of flooding there are a number of non-riverine mechanisms that can cause serious flood events.

Coastal and Tidal Flooding

- A3 Coastal flooding may be described simply as the inundation of low lying coastal areas by the sea, or the overtopping or breaching of sea defences. It is an infrequent event in Northern Ireland but (as elsewhere) is typically characterised by flows that are more rapid than those associated with river flooding. Consequently, the risk to public safety can be higher during this type of event.
- A4 Coastal flooding may be caused by seasonal high tides such as those driven by the spring neap tide cycle, storm surges and where increase in water level above the astronomical tide level is created by strong on shore winds or by storm driven wave action. Extreme conditions leading to coastal flooding are most commonly a result of a combination of two or more of these mechanisms. For example, the widespread flooding on the East Coast of England in 1953 was caused by a high spring tide, a deep

atmospheric low and northerly gales combining to create a massive storm surge which breached coastal defences. In excess of 24,500 houses were inundated, 30,000 people had to be evacuated and over 300 people lost their lives.

Estuarial Flooding

- A5 Flooding in estuaries may occur either due to abnormal coastal or river flows or through a combination of the two factors where river flow is constricted by an incoming tide. A high tide and significant flow in the watercourse can cause flooding which may be characterised by flow speeds similar to coastal or tidal flooding.

Groundwater Flooding

- A6 Elevated levels of groundwater resulting from prolonged periods of heavy rainfall can cause the flooding of basements and inundation of other underground structures, the ponding of water in low lying areas and the re-emergence of normally dry groundwater springs. Groundwater flooding often happens over and around aquifers where the underlying geology is highly permeable and has a high capacity to receive and store rainfall. It can result in high levels of infiltration of underground services and can increase damage from prolonged damp penetration since once it occurs it will often take a long time for groundwater levels to fall and for flooding to abate. Most significantly, this type of flooding can occur outside flood plains and can be very localised in extent. It is however uncommon in Northern Ireland.

Overland Flow Flooding

- A7 Sometimes referred to as overland sheet flow or pluvial flooding, overland flow flooding is characterised by water flowing over the ground surface where there is no drainage system to accept it. It is caused when the intensity of rainfall exceeds the infiltration capacity of the surface onto which it falls or when the soil is saturated and cannot accept more water. Overland flow may also occur where water flowing through the soil returns to the surface, for example in the saturated zone at the base of a slope. Ground conditions make overland flow a significant source of flooding in Northern Ireland.

Flooding from Artificial Drainage Systems

- A8 If the scale of a rainfall or storm event exceeds the capacity of ditches, drains, culverts and sewers to convey the water out of an area flooding

may result. Such flooding can happen during events below the design capacity of the system when capacity is temporarily reduced due to a blockage. Flood events of this type while typically localised can be particularly unpleasant as the flood waters can be contaminated with sewage and can enter properties through the foul drainage system.

Climate Change

- A9 Global temperature has risen by about 0.6 of a degree Celsius over the last 100 years and Government has recently concluded that much of the warming seen in the last 50 years is likely to have been caused by increasing concentrations of greenhouse gases due to human activities.
- A10 In the UK average temperatures have risen by a similar amount in the last century. In central England for example, the average recorded rise has been close to 1 degree Celsius. Furthermore, it is expected that some degree of further climate change is inevitable with much of the change over the next 40 years already determined by past and present emissions of greenhouse gases and the inertia of the climate system.
- A11 The potential impacts of climate change during the next 30 to 80 years have been estimated by UKCIP, the United Kingdom Climate Impacts Programme¹⁰. UKCIP 02 (2002) provides the current climate change scenarios recommended for use by Government for the assessment of climate change impacts. In the context of assessing flood risk the key results are:
- the UK climate will¹¹ become warmer;
 - winters will become wetter and summers may become drier everywhere;
 - heavy winter rain and snow will become more frequent;
 - relative sea level will continue to rise around most of the UK shoreline; and
 - extreme sea levels will be experienced more frequently.

¹⁰ *The UK Climate Impacts programme (UKCIP) is based at the University of Oxford and funded by Defra to co-ordinate assessment of how climate change will affect the UK. Information is available at www.ukcip.org.uk and see also www.defra.gov.uk/environment/climatechange/index.htm*

¹¹ *The word 'will' is used where UKCIP reports have a high level of confidence about an outcome*

- A12 The UKCIP 02 scenarios replace those of UKCIP 98 and give a more comprehensive analysis of predicted changes the results of which can be attributed a higher level of confidence. While they confirm general trends identified by the earlier report they refine and update predicted impacts, for example, the increase in frequency of heavy rainfall days is less marked in the new scenarios but remains substantial.
- A13 The SNIFFER (Scotland and Northern Ireland Forum for Environmental Research) Report 'Implications of Climate Change for Northern Ireland: Informing Development Strategy' identifies a similar set of climate change scenarios derived from the UKCIP and interpreted for the Region. The Report predicts that Northern Ireland will experience warmer, wetter and windier weather in the future. By the 2080's annual precipitation could increase by up to 13% with winter enhancement of up to 22%. Daily precipitation intensities are expected to increase both in summer and winter and while overall the frequency of gales may decline, winter storms of greater severity are expected to increase.
- A14 While flood damage is primarily a consequence of previous decisions on the location and nature of human settlement and land use it is widely believed that man-induced climate change will negatively influence flood behaviour. Climate changes like those identified above by UKCIP and the SNIFFER Report reinforce this perception. These reports are broadly supported by the Final Report on Climate Change of the Environmental Protection Agency, Ireland (2002)¹² and the significance of changes in climate in influencing flooding highlighted by the Foresight Report on Future Flooding published by the Office of Science and Technology (2004)¹³.
- A15 Recent flooding events in Northern Ireland have not been on the scale of those experienced in England and Scotland but they have raised concerns about the impact of a changing climate in the Region. The Government has, in its recently published UK programme for climate change¹⁴, set out policies and priorities for action on climate change in the UK and globally. In Northern Ireland such actions include the exercise of greater control over development at risk from flooding through the policies set out in this Statement.

¹² Available at www.epa.ie

¹³ Foresight Programme Report on Future Flooding (OST) (3 Vols) (2004) available at www.dti.gov.uk

¹⁴ Climate Change – The UK Programme 2006 (TSO) (2006)

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- A16 While the inundation of large areas by the sea is not common in Northern Ireland sea level rise occurring as a result of the warmer climate and tidal surges from more frequent storms is also expected to increase the risk of flooding in low lying open coasts and estuaries.
- A17 Increased flooding in Northern Ireland carries the potential for wide ranging effects on the Region's physical and social infrastructure, transport, energy provision, tourism, built environment, agriculture and biodiversity with flood risk, both perceived and real, touching on issues of health, economic development, environment and social well being.
- A18 Impacts on one sector will have effects in others, and effective responses to mitigate and manage these impacts need to acknowledge and address the interconnected nature of the environment in which they operate. The role of the land use planning process in managing flood risk may therefore require trans-boundary consultation on occasion.

Annex B: Development and Flood Risk

Flooding and the Human Environment

- B1 The effects of flooding can impact on a wide range of human interests. Perhaps the most obvious and most serious consequence is on the health and well being of people directly caught up in flood events.
- B2 Loss of life from drowning or physical injury arising from being swept away by floodwater is very rare in Northern Ireland. However, there is growing concern about the potential adverse health effects associated with the trauma of a flood event and living in the damp and dirty environment that such events cause and increasing recognition of the anxiety that living in an area liable to flooding can create. Table 1 highlights the possible health implications flooding can have.
- B3 Related socio-economic impacts can also affect the well-being of the wider community. These may range from the loss of homes and personal possessions to the disruption of key infrastructure and services and the local economy, the loss of business confidence and damage to cultural heritage and the environment. Additionally such effects may be exacerbated by the evolving stance of the Insurance industry.

Table 1: Health Implications of Flooding - Direct Effects

Causes	Health Implications
Stream flow velocity; topographic land features; absence of warning; rapid speed of flood onset; deep floodwaters; landslides; risk behaviour; fast flowing waters carrying debris.	Drowning Injuries
Contact with water	Respiratory diseases; shock; hypothermia; cardiac arrest.
Contact with polluted waters	Wound infections; dermatitis; conjunctivitis; gastrointestinal illnesses; ear, nose and throat infections; possible serious waterborne disease.
Increase in physical and emotional stress	Increase of susceptibility to psychosocial disturbances and cardiovascular incidences

Table 1 continued: Indirect Effects

Causes	Health Implications
Damage to water supply systems; sewage and sewage disposal damage; insufficient water supply	Possible waterborne infections (e.g. enterogenic E coli, shigella; hepatitis A; leptosperiosis)
Disruption to transport systems	Food shortages; disruption of emergency services.
Underground services disruption; contamination from waste sites; release of chemicals, oil, petrol storage etc.	Potential acute or chronic effects from chemical pollution.
Standing waters; heavy rainfall, expanded range of vector (disease carrying organism – especially insects) habitats	Vector borne diseases.
Rodent migration	Possible diseases caused by rodents.
Disruption of social networks; loss of property, jobs and family members/ friends	Possible psychosocial disturbance
Post flood clean up activities	Electrocutions; other injuries
Damage to or disruption of health services	Decreases in standard of or insufficient access to health care

Source: *Floods: Climate Change & Adaptation Strategies for Human Health, (WHO, 2002)*

B4 Insurers have, for some time, been concerned about the potential frequency and cost of environmental risks, including flooding. Recent floods, particularly since 2000, have caused insurers to review the provision of flood cover to UK property owners. Insurers have stated that it is their intention to continue to provide flood cover to as many property owners and occupiers as possible. However they have also pointed out that new development in areas at risk of flooding which lack the appropriate standard of protection will face difficulties with the cost and/or availability of insurance. This is confirmed in the Association of British Insurers (ABI) statement of principles on the provision of flood insurance issued in November 2005¹⁵. In the opinion of ABI and the Council of Mortgage Lenders developing in areas at risk from flooding could thus create difficulties in the mortgaging of new development

¹⁵ *Statement of principles on the Provision of Flood Insurance (Association of British Insurers) available at: www.abi.org.uk/*

which could make it impracticable. This in turn could undermine the basis of regeneration or other development strategies. Developers will therefore wish to consider the availability of insurance for subsequent purchasers or tenants at the earliest stage of the site evaluation process. For its own part, the insurance industry may wish to make appropriate representations about proposals for the location of new development during the preparations of development plans.

- B5 Many of the adverse consequences associated with flooding derive primarily from its physical impacts on buildings and the environment. The scale of damage to buildings is often dependent on the depth and duration of the flood event, while the primary significant environmental effects generally relate to water quality and polluted floodwaters. Table 2 (overleaf) illustrates flood damage to a typical residential property.
- B6 Traditionally, the threat of flooding in Northern Ireland has been met by the construction of hard-engineered defences and drainage schemes to protect land and development in areas exposed to frequent or extensive flooding. However, this sort of protectionist approach to flood risk is expensive in terms of construction and long-term maintenance costs, and while it can reduce the risk of flooding it cannot eliminate it. Flood banks or walls will be overtopped when a flood event is of greater severity than the defence was designed for. In addition flood risk may increase over time where the changing frequency or severity of weather events effectively acts to erode the standard of protection that defences were originally designed to provide for.
- B7 Hard-engineering solutions can create a cycle of vulnerability when the construction of a defence encourages further development that in turn leads to the need for further protection. Higher flood defences will lead to increased maintenance costs and may also result in more damaging floods when defences are breached by a severe weather event.
- B8 To continue the construction of new hard-engineered flood defences required as a consequence of the development on land with a propensity to flood is inconsistent with a commitment to sustainable development and the adoption of a precautionary approach to flood risk.

Table 2: Flood Damage to a Typical Residential Property

Depth of Flood	Damage to Building	Damage to Services/ fittings	Loss of Personal Possessions
Below ground level	Minimal damage to main building. Flood water enters basements, cellars and under floor voids. Possible erosion under foundations.	Damage to electrical sockets and other services. Carpets in basements and cellars may need replaced	Possessions and furniture in basements and cellars damaged.
Up to half a metre above ground floor level (GFL)	Damages to internal finishes, plaster, wall coverings etc. Floors and walls become saturated requiring cleaning and drying. Flooring may require replacement. Damage to external and internal doors, skirting, etc.	Damage to electricity meter and fuse-box. Damage to gas meter, low level boilers and telephone services. Carpets and floor covering may need replaced. Kitchen units and electrical appliances may need replaced	Damage to furniture and electrical goods. Damage to small personal possessions. Food in low cupboards contaminated
More than half a metre above GFL.	Increased damage to walls. Possible structural damage	Damage to higher units, electrical services and appliances	Damage to personal possessions

Source: *Preparing for Floods, (DTLR, 2002)*

The Impact of Development on Flood Risk

- B9 The nature of a flood event is shaped primarily by a combination of the effects of human activity and natural physical conditions.
- B10 New development, whether building works, engineering operations or changes in land use, can increase flood risk. Most simply, siting a building within an area likely to flood will increase the direct risks to that building. The greater the quantum of construction, the greater the consequences of a flood event are likely to be. While the direct consequences of flooding for a building are generally readily identifiable, less obvious but equally significant indirect impacts can be caused elsewhere.
- B11 New development can increase indirect flood risk in locations beyond the development site simply by increasing the amount of run-off from

the developed area. This may occur where permeable surface areas are reduced by construction work leading to increases in the volume and speed of water transported through a catchment.

- B12 Where development, for example, a poorly located bridge across a river, restricts the capacity of the drainage system to convey water through an area, this will increase the flood risk adjacent to and upstream of that development. This will create the potential for flooding to occur more often and to greater depths. Development that impairs the conveying capacity of the flood plain can also exacerbate risk by encouraging the gathering of water borne debris that may further restrict floodwater flows.
- B13 Buildings and the construction of other hard surfaces also have the potential to increase downstream flood risk by decreasing flood plain storage and increasing the scale or speed of run-off.
- B14 Land raising (sometimes called infilling), either to facilitate a development or as an operation in its own right, can also cause flooding where it interferes with existing drainage systems under normal conditions or areas that store or convey water during flood events.
- B15 Overland flow is a frequent cause of localised flooding in Northern Ireland (see Annex A). Where no development exists its consequences are not normally a significant source of risk. However, where overland flow is present, development that does not address it may increase potential for flood risk elsewhere by increasing the speed or the volume of flow. Flood risk will also be increased if new buildings or works are located where they may themselves be prone to inundation.
- B16 In addition to potential impacts upon public safety, human health and social and economic wellbeing, increased flood risk may also have adverse environmental impacts.
- B17 River and coastal flood plains are valuable ecological resources which provide habitat for a wide range of plants and animals, many of which are unique. A number of the priority habitats identified in the Northern Ireland Biodiversity Strategy are associated with floodplains. In addition, flood plains are often important landscape assets and the location of features of the archaeological and built heritage. Flood events can damage ecosystems, habitats, heritage and landscape assets, and

development can exacerbate such damage. The natural regulation of floodwater limits ecological damage caused by flooding, while pondage areas provide for the trapping and deposition of sediments and recycling of the nutrients from run-off.

- B18 Human activity can therefore have a significant impact in increasing flood risk and new development that is constructed without regard to flood risk may serve only to endanger life, increase property and environmental damage and require wasteful expenditure on remedial works.

How Flood Risk is Estimated

- B19 The probabilities of any site being flooded lay between virtually zero and near certainty. Even in areas generally free from flooding, local conditions and exceptional rainfall may lead to a flood event. It is therefore appropriate that the susceptibility of land to flooding is a material planning consideration.

- B20 Flood risk may be simply explained as the combination of the statistical probability of an event occurring and the scale of the potential consequences.

Probability

- B21 The likelihood of a flood event happening is usually expressed in terms of its predicted frequency of return. For example, a flooding event may be referred to as a 1 in 100 year event or, as having a 1% probability of being equalled or exceeded in any one year. Similarly, a 1 in 200 year event may be expressed as having a 0.5% probability of being equalled or exceeded in any one year.
- B22 It is however important to recognise that apparently low probability floods, considered over a long period of time have a significant likelihood of happening. For example, a 1-in-100 year flood has a 25 % chance of occurring at least once in a 30-year period (a typical mortgage duration) and a 50% probability of happening at least once in a 70-year period (a typical human lifetime).
- B23 While the probability of a flood event of a particular magnitude must be understood in these terms it should also be remembered, as recent experience of flood events across the UK has confirmed, low probability flood events can occur within a few years or even months of each other.

Potential Consequences

B24 The consequences of a flood event will depend on the vulnerability of the area to flooding and on the resultant economic, social and physical effects of that flooding. Among the factors which may influence the estimation of the consequences are:

- the characteristics of the area susceptible to flooding (including the amount of built development present);
- the depth, likely flow rate and duration of flood;
- the extent and standard of existing flood defences;
- the effects of climate change;
- the likelihood of effects on areas such as public open space, private amenity space and natural habitats;
- the nature of any development proposed (including its projected lifespan);
- the effect of flood on access, including by emergency services;
- the extent to which the development, its materials and construction is designed to be flood resistant; and
- the extent of the allowance made for freeboard.

B25 The estimation of flood risk is therefore dependant on a range of often discrete circumstances of which the probability of an event happening will be only one component. For example, differing depths of flood flow or duration of event may result in impacts of varying scale and severity. Flood risk estimation therefore, cannot be regarded as a precise forecast, but rather a best estimate influenced by the interaction of a range of variables that will include the potential impact of climate change.

Annex C: Sustainable Drainage Systems (SuDs)

- C1 Development changes the natural drainage regime, it reduces the amount of water infiltrating into the ground by replacing fields with buildings and hard surfaces and contributing to the compaction of other areas by vehicular movements. This increases the volume and speed of surface water run off and requires built up areas to be drained to remove excess water. Traditionally this has been done by installing underground pipes to convey water away as quickly as possible. Although this approach may prevent local flooding it can simply transfer flood risk to other parts of a catchment. The extension of built development alters natural flow patterns both in terms of quantity and the speed with which peak flows occur. The most obvious result may be downstream flooding but the increased flows from new development can also cause damage to property through erosion and ecological damage to streams and streamside habitats.
- C2 While the disposal of surface water has long been a material consideration in determining planning applications, amenity, ecology and water resource issues have historically had limited influence on drainage system design and the determination of development decisions. The commitment to a sustainable approach to building and the use of land underlined in the Regional Development Strategy for Northern Ireland. In addition, the water quality improvements required by the EC Water Framework Directive means that continuing to drain built up areas without taking these wider issues into consideration is no longer an option. Flood risk and the environmental damage associated with flood events can be managed by minimising changes in the volume and rate of surface run-off from development sites through the use of sustainable drainage systems.

What are Sustainable Drainage Systems?

- C3 Also known as Sustainable Urban Drainage systems¹⁶, sustainable drainage systems is the generic name for a range of techniques which seek to deal in an integrated way with the issues of water quantity,

¹⁶ *The word urban is intended only to convey a concern with surface run-off from the built environment, thus it is as applicable in rural, as in urban situations.*

water quality and amenity. They seek to manage surface water run off as near to source as possible, slowing down run-off, treating it naturally and releasing good quality surface water to watercourses or groundwater. Their use involves moving away from a reliance on traditional underground pipe drainage systems to engineering solutions that replicate natural drainage processes.

- C4 There is a wide range of sustainable drainage techniques¹⁷ available which can be applied, individually or in combination, to meet the particular drainage needs of a scheme. These include:
- source control techniques that seek to counter increased discharge from development sites by dealing with run-off as close to source as possible and minimising the quantity discharged to watercourses; and
 - permeable conveyance techniques that slow the velocity of runoff to the receiving watercourse, allowing storage, filtering and some loss of water through evaporation and infiltration before the discharge point.

Benefits of and constraints on Sustainable Drainage Systems

- C5 Experience of SuDs in England and Scotland indicates that they can help reduce flood risk. While the benefits of such systems are secured principally at the river-catchment scale, their use can make a significant contribution towards the sustainability of individual developments in:
- managing environmental impacts at source, rather than downstream; and
 - managing water run-off rates thereby reducing the impact of development on flooding.
- C6 Such benefits depend on the identification and application of clear design and maintenance objectives tailored to local circumstances. It requires developers to work in partnership with a number of disciplines and agencies (planners, drainage engineers, architects, landscape architects, ecologists and hydrologists) from the earliest stages of the development process.

¹⁷ See for further information, *Sustainable Urban Drainage Systems, an introduction* (Scottish Environmental Protection Agency, the Environment Agency and Environment and Heritage Service) and *Sustainable Urban Drainage Systems, Design Manual for Scotland & Northern Ireland* (Construction Industry Research and Information Association, 2000)

- C7 Surface water management using sustainable drainage systems can be implemented at all scales. It may start with good housekeeping measures and soakaways for individual premises and progress through the use of infiltration devices, tank storage, basins and wetlands for development at a more significant scale. At any level, it can help to reduce the need for investment in flood management and protection works by mitigating the intrinsic additional flood risk that new development might otherwise generate.
- C8 While there are tangible benefits to the use of sustainable drainage systems, there are also constraints on the choice of system. The surface structures that may be needed can take more space than conventional systems although it is often possible for them to be integrated into the surrounding land use, e.g. in public open space or road verges. Other limitations to infiltration devices can occur where:
- the soil is not very permeable;
 - the water table is shallow;
 - the groundwater under the site may be put at risk; or
 - infiltration of water into the ground, particularly if concentrated in a limited area, could adversely affect ground stability.
- C9 For example, infiltration from particular types of development may be prohibited in groundwater protection zones¹⁸ or be subject to the need for investigation and appropriate additional treatment prior to discharge.
- C10 Particular care is needed in designing sustainable drainage systems with appropriate capacity to handle run-off at their location. Contingency measures may be required to ensure that problems are not made worse when the intensity and/or duration of rainfall creates a situation where the quantity of run-off exceeds that for which the system was designed. In extreme events, sustainable drainage systems may, like other drainage systems be overwhelmed because they will only deal with the rainfall event for which they are designed. They may assist, however, in reducing the initial impact of extreme events.

¹⁸ See *Policy and Practice for Groundwater Protection in Northern Ireland* (DOE Environment and Heritage Service, 2001) available at www.ehsni.gov.uk/

The Future for Sustainable Drainage Systems in Northern Ireland

- C11 At present there remains a limited pool of experience in using sustainable drainage systems in Northern Ireland.
- C12 The Department's Environment and Heritage Service has been charged with the responsibility of meeting a range of the Water Framework Directive requirements, some of which imply the wider application of SuDs. To this end a Government Steering Group has been set up to examine their potential benefits and commissioned research on their applicability and implementation in the Northern Ireland situation. The findings of this research will assist in improving our understanding of the techniques, their applicability in Northern Ireland and the roles of the various agencies and undertakers in facilitating their integration into the development process.
- C13 While awaiting the final research report our current understanding suggests that the use of appropriately scaled and supported SuDs can, in the right circumstances, offer developers the opportunity to proceed with developments which would otherwise be refused because of the increased flood risk they would pose.
- C14 However, where the use of SuDs would facilitate development that might otherwise be refused, consent will not be granted without appropriate guarantees on the management and maintenance necessary to ensure that they will function effectively for the life of the development proposed.
- C15 It is anticipated that the research findings will inform the way forward and facilitate the formulation of a policy on the use of SuDs which can be incorporated as an addendum to this Statement or as part of the planned review within 5 years.

Annex D: Assessing Flood Risk and Drainage Impact

Assessing Flood Risk

- D1 Where an assessment of flood risk is required to facilitate the proper consideration of a planning application it shall be the responsibility of the applicant to provide the necessary information.
- D2 Such an assessment may be of a relatively minor nature, for example where the development proposed is small, or it may comprise a major basin-wide study, where a large infrastructure development is proposed. Preliminary or scoping studies may assist the preparation of a full report and developers should make early contact with the Planning Service and Rivers Agency to discuss proposals.
- D3 The detail and technical complexity of an assessment will vary depending on the scale and nature of the development proposed and the significance of the study. In all cases however applicants will be expected as a minimum to provide the following baseline information:
- (a) a location plan which clearly illustrates geographical features and built development including, where appropriate, street names. The plan should identify all watercourses, water bodies and other drainage infrastructure in the vicinity including drainage outfalls;
 - (b) a plan (and where appropriate, cross sections) of the site showing existing and post development levels related to Ordnance Datum;
 - (c) details of any existing flood alleviation measures or flood defence works that may influence the site;
 - (d) the identification of all potential sources of flooding;
 - (e) a plan of the site showing the extent and depth of flood events or flood predictions. (Information may include anecdotal or photographic evidence or where necessary, survey results and/or model estimates.); and
 - (f) proposals for the mitigation of any increases in flood risk that may arise as a result of the development proposed.

D4 The range and variety of local conditions will be such that each assessment will normally be an individually tailored report describing the implications of a proposed development. While it will be necessary to consider all the factors identified above, the depth of assessment necessary may vary greatly from case to case.

D5 Where it is anticipated that the effects of a proposal may require a basin wide study either by virtue of its size or its nature, applicants may be required to provide additional information on its impact(s) on flood risk. This may include:

- previous flood event data supported by information on rainfall, flood return periods and the probability of storm surge occurrences where appropriate. (Evidence on trends in flood occurrences is particularly valuable and should be included where available). Changes in the environment of the locality that have occurred since the last event where these may be material. Where this information is relevant its assessment will be an important aspect of the report;
- a plan and description of structures which may influence local hydraulics. For example, bridges, pipes/ducts crossing watercourses, culverts, embankments and walls;
- an assessment of hydraulics of all drains and sewers at the site or in the location, both existing and proposed, during a flood event. The methodology for assessment must be clearly identified;
- an estimate of the volume of run-off likely to be generated by the proposed development. Where appropriate the maximum flows that would be displaced from the site by the proposed development should also be estimated and the consequences of that displacement on neighbouring or other locations assessed;
- an assessment of :
 - (i) the likely speed with which flooding might occur;
 - (ii) the sequence in which various parts of the site or location may flood;
 - (iii) the likely duration of a flood event; and
 - (iv) the potential consequences/impacts of a flood event.

- D6 Because of the uncertainties inherent in flood estimation and expected climate change impacts, the application of the precautionary approach to hydrological analysis of flood flows and the determination of flood event return periods requires that any assessment of flood risk to incorporate the necessary allowances for increased rainfall, storminess and sea-level rise specified in UKCIP 02¹⁹.
- D7 All assessments should also acknowledge that there are no circumstances in which the risk of flooding can be removed entirely. In defended areas therefore consideration should always be given to the potential impacts of extreme events on defences and the minimising of risks to life in such cases.

Drainage Assessment

- D8 Where a drainage assessment is required to facilitate the proper consideration of a planning application it shall be the responsibility of the applicant to provide the necessary information.
- D9 Drainage assessments will normally be required to accompany development proposals where:
- the development comprises of 10 new dwelling houses or more;
 - the development site exceeds one hectare;
 - changes of use involving new buildings and/or hardsurfacing which exceed 1000 square metres in area; or
 - surface water run-off from the development may adversely impact upon a sensitive area²⁰.

¹⁹ *United Kingdom Climate Impacts Programme (2002 Report)*

²⁰ *Sensitive areas will include areas within, or upstream of, a conservation site designated under national or international legislation, for e.g. Areas of Special Scientific Interest (ASSI)*

Annex E: Roles and Responsibilities relating to Drainage and Flood Regulation.

E1 The following list provides a summary of the main Agencies with responsibilities relevant to the regulation of drainage and flood risk in Northern Ireland.

The Department of Agriculture & Rural Development, Rivers Agency

E2 Under the provisions of the Drainage (Northern Ireland) Order 1973 the Department of Agriculture & Rural Development has discretionary powers to:

- maintain watercourses and sea defences that have been designated by the Drainage Council for Northern Ireland;
- construct and maintain flood defence structures;
- administer advisory and enforcement procedures to protect the drainage function of all watercourses; and
- charge developers for the cost of drainage infrastructure works necessary to facilitate new development.

E3 All executive functions arising from the DARD's statutory remit under the Drainage order are undertaken by the Rivers Agency which also exercises DARD's responsibilities in regard to the water levels in Lough Neagh and Lough Erne.

The Department for Regional Development, Water Service

E4 Water Service is an executive agency within the Department for Regional Development. Its responsibilities include:

- the supply and distribution of drinking water;
- the provision of the collection system and treatment service for domestic sewage, surface water and trade effluent;
- the management and maintenance of public water mains and sewers; and
- operation of the Service's reservoirs, pumping stations and treatments works.

The Department of the Environment, Environment & Heritage Service

- E5 Environment & Heritage Service (EHS) is an executive agency within the Department of the Environment. It has a duty under the Water (Northern Ireland) Order 1999 to promote the conservation of water resources in Northern Ireland having regard to the needs of industry and agriculture, the protection of fisheries, the protection of public health, the preservation of amenity and the conservation of flora and fauna. EHS is also responsible for the implementation of the European Union Water Framework Directive (2000/60/EC) on the management of water quality.
- E6 Within EHS, Water Management Unit has responsibility for the protection of the aquatic environment. Its responsibilities include:
- monitoring water quality;
 - preparing water quality management plans;
 - controlling effluent discharges;
 - taking action to combat or minimise the effects of pollution; and
 - supporting environmental research.

The Department of the Environment, Planning Service

- E7 Planning Service is an executive agency within the Department of the Environment. The purpose of the planning system is to regulate development and land use in the public interest the functions of planning are set out in the Planning (Northern Ireland) Order 1991 and Planning Service exercises this responsibility through the key actions of:
- the development control process which deals with individual planning applications and the enforcement of planning control;
 - the preparation of development plans; and
 - the formulation of planning policies for all of Northern Ireland.
- E8 Development and use of land carries with it the potential to impact upon the aquatic environment. It can adversely impact upon drainage and consequently may worsen flooding in addition to being at direct risk of flooding if inappropriately located. Therefore, issues relating to drainage and flooding are material to planning decisions and a consideration for Planning Service in the execution of its responsibilities under the Planning (Northern Ireland) Order 1991.

Glossary

Biodiversity	(Biological Diversity) – the total variety of all living things.
Ecosystem	a living community of interacting plants and animals and their physical environment.
Culvert	a structure with integral sides, soffit and invert, including a pipe that contains a watercourse as it passes through or beneath a road, railway, building, embankment etc, or below ground.
Catchment	the area drained, either naturally or with artificial assistance, by a watercourse, including all drainage channels, tributaries, floodplains, estuaries and areas of water storage.
Drainage assessment	a statement of the drainage issues relevant to a development proposal and the measures to provide the appropriate standard of drainage. The detail of the assessment will be proportionate to the nature of the proposal. (It may also be called a Drainage Impact Assessment).
Flood defence	a structure or works designed to prevent the inundation of land and property from watercourses and/or the sea. Such defences may take the form of floodwalls or embankments or the management of water levels through drainage works.
Flood plain	the generally flat areas adjacent to a watercourse or the sea where water flows in time of flood or would flow but for the presence of flood defences. The limits of floodplain are defined by the peak water level of an appropriate return period event.

Flood Risk	the statistical probability of an event occurring combined with the scale of the potential consequences of that event.
Flood storage	an area, usually within floodplain where water is stored in time of flood.
Freeboard	a height added to the predicted level of flood to take account of waves or turbulence and the uncertainty in estimating the probability of flooding.
Groundwater	water below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil
Habitat	the natural home of a plant or animal.
Pondage	see Flood Storage
River basin	see catchment.
Run-off	that proportion of rainfall which is not absorbed into the ground and finds its way into watercourses, eventually flowing to the sea.
Storm surge	the increase in sea level caused by the combined effects of low atmospheric pressure, wind and a high tide.
Surcharging	a flow of water in a culvert or pipe which is above the design flow.
Watercourse	a river, stream, canal, ditch, drain, cut, culvert, dyke, sluice, valve, overland carrier, millrace or layde. Water mains and sewers are not included in this definition.

