

Dumfries and Galloway Council  
**LOCAL DEVELOPMENT PLAN 2**

# Flooding and Development

*Supplementary Guidance - February 2020*



## **Contents**

1 Introduction

2 Planning Framework

3 Roles and responsibilities; Flooding and Planning

4 Matters to consider for planning proposals

5 Flood Risk Assessment (FRA)

6 Certification and Checklists

Appendix 1 FRA Reference Documents

Appendix 2 FRA Requirements

Appendix 3 Self Certification

Acronyms

Glossary

## 1 INTRODUCTION

1.1 The purpose of this Supplementary Guidance is to provide practical detail for the application of Local Development Plan 2 (LDP2) Policy IN7: Flooding and Development. The consequences of flooding, wherever it happens, can be devastating and can pose a risk to life.

1.2 The Solway Local Flood Risk Management Plan District includes the whole of Dumfries and Galloway and small parts of East Ayrshire Council and Scottish Borders Council. Within this area there are approximately 3,900 residential properties and 900 non-residential properties at risk of flooding within the Local Plan District. This is approximately 5% of the residential properties and almost 13% of non-residential properties within the area. The Annual Average Damages caused by river flooding are £9.8 million, those caused by coastal flooding are £2.7 million and those caused by surface water flooding are £1.2 million.

### **Policy IN7: Flooding and Development**

*The avoidance principle is the most sustainable form of flood management, in accordance with the first principle of SPP (relating to sustainable development) and the Flood Risk Management (Scotland) Act 2009.*

*Where proposed development could lead to an unacceptable onsite or offsite flood risk<sup>1</sup>, as defined by the Risk Framework in SPP, then it will not be permitted. Where a proposed development could lead to an unacceptable flood risk, it may be that a Flood Risk Assessment (FRA) is able to clarify to the satisfaction of the Council and SEPA that the level of risk both on and off site would be acceptable.*

<sup>1</sup> Note: The meaning of 'flood risk' is from SPP. It is 'the combination of the probability of a flood and of the potential adverse consequences, associated with a flood, for human health, the environment, cultural heritage and economic activity'.

<sup>2</sup> Pluvial flooding is a result of rainfall runoff flowing or ponding over the ground before it

*For any site a Drainage Impact Assessment (DIA) may be required to ensure that surface water flows are properly taken into account in the development design. Consideration should be given to pluvial flows<sup>2</sup> especially those which exceed the capacity of the proposed drainage systems. Design of development must avoid flood risk from exceedance flows<sup>3</sup>. (See also Policy IN8 for Surface Water Drainage and SuDS.)*

*In order to satisfy the Council in respect of FRAs and DIAs, parties will be expected to provide independent verification of their professional competence, unless it is clear that this is not required.*

*This policy is supported by supplementary guidance.*

1.3 Flooding is primarily a natural phenomenon which cannot be prevented entirely. Despite this fact, it is not surprising that pressures for development can encourage proposals for land which may be susceptible to flooding, or that could exacerbate existing problems elsewhere. Additionally, global climate change is predicted to increase the likelihood of both coastal and inland flooding. However, if flooding is left unmanaged it can have a devastating effect on people, property, businesses and land.

1.4 This Supplementary Guidance also explains the wider context to DGC's flooding policy and the responsibilities of the main parties with particular interests. It intends to encourage an increased interest, understanding and knowledge about flooding and drainage issues for everyone involved in the development process, and thus make Dumfries and

enters a natural drainage system (eg watercourse) or an artificial one (eg sewer) because for example the system is already full to capacity or the drainage inlets have limited capacity

<sup>3</sup> Those which exceed the capacity of any formal drainage system.

Galloway a safer place to live, work and visit.

1.5 DGC is committed to working with developers to ensure that appropriate forms of development take place in appropriate locations and so do not generate unacceptable flood risk either on site or elsewhere. Flooding and drainage are material planning considerations. This guidance document is aimed at helping DGC achieve its long term flood risk management aspirations which include:

- Addressing flood risk issues as early as possible and prior to any development commencement;
- Achieving good-quality and reliable flood risk assessment of proposed development sites;
- Provision of adequate access to bodies of water for maintenance and inspection purposes;
- To reduce the flood risk of existing development if possible, without increasing flood risk elsewhere; and
- Working with the water environment, including support for the principles of sustainable flood management.

1.6 DGC has several different responsibilities in respect of flooding. This Supplementary Guidance is focussed on part of one of them, the responsibility that arises from the Council's role as planning authority. The roles and responsibilities of DGC in connection with planning and flood risk are significantly influenced by general duties outlined in Section 1 of the **Flood Risk Management (Scotland) Act 2009** (see *Appendix 1, Document 1*). These require the Scottish Ministers, SEPA and all responsible authorities (including local authorities) to:

- Exercise their flood risk related functions with a view to reducing overall flood risk;
- Act in the way best calculated to manage flood risk in a sustainable way;
- Promote sustainable flood management;

- Act in the way best calculated to contribute to the achievement of sustainable development; and,
- Adopt an integrated approach by co-operating with each other so as to co-ordinate the exercise of their respective functions.

1.7 This Supplementary Guidance aims to support the avoidance of unacceptable flood risk and to improve the design and implementation of developments and their related drainage arrangements. However, the various aspects of flooding cannot be simply separated out and covered in a single policy as there are important connections with other planning policies and other Council responsibilities. These are:

- The arrangements for surface water treatment, including sustainable drainage systems (SuDS) and avoidance of exceedance flows for developments. (See Policy IN8: Surface Water Drainage and sustainable drainage System (SuDS.);
- Waste water arrangements for developments;
- Standards of development construction; and
- The management of development infrastructure.

These connections are recognised and in the context of Flooding and Development this Supplementary Guidance takes them into account.

1.8 DGC wants to ensure that the built environment works with the water environment by steering new development away from areas in which it would generate unacceptable flood risk and by requiring developers to consider how their development is likely to impact on flood risk elsewhere. In the identification of sites for LDP2 account has been taken of SEPA's Development Plan Guidance on Flood Risk. See Appendix 1.

1.9 DGC recognises that managing flood risk and surface water is a material consideration for any development which should be assessed from the outset by an appropriately qualified, competent and experienced professional (*Appendix 3 sets out the Self Certification requirements for Flood Risk Assessment*). The location, layout and design of new developments are the most critical factors determining both the probability and impacts of flooding.

1.10 Detailed information on the concept of 'flood risk' i.e. the probability that a particular magnitude of flood will occur sometime in the future coupled with the impact that such a flood is likely to have, is available from publications such as CIRIA C624 (*See Appendix 1*) and SEPA's Technical Flood Risk Guidance for Stakeholders document (*See Appendix 1*).

1.11 Potential sources of flood risk are described in SEPA's Technical Flood Risk Guidance for Stakeholders. They are:

- **Fluvial** – flooding originating from a watercourse either natural or culverted.
- **Coastal** – flooding originating from the sea (open coast or estuary) where water levels exceed the normal tidal range and flood onto the low-lying areas that define the coastline.
- **Pluvial** – urban or rural flooding which results from rainfall-generated overland flow before the runoff enters any watercourse, drainage system or sewer. Note: this can be from within or outwith the site.
- **Groundwater** - flooding due to a significant rise in the water table, normally as a result of prolonged and heavy rainfall over a sustained period of time.
- **Drainage** - flooding as a result of surcharging of man-made drainage systems including combined sewers where the capacity of the system to discharge runoff has been exceeded.

- **Infrastructure Failure** – flooding due to failure of man-made infrastructure including hydro-dams, water supply reservoirs, canals, flood defence structures, underground conduits, water treatment tanks etc.

1.12 The main areas of flood risk concern in Dumfries & Galloway have been identified through SEPA's identification and mapping of Potentially Vulnerable Areas (PVAs) as part of its National Flood Risk Assessment under the requirements of the Flood Risk Management (Scotland) Act 2009. These are broad areas. They do not identify all areas of flood risk in the Region. Nor is the whole of each PVA subject to a significant flood risk. The identified areas can be viewed on the SEPA website. (*See Appendix 1*) The areas have been carried forward into the Solway Local Plan District Local Flood Risk Management Plan published in June 2016.

1.13 The general extent of areas in Dumfries & Galloway with a flooding probability of 1:200 AEP, or equivalent, are shown on the most recent SEPA flood hazard maps first published in January 2014 (*See Appendix 1*). Flood hazard resulting from; river, coastal and pluvial (rainfall) sources is presented on separate maps. In viewing the maps it is important to be aware that they are still 'indicative' and have certain limitations. These include:

- Whilst they provide a high quality and scientifically robust *indication* of areas which may flood, this is for a presentation scale no greater than 1:25,000;
- They have been developed to give an indication of whether a general area, not individual properties, may be affected by flooding;
- The fluvial maps only include the effects of hydraulic structures such as bridges where these have already been specifically modelled;
- They show only flooding from the specified sources. The fluvial maps do not show runoff from fields or

explicitly take into account any flood prevention schemes in place, unless this has been modelled and included;

- The fluvial map does not show flooding from very small burns i.e. where the area draining to the river is less than 3km<sup>2</sup>; and
- This Flood Map cannot replace site specific studies at a local scale.

1.14 Allocated sites in LDP2 that on the basis of current assessments may be subject to medium to high flood hazard or pluvial hazard have relevant commentary in their site guidance. If further evidence of flood hazard comes to light then this will also need to be taken into account. In cases affected by pluvial hazard it is expected that the issue should be capable of being managed in order to avoid unacceptable flood risk and enable development to take place. In order to assist with effective management it is considered that Drainage Impact Assessments (as could be required under Policy IN7 or IN8) should be prepared.

## 2 PLANNING FRAMEWORK

2.1 For the DGC planning response to the issue of flooding, the principal policy references are:

- DGC's planning policy in the LDP2; and
- Scottish Planning Policy (SPP) (see *Appendix 1, Document 4*);

2.2 The application of the policy for Flooding and Development may also be affected by:

- The Building Regulations (see *Appendix 1*); and
- The Water Environment Controlled Activities Regulations 2011 (CAR). (see *Appendix 1*)

### 2.3 Scottish Planning Policy

2.3.1 The Scottish Government approach to flooding is developed from the concept of the 'Functional Flood plain'. This is the area of land adjacent to any watercourse that has an AEP of 1:200 or more. In

general, built development should not take place within this demarcated flood plain. The same 1:200 AEP is adopted for coastal flood risk.

2.3.2 SPP covers flooding and related matters in paragraphs 254 - 268. It states in Para 255 that 'The planning system should promote a precautionary approach to flood risk from all sources, including coastal, water course (fluvial), surface water (pluvial), groundwater, reservoirs and drainage systems (sewers and culverts), taking account of the predicted effects of climate change.' It goes on to say in Para 258 that 'Planning authorities should have regard to the probability of flooding from all sources and take flood risk into account when preparing development plans and determining planning applications.

2.3.3 SPP sets out the 'risk framework', within which the level of risk is related to the type of land use. SPP effectively sets a return period of 1:200 AEP as an acceptable minimum standard for many forms of development, including most types of housing. However, for essential civil infrastructure (such as hospitals, fire stations, emergency depots etc) an AEP of 1:1,000 should generally be the minimum

– unless operational reasons dictate otherwise.

2.3.4 The risk framework applies to both greenfield and brownfield areas (see Glossary). For brownfield sites redevelopment may be appropriate but in terms of the risk framework this should not materially increase flood risk.

### 2.4 D&G LDP2 Planning Policy

2.4.1 The specific DGC planning policy on flooding is **Policy IN7: Flooding and Development**. This takes account of the circumstance of this area, and gives local effect to SPP. It requires avoidance of flood risk areas and specifies that there are circumstances when a developer flood risk assessment (FRA) will be required. The meaning of 'flood risk' is from SPP. It is 'the combination of the probability of a flood and of the potential adverse

consequences, associated with a flood, for human health, the environment, cultural heritage and economic activity'. Further guidance on the flood sensitivity of uses is provided by SEPA's Land Use Vulnerability Guidance (see. Appendix 1).

2.4.2 The policy means that:

- Development proposals should avoid areas susceptible to flooding and promote sustainable flood management;
- Development proposals within or bordering medium to high flood risk areas, will need to demonstrate compliance with Scottish Planning Policy through the submission of suitable information which may take the form of a Flood Risk Assessment;
- As stated in the SPP civil infrastructure will generally not be suitable in low to medium flood risk areas. Development proposals outwith indicative medium to high flood risk areas may be acceptable. However, a Flood Risk Assessment (FRA) or other suitable information which demonstrates compliance with the policy standard will be required where:
  - better local flood risk information is available and suggests a higher risk; or
  - a sensitive land use (as specified in the risk framework of Scottish Planning Policy) is proposed, and/or;
  - the development borders the coast and therefore may be at risk from climate change. Paragraph 88 of SPP says that planning authorities should confirm that new development requiring new defences against coastal erosion or coastal flooding will not be supported except where there is a clear justification for a departure from the general policy to avoid

development in areas at risk.

2.4.3 When considering the possibility of new development of any type or proposals for a new development it is vital that it be located where it will not be prone to flooding. Also, development should not be located where it will reduce flood storage, or where surface water run-off from the development site will increase flood risk either upstream or downstream of a receiving watercourse or drainage network. The capacity of a new development's surface water drainage system should be adequate to deal with the required standard for storm events, without causing flooding.

2.4.4 In seeking to achieve the standard set by Policy IN7, the first consideration should be to avoid developing on land, which is naturally, liable to flood. Development in such areas not only puts the new development at risk, but also effectively removes areas of natural water attenuation / storage, as water displaced by development must go somewhere.

2.4.5 Within areas protected by flood prevention measures, development may be acceptable where the measures are properly maintained and offer protection to a level acceptable in accordance with the Risk Framework. Development that would, in terms of the risk framework, materially increase flood risk due to the number of properties or the vulnerability of people would not be appropriate.

2.4.6 Undeveloped and sparsely developed medium to high risk areas are generally not suitable for additional development. Exceptions may arise if a location is essential for operational reasons, e.g. for navigation and water based recreation uses, agriculture, transport or some utilities infrastructure and an alternative lower risk location is not achievable. Such infrastructure should be designed and constructed to remain operational during floods. These areas may also be suitable for some recreation, sport, amenity and nature conservation uses provided adequate evacuation

procedures are in place. Job-related accommodation (e.g. caretakers and operational staff) may be acceptable. New caravan and camping sites should not be located in these areas. If built development is permitted, measures to manage flood risk are likely to be required and the loss of flood storage capacity minimised. Water resistant materials and construction should be used where appropriate.

2.4.7 In general, if any part of a proposed development site lies within a natural flood plain and/or is close to waterbody (such as a burn, stream, river, estuary or open coast) which has a history of over-topping and flooding, or even if there is a concern or a doubt about local incidences of flooding within the vicinity both downstream and immediately upstream of the proposed development, flood risk must be considered. Account should also be taken of the possibility of flood risk from sources such as ground water, reservoirs and dams, cessation of mine-water pumping and the inadequate capacity of culverts, which convey watercourses. No possible source of flooding should be ignored. In these circumstances an appropriate FRA should be submitted. Alternatively, there should be justification if such a FRA is not prepared. A further FRA may be required by a condition attached to an approval of an application in principle.

2.4.8 While this Supplementary Guidance is specifically intended to support Policy IN7: Flooding and Development, there are other LDP2 policies that are important in the context of flooding as a planning issue. These are:

- OP1(f): Overarching Policy - Sustainability
- OP1(g): Overarching Policy - Water Environment
- NE10: Erosion and Coastal Protection
- NE11: Supporting the Water Environment
- NE12: Protection of Water Margins
- IN8: Surface Water Drainage and Sustainable Drainage Systems SuDS

- IN9: Waste Water Drainage

### **3 ROLES AND RESPONSIBILITIES FOR FLOODING AND PLANNING**

3.1 Many organisations, with different roles and responsibilities, work together to manage flood risk in Dumfries & Galloway. Relevant public organisations are placed under a duty to work together to reduce overall flood risk by the Flood Risk Management (Scotland) Act 2009 (Appendix 1, Document 1). Developers, landowners and householders also have responsibilities.

#### **3.2 Developers**

- Should provide sufficient information to the relevant authorities to demonstrate that their proposals will not increase flood risk to an unacceptable level at the site of their proposal or elsewhere
- Should provide details for surface water drainage, including SuDS. A Drainage Impact Assessment (DIA) would generally be helpful and may be required. The early preparation of a Drainage Impact Assessment (DIA) – proportionate to the scale and location of any proposed development would normally be considered good practice. (See supplementary guidance for IN8: Surface Water Drainage and Sustainable Drainage Systems (SuDS).

#### **3.3 Scottish Government**

- Setting National Policy on Flood Risk Management and Flood Warning
- Setting Scottish Planning Policy and providing planning advice in PAN
- Provision of resources to support authorities in addressing flood risk

#### **3.4 SEPA**

- Provide a flood warning service for Scotland and operate 'Floodline'. (See Appendix 1 Reference 13b.) This means that the public and



organisations can take action to limit the consequences for homes and other properties. Provide advice to Local Authorities on flood risk and planning

- SEPA also have an important role in the coordination of flood risk management policy and activities across Scotland (in support of implementation of the Flood Risk Management (Scotland) Act 2009) which includes the:
  - Development and publication of the National Flood Risk Assessment
  - Development of Flood Risk Management Strategies (Published December 2015.) (See Appendix 1)
  - Assessment of flood risk across Scotland including publication of flood risk and hazard maps (See Appendix 1)
  - Establishment of national and local Flood Risk Advisory Groups
  - Preparation of maps of artificial structures and natural features

### **3.5 Planning, Infrastructure and Transportation, and Building Standards**

- Development Management and Development Planning in DGC's Planning Service, taking flood risk advice from SEPA and DGC's Flood Risk Management Team in its Infrastructure and Transportation Service
- Prepare Local Flood Risk Management Plan. The first such plan was published in June 2016. This was prepared using a catchment-based approach to reducing overall flood risk. This approach allows that opportunities to return bodies of water to their natural drainage capability may be explored e.g. de-culverting watercourses where possible through the planning process, provided flood risk is not increased elsewhere as a result. It should

also be noted that Policy NE11: Supporting the Water Environment provides broad support for Sustainable Flood Management

- Preparation of maps of relevant bodies of water and SuDS
- Assessing water bodies for conditions likely to pose a flood risk
- Undertake clearance and repair works in water bodies including the clearance of watercourses where the works will significantly reduce flood risk
- Maintenance of existing flood protection schemes
- Maintain road gullies – these are not designed to cope with extreme weather events, but it is still important that they operate efficiently to avoid localised flooding
- Local Authorities also have discretionary powers to undertake works of flood protection or promote flood protection schemes. There is no statutory duty for a Local Authority to prevent property from flooding.

3.5.1 The Building (Scotland) Regulations 2004, as amended, state under mandatory standards 3.3 Flooding and Groundwater: Every building must be designed and constructed in such a way that there will not be a threat to the building or the health of the occupants as a result of flooding and the accumulation of groundwater.

3.5.2 DGC, as Building Standards authority, must be satisfied that suitable provision has been made for drainage and prevention of flood risk. Any proposed scheme should be designed and constructed to meet the Technical Standards for compliance with the Building (Scotland) Regulations 2004, as amended.

3.5.3 DGC should be given the opportunity to inspect drainage features during and after construction. As built drawings of drainage features shall, upon completion, be submitted to DGC Infrastructure &

Transportation Services. Generally, Building Standards welcome early dialogue regarding schemes and are happy to engage with designers prior to submission of a formal application for Building Warrant.

### 3.6 Scottish Water

- Maintaining water supply and drainage infrastructure
- Managing the discharge of surface water that enters the public drainage system
- Working in partnership with the local authority and emergency services
- Dealing with flood damaged mains and any flooding caused by bursts and chokes of the sewer network
- Responsible for assessing the risk of flooding from surface water and combined (surface and foul) sewers that results from higher than usual rainfall events. Once risks are identified, Scottish Water, working with local authorities and SEPA, will look for opportunities to reduce those risks through its capital investment programme. This will be co-ordinated with other work to address surface water flooding
- Advice regarding sewerage provision and management of surface water should be sought from Scottish Water before development proposals are submitted for planning consent. Scottish Water's document 'Sewers for Scotland 3<sup>rd</sup> Edition' details the technical standards to be applied in the design of any proposals. This document also provides clarity on Scottish Water's requirements in terms of surface water drainage design.

### 3.7 Property Owners and Household

- Responsible to take reasonable care to protect their property from flooding
- Responsible for acquiring home contents and buildings insurance

- Responsible for maintaining private drainage

3.7.1 Property owners are strongly advised to make prior preparations for protecting their own property as flood incidents can occur with little warning and can be widespread. Further advice can be sought on protecting against flood risk at:

- Dumfries & Galloway Council: <http://www.dumgal.gov.uk/flooding>
- Scottish Environmental Protection Agency: <http://www.sepa.org.uk/flooding>
- Scottish Flood Forum: <http://www.scottishfloodforum.org/>

### 3.8 Landowners

- Landowners are primarily responsible for the maintenance of watercourses and other water bodies on their land including repairs and clearing
- Landowners are responsible for private flood defences on their land and maintenance of private drainage systems

## 4 MATTERS TO CONSIDER FOR PLANNING PROPOSALS

4.1 Before a planning application is lodged the following flood risk and drainage matters should be considered:

- Does the development site have a medium or greater probability of flooding from any source?
- Would development of the site lead to increased flood risk elsewhere?
- Would safe access and egress to and from the development be possible during flood events?
- Is the development likely to prevent safe access to and maintenance of bodies of water and/or flood defence measures?
- Is the development design employing SuDS?
- How is natural water emanating from the site being dealt with and managed?
- This should include consideration of surface or ground water that will

not be part of the storm water treatment;

- How is water from uphill surface or ground sources, being managed?  
Note: In dealing with this question flood risk issues should not simply be shifted to another location.
- What is to be done during construction phases to control water contamination and limit flow rates?
- Will future users of the development be faced with difficulty obtaining insurance or mortgage finance?
- Who will be responsible for maintenance of the arrangements for drainage?

## 5 FLOOD RISK ASSESSMENT (FRA)

5.1 In the past, flood risk has been calculated from historic data and expressed in terms of the expected frequency of a flood of given magnitude: Floods of greater scale are expected to occur less often than floods of a smaller scale. The assumption was that historical flood records represent a reasonably unbiased sample and the conditions (e.g. climate and land use) have been basically constant over the period of the record. Thus, the calculation of standards for flooding and development are based on the idea of the return period. There are now two weaknesses with this approach. Climate change means that:

- Evidence of flooding in the past is not necessarily a good guide to what may happen in the future; and
- Any particular level of flood risk at the present time may not stay at that level for future years.

Thus, the flooding history of a site will not form as reliable a guide to its future flood risk as formerly was the case.

Assessments must be based on the most recent data available about current and future flood risk and hazard.

5.2 The likelihood of a flood is now more usefully expressed in terms of the probability that it will occur within any particular year. This is known as the

Annual Exceedance Probability (AEP). For the location of most new housing development a current AEP of 1:200, (or 0.5% annual probability) is the minimum standard. In the preparation of FRAs it is expected that there will be an addition for freeboard and now also an allowance for climate change. This should be based on the most recent generally recognised projections.

5.3 It should be noted that the surface water drainage systems of many older developments are designed for basic peak flows from a 1:1 AEP (100% annual probability) storm event. Rarer events, up to a 1:30 AEP (3.3% annual probability) storm event (Sewers for Scotland), are dealt with by "surcharging" the drainage system. This surcharge is contained within the drains. It follows that pluvial events with an AEP of between 1:30 and 1:200 could produce exceedance flows and may contribute to overall flood risk.

## 5.4 When a FRA is Required

5.4.1 When DGC as Planning Authority considers that there might be an unacceptable flood risk associated with or as a result of a proposed development, it may require that a Flood Risk Assessment (FRA) be submitted in support of any planning application. In coming to a conclusion on whether a FRA will be required there may be consultation with DGC's Infrastructure and Transportation Service and/or SEPA.

5.4.2 The possible requirement of further information about a planning application is enabled by Regulation 24 of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2008)

5.4.3 It should be noted that:

- The requirement of a FRA does not have any significance relative to any of the other planning issues that may affect the ultimate decision on a planning application that it intends to support; and
- The conclusion of a properly prepared FRA may be that the flood risk is such that development

of the site should be limited or even prohibited.

5.4.4 Consultations with relevant parties, including SEPA, DGC's Planning & Building Standards Service, and Scottish Water are considered to be a vital element in establishing the flood history of a site. The location, nature and size of development coupled with the perceived flood source, probability and history will guide the complexity and technical requirements of a FRA. (See Appendix 3.)

5.4.5 A key requirement for a FRA is that it must consider all sources of flooding (with the specific exclusion of internal sewer flooding - as defined in the Flood Risk Management (Scotland) Act 2009 Act). In certain circumstances it may need to demonstrate how flood mitigation methods will be managed. The FRA will be required to certify that any flood risk associated with the development can be managed now and for the lifetime of the development, taking into account the potential effects of climate change. It should also demonstrate that the development will not increase flood risk elsewhere.

5.4.6 It is important to note that adoption of flood mitigation measures could only be suitable in particularly constrained circumstances (such as for low vulnerability development and/or certain brownfield areas) and that DGC will otherwise insist on the avoidance of flood risk as the first principle.

5.4.7 In line with SPP most forms of new development need to be free from unacceptable flood risk for all flood events up to 1:200 AEP, including an allowance for climate change and also freeboard.

5.4.8 The D&G coastline with many associated settlements means that coastal flood risk is an issue in the area. Climate change is expected to increase coastal flood probability over the years, and should be factored into calculations of flood risk. Account should be taken of the intended design life of the proposed

development. In practical terms the extent of flood probability varies along the Solway coast with levels increasing toward the Inner Solway area.

5.4.9 DGC may require a higher level of protection, typically 1 in 1000 AEP, for potentially vulnerable developments such as care homes, schools, critical infrastructure etc. Prior to the preparation of schemes for these types of development, reference should be made to SEPA's Land Use Vulnerability Guidance, v2, 27 July 2017. (See Appendix 1) Any required clarification on the position should be sought from DGC Planning & Building Standards Services.

## 5.5 Proportionality of FRA

5.5.1 The detail and technical complexity of a FRA should reflect the scale, and potential social and economic value of the proposed development. A summary of the FRA requirements is set out in the Table below. A longer description of the requirements is provided in *Appendix 3*.

5.5.2 In line with Section 5.3 of CIRIA publication C624 'Development and flood risk – guidance for the construction industry (2004)' (See Appendix 1) an 'appropriate level of FRA' should be carried out as soon as a site is considered for development. C624 states that '*an initial FRA can be extremely useful in identifying the viability of a potential development site and guiding development proposals at an early stage, and it is strongly recommended that this is undertaken before purchasing any site. As development proposals progress, additional FRAs can be undertaken to inform the master planning and outline design process. These will be at increasing levels of detail, as appropriate*'.

5.5.3 DGC considers that flood risk assessments should be proportionate to the development (including location) proposed. DGC may require one of the three levels of FRA as set out in Table 1 below. These have been extracted from C624.

**Table 1: FRA Levels**

<b>FRA Level</b>	<b>Description</b>
1	Screening Study <sup>4</sup> – to identify whether there are any flooding issues related to the development of the site which may warrant further consideration.
2	Scoping Study – to be undertaken if the Level 1 study indicates that the site may lie within an area which is at risk of flooding or that the site may increase flood risk due to increased runoff, to confirm the possible sources of flooding which may affect the site. The study should include the following objectives: <ul style="list-style-type: none"> <li>• Assessment of the availability and adequacy of existing information</li> <li>• Qualitative assessment of the flood risk of the site, and the impact of the site on flood risk elsewhere</li> <li>• Assessment of the possible scope for appropriate development design and to scope additional work required.</li> </ul>
3	Detailed Study – to be undertaken if the level 2 study concludes that quantitative analysis is required to assess flood risk issues related to the development of the site. The study should include: <ul style="list-style-type: none"> <li>• Quantitative assessment of the potential flood risk to the development</li> <li>• Quantitative assessment of the potential impact of the development site on flood risk elsewhere</li> <li>• Quantitative demonstration of the effectiveness of any proposed mitigation measures.</li> </ul>

**Table 2: FRA Content Summary**

<b>Level of Assessment:</b>	<b>Completed by:</b>	<b>Applicable to:</b>	<b>Requirements (refer to main text for requirements):</b>
Level 1 Flood Risk Statement <sup>5</sup>	Level 1 Flood Risk Statement	Requested at the discretion of Planning Authority/ where developer seeks to assure planning Authority of no risk. Small scale developments where FR not expected/ known	Brief statement/ screening General description of the development, its size, location and surrounding topography. FR from all sources considered/ commented on (based on authors' knowledge/ observations/ experience). Consultation with DGC Flood Team for historic flooding incidences and comment

<sup>4</sup> Note: A Screening Study or Level 1 Flood Risk Statement could form part of a Drainage Impact Assessment as may be required or good practice under Policy IN8: Surface Water Drainage and SuDS. See also the supplementary Guidance in support of that Policy.

<sup>5</sup> Note: A level 1 Flood Risk Statement could form part of a Drainage Impact Assessment as may be required or good practice under Policy IN8: Surface Water Drainage and SuDS. See also the Supplementary Guidance in support of that Policy.

			Reference to SEPA flood maps where applicable.
Level 2 Flood Risk Assessment	Civil Engineer/Hydrologist or equivalent member of professional institution e.g. ICE, CIWEM, INSTRUCTE	Whenever FR is known (e.g. within SEPA 200yr flood extents). Larger scale developments > no. properties (offsite risk of flooding may increase)	General FRA requirements as Level 1 but providing a full report including drawings/ calcs/ figures. FR from all sources qualified in detail. Desk Study approach Consultation with DGC Flood Team for historic flooding incidences/ guidance. Consultation with SEPA & Scottish Water Recommendations on appropriate development design / possible mitigation. Assessment as to whether further modelling is required to fully assess impact of flooding.
Level 3 Flood Risk Assessment	Civil Engineer/ Hydrologist or equivalent member of professional institution e.g. ICE, CIWEM, INSTRUCTE	Whenever FR is known (e.g. within SEPA 200yr flood extents). Larger scale developments > 5 no. properties (offsite risk of flooding may increase)	As Level 2 but with flood risk on and off site quantified by hydraulic/ hydrological model results. Detailed development drawings/ elevations to be provided. Detailed proposals of mitigation methods. Detailed proposals of flood resilient materials. Topographic site survey to be provided and used to assess flood routing/ depths. Calculations provided for provision of compensatory storage.
Exemptions: A FRA is not required for extensions to single dwellings; garages/ conservatories, above ground structures or Permitted Development			

5.6 More detailed requirements for the three levels of FRA are indicated in Appendix 2 and discussed in detail in Sections 5.3.3 to 5.3.5 of CIRIA C624 (See Appendix 1, Document 35). It is essential that a FRA is completed to a highly proficient standard, contain only relevant information, and cover all site specific issues. When completing a FRA the methodology followed should be in line with industry standards and best practice. However, the detail and technical

complexity of a FRA will be determined by the level of assessment required. In all cases of a FRA being undertaken for any location, the resulting report should ideally conform to the structure set out in Appendix 2:

5.7 There are a number of professional guidelines produced by recognised bodies which are designed as a reference for the implementation of good practice in the assessment of flood risk (See Appendix 1).

5.8 When numeric modelling is carried out in support of a FRA an electronic copy of the model used must be supplied to DGC.

5.9 Developers commissioning FRAs must accept that data used in support of their application may also be adopted and made public by DGC and SEPA.

## **6 CERTIFICATION & CHECKLISTS**

6.1 Level 1 Flood Risk Statements may be completed and submitted by the applicant, architect or agent acting for the client. Level 2 and 3 Flood Risk Impact Assessments should be undertaken by a competent professional. It is recommended that assessments should be carried out under the direction of a chartered member of a relevant professional institution, with experience of flood risk/drainage assessment and management.

6.2 DGC support SEPA's flood risk assessment checklist procedure which involves the requirement to complete and attach a checklist to the front cover of a

FRA to provide a summary of key information in relation to the FRA (See Appendix 1).

6.3 In addition, DGC requires Levels 2 and 3 FRAs to be accompanied by a signed-off Compliance Certificate (See Appendix 3) to certify that the assessment has been carried out in accordance with this guidance, relevant documents and legislation. (See Appendix 3) An individual Compliance Certificate must be submitted for each assessment.

6.4 DGC also requires that the signatory holds Professional Indemnity Insurance which is maintained at a level that is at least appropriate for the development proposed. Evidence will take the form of a copy of the insurance policy, certificate of insurance and evidence that all premiums are paid and up to date for a minimum of ten years.

6.5 It is the responsibility of the author(s) to ensure that all detailed calculations and computations are technically accurate. DGC is reliant on the accuracy, completeness and timeliness of information submitted.

## APPENDIX 1: FRA Reference Documents

1. Flood Risk Management Strategy for Solway Local Plan District (2015)  
<http://apps.sepa.org.uk/FRMStrategies/solway.html>
2. Solway Local Plan District Local Flood Risk Management Plan: June 2016  
[https://www.dumgal.gov.uk/media/18252/Solway-Local-Flood-Risk-Management-Plan/pdf/Solway\\_LPD\\_Local\\_FRM\\_V\\_Committee\\_14\\_June\\_2016.pdf?m=63601150268080000](https://www.dumgal.gov.uk/media/18252/Solway-Local-Flood-Risk-Management-Plan/pdf/Solway_LPD_Local_FRM_V_Committee_14_June_2016.pdf?m=63601150268080000)
3. Flood Risk Management (Scotland) Act 2009  
<http://www.legislation.gov.uk/asp/2009/6/contents>
4. The Building (Scotland) Regulations 2004  
<http://www.legislation.gov.uk/ssi/2004/406/contents/made>
5. Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR) (as amended)  
<http://www.legislation.gov.uk/ssi/2011/209/made>
6. Scottish Government; Scottish Planning Policy; June 2014  
<http://www.scotland.gov.uk/Resource/0045/00453827.pdf>
7. Planning Advice Note 51: Planning, Environmental Protection and Regulation  
<http://www.scotland.gov.uk/Resource/Doc/152228/0040973.pdf>
8. Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems; 2001  
<http://www.scotland.gov.uk/Publications/2001/07/pan61>  
<https://beta.gov.scot/publications/pan-61-sustainable-urban-drainage-systems/>
9. Planning Advice Note 69: Planning and Building Standards Advice on Flooding  
<http://www.scotland.gov.uk/Resource/Doc/17002/0026290.pdf>
10. Planning Advice Note 79: Water and Drainage  
<http://www.scotland.gov.uk/Publications/2006/09/26152857/0>
11. Scottish Government: Delivering Sustainable Flood Risk Management  
<https://www.gov.scot/publications/flood-risk-management-scotland-act-2009-delivering-sustainable-flood-risk/>
12. Scottish Government: Surface Water Management Planning Guidance  
<http://www.scotland.gov.uk/Resource/0041/00413778.pdf>
13. SEPA; Flood Maps: First Published January 2014 (website)  
[http://www.sepa.org.uk/flooding/flood\\_maps.aspx](http://www.sepa.org.uk/flooding/flood_maps.aspx)
14. SEPA; Controlled Activities Regulations 2011 - A Practical Guide  
[https://www.sepa.org.uk/media/34761/car\\_a\\_practical\\_guide.pdf](https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf)



15. SEPA; 'Guidance and advice notes' for Planning (webpage)

<https://www.sepa.org.uk/environment/land/planning/guidance-and-advice-notes/>

- Development Management Guidance on Flood Risk
- Planning Information Note 4: SEPA Position on development protected by a Flood Protection Scheme
- Development Plan Guidance on flood risk
- Background Paper on Flood Risk
- Flood Risk and Land Use Vulnerability Guidance
- Planning Information Note 3: Flood Risk Advice for Planning Authorities

16. SEPA Floodline

<http://www.floodlinescotland.org.uk/>

17. SEPA; Technical Flood Risk Guidance for Stakeholders:

<https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf>

Or as downloaded from:

<https://www.sepa.org.uk/environment/land/planning/guidance-and-advice-notes/>

18. SEPA – Flood Risk Assessment checklist;

<https://www.sepa.org.uk/media/159170/flood-risk-assessment-checklist.xls>

19. SEPA Policy No 41: Development at Risk of Flooding: Advice and Consultation (October 2016);

<http://www.sepa.org.uk/media/136143/sepa-planning-authority-protocol-41.pdf>

20. SEPA; Water Assessment and Drainage assessment Guide (SUDSWP); See webpage - Diffuse pollution in the urban environment (SUDS)

[https://www.sepa.org.uk/media/163472/water\\_assessment\\_and\\_drainage\\_assessment\\_guide.pdf](https://www.sepa.org.uk/media/163472/water_assessment_and_drainage_assessment_guide.pdf)

21. SEPA; Diffuse pollution in the urban environment (SuDS) (webpage)

<https://www.sepa.org.uk/regulations/water/diffuse-pollution/diffuse-pollution-in-the-urban-environment/>

22. SEPA; LUPS GU2 Planning Advice on SUDS

<https://www.sepa.org.uk/media/143195/lups-gu2-planning-guidance-on-sustainable-drainage-systems-suds.pdf>

23. SEPA; Regulatory Method (WAT-RM-08) SUDS

<https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/>

24. SEPA et al; Guidance for Pollution Prevention: Works and maintenance in or near water: GPP5 (SEPA et al. Jan 2017)

<http://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf>

25. SEPA; Position Statement on Culverting of Watercourses (WAT-PS-06-02)  
[http://www.sepa.org.uk/water/water\\_regulation/guidance/engineering.aspx](http://www.sepa.org.uk/water/water_regulation/guidance/engineering.aspx)  
[http://www.sepa.org.uk/water/water\\_regulation/guidance/engineering.aspx](http://www.sepa.org.uk/water/water_regulation/guidance/engineering.aspx)
26. SEPA; Policy and Supporting Guidance on Provision of Waste Water Drainage in Settlements (WAT-PS-06-08)  
[https://www.sepa.org.uk/media/90272/wat\\_ps\\_06\\_08\\_policy\\_and\\_supporting\\_guidance\\_on\\_provision\\_of\\_waste-water\\_drainage\\_in\\_settlements.pdf](https://www.sepa.org.uk/media/90272/wat_ps_06_08_policy_and_supporting_guidance_on_provision_of_waste-water_drainage_in_settlements.pdf)
27. SEPA: Private sewage treatment systems / septic tanks  
<https://www.sepa.org.uk/regulations/water/small-scale-sewage-discharges>  
[https://www.sepa.org.uk/media/152675/wat\\_rm\\_03.pdf](https://www.sepa.org.uk/media/152675/wat_rm_03.pdf)
28. Scottish Government et al; Dynamic Coast: Scotland's Coastal Change Assessment (website)  
<http://www.dynamiccoast.com/>
29. SUDS Working Party; SuDS for Roads: August 2009  
<http://www.scotsnet.org.uk/assets/SudsforRoads.pdf>
30. CIRIA C753; The SuDS Manual; Updated November 2015  
[https://www.ciria.org/Memberships/The\\_SuDs\\_Manual\\_C753\\_Chapters.aspx](https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx)
31. CIRIA; Guidance on the construction of SuDS (C768)  
<https://www.ciria.org/ItemDetail?iProductcode=C768&Category=BOOK>
32. CIRIA and HR Wallingford (x108); Drainage of Development Sites – A Guide; 2004  
<https://www.ciria.org/Search?SearchTerms=x108>
33. CIRIA C698: Site Handbook for the Construction of SuDS  
<https://www.ciria.org/ItemDetail?iProductCode=C698&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91>
34. CIRIA; C635 - Designing for Exceedance in Urban Drainage  
<https://www.ciria.org/ItemDetail?iProductCode=C635&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91>
35. CIRIA C624: Development and Flood Risk Guidance for the Construction Industry  
<https://www.ciria.org/Search?SearchTerms=C624>
36. CIRIA; C688 - Flood Resilience and Resistance for Critical Infrastructure  
[https://www.ciria.org/Resources/Free\\_publications/Flood\\_resilience.aspx](https://www.ciria.org/Resources/Free_publications/Flood_resilience.aspx)
37. CIRIA C689: Culvert design and operations guide [Replaces R168; Culvert Design Manual]  
<https://www.ciria.org/Search?SearchTerms=C689>

38. CIRIA C532D; Control of Water Pollution from Construction Sites - Guidance for Constructors and Contractors  
<https://www.ciria.org/Search?SearchTerms=C532>
39. RSPB + WWT; Sustainable Drainage Systems: Maximising the potential for people and wildlife: A guide for local authorities and developers  
[http://ww2.rspb.org.uk/Images/SuDS\\_report\\_final\\_tcm9-338064.pdf](http://ww2.rspb.org.uk/Images/SuDS_report_final_tcm9-338064.pdf)
22. SEPA; Diffuse pollution in the urban environment (SuDS) (webpage)  
<https://www.sepa.org.uk/regulations/water/diffuse-pollution/diffuse-pollution-in-the-urban-environment/>
23. SEPA; LUPS GU2 Planning Advice on SUDS  
<https://www.sepa.org.uk/media/143195/lups-gu2-planning-guidance-on-sustainable-drainage-systems-suds.pdf>
24. SEPA; Regulatory Method (WAT-RM-08) SUDS  
<https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/>
25. SEPA et al; Guidance for Pollution Prevention: Works and maintenance in or near water: GPP5 (SEPA et al. Jan 2017)  
<http://www.netregs.org.uk/media/1418/gpp-5-works-and-maintenance-in-or-near-water.pdf>
26. SEPA; Position Statement on Culverting of Watercourses (WAT-PS-06-02)  
[http://www.sepa.org.uk/water/water\\_regulation/guidance/engineering.aspx](http://www.sepa.org.uk/water/water_regulation/guidance/engineering.aspx)  
[http://www.sepa.org.uk/water/water\\_regulation/guidance/engineering.aspx](http://www.sepa.org.uk/water/water_regulation/guidance/engineering.aspx)
27. SEPA; Policy and Supporting Guidance on Provision of Waste Water Drainage in Settlements (WAT-PS-06-08)  
[https://www.sepa.org.uk/media/90272/wat\\_ps\\_06\\_08\\_policy\\_and\\_supporting\\_guidance\\_on\\_provision\\_of\\_waste-water\\_drianage\\_in\\_settlements.pdf](https://www.sepa.org.uk/media/90272/wat_ps_06_08_policy_and_supporting_guidance_on_provision_of_waste-water_drianage_in_settlements.pdf)
28. SEPA; Private sewage treatment systems / septic tanks  
<https://www.sepa.org.uk/regulations/water/small-scale-sewage-discharges>  
[https://www.sepa.org.uk/media/152675/wat\\_rm\\_03.pdf](https://www.sepa.org.uk/media/152675/wat_rm_03.pdf)
29. Scottish Government et al; Dynamic Coast: Scotland's Coastal Change Assessment (website)  
<http://www.dynamiccoast.com/>
30. SUDS Working Party; SuDS for Roads: August 2009  
<http://www.scotsnet.org.uk/assets/SudsforRoads.pdf>
31. CIRIA C753; The SuDS Manual; Updated November 2015  
[https://www.ciria.org/Memberships/The\\_SuDs\\_Manual\\_C753\\_Chapters.aspx](https://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx)
32. CIRIA; Guidance on the construction of SuDS (C768)  
<https://www.ciria.org/ItemDetail?iProductcode=C768&Category=BOOK>

33. CIRIA and HR Wallingford (x108); Drainage of Development Sites – A Guide; 2004  
<https://www.ciria.org/Search?SearchTerms=x108>
34. CIRIA C698: Site Handbook for the Construction of SuDS  
<https://www.ciria.org/ItemDetail?iProductCode=C698&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91>
35. CIRIA; C635 - Designing for Exceedance in Urban Drainage  
<https://www.ciria.org/ItemDetail?iProductCode=C635&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91>
36. CIRIA C624: Development and Flood Risk Guidance for the Construction Industry  
<https://www.ciria.org/Search?SearchTerms=C624>
37. CIRIA; C688 - Flood Resilience and Resistance for Critical Infrastructure  
[https://www.ciria.org/Resources/Free\\_publications/Flood\\_resilience.aspx](https://www.ciria.org/Resources/Free_publications/Flood_resilience.aspx)
38. CIRIA C689: Culvert design and operations guide [Replaces R168; Culvert Design Manual]  
<https://www.ciria.org/Search?SearchTerms=C689>
39. CIRIA C532D; Control of Water Pollution from Construction Sites - Guidance for Constructors and Contractors  
<https://www.ciria.org/Search?SearchTerms=C532>
40. CIRIA R156; Bettess 1996; Infiltration Drainage Manual of Good Practice  
<https://www.ciria.org/Search?SearchTerms=R156>
- 40a. Webpage: CIRIA guidance including BeST (Benefits of SuDS Tool)  
<https://www.susdrain.org/resources/ciria-guidance.html>
41. Scottish Water; Sewers for Scotland  
<https://www.scottishwater.co.uk/Business-and-Developers/Connecting-to-Our-Network/Waste-Water-Connection/www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Business-and-Developers/Connecting-to-our-network/All-connections-information/SewersForScotlandv4.pdf?la=en&hash=A6F10AE4967C96DF3DA4D5F69D4712CCD57CBEE2>
42. Building Research Establishment; Soakaway design; (DG365 – 2016)  
<https://www.brebookshop.com/index.jsp>
46. CEH Wallingford: Flood Estimation Handbook,  
<https://www.ceh.ac.uk/services/flood-estimation-handbook>
47. IH Report 124; Flood estimation for small catchments; 1994

<http://nora.nerc.ac.uk/7367/>

48. Environment Agency: Coastal flood boundary conditions for UK mainland and islands - Project: SC060064/TR4: 'Practical guidance design sea levels'.

Note: Future sea level rise estimates are not considered in this project.

<https://www.gov.uk/government/publications/coastal-flood-boundary-conditions-for-uk-mainland-and-islands-design-sea-levels>

49. NERC Open Research Archive: Estimating flood peaks and hydrographs for small catchments: Phase 1 – Project SC090031; May 2012

<http://nora.nerc.ac.uk/id/eprint/19604/>

50. UK climate Projections

<https://www.metoffice.gov.uk/pub/data/weather/uk/ukcp18/science-reports/UKCP18-Overview-report.pdf>

<https://adaptationscotland.org.uk/news-events/stories/ukcp18-climate-projections-launched>

51. UKCP09 sea level change estimates

[http://www.ukcip.org.uk/wordpress/wp-content/PDFs/UKCIP\\_sea-level.pdf](http://www.ukcip.org.uk/wordpress/wp-content/PDFs/UKCIP_sea-level.pdf)

52. Environment Agency: Technical Report W.187 'Fluvial Freeboard Guidance Note' (2000)

Note: Update project to complete 30/04/17.

<https://www.gov.uk/government/publications/fluvial-freeboard-guidance-note>

<http://evidence.environment>

[agency.gov.uk/FCERM/en/FluvialDesignGuide/Chapter9.aspx?pagenum=14](http://agency.gov.uk/FCERM/en/FluvialDesignGuide/Chapter9.aspx?pagenum=14)

## APPENDIX 2: FRA Requirements

Table 1: FRA Background

FRA Level			A Background Information	
1	2	3		
√	√	√	<b>A1</b>	Study area description
√	√	√	<b>A2</b>	Outline of development proposal
√	√	√	<b>A3</b>	Geo-referenced location and site plans showing all bodies of water or sources of flood risk which may have an influence on the site
	√	√	<b>A4</b>	Plan of site illustrating pre and post development ordnance datum levels to a recognised scale
	√	√	<b>A5</b>	A plan and description of any structures that may influence local hydraulics. This will include bridges and pipes/ducts crossing the watercourses together with culverts, screens, embankments or walls, overgrown or collapsing channels and their likelihood of choking with debris
√	√	√	<b>A6</b>	Good use of photographs illustrating important features such as culverts etc
√	√	√	<b>A7</b>	Catchment description

	√	√	<b>A8</b>	If appropriate, information on current flood alleviation measures including the level of protection and condition
	√	√	<b>A9</b>	Identification on the ownership of any water related structures and assessment of their condition
	√	√	<b>A10</b>	Information of historic flood events, photographs, levels, trends in the vicinity of the development
	√	√	<b>A11</b>	Clear drawings, plans and maps to a recognised scale relevant to the site
	√	√	<b>A12</b>	Information on consultations undertaken with others

Table 2: FRA Methodologies

FRA Level			B Methodologies	
1	2	3		
√	√	√	<b>B1</b>	Description of the type or source of any present flooding risk
		√	<b>B2</b>	In the event that hydrological and/or hydraulic modelling is required it is important to ensure that the appropriate method has been chosen and explained in the FRA, justifying how the chosen model will accurately reflect the complexity of the hydrological processes
		√	<b>B3</b>	Appropriate model calibration and verification should be carried out where possible. Un-calibrated models should be accompanied by appropriate sensitivity analysis.
		√	<b>B4</b>	For fluvial assessments all technical records and data sets derived from the Flood Estimation Handbook (FEH) or other (if appropriate)
		√	<b>B5</b>	For coastal assessments all technical records and data sets derived by following the industry accepted methodology (See Appendix 1, Document 14)
		√	<b>B6</b>	All modelling should be completed using recognised industry software to determine design water levels and a sensitivity analysis undertaken to determine the sensitivity of design water levels with regards to the key model parameters such as design flow, boundary conditions and roughness. (See Appendix 1, Document 9)
			<b>B7</b>	It is considered best practise to include an additional allowance for climate change <sup>6</sup> , preferably utilising latest estimates from the UK Climate Projections Project <a href="http://ukclimateprojections.metoffice.gov.uk/">http://ukclimateprojections.metoffice.gov.uk/</a> . In general a 20% increase in peak fluvial flows should be adopted to assess the potential long term impacts of climate change on future flood risk.

Table 3: FRA Results

FRA Level			C Results	
1	2	3		

<sup>6</sup> Technical flood risk guidance for stakeholders: "Best estimates, based on the most up-to-date findings, should also be made of climate change impacts on probabilities, flood depths and extents for fluvial and coastal situations. Current fluvial guidance (published by DEFRA) recommends that the 0.5% (200-year) peak flow estimate should be increased by +20%." This may be varied in response to specific circumstances. A higher percentage increase in peak flows could be required for developments with a longer design life. The approach for estimating extreme still water levels has now been updated and the Coastal Flood Boundary method should now be used. For projected increases in sea-level rise, refer to UKCP09 sea level change estimates. (See Appendix 1, Document 26.)

√	√	√	<b>C1</b>	Comment and recommendations on application of appropriate design to suit flood risk.
		√	<b>C2</b>	To ensure a complete FRA, the reporting of any modelling study is compulsory and should address important issues to an appropriate level of detail
		√	<b>C3</b>	If the FRA is underpinned by hydraulic modelling the results should be summarised in a tabular format, including results for appropriate sensitivity analysis
		√	<b>C4</b>	If applicable pre and post development flood levels should be compared for a range of annual return periods up to 1 in 200, unless for high risk developments (see SPP Framework) which should satisfy a standard of 1:1000 AEP.
		√	<b>C5</b>	If the proposal is likely to result in a loss of flood plain storage then a quantitative assessment should be made of the anticipated loss on a level-for-level and volume-for-volume basis. Proposals to compensate for such loss should also be included
		√	<b>C6</b>	Should site flood levels be influenced by downstream hydraulic features such as culverts, an assessment should be made of the potential impact various blockage scenarios may have on expected flood levels
		√	<b>C7</b>	An appropriate freeboard <sup>7</sup> to mitigate uncertainty in relation to flood estimation and exacerbating factors such as wave action - in line with industry standard principles and available guidance, will be required.
		√	<b>C8</b>	An assessment of the impact of the design flood on access to and egress from the development will be required

Table 4: FRA Conclusions

FRA Level				D Conclusions
1	2	3		
√	√	√	<b>D1</b>	The conclusions should include a summary of the findings detailing any recommendations that have been made.
√	√	√	<b>D2</b>	The report should also indicate how all flood risks have been identified and appropriately mitigated or managed. The plans of the development should clearly take cognisance of these conclusions.
√	√	√	<b>D3</b>	A statement outlining how, in the author(s) opinion, the development proposal complies with current flood legislation and policy should be provided
	√	√	<b>D4</b>	A summary of residual risk after any proposed flood mitigation measures have been suggested and recommendations for further study/ risk reduction

<sup>7</sup> Indicative freeboard for access and egress and to property ground floor levels is 600mm minimum. "The appropriate level of freeboard will take account of the flow and turbulence of the flood water, the speed, direction and duration of the wind, plus the extent of the water over which the wind blows. It is therefore not possible to give a universal figure for freeboard, but it should be determined through a consistent approach ..." The Environment Agency has produced a Technical Report W.187 'Fluvial Freeboard Guidance Note' (2000) which should be used to determine the appropriate freeboard allowance. (See Appendix 1)

### APPENDIX 3: Self Certification

FRA Guidance Assessment Compliance Certificate	
I certify that all reasonable skill, care and attention to be expected of a qualified and experienced professional in this field have been exercised in carrying out the attached Assessment. I also confirm that I maintain the required Professional Indemnity Insurance <sup>8</sup> . The report has been prepared in support of the below named development in accordance with the reporting requirements issued by Dumfries & Galloway Council.	
Assessment type: FRA	
Additional Information	
Assessment Ref No:	
Assessment Date:	
Name of Proposed Development:	
Address:	
Name of Prospective Developer:	
Name and Address of Organisation preparing this Assessment	
Name of Approver	
Signed:	
Date:	
Position Held:	
Qualification of person responsible for signing off this Assessment <sup>9</sup>	

<sup>8</sup> Please attach appropriate evidence of Professional indemnity Insurance

<sup>9</sup> A Chartered member of a relevant professional institution



## Acronyms

AEP Annual Exceedance Probability  
CAR Water Environment (Controlled Activities) Regulations 2011  
CEH Centre for Ecology and Hydrology  
DIA Drainage Impact Assessments  
DGC Dumfries & Galloway Council  
CIRIA Construction Industry Research and Information Association  
FEH Flood Estimation Handbook  
FRA Flood Risk Assessment  
LDP2 Local Development Plan 2  
SEPA Scottish Environment Protection Agency  
PAN Planning Advice Note  
SFM Sustainable Flood Management  
SPP Scottish Planning Policy (2014)  
SuDS Sustainable Drainage Systems  
SW Scottish Water  
UKCIP United Kingdom Climate Impacts Programme

## Glossary

**AEP (Annual Exceedance Probability):**  
This is the accepted measure of the likelihood of a flood occurring at a particular location within a period of one year. For example, a flood with a 1% AEP has a statistical probability of being reached or exceeded in any year of 1% (1:100). This is often referred to as the 'once in 100 year flood'. It should be noted however, that the occurrence of a flood event does not change the statistical probability of another flood occurring.

**Brownfield:** Previously developed land and premises, including the curtilage of buildings, which may still be partially occupied or used. Most commonly associated with derelict urban land with redundant industrial buildings. Excludes agriculture, forestry and previously used

land which now has nature conservation or recreation value.

**DIA (Drainage Impact Assessment):** A statement of the drainage issues relevant to a proposal and the suitable means of providing drainage. The length and detail should be proportionate to the issues. As appropriate it may include existing drainage systems and problems, infiltration, groundwater, surface water flow, foul and storm water disposal, SuDS and drainage related flooding issues. See also PAN 61 paragraphs 23 – 24.

**Flood Plain:** Generally low lying areas adjacent to a watercourse, tidal lengths of the river or sea, where water flows in times of flood or would flow but for the presence of flood defences. SPP says that this is the equivalent to the 1:200 AEP area.

**Flood Risk Assessment:** An assessment of the likelihood of flooding in a particular area so that development needs and mitigation measures can be carefully considered. 24 draft

**Freeboard:** This is often defined as the difference between the flood defence level and the design flood level. It can also however be the difference between the design flood level and the finished floor levels of any development. Freeboard is required to account for (a) the uncertainties involved in flood design and (b) physical imponderables such as post-construction settlement or wave action. Any allowance for climate change should be independent of the freeboard allowance.

**Greenfield:** Land not previously developed, can include agricultural land.

**Relevant Bodies of Water:** Expression used in the Flood Risk Management (Scotland) Act 2009 to defines those bodies of water (other than canals) that a local authority should assess for the purpose of ascertaining whether their condition gives rise to a risk of flooding of land within or outwith its area.

**Sustainable Drainage System (SuDS):** These are designed to reduce the potential impact of developments with respect to surface water discharges by replicating natural systems of drainage (rather than by routing water through solid pipes) allowing water to be released slowly back into the environment