PERTH & KINROSS COUNCIL

FLOOD RISK AND FLOOD RISK ASSESSMENTS

(DEVELOPERS GUIDANCE NOTE ON FLOODING & DRAINAGE)

June 2014

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1 INTRODUCTION

1.1 Flooding is a natural phenomenon and many parts of Scotland have a legacy of development at risk of flooding from watercourses, the sea, groundwater and inadequate drainage. Recent research indicates that climate change will significantly increase the risk of flooding due to changes in precipitation and rising sea levels. Already, since the mid 1980s, Scotland has seen an increase in the number of floods and high flow levels on many rivers.

As a result of the increased risk of flooding, the Scottish Government has developed a policy over the last ten years based on the principles of avoidance, awareness, assistance and alleviation. In June 2009, the Scottish Parliament enacted the Flood Risk Management (Scotland) Act to implement the European Directive 2007/60/EC (the Flood Directive) and modernise flood risk management in Scotland. The new Act provides the framework for a sustainable and risk based approach to flood risk management considering flooding from all sources. In February 2010, the Scottish Government published the Scottish Planning Policy (SPP) which combines and updates previously separate planning policies, including SPP7 (Planning and Flooding). This provides a national framework on which Perth and Kinross planning policy is based. A revised 2013 version of the Scottish Planning Policy is currently being prepared and will shortly replace the 2010 version.

This supplementary guidance document on flooding & drainage has been prepared by Perth & Kinross Council (PKC) Flooding Team to inform developers, their consultants and all stakeholders involved in the planning process in relation to flooding and drainage about the requirements of PKC. It is based on other existing legislation, planning policy, and technical guidance. Compliance with the guidance will serve to meet the requirements of SPP, the Council's Local Development Plan and assist in the efficient processing of a developers' application.

2 AIM

2.1 This guidance document is intended as supplementary guidance for the area of Perth and Kinross in respect of existing national legislation and guidance regarding flooding and drainage (see list in Section 4). It also aims to encourage an increased awareness, understanding and knowledge in flooding and drainage issues of everyone involved in the development process and thus make Perth and Kinross a safer place to live, work and visit.

This guidance document is not intended to replace the consultation that developers will require to initiate with PKC Flooding Team and other consultees. Therefore, before submitting a planning application, developers are strongly advised to consult with the Council's Flooding Team and SEPA. The Council holds information on historic flooding, flood studies, flood schemes, watercourse maintenance records, biennial flood prevention reports, etc with relevant information on flooding within Perth and Kinross.

3 BACKGROUND TO FLOODING

3.1 Riparian Owner

3.1.1 Flooding is a natural phenomenon and as such the main responsibility for reducing flood risk lies with the owner of the affected property. It is long established that a property owner should take responsibility for the safety and security of his/her own property, which includes a right to take steps to reduce the risk of flooding.

3.1.2 Under Common Law riparian owners must:

- Accept water from upstream;
- Have the right to protect own property;
- Should not make the situation (flooding) worse for others;
- Undertake maintenance of watercourses on their property.

3.2 Legislation

3.2.1 There are many pieces of legislation covering flooding and drainage. A general summary is outlined below:

3.2.2 *Flood Risk Management (Scotland) Act 2009*

The Scottish Parliament enacted the Flood Risk Management (Scotland) Act 2009 to implement the European Directive 2007/60/EC (the Flood Directive) and modernise flood risk management in Scotland. The new Act provides the framework for sustainable and risk based approach to flood risk management considering flooding from all sources. The new Act identifies the roles and functions of the responsible parties with a view to reducing overall flood risk.

The main roles and responsibilities for PKC under the Act are:

- Map bodies of water and Sustainable Drainage Systems;
- Assess bodies of water from time to time for the purpose of ascertaining whether the condition of any such body of water gives rise to a risk of flooding of land within or outwith its area;
- Where a body of water gives rise to such a risk, the authority shall prepare and carry out a schedule of clearance and repair works;
- Prepare local flood risk management plans.

3.2.3 *Scottish Planning Policy (SPP)*

Scottish Planning Policy (SPP) is a statement of Scottish Government policy on land use planning and provides a national framework on which Perth and Kinross planning policy is based. In particular, SPP states planning authorities must consider flooding from all sources and the risks involved when preparing development plans and determining planning applications. A revised 2013 version of the Scottish Planning Policy is currently out to consultation and will shortly replace the 2010 version.

3.2.4 *Water Environment Water Services (Scotland) Act 2003 (WEWS Act)*

The WEWS Act gave Scottish Ministers powers to introduce regulatory controls over water activities, in order to protect, improve and promote sustainable use of Scotland's water environment. This includes wetlands, rivers, lochs, transitional waters (estuaries), coastal waters and groundwater.

3.2.5 *Controlled Activities (Scotland) Regulations 2011*

These regulations are more commonly known as the Controlled Activity Regulations (CAR).
If you intend to carry out any activity which may affect Scotland's water environment, you must be authorised by SEPA to do so.

3.3 Role of Local Authority regarding Flooding and Drainage

3.3.1 *Roads Authority*

The Roads (Scotland) Act 1984 gives local authorities powers and duties with regards to public roads. Of particular relevance are:

- Manage and maintain all roads in their area which includes draining roads and keeping drains clear;
- Contribute towards the costs of drainage works which appear to them desirable for protection or enjoyment of a public road;
- There is a duty on owners and occupiers of land adjacent to a road to prevent water or dirt from flowing onto or across the public road.

3.3.2 *Flood Authority*

PKC have duties and powers to reduce flood risk in their area. The Flood Risk Management (Scotland) Act 2009, detailed in Section 3.2.2, outlines the duties of the Local Authority.

However, flooding is a natural phenomenon and as such the main responsibility for reducing flood risk lies with the owner of the affected property.

3.3.3 *Planning Authority*

The planning system is used to make decisions about future development, and the use of land in our towns, cities and countryside. It decides where development should happen, where it should not and how development affects its surroundings. PKC, as Planning Authority, have a role in checking the adequacy or otherwise of a development in terms of flooding from all sources (i.e. Surface Water, Fluvial Flooding, Groundwater) and inform the Developer when a FRA/DIA is required. SPP provides the framework in which to carry out these duties, refer to Section 3.2.3.

3.4 Types of Flooding[1]

3.4.1 Developers will need to consider all sources of flooding when assessing flood risk at a site. The various types of flooding are generally defined as follows:

3.4.2 **Fluvial** – flooding originating from a watercourse either natural or culverted. Normally caused when the river channel capacity (or culvert capacity) is exceeded and water flows out-of-bank onto the floodplain, which could either be natural floodplain or developed. A floodplain is the area(s) of land adjacent to a watercourse where floodwaters naturally flow and/or are stored during times of flood. In some instances fluvial flooding can occur from a combination of several local watercourses.

3.4.3 **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 coast line. This coastal plain could be either natural or developed. Coastal flooding can occur due to four physical elements (as outlined below) either acting on their own or in combination with each other.

[1] SEPA – Technical Flood Risk Guidance for Stakeholders

- **Predicted astronomical tide:** expected sea level due to the gravitational effects of the sun and the moon.
- **Storm surge residual:** elevated sea level caused by the combined effect of low pressure and persistent, strong wind (for every millibar drop in pressure, a 10mm rise in the sea surface elevation occurs).
- **Wave effects:** a function of both wind strength and open water 'fetch' length. As a result of high winds, waves can also be associated with low pressure systems which cause storm surge effects as described above.
- **Local bathymetric effects:** topographic funnelling due to the forcing of a large volume of open sea water into a restricted coastal embayment, e.g. estuary (Firth of Forth), tidal basin (Montrose Basin) or sea loch (Loch Fyne), which will elevate water levels locally.

3.4.4 **Pluvial** – urban or rural flooding which results from rainfall-generated overland flow before the runoff enters any watercourse, drainage system or sewer.

3.4.5 **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 (can affect cellars and drainage systems). Normally associated with catchments where porous substrate and/or aquifers exist. This type of flooding can last for a considerable period of time, i.e. weeks, months.

3.4.6 **Drainage** – flooding as a result of surcharging of man-made drainage systems including combined sewers where the capacity of the system to convey runoff has been exceeded.

3.4.7 **Infrastructure Failure** – flooding due to collapse/failure of man made infrastructure including hydro-dams, water supply reservoirs (private or public), canals, flood defence structures, underground conduits (e.g. sewers) and water treatment tanks.

3.4.8 Note that flooding may occur due to a combination of more than one type of flood process (i.e. fluvial and coastal flooding). In these circumstances please contact the Flooding Team to discuss the implications and any additional work required.

3.5 Flood Probability

3.5.1 The annual probability (AP) of flooding is the statistical chance (or risk) that a location will flood in any given year and relates to a particular size or magnitude of flood, e.g. the 0.5% AP (200-year) flood event is smaller in size than the 0.1% AP (1000-year) flood event (although a 0.5% AP flood event will occur more frequently than a 0.1% AP flood event).

3.5.2 For any given location, the 0.5% AP (200-year) flood event should (in theory) affect a smaller spatial area, or, will inundate the same area to a lesser depth (if the floodplain is constricted by topography), than the larger 0.1% AP (1000-year) flood event. The chance of experiencing the larger 0.1% AP flood event, however, is smaller as explained below:

3.5.3 For the same location, the 0.5% AP flood event can be expressed as 'the flood which has a 0.5% chance of occurring in any given year' (i.e. there is a 1 in 200 chance of experiencing a flood of that size, at that location); also referred to as the 200-year flood or the flood with a return period of 200-years.

3.5.4 However, it does not follow that if a location suffers the 0.5% AP flood event this year, it will not be flooded again to this extent for 199 years. Statistically, the chance or probability of experiencing the 0.5% AP flood event remains the same in any given year. Furthermore, it also does not follow that over any 200-year period, the 0.5% AP (200-year) flood event will definitely be experienced, i.e. statistically, the chance of experiencing the 200-year flood event within a 200-year period is only 63% (see table 1 below).

	Return Period (Annual Probability)			
Design Life (Years)	50 (2% AP)	100 (1% AP)	200 (0.5% AP)	1000 (0.1% AP)
1	2	1	0.5	0.1
10	18	10	5	1
20	33	18	10	2
50	64	39	22	5
70	76	50	30	7
100	87	63	39	10
200	98	87	63	18

Table 1: Probability of experiencing a range of flood events over different time periods (design life)

3.5.5 Flooding is likely to increase due to climate change. In general terms this is likely to result in an increased probability of occurrence of extreme storm event. However the concept of flood probability is generally based on stationary process and therefore does not take into account climate change directly. Hence there is a need to add an allowance for the impact of climate change as detailed below.

3.6 Climate Change

3.6.1 Climate change is happening and there is mounting evidence of fundamental alterations to the key elements of our climate system as a result of human activities. Left unchecked these changes will accelerate, with significant consequences for our environment, economy and society.

3.6.2 The pace and signs of climate change varies across the globe, but eventually everyone will either be directly or indirectly affected by climate change. Flooding and drought are obvious direct threats, and these can have indirect impacts such as higher food prices as a result of crop damage.

3.6.3 In Scotland, climate change is evident from observed changes in temperature, rainfall and snow cover. These changes are causing significant shifts in the growing, breeding and migration seasons, as well as species abundance and diversity. Higher river flows are leading to flood risks and sea level rise is causing coastal erosion.

3.6.4 Left unchecked, climate change will accelerate. Therefore, developers must aim to reduce and account for the affects of climate change in order to minimise the burden for future generations.

4 DESIGN GUIDANCE

4.1 This section lists the main national legislation and technical guidance that PKC expects developers and their consultants to follow when preparing a Drainage Impact Assessment (DIA), Flood Risk Assessment (FRA), design of Sustainable Drainage Systems (SuDS) and other drainage infrastructures. The list below is not exhaustive, and developers must ensure that all guidance and other relevant documentation is clearly referenced in their submissions.

Many of these documents are subject to frequent revision, and developers should ensure that they are using the current versions.

4.2 Scottish Government

- Flood Risk Management (Scotland) Act 2009
- Scottish Planning Policy, February 2010 – (2013 update due out soon)
- Planning Advice Note 51: Planning, Environmental Protection and Regulation
- Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems[2]
- Planning Advice Note 69: Planning and Building Standards Advice on Flooding[2]
- Planning Advice Note 79: Water and Drainage[2]
- The Water Environment and Water Services (Scotland) Act 2003
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011
- Roads (Scotland) Act 1984
- Planning etc (Scotland) Act 2006
- Delivering Sustainable Flood Risk Management
- Surface Water Management Planning Guidance

4.3 Scottish Environment Protection Agency (SEPA)

- SEPA Policy No 41: Development at Risk of Flooding: Advice and Consultation
- SEPA Ponds, Pools and Lochans – Guidance on the Good Practise in the Management and Creation of Small Waterbodies in Scotland
- SEPA Technical Flood Risk Guidance for Stakeholders
- SEPA's Indicative River and Coastal Flood Map
- Various SEPA policy documents for water, water resources, flooding and climate change
- SEPA advice on Sustainable Drainage Systems (SuDS)
- And other general SEPA surface water drainage guidance available
- Habitat Enhancement Publications
- Land Use Vulnerability Guidance

4.4 SuDS Working Party

- Drainage Assessment: A Guide for Scotland

4.5 Construction Industry Research and Information Association (CIRIA)

- CIRIA C532: Control of Water Pollution form Construction Sites – Guidance for Consultants and Contractors
- CIRIA C582: Source Control using Constructed Pervious Surfaces. Hydraulic, Structural and Water Quality Performance Issues
- CIRIA C624: Development and Flood Risk – Guidance for the Construction Industry
- CIRIA C625: Model Agreements for Sustainable Water Management Systems
- CIRIA C635: Designing for Exceedance in Urban Drainage – Good Practice
- CIRIA C680: Structural Designs of Modular Geocellular Drainage Tanks
- CIRIA C687: Planning for SuDS – Making it happen
- CIRIA C688: Flood Resilience and Resistance for Critical Infrastructure
- CIRIA C689: Culvert Design and Operation Guide

[2] Note: Planning Advice Note 61, 69 and 79 are in the process of being amalgamated into one document.

- CIRIA C697: SuDS Manual
- CIRIA C698: Site Handbook for the Construction of SuDS
- CIRIA C713 Retrofitting to Manage Surface Water
- CIRIA C715: Environmental Good Practice on Site – Pocket Book
- CIRIA C724: Creating Water Sensitive Places
- CIRIA R156: Infiltration Drainage – Manual of Good Practice

4.6 Scottish Water

- Sewers for Scotland 2nd Edition

4.7 Other

- BRE Digest 365
- DEFRA – Flood Risk Assessment Guidance for New Development
- UKCP09
- DEFRA FCDPAG3 October 2006 Supplementary Note on Climate Change Impacts
- TAYplan
- Perth and Kinross Local Development Plan
- BS EN 1610:1998 Construction and Testing of Drains and Sewers
- Institute of Hydrology Report 124
- Flood Estimation Handbook
- SuDS for Roads

5 DRAINAGE IMPACT ASSESSMENT

5.1 Introduction

5.1.1 This section provides guidance on the requirements for the preparation and submission of a DIA for new developments.

5.1.2 Drainage is a material consideration at the planning stage of a development and due consideration must be given to the impact of the proposed development on the catchment area. This includes an assessment of potential for both flood risk and pollution.

5.1.3 Submission of a DIA with all the information required will accelerate consideration of the planning application. Failure to demonstrate that satisfactory means of waste water and/or surface water drainage can be provided may lead to refusal of planning permission.

5.1.4 A DIA is site specific and should deal with waste water and surface water drainage. The latter should be drained according to the principles of SuDS, refer to Section 7.

5.1.5 Where the development is to be phased, constructed at different stages or by different developers, a strategic drainage plan covering the whole area of the development should be submitted at outline planning stage.

5.1.6 Where the development will lead to the production of waste water, a DIA must include a section on waste water.

5.2 Does the Development Require a DIA?

5.2.1 Most developments will require a DIA to be submitted as part of the planning process. The extent of a DIA will be dependant on the size and complexity of the Development. For large developments where there is an intention to separate the development into zones which will potentially be constructed at different stages or by different developers, a drainage masterplan covering the whole of the development will be required.

5.2.2 The following categories of development will not require a DIA, but the best available option for waste water and surface water drainage is expected to be demonstrated.

1. Developments with a total proposed impermeable surface area of less than 1000m^2 unless the development may affect sensitive areas*;
2. Extension of building or hardstanding area under 100 square metres;
3. Changes of use not involving new buildings or hard surfacing;
4. Where the submission forms part of a larger development for which a DIA has already been accepted.

Sensitive Areas include:

a. Areas where there is no available public sewer;
b. Areas affected by flooding;
c. Areas with high water table problems;
d. Receiving water with no capacity for additional flow (e.g. Perth Town Lade);
e. Areas surrounding Fisheries i.e. local fish farms;
f. Areas with or upstream (1km) of a conservation site designated under national or international legislation, for example a Site of Special Scientific Interest (SSSI); and
g. Contaminated Land.

5.2.3 In the event that you are unsure as to whether a DIA is required or whether your development affects any of the sensitive areas please contact the Flooding Team for clarification, refer to Section 10 for contact details.

5.3 What Should a DIA Include

5.3.1 *Planning Permission In Principle*

Planning Permission in Principle will require a brief overview of the development site drainage arrangements, associated issues and include the following:

i. Drawings showing the development site in relation to the natural surface water runoff catchment or sub-catchment areas, including contour plans and details of the existing receiving watercourses and surface water drainage.
ii. A statement identifying which, if any, of the receiving drains and watercourses are historically prone to flooding in any part of their length.
iii. Sufficient information on the restriction of post development surface water forward flow, basic catchment areas, pervious and impervious areas ratio, proposed methods of attenuation and indicative SuDS details, in order that a Strategic Drainage Plan or a local drainage proposal can be agreed in principle.
iv. Completed Appendix B.

5.3.2 *Full Planning Applications*

A full DIA should include all information relating to the design, construction, operation and maintenance of the drainage infrastructure. In particular:

5.3.3 *Background Data*

1. Background to the existing drainage infrastructure, including a drawing (1:1250) detailing the size, percentage of impermeable area, type, level and rough gradient of each drainage infrastructure (field drains should be incorporated where possible). Photographs are recommended to record details of key site features/water related structures (bridges, culverts, riverbanks, ditches, ponds, existing flood protection measures, existing SuDS, etc) and provide an assessment of their condition;
2. A brief summary of how the drainage design provides SuDS techniques in accordance with current design guidance;

5.3.4 *Supporting Text*

1. The size of the Development and percentage of impervious surfaces (including an additional 10% for future expansion);
2. The soil classification for the site including test results and, specifically, details of any site contamination;
3. Subsoil porosity test for proposed infiltration devices should be undertaken in line with the requirements of BRE Digest 365 or similar recognised methodology (to be confirmed by the Developer). Note, subsoil porosity tests must be undertaken as close as possible to the proposed location of each proposed infiltration device/component to ensure that the results are representative. If a porosity test is deemed by PKC to be too remote from the proposed location, the test may require to be re-done;
4. Summary of SuDS to be incorporated and how the system will perform and operate including suitability (or not) for future development connections. The summary of SuDS should include comment on the interaction with any contaminated soil present on the site during the construction and operation of the SuDS;
5. Assessment of flood risk including consideration of the overland flow route back to the receiving watercourse for up to the 0.5% AP (200-year) plus climate change flood event showing no detriment to land or property as a result of overland flow. The 0.5% AP (200-year) plus climate change flood event must be a minimum of

300mm from the lowest garden ground level[3] and 600mm from property finished floor levels (FFL);

6. A method statement detailing how water arising during construction will be dealt with (refer CIRIA publication C532 Control of water pollution form construction sites. Guidance for consultants and contractors), with particular reference to erosion prevention, sediment and runoff control and pollution prevention in order to ensure the integrity and satisfactory performance of SuDS. The use of completed SuDS for this purpose will not be accepted;
7. Copies of plans from Scottish Water confirming the location of the nearest public sewers and signed correspondence confirming their availability for servicing the development. This shall clearly state agreed flow rates for waste water and surface water as applicable;
8. A copy of a letter from SEPA outlining their approval of the design flows for the watercourse(s) being considered;

5.3.5 *Calculations*[4]

1. Drainage network calculations for various durations (minimum of 15, 30, 60, 120, 240, 360, 480, 960, 1440min) at the following return periods 1-year, 30-year, 100-year and 200-year;
2. Calculations demonstrating the attenuation required so that the post-development run-off volume does not exceed that for pre-development for the critical rainfall events (refer to Section 7.6);
3. Calculations demonstrating the pre development peak run-off flow rate for the critical rainfall event for 3.33% AP (30-year), 1% AP (100-year) and 0.5% AP (200-year) and for post development peak run-off flow rate for the critical rainfall event for 3.33% AP (30-year), 1% AP (100-year) and 0.5% AP (200-year), including 20% for climate change (e.g. post development for 0.5% AP (200-year) with CC to be attenuated to pre development for 0.5% AP (200-year) without CC). If using software, a CD containing all input and results files with a word document summarising the contents of each file should be included;
4. Calculation of the treatment volume (V_t) and required multiples thereof and demonstration that the level of treatment and available treatment volume in the SuDS is adequate. Swales as conveyance systems contribute to the total V_t;
5. Calculations for the outlet control for attenuation structures and/or SuDS treatment facilities, along with manufacturers' data for proprietary controls;
6. To aid review and understanding, all calculations should be suitably annotated to provide descriptive text of the logic, reasoning and methodology utilised. The origin of all formulae should be identified. All assumptions should be clearly stated with reference to their origin. All units should be clearly stated;

5.3.6 *Drawings*

1. Detailed scale drawing/s showing the development proposals at a scale of 1:1250;
2. Detailed scale drawing/s showing the development waste water and surface water drainage proposals at a scale of 1:1250 or 1:500 where complex;

5.3.7 *Maintenance*

1. Details of in principle maintenance responsibilities including copies of relevant correspondence. Responsibility for maintenance of SuDS within property boundaries rests with the property owner. Developers shall provide confirmation

[3] It is acknowledged that in certain circumstances 300mm freeboard for garden ground may not be achievable and early consultation and agreement with the Flooding Team is recommended.

[4] It is acknowledged that the requirement for fully detailed drainage calculations (Section 5.3.5) at full planning application stage is not always appropriate. Therefore, the developer should approach the Flooding Team to discuss the level of detail required to properly assess the application. Outline design calculations will be required as a minimum.

on how they intend to make homeowners aware of the burden of responsibility and whether there will be an allowance for setting up factoring arrangements to manage maintenance;
2. A maintenance schedule for all proposed SuDS, to include a detailed list of activities and timescales;

5.3.8 *Health & Safety*

1. Risk assessments for SuDS facilities and attenuation structures which have permanent or temporary opening and a water of a depth that could pose a risk to health and safety.

5.3.9 *General*

1. All documents, drawings and calculations should clearly state a reference title, number and version to ensure that appropriate version control is applied and to provide ease of reference through any subsequent necessary revisions. All documents, drawings and calculations should show evidence of appropriate check, review and approval prior to issue;
2. All levels should be related to Ordnance Datum Newlyn;
3. Completed Appendix B.

Please note, this list is not exhaustive and additional information maybe requested as required.

5.3.10

IMPORTANT INFORMATION

In the event that the Development is approved, the Flooding Team require a copy of the Health & Safety File on completion of the Maintenance Period. The Health & Safety File should incorporate as a minimum:

1. **Risk assessments**
2. **Maintenance schedules**
3. **Up to date full CCTV survey of system**
4. **As-Built drawings**
5. **Maintenance procedures**

The above information is required in order that PKC can comply with the Flood Risk Management (Scotland) Act 2009.

Failure to provide the above information may delay or prevent the adoption of your development.

6 FLOOD RISK ASSESSMENT

6.1 When is a FRA Required?

6.1.1 Flooding is a material consideration at the planning stage of a development and is required from the outset (i.e. at planning permission in-principle stage). The Flood Risk and Planning Flow Chart, see Figure 1 below, illustrates when a FRA is required. Should a developer be unclear as to whether a FRA is required, then contact should be made with the Flooding Team for clarification, refer to Section 10.

6.1.2 In addition, a FRA is also required in the following circumstances:

1. Construction of a new watercourse;
2. Construction of a structure over or adjacent to a watercourse;
3. Development in or adjacent to a flood bank or any flood control structure or constraint;
4. Construction adjacent to Coastal waters and/or below the 6m mAOD contour.

6.1.3

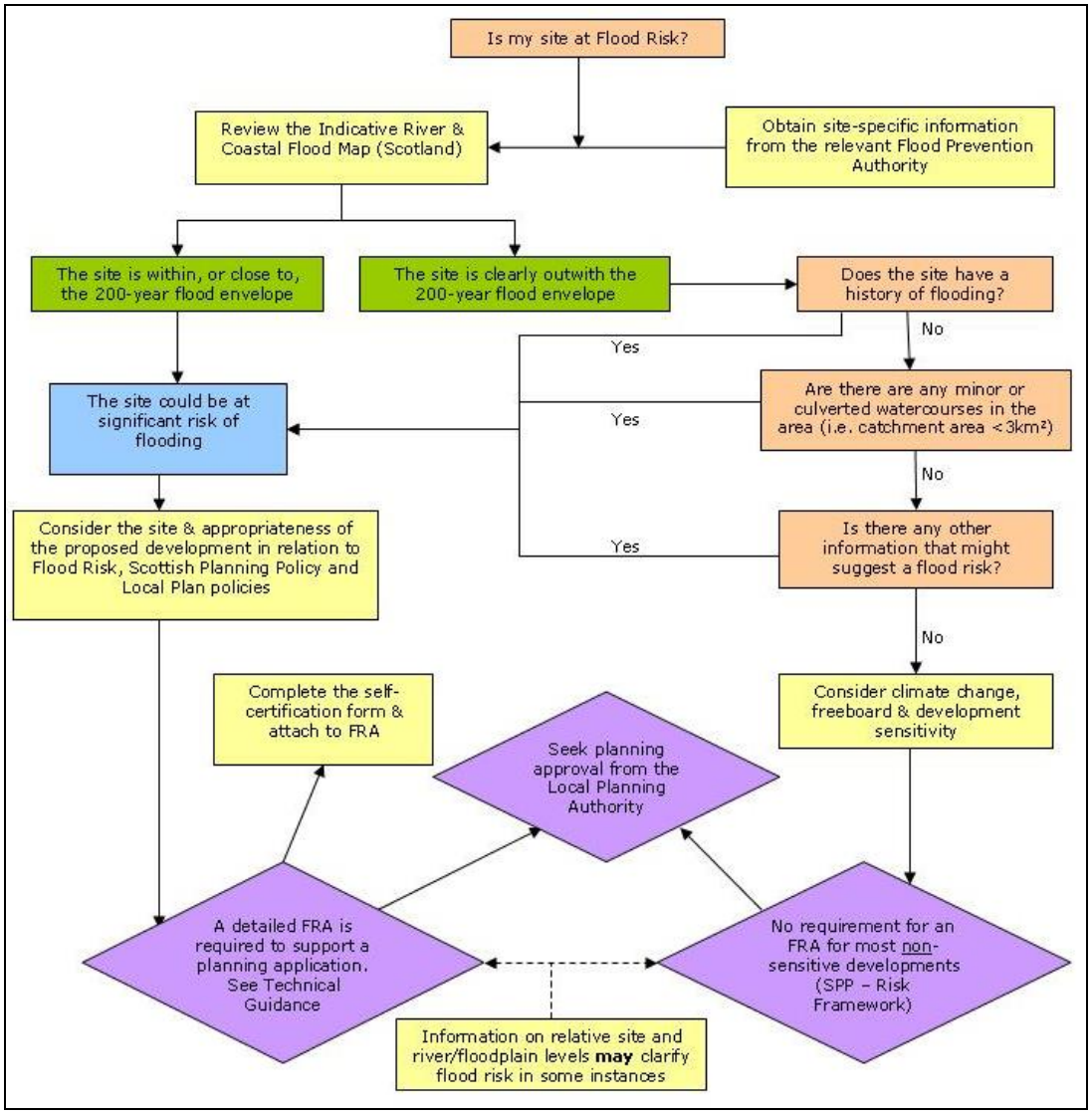

Figure 1 – http://www.sepa.org.uk/flooding/flood_risk/planning__flooding/flow_chart.aspx

6.2 What Should a FRA Include?

6.2.1 PKC endorses technical guidance provided by SEPA and will require developers to strictly adhere to them. The detail and technical complexity of a Flood Risk Assessment will be proportionate to the scale and potential significance of the development but, in all cases, it should comply with the requirements of SEPA's Technical Flood Risk Guidance for Stakeholders – current version.

Additional PKC requirements for a FRA are outlined below:

6.2.2 *Climate Change*

In accordance with recent DEFRA research, PKC require a climate change (CC) allowance (a 20% increase in the estimated peak flow) to be applied to the 0.5% AP (200-year).

6.2.3 *Freeboard*

Freeboard is an allowance in height above the predicted level of a flood to take account of the height of any waves or turbulence and the uncertainty in estimating the probability of flooding. PKC apply the following requirements for Freeboard:

- Finished Floor Levels (FFL) must be a minimum of 600mm above the 0.5% AP (200-year) design flood level (the design flood level must include 20% for CC).
- Lowest garden ground level must be a minimum of 300mm above the 0.5% AP (200-year) design flood level (the design flood level must include 20% for CC).[5]

6.2.4 *Critical Infrastructure*

Most developments will be required to model up to the 0.5% AP (200-year) return period. However, where developments are regarded as critical infrastructure, under SPP, they will be required to model up to, and be out with, the 0.1%AP (1000-year) flood plain.

6.2.5 *Sensitivity Analysis*

The Flooding Team expect an appropriate sensitivity analysis should be carried out to determine the sensitivity of the design water levels to key model parameters. A sensitivity analysis will include the following parameters and the appropriate figures to be used will be dependant on the site characteristics and the quality of data used:

- Peak Flow;
- Manning's Roughness;
- Blockage to all obstructions (where applicable);
- Upstream/Downstream Boundary Conditions (where applicable).

6.2.6 *Safe Access/Egress*

Any new development must incorporate safe access/egress for pedestrians and vehicular traffic within the development site. This should take account of flooding from all sources such as the predicted 0.5% AP (200-year) including climate change flood envelope and overland flood routes from within and external to the site.

[5] It is acknowledged that in certain circumstances 300mm freeboard for garden ground may not be achievable and early consultation and agreement with the Flooding Team is recommended.

6.2.7 *Coastal Areas*

The FRA requirements for coastal developments differ from inland developments and should be discussed with the Flooding Team at the earliest opportunity.

6.2.8 *Provision of Calculations and Modelling data*

When submitting a FRA an electronic copy of the modelling results and supporting information shall be submitted using E-mail, Compact Disc (CD) or USB pen drive. The FRA should contain the following information:

- All data and modelling results files for each of the modelled scenarios: 50% AP (2-year), 2% AP (50-year), 1% AP (100-year), 0.5% AP (200-year), 0.5% AP (200-year) including 20% for CC, pre and post development. If critical infrastructure, the 0.1% AP (1000-year) scenario should also be included This information should be in both raw data form and expressed in map form;
- Proposals and calculations for compensatory storage or flood mitigation measures to deal with the assessed post development increase in flooding on the site and elsewhere (where required);
- Rainfall data (where required);
- Gauging station data (where required);
- Catchment descriptors;
- Other supporting information;
- A word document containing a summary of the methodology behind the model; and
- Brief summary of each electronic file, where required (i.e. modelling files).

6.2.9 *Background Data*

Good use of photographs is recommended to record details of key site features. Information should be provided to identify the ownership of any water related structures and an assessment of their condition.

6.2.10 *Submission of a FRA*

A FRA shall be submitted in paper and electronic format as detailed below:

Papercopy:

FRA
All associated correspondence
Completed Appendix A
Completed Appendix B

Compact Disk or USB device containing:

FRA*
All Associated correspondence*
Completed Appendix A*
Completed Appendix B*
Complete Hec-ras, Infoworks, Mike 11, ISIS, Windes etc modelling results **and word document summarising methodology and file documentation.**

*Acceptable formats are .pdf, .xls, .doc.

Failure to enclose any of the above documentation will prolong the assessment process.

6.3 Can PKC Provide any Data for a FRA?

6.3.1 Yes, depending on the location of your development, PKC can, subject to availability, provide the following information:

- **Historical Flood Records** – PKC publishes a biennial report which specifies the measures required, and the measures taken, to mitigate flooding of land in their area and all occurrences of flooding. The latest biennial report can be requested by contacting the Flooding Team;
- **Completed Flood Studies**[6,7] – PKC are currently undertaking or have completed a number of flood studies in known flood risk areas such as Almondbank, Alyth, Bankfoot, Birnam, Burrelton, Comrie/Dalginross, Coupar Angus, Dalguise, Dunkeld, Greenloaning, Inchyra (quick appraisal), Invergowrie, South Kinross, Logierait, Longforgan, Meikleour, Pitlochry and Scone.
- **Flood Prevention Schemes**[6] – PKC hold records of flood prevention measures constructed in Perth, Bridge of Earn, Milnathort, Comrie and Weem.

6.3.2 It should be noted that SEPA also hold historic flood risk information and monitor river levels and flows throughout Perth & Kinross which can help in the assessment of flood risk.

[6] Please contact a member of the Flooding Team for an updated list of ongoing/completed flood studies/schemes

[7] Please note that a number of these studies were completed over 5 years ago and the developer should (in consultation with the Flooding Team) review the information to determine if further assessment is required.

7 SURFACE WATER DRAINAGE DESIGN

7.1 Introduction

7.1.1 Under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 surface water drainage must be discharge by means of a SuDS (there are exceptions for single house dwellings or discharges to coastal waters). The SuDS shall avoid pollution of the environment and attenuate flows to Greenfield runoff levels (refer to Section 7.6).

7.2 Hydraulic Design

7.2.1 The hydraulic design of surface water drainage systems (and SuDS), to be adopted by PKC, should meet the following criteria:

- The surface water system should be designed so that the system does not surcharge during 3.33% (30-year) flood event.
- The surface water system should be designed such that the system may surcharge but not flood properties or garden ground during a 1% AP (100-year) flood event.
- The surface water system should be designed so that should flooding occur during a 0.5% AP (200-year) flood event + 20% Climate Change, it should not encroach within 300mm of the lowest garden ground level[8] or 600mm of property FFL. The overland flow route shall be defined until a suitable conclusion to a receiving watercourse or suitable drainage system. In addition, access and egress must be maintained at all times during the event.
- The discharge rate from the development shall be restricted to the pre-development Greenfield runoff for the equivalent return period (or as agreed with the Flooding Team). Refer to Section 7.6.

Note: PKC would prefer the SUDS system to attenuate up to the 0.5% AP (200-year) flood event + 20% climate change in order that adjacent development zones are not blighted by overland flow routes.

7.3 SuDS Design

7.3.1 SuDS design should be in accordance with the most up to date CIRIA guidance.

Maintenance of SuDS is essential if they are to perform properly and not themselves pose a risk of flooding. It is essential that proposals for ownership/adoption and arrangements and responsibilities for future maintenance of all parts of the system are documented in the design submission.

Early discussion between the Developer, PKC, Scottish Water and SEPA should be initiated when designing SuDS for a development. Where SuDS are being designed on the basis that they are to be vested by Scottish Water, the Developer shall ensure that the design is in accordance with Sewers for Scotland, 2nd Edition. Where the Developer intends to request that PKC adopt/vest a SuDS feature, early discussion with PKC should be held to explore the potential for such an agreement. In these circumstances, an agreement to provide a commuted sum towards the cost of maintenance may be expected from the Developer before Planning Permission is granted.

Responsibility for maintenance of SuDS within property boundaries rests with the property owner. Developers must make homeowners aware of the burden of responsibility and should investigate setting up factoring arrangements to manage maintenance.

Submission of your surface water drainage design should always include a signed version of Appendix B.

Other relevant guidance specific to SuDS is outlined in the following sections:

[8] It is acknowledged that in certain circumstances 300mm freeboard for garden ground may not be achievable and early consultation and agreement with the Flooding Team is recommended.

7.3.2 *Embankment Gradients*

SuDS Embankment gradients shall be a maximum of 1:4 in order to allow safe egress/aggress.

7.3.3 *Flood Flow Routes*

Where the design of a SuDS shows the system will overtop during a 0.5% AP (200-year) flood event including climate change, the flood flow routes shall be determined. Where they approach property and/or garden thresholds, the routes should be manipulated to divert the flood water to locations that cause the minimal interference. A plan detailing the flood routes should be included with the planning application where required. The plan shall clearly identify where overland flow originating from within the development site has the potential to impact upon adjacent land or properties outwith the development boundary until it reaches a suitable conclusion into a receiving watercourse or appropriate drainage system.

7.3.4 *Pond Layout & Location*

Where possible a SuDS pond should be located adjacent to non-intensively managed landscapes where natural sources of native species are likely to be good. i.e. close to wetlands or natural ponds, lakes and river floodplains. However, they must not be connected in order to prevent contamination.

The council will not accept any SuDS located within the 0.5% AP (200-year) flood plain as during flood events the performance of the pond will be compromised by flood water and could potentially lead to more extreme flooding and pollution of the site.

A pond should create habitat mosaics with sub basins of permanent, temporary and semi-permanent ponds: vary these in size and depth – see figure 2 below. Ensure that some ponds, or parts of basins are not exposed to the main pollutant burden allowing many more sensitive animals and plants to exploit some parts of the site.

SuDS ponds should be designed to be open and accessible to residents and the general public. Fencing of a SuDS pond should only be considered as a last resort or where required by Scottish Water in order to agree vesting of the asset.

Further information on the creation of a SuDS pond can be found in SEPA's 2000 publication called Ponds, Pools and Lochans - guidance on good practice in the management and creation of small waterbodies in Scotland.

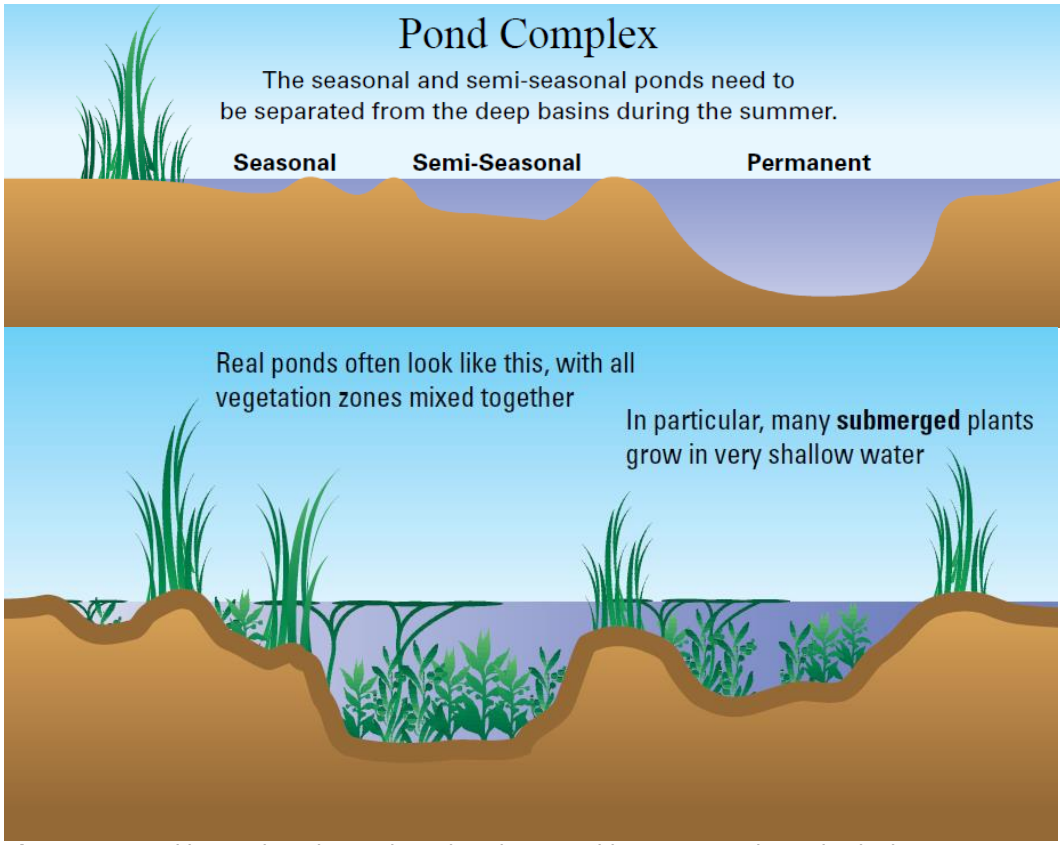

Figure 2 – Pond layout (Ponds, Pools and Lochans, Guidance on good practice in the management and creation of small waterbodies in Scotland, June 2000, SEPA)

7.3.5 *Surface Water Systems to be adopted by Scottish Water*

Where surface water drainage systems are to be adopted by Scottish Water they must be designed to Sewers for Scotland, 2nd Edition. Currently, the design criteria is 3.33% (30-year) event. As a result, the developer must detail the flood flow routes for a 0.5% (200-year) flood event including climate change, and how this will be managed on site in order that access and egress is maintained at all times and the designed flood water level is a minimum of 600mm from FLL and 300mm from the lowest garden ground level[9]. The overland flow route shall be defined until a suitable conclusion to a receiving watercourse or suitable drainage system.

7.3.6 *Treatment Volume*

$$V_t\,(m^3/ha) = 9.D.[SOIL/2+(1 - SOIL/2).I]$$

Where:

Vt	=	Water Quality Treatment Volume (as a function of the total development area)
SOIL	=	Soil classification (from Flood Studies or Wallingford Procedure WRAP map)
I	=	Fraction of the area which is impervious (eg 30 per cent impermeable area = 0.3)
D	=	M5 – 60 minute rainfall depth (ie 5-year return period, 60 minute duration storm depth determined from the Wallingford Procedure)

Equation 1 should be submitted as part of the planning application. Refer to Section 4.5 of CIRIA C697 'The SuDS manual'.

[9] It is acknowledged that in certain circumstances 300mm freeboard for garden ground may not be achievable and early consultation and agreement with the Flooding Team is recommended.

7.3.7 *Trash Screens*

All SuDS inlet headwalls shall feature a trash screen which includes an open tread surface to facilitate easy access but also allow an alternative route for water to flow should the face of the screen become blocked. Any pipe outlets shall not be covered with a trash screen.

7.4 Soakaway Design

7.4.1 Soakaways should only be used for surface water disposal where it can be demonstrated that the hydrological and hydrogeological conditions are suitable and the time for emptying will not be excessive.

7.4.2 The design of surface water soakaways should be to the requirements of BRE Digest 365 or CIRIA C697.

7.4.3 Soakaways should not be located within 5m of building foundations, nor in any position where the ground below foundations is likely to be affected. In addition, soakaways must take account of seasonal variations in the groundwater table.

7.4.4 Attention should be paid to the source of the runoff water to be collected and appropriate pre-treatment facilities provide (i.e. grit traps, oil interceptors, etc.) with suitable access for maintenance.

7.4.5 All soakaways shall be designed with facilities for inspection and maintenance.

7.4.6 Percolation testing shall be carried out to BRE Digest 365 and forwarded to the Flooding Team for approval. Depending on the sensitivity of the site to seasonal variations in groundwater level further percolation testing may be required (i.e. during the winter period). The developer should liaise with the Flooding Team regarding this issue. Note: subsoil porosity tests must be undertaken as close as possible to the proposed location of each proposed infiltration device/component to ensure that the results are representative. If a porosity test is deemed by PKC to be too remote from the proposed location, the test may require to be re-done.

7.5 PKC Adoption Requirements for SuDS/Surface Water Drainage System

7.5.1 On completion of the maintenance period the following information and testing will be required before PKC will formally adopt any surface water drainage system or SuDS:

7.5.2 *CCTV Survey and Drawings*

A full CCTV survey and as built drawings of the entire surface water system (including SuDS) shall be completed and handed over to the Flooding Team. This is required in order for PKC to comply with Section 17 of the Flood Risk Management (Scotland) Act 2009. **NOTE: The system will not be adopted until such information is received.**

7.5.3 *Health and Safety File*

A completed Health and Safety File containing risk assessments, maintenance procedures, calculations and drawings of all SuDS shall be handed over to the Flooding Team.

7.5.4 *System Testing*

A full test of all surface water drainage and SuDS shall be carried out and records passed to the Flooding Team. A full test shall consist of the following:

- Drainage pipes shall be air or water tested to BS EN 1610 and where velocities are less than 1m/s a Mandrel Test may be required;
- Soakaways shall be 'onsite' tested to confirm rate of permeability;
- Ponds and Basins will require suitable testing before they will be formally adopted. It is anticipated that suitable manual recording systems, video and photographic evidence during heavy rainfall events over the maintenance period will prove the following scenarios:
    - Overflow facility operates correctly;
    - Discharge rates are as per agreed Greenfield runoff rates;
    - No leakage through embankments; and
    - Designed storage capacity has been provided (As built drawings would provide this evidence).

Failure to provide sufficient evidence will result in significant delays to the formal adoption of any drainage system by PKC. Any SUDS system not mentioned above will still be subject to testing and early discussions with the Flooding Team will be required in order to agree a suitable method of testing.

N.B. A member of the Flooding Team should be informed of the test arrangements so they may attend if necessary, refer to Section 10 for contact details. A minimum of 7 days notice is required prior to the test day.

7.6 Greenfield Runoff and Permissible Development Discharge Rates

7.6.1 Greenfield runoff rates are calculated to inform the selection of an acceptable rate of discharge from the site to the receiving watercourse, local Authority or Scottish Water owned surface water drainage system. The Calculation of peak rates of runoff from Greenfield areas is related to catchment size. The method of calculating Greenfield runoff is outlined below:

Table 2 summarises the approaches that may be used to calculate Greenfield runoff rate.

Development size	Method
0 – 50 ha	The Institute of Hydrology Report 124 *Flood estimation for small catchments* (Marshall & Bayliss, 1994) is to be used to determine peak greenfield runoff rates for QBAR. Where developments are smaller than 50 ha, the analysis for determining greenfield discharge rate should use 50 ha in the formula but linearly interpolate the flow rate value based on the ratio of the size of the development to 50 ha. FSSR 14 (IH, 1993) regional growth curve factors should be used to calculate greenfield peak flow rates for 1-, 30- and 100-year return periods.
50-200 ha	IH Report 124 should be used to calculate greenfield peak flow rates. Regional growth factors to be applied.
Above 200 ha	IH Report 124 can be used for catchments that are much larger than 200 ha. However, for schemes of this size it is recommended that the Flood Estimation Handbook (FEH) (IH, 1999) should be applied. Both the statistical approach and the unit hydrograph approach should be used to calculate peak flow rates. However, where FEH is not considered appropriate for the calculation of greenfield runoff for the development site, for whatever reasons, IH 124 should be used.

Table 2 Greenfield runoff rate estimation methods (National SuDS Working Group, 2004)

In general, the majority of developments will come under 50hectares and the flood estimation for small catchments is outlined in Section 7.6.2. PKC will accept discharge rates calculated using this method.

As a rule of thumb PKC expect the discharge rate for a 1% AP (100-year) flood event to be around 5l/s/ha and 5.5l/s/ha for a 0.5% AP (200-year) flood event. These discharge rates shall be adopted where no calculations have been carried out. However, Section 7.6.4 outlines instances where more stringent discharge rates may or may not apply.

7.6.2 *Flood Estimation of Small Catchments (QBAR)*

QBAR can be calculated as follows:

$$QBAR_{rural} = 0.00108AREA^{0.89}.SAAR^{1.17}.SOIL^{2.17}$$

Where:

$QBAR_{rural}$ = Catchment mean annual peak flow (approximately 43% annual probability or 2.3 year return period) (m^3/s)
AREA = Catchment area (km^2)
SAAR = Standard average annual rainfall for the period 1941 to 1970 (mm)
SOIL = Soil index (from Flood Studies or Wallingford Procedure WRAP maps). It is a weighted sum of individual soil class fractions, where:

$$SOIL = 0.1\ SOIL_1 + 0.3\ SOIL_2 + 0.37\ SOIL_3 + 0.47\ SOIL_4 + 0.53\ SOIL_5$$

Equation 2 IH124 Mean annual flood flow rate equation

Values of SAAR and SOIL for a specific catchment can be obtained from the *Flood Studies Report (IH, 1975), The Wallingford Procedure (HR and IH, 1981),* the *Wallingford Procedure for Europe (Kellagher, 2000)* or you can contact the Flooding Team.

Greenfield peak flow rates for other probabilities can be estimated using the Q/QBAR factor from the appropriate growth curve, which for Perth & Kinross is region 1 (refer to the Institute of Hydrology - Flood Studies Supplementary Report 14) and is summarised below:

PKC Growth Curve Factors							
Return Period							
2	**5**	**10**	**25**	**50**	**100**	**200**	**500**
0.9	1.2	1.45	1.81	2.12	2.48	2.82	3.25

Table 3 Scotland Growth Curve Factors

7.6.3 *Example Greenfield Runoff Calculation*

Below is an example calculation method for finding the peak flow runoff from a Greenfield site:

Catchment Characteristics

Location	- Perth
Site AREA	- 1 hectare
SAAR	- 786mm
SOIL	- 0.3
Hydrological Region	- 1

Therefore, using the formula from the Institute of Hydrology Report 124 as detailed in Equation 2:

$QBAR_{rural} = 0.00108AREA^{0.89}SAAR^{1.17}SOIL^{2.17}$

Where developments are smaller than 50 hectares, the analysis for determining Greenfield discharge rate should use 50 hectares in the formula but linearly interpolate the flow rate value based on the ratio of the size of the development to 50 hectares. Therefore:

$QBAR_{rural} = 0.00108 \times 0.5^{0.89} \times 786^{1.17} \times 0.3^{2.17}$

$QBAR_{rural}$ = 0.00108 x 0.54 x 2441 x 0.073

$QBAR_{rural}$ = 0.104m^3/s or 104 l/s for 50 Hectares

Hence, $QBAR_{rural}$ for actual site = $QBAR_{rural}$ / 50 x site area = 104 / 50 x 1 = 2.1 l/s/ha

Therefore, by multiplying the $QBAR_{rural}$ by the necessary return period factors as illustrated below, you achieve the following Greenfield limiting discharge rates:

1/1 factor – 2.1 x 0.85 = 1.8 l/s
1/30 factor – 2.1 x 1.9 = 4.0 l/s
1/100 factor – 2.1 x 2.48 = 5.2 l/s
1/200 factor – 2.1 x 2.82 = 5.9 l/s

7.6.4 *Discharge Rate Exceptions*

Known Flood Risk Locations

Where a development is located within a known flood risk location the Flooding Team may impose stricter discharge rates which are significantly below pre-development Greenfield runoff rates.

Excessive Levels of Greenfield Runoff

SPP states that any drainage measures should have a neutral or better effect on the risk of flooding both on and off site. Therefore, if in the opinion of the Flooding Team the calculated Greenfield runoff is deemed excessive they may impose stricter discharge rates.

Steeply Sloping Sites

Runoff rates for steeply sloping sites are likely to have increased discharge rates and therefore higher growth curve factors compared to flat sites. The developer should contact the Flooding Team for further information and clarification if this applies to the development site.

Small Developments

The Flooding Team accepts that it may not be possible for single house dwellings or small developments to achieve the allowable Greenfield runoff discharge rates as the orifice size required to control such discharge may be susceptible to blockages. In these instances, the developer should contact the Flooding Team in order that a suitable discharge rate can be agreed. The agreed figure will be dependant on factors such as the size of the watercourse to which you will be discharging to and the susceptibility of the area to flooding.

Discharges to Scottish Water Assets

Where surface water runoff from the development is to be discharged to Scottish Water Infrastructure, a copy of signed correspondence is required to confirm the rate of discharge that has been agreed with the water authority. Where the agreed rate of discharge is in excess of the equivalent Greenfield runoff rate, PKC reserve the right to enforce a more onerous discharge rate.

8 FREQUENTLY ASKED QUESTIONS

8.1 What return periods should I design to?

All SuDS and drainage systems (to be adopted by PKC) shall be designed to meet the following criteria:

3.33% (30-year) flood event - The surface water drainage system should be designed such that the system does not surcharge.

1% AP (100-year) flood event – The system may surcharge but must not overtop the system (i.e. flood out with the drainage network).

0.5% AP (200-year) flood event + 20% Climate Change - Surcharging and flooding may occur but it should not encroach within 300mm of the lowest garden ground level[10] or 600mm of property FFL. The overland flow route shall be defined until a suitable conclusion to a receiving watercourse or suitable drainage system. In addition, access and egress must be maintained at all times during the event.

Note: PKC would prefer the SUDS system to attenuate up to the 0.5% AP (200-year) flood event + 20% climate change in order that adjacent development zones are not blighted by overland flow routes. In addition, an allowance of 10% should be added to impermeable areas to allow for future expansion.

8.2 What allowance for climate change should I add?

A 20% increase in peak river flow volume/peak rainfall intensity must be applied to all designs including soakaways.

8.3 What are your freeboard levels?

A minimum of 300mm freeboard to the lowest garden ground level[10] and 600mm freeboard to property FFL will be required in addition to climate change.

8.4 What are your Greenfield runoff rates?

This can be calculated using Equation 2 or as a rule of thumb we expect the discharge rate for a 1% AP (100-year) flood event to be 5l/s/ha and 5.5l/s/ha for a 0.5% AP (200-year) flood event. Refer to Section 7.6 for further details.

8.5 Is there a minimum level to which I should design my bridge soffit?

Bridge soffit levels should be designed to the 0.5% AP (200-year) flood event with a 20% increase in peak river flow volume/peak rainfall intensity and an addition of 600mm freeboard.

It may be difficult to achieve the above design standard for small bridges over a small watercourse. In these instances, the Flooding Team may agree to a reduced design level provided the bridge does not cause a risk of flooding elsewhere.

8.6 Is there a minimum and maximum gradient I can lay pipes to?

There is no minimum or maximum gradient as long as a minimum velocity of 1m/s is maintained. Testing of the system will be required prior to adoption, refer to Section 7.5.4.

[10] It is acknowledged that in certain circumstances 300mm freeboard for garden ground may not be achievable and early consultation and agreement with the Flooding Team is recommended.

8.7 Do you require electronic copies of my drainage/river modelling design?

Yes, any computer modelling should be forwarded via Email, on CD or USB drive with your submission in addition to a paper copy, refer to Section 6.2.4 and 6.2.5. Details of the computer modelling software utilised should also be provided.

8.8 Is there a maximum gradient for SUDS embankments?

Yes, all SuDS embankments should have a maximum gradient of at least 1:4.

Due to safety and maintenance reasons, we cannot accept any gradients steeper than 1:4, therefore your design will not be accepted and the SuDS will remain unadopted.

8.9 I am building next to a watercourse; is a maintenance strip required?

Yes, a minimum of 5 metres between the watercourse and any obstacles (such as a building or fence line) must remain in order to allow for maintenance access.

8.10 Can I develop land adjacent to an existing Flood Protection Scheme?

If you are developing land within close proximity of an existing flood protection scheme then you should contact a member of the Flooding Team as soon as possible.

8.11 How long does it take to process a FRA or DIA?

The Flooding Team generally receive a request for comment on a FRA or DIA from Planning and endeavour to reply within 21 days of receiving all required documentation.

The process of concluding whether the FRA or DIA will be approved or declined is dependant on the timeous submission of the document by the developer and the complexity of the application. This process can take up to several months.

The Flooding Team are happy to liaise with developers and consultants at any stage in the process to help reduce the timescale for completion.

9 CERTIFICATION & INSURANCE

9.1 Self Certification & Insurance

The submission of your FRA/DIA/Surface Water Drainage Design or other documentation will mean that all reasonable skill, care and the attention of a qualified and competent professional in this field has been applied in accordance with the required guidance.

To provide confirmation to this effect, Appendix B contains an assessment compliance certificate that should be completed and submitted in support of an application. Please note that a copy of your professional indemnity insurance policy will also be required. The minimum level of professional indemnity insurance to be maintained is five million pounds (£5,000,000).

Appendix A contains SEPA's FRA check sheet that should be completed and submitted in support of an application.

9.2 3rd Party Certification

In certain circumstances (such as unique designs) the Flooding Team may require a 3rd party Engineer check. In this instance, the Developer will be required (at their own cost) to identify a 3rd party Consultant that is acceptable to the Flooding Team (i.e. is a Chartered Engineer and has suitable experience in Flood and Drainage Issues) and have them conduct a review of your design as per this guidance. The complete 3rd party report should be forwarded to the Flooding Team along with evidence to support any necessary updates and changes have been carried out as recommended by the 3rd party Engineer.

10 CONTACT DETAILS

10.1 Flooding Team

Technician:	Craig McQueen (01738 477219) (cjmcqueen@pkc.gov.uk)
Technician:	Steven Smith (01738 477250) (srsmith@pkc.gov.uk)
Engineer:	Russell Stewart (01738 477277) (rsstewart@pkc.gov.uk)
Senior Engineer:	Peter Dickson (01738 477278) (pdickson@pkc.gov.uk)

Address for Flooding Team:

Flooding Team
Perth & Kinross Council
The Environment Service
The Atrium
137 Glover Street
Perth
PH2 0HY

10.2 Road Construction Consent Queries

Brian Fraser (01738 476517) (bvfraser@pkc.gov.uk)
Technician
Planning
Perth & Kinross Council
The Environment Service
Pullar House
35 Kinnoull Street
Perth
PH1 5GD

10.3 Planning Queries (General)

Development Management (01738 475000) (developmentmanagment@pkc.gov.uk)
Perth & Kinross Council
The Environment Service
Pullar House
35 Kinnoull Street
Perth
PH1 5GD

11 GLOSSARY / ABBREVIATIONS

AREA	Catchment Area (km^2).
Attenuation	Reduction of peak flow by spreading it over a longer period of time.
BRE	Building Research Establishment.
Bridge Soffit	The under-surface of a Bridge.
CCTV	Closed Circuit Television.
CIRIA	Construction Industry Research and Information Association.
DIA	Drainage Impact Assessment.
FFL	Finished Floor Level.
Freeboard	A 'safety margin' to account for residual uncertainties in water level prediction and/or structural performance. It is the difference between the height of a flood defence or floor level and the design flood level.
Floodplain	Land adjacent to a watercourse that would be subject to repeated flooding under natural conditions up to the 0.5% AP (200-year) return period.
Flood Estimation Handbook	The FEH offers guidance on rainfall and river flood frequency estimation in the UK and also provides methods for assessing the rarity of notable rainfalls or floods.
Flood Risk Management (Scotland) Act 2009	A more sustainable and modern approach to flood risk management, Supersedes Flood Prevention (Scotland) Act 1961 and Flood Prevention and Land Drainage (Scotland) Act 1997.
FRA	Flood Risk Assessment.
Groundwater	Water that has percolated into the ground; it includes water in both the unsaturated zone and the water table.
Greenfield Runoff	This is the surface water runoff regime from a site before development, or the existing site conditions for a brownfield redeveloped site through the attenuation of runoff by way of SuDS.
Ha	Hectares.
Health & Safety File	The Health and Safety File(s) is a statutory document held by the client. They are the means by which health and safety information is recorded and kept for future use at the end of a construction project.
HEC-RAS	A software tool which can perform one-dimensional steady flow, unsteady flow, sediment transport/mobile bed computations, and water temperature modeling. Similar to ISIS.
IH	Institute of Hydrology (now Centre for Ecology and Hydrology).
ISIS	A software tool which can perform river modeling. Similar to HEC-RAS.
M2-60	60-minute rainfall of 2-year return period (mm).

Pond	Permanently wet basin designed to retain and attenuate surface water runoff and permit settlement of suspended solids and biological removal of pollutants.
$QBAR_{Rural}$	Mean Annual Maximum Flood (M^3/s).
QMED	Median Annual Maxima Flood (M^3/s). Hence has an annual exceedance probability of 0.5, and a return period of two years.
Return Period	The theoretical return period is the inverse of the probability that the event will be exceeded in any one year. For example, a 10-year flood has a 1 / 10 = 0.1 or 10% chance of being exceeded in any one year and a 50-year flood has a 0.02 or 2% chance of being exceeded in any one year.
Risk Assessment	A Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat (also called hazard).
SAAR	Standard Average Annual Rainfall (1961-90) (mm).
SEPA	Scottish Environment Protection Agency.
SEPA's Indicative Flood Map	Details areas of land in Scotland estimated to be at risk of flooding from either rivers or the sea (or both), with an annual probability of 0.5% (1:200) or greater.
Soakaway	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
SOIL	Soil index, being a weighted sum of SOIL1, …, SOIL5.
Source Control	The control of runoff at or near its source.
SPP	Scottish Planning Policy.
SuDS	Sustainable Drainage Systems or Sustainable urban Drainage Systems. A sequence of management practices and control structures designed to drain surface water in a more sustainable fashion than some conventional techniques.
Trash Screen	A screen used at inlets to prevent the passage of material liable to block the pipe.
Treatment Volume	The proportion of total runoff from impermeable areas captured and treated to remove pollutants.
V_t	Treatment Volume.
Watercourse	All means of conveying water except a water main or sewer.
Water Environment (Controlled Activities) (Scotland) Reg	A set of regulations that control activities which may affect Scotland's water environment.
Water Environment Water Services (Scotland) Act	Gave powers to introduce regulatory controls over water activities, in order to protect, improve and promote sustainable use of Scotland's water environment.
WINDES	A software tool to design and analyse drainage systems.

APPENDIX A – FRA CHECK SHEET

Hyperlink to SEPA FRA check sheet:
http://www.sepa.org.uk/flooding/planning__flooding/fra_checklist.aspx

APPENDIX B - ASSESSMENT COMPLIANCE CERTIFICATION & INSURANCE

Assessment Compliance Certification

I certify that all reasonable skill, care and attention has been exercised in undertaking the attached Flood Risk Assessment / Drainage Impact Assessment / Surface Water Drainage Design* (delete as appropriate). The documentation has been prepared for the below noted development in accordance with the PKC Developers Guidance Note on Flooding and Drainage.

Name of Development ……...

Address of Development ……...

……...

……...

Name of Developer ……...

Planning Application No ……...

Name and Address of ……...

Organisation preparing this ……...

Assessment ……...

Signed ……...

Name ……...

Position Held ……...

Engineering Qualification ……..[1]

Date ……...

INSURANCE

Please attach a copy of your professional indemnity insurance policy to this document.

[1] Chartered Engineer or equivalent from an appropriate Engineering Institution.