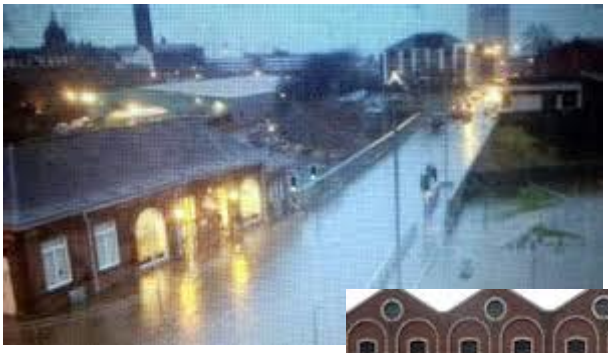
Flood Risk Assessment and Drainage Impact Assessment:

Planning Guidance for Developers



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Contents

1. Introduction 3
2. Flood Risk Assessments 3
2.1. Background 3
2.2. Content 3
2.3. Base Data Requirements 4
2.4. Methodology used in carrying out the assessment. 4
2.5. Hydrological methods used in the assessment. 4
2.6. Conclusions 6
2.7. FRA Check list 6
3. Drainage Impact Assessment (DIA) 6
3.1. Background 6
3.2. Content 7
3.3. Surface Water Drainage 8
3.4. Wastewater Drainage 8
3.5. Approvals 9
3.6. Building Control 9
3.7. Integrated Infrastructure 9
3.8. Drainage Impact Assessment Check List 9
4. Planning Requirements 10
4.1. Compliance Certificate Requirements 10
4.2. Independent Check Certificate 10
4.3. SSP June 2014 (Paras 254 – 268) Operational Protocol 11
5. Appendix A 12
6. Appendix B 13
7. Appendix C 14
8. Appendix D 15

1. Introduction

This guidance has been produced by Inverclyde Council to assist developers and consulting engineers produce Flood Risk Assessments (FRA's) and Drainage Impact Assessments (DIA's). In an attempt to reduce the amount of flooding which affects new developments, national policies and the Local Development Plan (LDP) now require additional information and evidence, including FRA and DIA, to accompany planning applications. By following this guidance it is anticipated that submitted assessments will be comprehensive, clear and concise.

Inverclyde Council now operate a mandatory self certification scheme for any residential development comprising more than 5 dwelling and for industrial or commercial developments of more than 250m^2. The scheme requirements are set out in Section 4.

2. Flood Risk Assessments

2.1. Background

Currently a FRA has to be submitted along with a planning application depending on the location, size and type of development. Under new guidance from Inverclyde Council an assessment is now required for any residential development comprising more than 5 dwelling and for industrial or commercial developments of more than 250m^2. Any development identified by Inverclyde Council to be in a sensitive location will also require an assessment.

A key requirement for a FRA is that it must consider all sources of flooding and 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 in the future, taking into account climate change and illustrate how the development will not increase the risk of flooding elsewhere. The FRA should be produced under the direction of a member of the relevant chartered professional institution with experience of flood risk assessment and management.

2.2. Content

It is essential that FRA's are completed to a highly proficient standard, contain only relevant information and cover all site specific issues.
The detail and technical complexity of a FRA will reflect the scale and potential significance of the study but, in all cases, whenever a FRA is undertaken for any location, the resulting report should address, as a minimum, the following requirements:

- Base Data Requirements;
- Methodology used in carrying out the assessment;
- Hydrological methods used in the assessment;
- Conclusions.

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 A for details.

2.3. Base Data Requirements

The report should include:

- Geo-referenced location plans;
- Proximity to nearest watercourse;
- Plan of site illustrating Ordnance Datum levels to a recognised scale;
- Good use of photographs illustrating important features such as culverts etc;
- If appropriate, information of current flood alleviation measures including the level of protection and condition;
- Identification of the ownership of any water related structures and assessment of their condition;
- Information of past flood events; photographs, levels, trends;
- Clear drawings, plans and maps to a recognised scale relevant to the site;

2.4. Methodology used in carrying out the assessment.

When completing a FRA, the methodology followed should be in line with industry standards and best practice. This includes:

- A summary of the type or source of any present flooding risk;
- All technical records and datasets derived from the Flood Estimation Handbook;
- Details of flood mitigation methods, the proposals and the effects of the planned solution;
- All data must be reported against relevant standards set by SEPA, Scottish Water and Inverclyde Council policy;

Note: Any solutions or flood prevention measures should include sustainable drainage systems.

2.5. Hydrological methods used in the assessment.

To ensure a complete FRA, the reporting of any modelling study is compulsory and should address important issues to an appropriate level of detail.

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.

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. (e.g. design flow and roughness).

The FRA should determine the appropriate design flows and levels of any potential flooding in or around the proposed site including a flooding assessment of all watercourses, drains or sewers which are proposed or exist on the development.

The report must demonstrate that the development will not be affected by a storm event of the appropriate rainfall return period detailed in the Local Plan and SPP June 2014 (Paragraphs 254 – 268). It must also illustrate that there shall be no adverse effect on any watercourse and that flooding will not be increased in the surrounding area upstream and downstream as a result of the development.
Each FRA should be unique to the site it describes. The length and complexity lies with the author however, where appropriate, addition details may include:

- 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;
- All culverts, detailing condition and capacity;
- Any property and/or environment that will be affected by various degrees of flooding;
- An assessment of the return periods or probabilities including any observed trends and the extent and depth of floods for the location and, if appropriate, routes and speed of water-flow. At this stage, best estimates, based on the most up-to-date findings, should also be made of climate change impacts on probabilities;
- An estimation of the volume of water which would be displaced from the site during various flood events both during and following development of the site;
- Brief assessment/summary on the impact on river or coastal ecology, if applicable.
- More important issues should be included in a separate EIA (Environmental Impact Assessment);
- An assessment of the potential impact of any development on fluvial or coastal morphology and on the likely longer-term stability and sustainability;
- An assessment of the capacity of any drains or sewers, existing or proposed, on the site during various flood events and mitigation measures if required;
- Taking into account projected climate change, details illustrating how the development meets an acceptable standard of flood protection for the design life of the development.

2.6. Conclusions

The conclusions should include a summary of the findings detailing any recommendations that have been made. The report should also indicate how all flood risks have been identified and appropriately mitigated. The plans of the development should clearly take cognisance of these conclusions.

2.7. FRA Check list

- ✓ The development will not be at risk or susceptible to damage due to flooding within the parameters set in the Local Plan and SPP June 2014;
- ✓ Normal operation of the development will not be susceptible to disruption as a result of flooding from the appropriate event;
- ✓ Safe access to and from the development will be possible during the appropriate design flood event;
- ✓ The development will not increase flood risk anywhere else;
- ✓ The development will provide for safe access for maintenance of watercourses or maintenance and operation of flood defences by the Inverclyde Council;
- ✓ The development will not lead to the degradation of the environment;
- ✓ The development will meet all the outlined criteria for its entire lifetime including consideration for climate change.

To complete a comprehensive assessment the developer must:

- Be aware of all the relevant planning policy and legislation;
- Complete technically accurate calculations;
- Follow professional guidelines and procedures;
- Certify that flooding will not pose a risk to the development;
- Complete the required Compliance and Independent Check Certificate;
- Submit evidence of appropriate Professional Indemnity insurance.

3. Drainage Impact Assessment (DIA)

3.1. Background

A DIA is a report, prepared by the developer, demonstrating the drainage issues relevant to a proposal and the suitable means of providing drainage. Due to the increase of impermeable area, action is required to deal with the reduction in storage, therefore any proposed drainage infrastructure should look to protect the site from flooding and also remove all waste effluent.

Drainage design is a complex process so it is important that all drainage matters are considered at an early stage in the design process. It is therefore required that a DIA is submitted with the first planning application, whether planning application or application in principle, for any development which requires waste or surface water

to be drained. It is also recommended that a pre-application meeting takes place for larger schemes and, when located in sensitive areas, discuss plans for the site and any potential drainage issues. Sewers for Scotland - 2nd edition, also states that "for all developments at an early stage before a DIA is submitted, the developer should consult with Scottish Water on appropriate SUD's (sustainable urban drainage) system design and the practical aspects of servicing the development."[1]

[1] *Sewers for Scotland 2nd Edition, Page 5, General Principles and Guidance 10*

3.2. Content

A Drainage Impact Assessment will be required to be submitted for any residential development comprising more than 5 dwelling and for industrial or commercial developments of more than 250m^2. Any development identified by Inverclyde Council to be in a sensitive location will also require an assessment. The submitted DIA is required to meet the following basic requirements and any additional site specific requirements specified by Inverclyde Council.

Requirements may include:

- An examination of the current and historical drainage patterns;
- A concept drawing of the development;
- An outline drawing of how the drainage design provides sustainable drainage techniques in accordance with recognised design manuals;
- Details of the site drainage patterns including all watercourses crossing the site;
- The soil classification of the site;
- Evidence of subsoil porosity tests including where possible at the location of any intended infiltration device and the proximity of the winter water table;
- Calculations showing that post development peak run-off volumes do not exceed that for pre-development for the critical rainfall event;
- Demonstration that the drainage solution selected will ensure that properties on and off the proposed site are not at risk of flooding from the appropriate rainfall return period relevant to the categories of development specified in the Local Plan INF4– Reducing Flood Risk, INF5-Sustainable Urban Drainage Systems and Sewers for Scotland 2nd edition;
- Details of the accountable body responsible for vesting and maintenance for individual aspects of the drainage proposals and confirmation in writing that these bodies will vest/adopt the system;
- Wastewater drainage proposals and confirmation in writing that they will vest in Scottish Water.

In line with Flood Risk Assessments there are a number of professional guidelines produced by recognised bodies which are designed as a reference for the implementation of good practice when completing a Drainage Impact Assessment. See Appendix B for details.

3.3. Surface Water Drainage

The DIA should demonstrate that the surface water drainage system takes account of SUDS principles in accordance with current legislation and guidelines such as Design Manuals for Scotland and Northern Ireland and the specification set out within Sewers for Scotland 2nd Edition. The SUDS principles must also conform, as a minimum, to the basic level of treatment control outlined within the General Binding Rules of the Water Environment (Controlled Activities) (Scotland) Regulations 2011(as amended) and be approved by SEPA and or Scottish Water.

The DIA should demonstrate, using up to date techniques, that the rate and volume of surface water runoff from the post-development situation does not exceed the greenfield surface water runoff from the existing site. The design storm used for the pre-development calculation shall be **M_2 – 60 (1 in 2 yr, 60 minute storm).** Attenuation or other limiting methods shall be provided to comply with this. More importantly, the proposed method used for drainage should ensure that there is no increase to the probability of flooding within the receiving watercourse and local area, upstream or downstream from the site. All surface water drainage within or out with the site will be designed to accommodate a **M30 – 60 (1 in 30 yr, 60 minute storm**). Additionally, surface water runoff should be managed to minimise pollutants reaching the receiving watercourses. Further guidance may be obtained from SEPA. The requirements for drainage should be taken into account when determining the overall layout of the development. For large developments where there is an intention to separate the development into zones, which are to be constructed at different stages, or by different developers, it is a requirement that a drainage master plan covering the whole area of development be submitted.

The difference between the 1 in 30 yr and the 1 in 200 year (plus 20% uplift for the predicted effects of climate change) post development critical storms for the application site is to be accommodated within the application site without the detriment to properties, within or out with the application site.

On development sites where surface water run-off is received from adjacent higher ground, it will also be necessary for applicants to demonstrate that this additional volume of storm water has been considered.

In the event of a design exceedance, the DIA should give an assessment and consideration of the flood flow route for the appropriate return period flood event and should show that there will be no detriment to land or property as a result of overland flow caused by the development. The **finished floor levels** of dwellings adjacent to flooded areas must be a minimum of **0.6m above the high water level or 1.0m above the high water level when the application site is adjacent to a watercourse.**

3.4. Wastewater Drainage

Where the development will lead to the production of wastewater, a DIA must include a section on wastewater drainage. The assessment should examine the availability of public sewers to carry wastewater from the development and should include copies of all correspondence with Scottish Water including their approval in principle to connect to the local network.

Any discharge to existing networks should not increase the occurrence of flooding or surcharging to the existing sewer network. Consideration should also be given for the potential for effluent to discharge during severe storm events into adjacent watercourses via combined sewer overflows and the impact this may have on the receiving watercourse. The DIA should also address what measures are in place to ensure that during construction there will be no cross connections leading to contamination of surface water sewers.

3.5. Approvals

Throughout the planning process the DIA will form the basis of statutory consultation with the appropriate bodies:

- Scottish Water (drainage connection consent);
- Inverclyde Council (planning permission and road construction consent);
- Scottish Environment Protection Agency (CAR licences/conditional prohibition notice).

3.6. Building Control

Inverclyde Council, as a building standards authority, must be satisfied that adequate provision has been made for drainage and flood risk. Any proposed scheme should be designed and constructed to meet the technical standards for compliance with the Building Standards (Scotland) Regulations 2003.

3.7. Integrated Infrastructure

Inverclyde Council wishes to promote the most effective use of space in the delivery of necessary infrastructure within a development. Where appropriate, Inverclyde Council will consider a departure from normal vesting standards used for SUDS. Such a departure will, however, require to be discussed in detail at an early stage.

3.8. Drainage Impact Assessment Check List

- ✓ Any proposed drainage designs must, to a minimum, conform to the relevant specifications outlined in Sewers for Scotland-2nd Edition and must also comply with General Binding Rules issued by SEPA;
- ✓ The proposals must address the cumulative impact on infrastructure capacity of incremental growth of impermeable surfaces by not increasing the quantity and rate of surface water run-off from any site;
- ✓ Any flows that are to be discharged to a watercourse must have the appropriate permission from SEPA and Inverclyde Council;
- ✓ Submissions must include information on foul and surface water drainage and must show that Scottish Water and the appropriate authorities have been consulted.
- ✓ For large developments where there is an intention to separate the development into zones, which are to be constructed at different stages, or by different developers, a drainage master plan covering the whole area of development is submitted.

A Drainage Impact Assessment should be undertaken by a competent professional. It is recommended that a DIA should be carried out under the direction of a member of the relevant chartered professional institution, with experience of drainage impact assessment and management.

4. Planning Requirements

4.1. Compliance Certificate Requirements

Inverclyde Council requires the applicant or the suitably qualified agent to certify that the Flood Risk Assessment and/or Drainage Impact Assessments have been carried out in accordance with this guidance, relevant documents and legislation (See Appendix A and B), using the Assessment Compliance Certificate (Appendix C). Inverclyde Council also requires that Professional Indemnity Insurance is maintained for the level of five million pounds (£5,000,000) for each and every claim. 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 10 years.

The Council will give consideration to a lower limit on professional indemnity insurance on the following basis:-

1. Professional indemnity insurance of one million pounds (£1,000,000).

   Will be considered for a development site of no greater than 5 dwelling houses where there are no watercourses within or immediately adjacent to the site and/or any SuDS ponds or basin are deemed to be at no risk to any properties within or out with the development.

   Site Development value should also be less than one million pounds (£1,000,000).

2. Professional indemnity insurance of a minimum of three million pounds (£3,000,000).

   Will be considered for a development site of no greater than 5 dwelling houses where there is a watercourses within or immediately adjacent to the site and/or any SuDS ponds or basin are deemed to be at no risk to any properties within or out with the development.

   Site Development value should also be less than three million pounds (£3,000,000).

4.2. Independent Check Certificate

It is a requirement that all submitted assessments are verified by an independent check process. This secondary check must be completed by an organisation which is entirely independent from the author. The Independent Check Certificate (Appendix D) must be completed by a competent professional who is a member of

the relevant chartered professional institution, or equivalent, with experience of flood risk and drainage impact assessment and management.

The independent check shall confirm that the correct methodology and procedures have been followed and that all risks have been accounted for. It is the responsibility of the author to ensure that all detailed calculations and computations are technically accurate. The independent checker shall not be responsible for checking calculations.

4.3. SSP June 2014 (Paras 254 – 268) Operational Protocol

Any Applicant or Agent submitting a flood risk or drainage impact assessment for any residential development of more than 5 dwellings and for industrial and commercial developments of more than 250m^2 without an Independent Check Certificate would be notified of the operational protocol and required to provide self certification in the form set out by the Council guidance.

5. Appendix A

Flood Risk Assessment Reference Documents

- Flood Risk Management (Scotland) Act 2009
- Delivering Sustainable Flood Risk Management (Scottish Government, 2011)
- Surface Water Management Planning Guidance (Scottish Government, 2013).
- Scottish Planning Policy 2014 (Paragraphs 254 – 268);
- Planning Advice Note 51: Planning, Environmental Protection and Regulation;
- Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems;
- Planning Advice Note 69: Planning and Building Standards Advice on Flooding;
- Planning Advice Note 79: Water and Drainage;
- Scottish Environment Protection Agency – Technical Flood Risk Guidance for Stakeholders;
- Scottish Environment Protection Agency – Flood Risk Assessment checklist;
- Scottish Environment Protection Agency Policy No 22: Flood Risk Assessment Strategy;
- Scottish Environment Protection Agency Policy No 26: Policy on the Culverting of Watercourses;
- Scottish Environment Protection Agency Policy No 41: Development at Risk of Flooding: Advice and Consultation;
- Scottish Environment Protection Agency Water Environment (Controlled Activities) (Scotland) Regulations 2011(as amended);
- CIRIA C697: The SUDS Manual;
- CIRIA C698: Site Handbook for the Construction of SUDS;
- CIRIA C624: Development and Flood Risk- Guidance for the Construction Industry;
- CIRIA R168: Culvert Design Manual;

And to such other documents, statutory guidance and/or legislation that are in force at the date of submission.

6. Appendix B

Drainage Impact Assessment Reference Documents

- Sustainable Urban Drainage Systems. Design manual for Scotland and Northern Ireland CIRIA Report C521, London ;
- Planning and Sustainable Urban Drainage Systems Planning Advice Note PAN 61, The Scottish Executive, 2001;
- Scottish Planning Policy 2014 (Paragraphs 254 – 268);
- Ponds, pools and lochans- Guidance on good practice in the management and creation of small waterbodies in Scotland SEPA;
- Disposal of Sewage Where No Mains Drainage is Available: PPG4, SEPA;
- Safety at Inland Water Sites RoSPA, Birmingham;
- Control of Water Pollution From Construction Sites - Guidance For Constructors And Contractors CIRIA Report 532, London;
- Working at Construction and Demolition Sites: PPG6, SEPA;
- Sewers for Scotland – 2nd Edition WRc, Nov 2007;
- The Wallingford Procedure UK Edition, Wallingford;
- The Wallingford Procedure Europe Edition, Wallingford;
- Flood Estimation Handbook, Centre for Ecology and Hydrology, Wallingford;
- BRE Digest 365, Building Research Establishment;
- Scope For Control of Urban Runoff CIRIA Report 123, London;
- Infiltration Drainage Manual of Good Practice CIRIA Report 156, London;
- Flood Studies Report, NERC, London;
- Manual of River Restoration Techniques River Restoration Centre;
- Natural Heritage National Planning Policy Guidance NPPG 14;
- Watercourses in the community SEPA;
- Culverting, an agenda for action SEPA;
- Returning Watercourses to the community ICE;
- Planning and Building Standards Advice on Flooding, Planning Advice Note 69, The Scottish Executive, 2004.

7. Appendix C

Assessment Compliance Certificate

I certify that all reasonable skill, care and attention to be expected of a qualified and experienced professional in this field has been exercised in carrying out the attached Flood Risk Assessment / Drainage Impact Assessment* (delete if applicable). The report/s have been prepared for the below named development in accordance with the reporting requirements issued by Inverclyde Council.

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 of person responsible for preparing this Assessment _____ (1)

Date _____

Note: 1 – C.Eng from an appropriate Chartered Engineering Institution.

8. Appendix D

Independent Check Certificate

I certify that all reasonable skill, care and attention to be expected of a qualified and experienced professional in this field has been exercised in checking the attached Flood Risk Assessment / Drainage Impact Assessment* (delete if applicable) for the below named development.

Name of Development _____

Address of Development _____

_____

_____

Name of Developer _____

Name and Address of
Organisation providing check _____ (1)

_____

Signed _____

Name _____

Position Held _____

_____

Engineering Qualification of
person responsible for checking
this Assessment _____ (2)

Date _____

Note: 1 - Organisation to be totally independent of original designer/design organisation.
2 - C.Eng from an appropriate Chartered Engineering Institution.