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Falkirk Council Planning Application Advice on Flood Risk and Surface Water Drainage

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1. Introduction

This document details Falkirk Council's technical requirements for drainage and flooding that developers must comply with for new planning applications.

The objective is to ensure all developments have considered flood risk and for developers to provide evidence of measures implemented to reduce overall flood risk of the proposed site and any existing development.

The Council adopts a precautionary approach to flood risk from all sources and operates a presumption against development which would have a significant probability of being affected by flooding or would increase the probability of flooding.

The checklist located in Appendix A should be completed and submitted with the application to show compliance with the guidance set out within this document.

All drainage assessments and flood risk assessments must comply with the following guidance documents; this is not an exhaustive list. The references to guidance within this document have been made as up to date as possible, however applicants should ensure they review guidance from the relevant bodies.

Legislation/Policy	**Link**
Scottish Planning Policy	https://www.gov.scot/publications/scottish-planning-policy/
Flood Risk Management (Scotland) Act 2009	http://www.legislation.gov.uk/asp/2009/6/contents
Falkirk Local Development Plan (LDP)	https://www.falkirk.gov.uk/services/planning-building/planning-policy/local-development-plan/
SEPA's "Technical Flood Risk Guidance for Stakeholders"	https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf
SEPA's "Climate Change Allowances for Flood Risk Assessment In Land Use Planning"	https://www.sepa.org.uk/media/594168/climate-change-guidance.pdf
Flood Risk and Land Use Vulnerability Guidance	https://www.sepa.org.uk/media/143416/land-use-vulnerability-guidance.pdf
Flood risk: planning advice	https://www.gov.scot/publications/flood-risk-planning-advice/
Water Assessment and Drainage Assessment Guide, Sustainable Urban Drainage Scottish Working Party (SUDSWP)	https://www.sepa.org.uk/media/163472/water_assessment_and_drainage_assessment_guide.pdf
Planning Advice Note 61: Sustainable urban drainage systems	https://www.gov.scot/publications/pan-61-sustainable-urban-drainage-systems/

2. Flooding Guidance

2.1 Background information

The proposed development should be assessed for risk from all sources of flooding, including fluvial, pluvial, tidal, groundwater, sewer inundation, or infrastructure failure such as a canal or flood protection structure. Historic flooding events and any existing flood alleviation measures should be detailed to help determine the flood risk of the proposed site. It is recommended that SEPA flood maps are used to provide a general understanding of the flood risk within the area. This will also help to determine if a deeper understanding of the flood risk is needed.

Details should be provided on surrounding watercourses including photographs of key features, such as bridges and culverts. This will help inform whether a Flood Risk Assessment (FRA) is required. The trigger points for when an FRA is required are detailed in section 2.2.

Where applicable, a pre and post development topographic plan is required that will provide details of the proposed earthworks and topographic changes. Pre and post development flow paths should be provided to show the change in surface water flow behaviour across the site after construction. Surface water flows on site should be captured by on-site drainage or be directed away from properties. The amount of surface water flowing away from the site

should not increase post-construction since this will increase flood-risk elsewhere, such as to neighbouring properties.

2.2 Flood Risk Assessment

Falkirk Council will require an FRA as supplementary evidence to support a planning application if the site has one of the following;

- Proposed development is close enough to a watercourse/drainage ditch that it poses a realistic risk.
- Historic flooding has been recorded in the area.
- SEPA flood maps show the site is at risk of flooding from any source.

2.3 Hydrology for Watercourse Modelling

Rainfall estimation for use in hydraulic modelling of watercourses should be computed using an up-to-date method such as FEH 2013 and an allowance for climate change should be added.

SEPA's Climate Change Allowances for Flood Risk Assessment in Land Use Planning[1] recommends certain climate change uplifts (CC) to be applied to peak flows.

Specifically:

- A peak river flow climate change uplift of 56% for river catchments greater than 50km^2;
- A rainfall intensity uplift of 39% for catchments smaller than 30 km^2;
- Or the greatest of the two uplifts for catchments between 30 and 50 km^2.

Different design flood events should be considered depending on the type of development. For general developments a design event of 0.5% AEP+CC is required. However, for Most Vulnerable category properties the design event should be 0.1% AEP+CC. SEPA's Flood Risk and Land Use Vulnerability Guidance [2] should be consulted for categories of development, Most Vulnerable properties include, but are not limited to, emergency services, nurseries and care homes.

2.4 Estuary/Tidal

Should it be deemed that an inherent tidal flood risk is present at the proposed development site, then this should be fully accounted for in the FRA. Modelling of tidal waters may be necessary to fully understand the risk to the development. Falkirk Council will ensure best use of data and share relevant information where possible.

2.5 Hydraulic Modelling

A model of the surrounding rivers and tidal sources may be required in order to effectively assess the flood risk. Modelling results should be provided which indicate expected flood levels for different design events and the flood envelope surrounding the watercourse. If a model is required, justification must be given as to the type of model used (1D, 2D, linked 1D-2D), and must be calibrated and verified where possible. Models should be accompanied by appropriate sensitivity analysis. Flood extents should be provided for a range of flood events including the 1% AEP and 0.5% AEP event, with an allowance for climate change.

If there are hydraulic structures located upstream or downstream of the site, blockage scenarios should be included within the analysis. This will highlight any overland flows which may result due to blockages or indicate additional flood plain storage upstream of the structure which may not have previously been accounted for.

2.6 Finished Floor Levels (FFL)

Properties should be protected from flooding through the setting of appropriate finished floor levels within the development. The FFL should be set at least 600mm above the floodwater level or the nearby watercourse/water body level. Properties should be protected from flooding from all sources including fluvial, tidal, groundwater, infrastructure failure (manmade structures such as reservoirs), sewer inundation and surface water flooding.

[1] SEPA, (2022). *Climate Change Allowances for Flood Risk Assessment in Land Use Planning*
[2] SEPA (2018), *Flood Risk and Land Use Vulnerability Guidance*

2.7 Access and Egress

Access and egress to the site must be maintained during a design flood event. The results of hydraulic modelling and drainage network modelling (discussed below) should indicate whether the access and egress will be affected by flooding. The developer must demonstrate that access and egress will not be compromised due to a range of flood types.

Any mitigation measures should be identified and appropriately explained. The report should also outline the residual risk after mitigation measures have been introduced.

2.8 Compensatory Storage

If the proposed development requires land raising within the functional floodplain, SEPA guidance on compensatory storage areas in the Technical Flood Risk Guidance document should be followed.

2.9 Buffer Strips

A buffer strip is an area of permanent vegetation between development and a watercourse. The benefits of buffer strips can include habitat creation, green network enhancements, improved water quality, bank stabilisation, reduced soil erosion and improved flood risk management. Buffer strips of a minimum width on either side of the watercourse are required for all watercourses. Wide watercourses will require a larger buffer strip than narrow watercourses. The buffer strip will be measured from the top of the bank

The table below provides minimum widths for a buffer strip based on the width of the watercourse. However, the width of the buffer strip will be dependent on site conditions such as the nature and topography of the surrounding land and, therefore, may need to be wider than the relevant minimum width stated below. A buffer of at least 3m (both sides of the feature) may be required for ditches and culverted watercourses to allow for maintenance access.

Width of watercourse (measured between the top of banks)	Minimum width of buffer strip (either side of the watercourse)
Less than 1m	6m
1-5m	12m
5-10m	15m
10m+	20m

3. Drainage Guidance

3.1 Drainage Impact Assessment

A drainage impact assessment is required for all applications to demonstrate how surface water will be drained from the site. Calculations and drawings should be submitted to show how surface water will be routed from source to receiving watercourses, sewers or to the ground via infiltration, and highlight how any attenuation and treatment requirements will be met.

Only in the following circumstances is a Drainage Impact Assessment not required;

- developments with no known existing drainage/flooding problems, along with no known connection capacity problems to natural watercourses, land drains or surface water drainage systems.
- developments with a total proposed impermeable surface area of less than 1000 m², single residential properties and developments which are effectively a sub development of a larger development area for which a drainage impact assessment has already been submitted.

3.2 Drainage Layout Drawing

A drainage layout drawing should be submitted showing the entire proposed network. The drawing should clearly show the location of all manholes within the development and their corresponding manhole number. SuDS features should be shown on this plan showing how they are connected to the drainage system to help inform the area draining to each feature. The location of discharge should also be shown on the layout drawing.

3.3 Hydrology

An up-to-date method for estimating design rainfall should be used. FEH 2013 rainfall data is an industry recognised technique and is the most recent method available. Adequate rainfall estimation is necessary for reliable modelling of drainage networks and all components should be calculated prior to modelling all aspects of the drainage system.

It is recommended in SEPA's Climate Change Allowances for Flood Risk Assessment in Land Use Planning that an allowance of 39% is used to account for increases in rainfall intensity due to climate change.

3.4 Drainage Network Modelling

MicroDrainage or similar modelling software should be used to model the proposed drainage network and any SuDS components. Calculations should be provided showing the water levels of critical durations across the proposed drainage network. Modelling results for the 0.5% AEP+CC, 1% AEP+CC and 3.33% AEP+CC flood events should all be provided. The results should show no flooding of the network during the 1% AEP+CC flood event. The drainage calculations should be checked for a range of 0.5% AEP+CC storm events to determine any flooding resulting from surcharging of the system. Any surcharging flooding should be dealt with appropriately, ensuring that flows are directed away from properties, whilst not leading to an increase in flood risk for neighbouring properties. Evidence should be provided for the 0.5% AEP+CC event showing that there will be no flooding within 300mm of the lowest garden ground level or 600mm of property FFLs.

The proposed discharge rate to an existing body of water from a development site must be in accordance with Falkirk Council requirements. For a 0.5% AEP+CC event Falkirk Council require a discharge rate of less than 3.2 l/s per hectare of proposed development area. In order to attain these flow rates surface water should be attenuated within the development boundary using SuDS. SuDS must not be placed within an area at risk of flooding, for example adjacent to a watercourse. An impermeable to permeable area ratio is required to help guide the DIA on a suitable discharge rate.

Example discharge rate calculation: If the proposed development has a 2.0 Ha developable area, then the maximum allowable discharge rate would be 6.4 l/s during a 0.5% AEP+CC event. Should the site be small, and the application of the 3.2 l/s/Ha condition leads to a discharge rate of less than 3 l/s then Falkirk Council would request that a Hydrobrake of minimum 75mm diameter is used which can pass ~3.0 l/s at 1.0m head. Falkirk Council will not accept flow control devices which are less than 75mm in diameter as they pose an increased blockage and maintenance risk.

The location of discharge to the water body should be shown on development drawings.

3.5 Discharge to existing sewer

A confirmation letter from Scottish Water should be submitted showing confirmation that in principle the existing network has enough capacity for receiving surface water flows from the new development. This letter should detail the maximum allowable discharge rate to the sewer. Modelling calculations should show compliance with this allowable discharge rate. Scottish Water have created a customer portal at ScottishWater.co.uk/portal to assist with planning applications.

3.6 Sustainable Urban Drainage Systems (SuDS)

SuDS should be used wherever possible in order to retain, attenuate and treat discharge from site. SuDS features should be designed in accordance with the SuDS Manual: CIRIA 753[3]. Drawings should be provided showing layout and dimensions of all proposed SuDS. Falkirk Council require basin slopes to be no steeper than 1:4, security screen on inlets to basins and debris screens on outlets from basins.

3.7 Treatment

SuDS should be incorporated into a development to ensure surface water is being treated adequately before discharging to a watercourse. Developers should use a simple index approach or similar in order to provide evidence that the surface water arising from the development will be adequately treated before leaving site. For adoptable road drainage water treatment requirements please contact Roads Development Control on 01324 50 60 70.

[3] CIRIA, (2015). *The SuDS Manual.*

3.8 Adoption and Maintenance

Provide an adoption plan and a letter of provisional agreement from the relevant parties.

A maintenance schedule/statement should be provided for all components of the drainage network. The statement should also include confirmation of responsible parties that will carry out the maintenance for each component.

3.9 Soakaway

If soakaways are proposed for the development the following guidance must be followed;

- BRE Digest 365: Percolation tests must be carried out and results forwarded for approval (tests must be carried out as close to the proposed location of the soakaway as possible).
- Must not be located within 5m of building foundations.
- Must take account of seasonal variations in the groundwater table.
- Must have appropriate treatment facilities.
- Designed with facilities for inspection and maintenance.
- Designed to the requirements of BRE Digest 365 or CIRIA C753.
- Follow the surcharge/flooding considerations as other SuDS features i.e. not surcharging during a 1% AEP+CC event, not flooding within 300mm of the lowest garden ground level or 600mm of property FFL during a 0.5% AEP+CC event, with any overland flow routes shown clearly on a plan.

3.10 Construction phase

If the development requires a large volume of earthworks, a description of how surface water will be managed during the construction phase should be provided. This is to ensure earthworks during the construction phase will not increase flood risk to neighbouring properties.

4. Checklist

The checklist located in Appendix A should be completed and submitted to Falkirk Council along with relevant documents to support the application. If the checklist is not submitted along with the planning application, or on completion of the checklist it is clear insufficient evidence has been provided, the application will not be reviewed.

5. Contacts

For all planning application queries please contact:

dc@falkirk.gov.uk

For all enquiries about this guidance note please contact:

Flooding.Planning@falkirk.gov.uk

Appendix A - Checklist

* Please continue reasoning on separate sheet if required, noting the section reference number.

Application Ref No	Flooding	Provided? (Yes/No)	N/A	Submission Section Reference	Reason if No or N/A*
	Full Planning Application/Planning in Principle				
1	Location Plan				
2	Study area description (location, previous land use)				
3	A statement outlining how, in the author(s) opinion, the development proposal complies with current flood legislation and policy.				
4	Plan of site showing pre and post development ordnance datum levels				
5	Pre-Development and post-development overland flow paths for site and surrounding land.				
6	Good use of photographs illustrating important features such as culverts etc.				
7	Catchment description				
8	Hydrology should be derived using FEH 13 rainfall catchment description. Comparison of relevant methods such as ReFH2, FEH Rainfall Runoff and statistical where appropriate.				
9	An allowance for climate change should be included. This is 39% for surface water, 56% for peak river flows and 0.86m uplift on peak sea levels to follow SEPA guidance.				
10	Information on historic flood events				
11	Details of any existing flood alleviation measures including the level of protection and condition				
12	Identification on the ownership of any water related structures and assessment of their condition				
13	Information on consultations undertaken with others				
14	Assessment of all relevant sources of flooding and level of risk. Sources include fluvial, pluvial, coastal, groundwater, infrastructure.				
15	Assessment of increased flood risk to surrounding sites.				
16	Full details of modelling approach including schematisation, justification on chosen model and software (e.g. why a linked 1D-2D model has been used), appropriate consideration of upstream and downstream boundaries).				
17	Flood maps for the 3.33%, 1%, 0.5%, 0.5%+CC AEP flood events. Flood elevations at key locations. (0.1% AEP+CC for Most Vulnerable category properties, as defined by SEPA).				
18	Details of appropriate model calibration and verification should be provided where possible.				
19	All models should be accompanied by appropriate sensitivity analysis.				
20	Blockage scenarios should be provided if the flood site levels are influenced by downstream structures. Results should show impact on water levels should these features become blocked.				
21	Flood water levels from all sources should not encroach within 600mm of FFL's up to and including the 0.5% AEP+CC event.				
22	An assessment of emergency access to and from the proposal up to and including the 0.5% AEP+CC event.				
23	Description of how all flood risks have been identified and appropriately mitigated or managed.				
24	A summary of residual risk after any proposed flood mitigation measures and recommendations for further study/risk reduction.				

Application Ref No	Drainage	Provided? (Yes/No)	N/A	Submission Section Reference	Reason if No or N/A
	Planning in Principle				
1	Indicative drawings showing planned development layout including proposed developed areas.				
2	Areas of impermeable and permeable surfaces contributing to surface water runoff should be quantified and shown on plan drawing.				
3	Indicative layout drawing of the drainage design including all SuDS features.				
4	Drawings showing development in relation to natural surface water and existing receiving watercourses.				
5	Details on the restriction of post development surface water flow.				
6	Details of proposed attenuation and treatment. Attenuation should be provided to the 1% AEP+CC flood event and treatment should follow the simple index approach or similar.				
	Full Planning Application				
7	Drawings showing planned development layout including proposed developed areas.				
8	Areas of impermeable and permeable surfaces contributing to surface water runoff should be quantified and shown on plan drawing.				
9	Layout drawing of the drainage design including all SuDS features and manhole numbers (surface water and wastewater)				
10	Drawings showing development in relation to natural surface water and existing receiving watercourses				
11	Drainage strategy outlining the SuDS to be used in the development				
12	Details on the restriction of post development surface water flow. • If there will be a connection to a public sewer, a letter of agreement in principle from Scottish water is required, stating maximum allowable discharge rate to sewer. • If discharging to a body of water, evidence that a maximum discharge rate of 3.2l/s/Ha (of developable area) has been met for the 0.5% AEP+CC event*. *Subject to minimum 75mmØ flow control (~3l/s)				
13	Drawing showing point of discharge, the outfall structure and how it is intended to connect/link into the existing surface water drainage network and/or watercourses.				
14	Details of proposed treatment of surface water using simple index approach or similar.				
15	Storage, attenuation, and discharge calculations are required for all SuDS features				
16	FEH 2013 catchment descriptors preferred, justification required for alternative method.				
17	An allowance for climate change should be included, this is 39% for surface water.				
18	Calculations should be provided of the proposed drainage network for the critical rainfall event for the 3.33%, 1%, 0.5% AEP events, plus an allowance for climate change. MicroDrainage or similar should be used.				
19	Calculations showing no flooding for the 1% AEP+CC event				
20	If flooding occurs in the 0.5% AEP+CC event, overland flow paths of this event must be provided. The level of the flooding must not encroach within 600mm of any FFL.				
21	Confirmation that emergency access to and from the site will be maintained, even during the 0.5% AEP+CC event.				
22	Provide an adoption, vesting and maintenance plan for the SuDS components in the development including details of accountable body responsible for vesting & maintenance.				
23	Description of measures to manage surface water runoff in construction phase				
24	If infiltration devices are proposed has subsoil porosity tests at location of infiltration devices in line with Digest 365 or similar been undertaken				
25	If no public sewer is available in the settlement, then evidence of compliance with SEPA's Policy and supporting Guidance on the Provision of Wastewater Drainage in Settlements				

Glossary

AEP	Annual Exceedance Probability (AEP) refers to the probability of a flood event occurring in any one year. The probability is expressed as a percentage. For example, a large flood which may be calculated to have a 1% chance to occur in any one year, is described as having a 1% AEP.
Attenuation	Reduction of peak flow by spreading it over a longer period of time.
BRE	Building Research Establishment
CCTV	Closed Circuit Television
CIRIA	Construction Industry Research and Information Association
DIA	Drainage Impact Assessment
FFL	Finished Floor Level
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, which supersedes the Flood Prevention (Scotland) Act 1961 and the Flood Prevention and Land Drainage (Scotland) Act 1997.
FRA	Flood Risk Assessment
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.
Functional Floodplain	The functional floodplain is defined as land where there is a 0.5% or greater annual probability of flooding in any year.
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.
Groundwater	Water that has percolated into the ground; it includes water in both the unsaturated zone and the water table.
Ha	Hectares
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.
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 Exceedance Probability (AEP) of 0.5% (200 year) or greater.
Soakaway	A subsurface structure into which surface water is conveyed to allow infiltration into the ground.
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.
Watercourse	All means of conveying water except a water main or sewer.
The Water Environment (Controlled Activities) (Scotland) Regulations 2011	A set of regulations that control activities which may affect Scotland's water environment.
Water Environment and Water Services (Scotland) Act 2003	Gave powers to introduce regulatory controls over water activities in order to protect, improve and promote the sustainable use of Scotland's water environment.