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# Good Practice Guide

## **Producing flood risk hydraulic models and flood consequence assessments for development planning purposes**

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### 1. Scope

The Welsh Government seeks to ensure new development is sustainable in the long term and does not create a legacy of problems for future generations. Its national planning policy aims to direct new development away from areas of flood risk and ensure any flood risk and associated impacts both on and off-site can be appropriately managed. The preparation of a Flood Consequences Assessment (FCA) is key in identifying the flood risk to and from a development. It can also be used to demonstrate what mitigation measures will be required to reduce the risks and impacts to ensure the development itself is as safe as possible and that there is minimal impact on flood risk generally.

This guidance has been developed by Natural Resources Wales (NRW) to provide good practice advice for developers and their consultants who are preparing flood risk documentation to support development planning proposals associated with flood risk.

It should be noted that this document is a living draft and will be updated as a result of any future changes or amendments made to the Welsh Government's flood risk, or development planning legislation and data.

### 2. Regulatory Information

Most development proposals require planning permission from the Local Planning Authority (LPA). In gaining that permission, any development shown to be at risk of flooding will need to comply with the Welsh Government's Planning Policy Wales and Technical Advice Note 15 (TAN15)<sup>1</sup>. In some circumstances, a formal Flood Defence Consent is also required, either from NRW for locations at risk of flooding from main rivers or the sea, or from a Local Authority for ordinary watercourses such as streams.

Information on whether a location is at river or coastal flood risk can be found by referring to the Welsh Government's development advice map<sup>2</sup>. Further detail on all sources of flood risk can be found on NRW's own flood maps<sup>3</sup>.

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<sup>1</sup><http://gov.wales/topics/planning/policy/tans/tan15/?lang=en>

<sup>2</sup> <http://data.wales.gov.uk/apps/floodmapping/>

<sup>3</sup> <https://naturalresources.wales/our-evidence-and-reports/maps/flood-risk-map/?lang=en>

A key requirement of TAN15 is that a Flood Consequence Assessment (FCA) must be produced for any development at risk of river or coastal flooding. The results of the FCA should be used to inform the final design of a development and to demonstrate that all risks have been identified and appropriately mitigated for. This is vital to ensure that the development will be safe for people to live in or use for all of its proposed lifetime.

NRW is a statutory consultee in the Town & Country Planning process. Our role regarding flood risk is to provide technical advice to LPAs on the acceptability of flood risk assessment and the measures proposed to manage that risk to people and property from any new development proposal.

NRW assess FCAs and any other supporting flood risk documentation that accompany planning application consultations to identify whether the applicant has met the requirements of Planning Policy Wales and TAN15. Within our advice to the LPA, we provide comment regarding the acceptability of flooding consequences and the technical soundness of an FCA. It is important to note however that there are matters related to flood risk that we are unable to give advice on, such as emergency plans, procedures and measures to address structural damage that may result from flooding. For such matters, advice should be sought other professional advisors.

Although TAN15 primarily refers to built development such as housing, industrial or commercial premises, the principles of assessing flood consequences relate to any development at risk of flooding that requires planning permission and/or land drainage consent and the production of a FCA.

Ideally, the FCA/assessment of flood risk will be a standalone document and should be considered as early as possible in the development feasibility stage. To comply with the requirements of TAN15, the FCA/ appraisal must include:

- an assessment of the consequences of flooding to the development.
- consideration of an appropriate allowance for climate change in line with current government guidance at the time of application. Current national planning policy requires climate change to be considered on all fluvial flows up to and including the 1% (1 in 100) annual probability of occurrence and on all coastal flood levels up to and including the 0.1% (1 in 1000) annual probability of occurrence.
- an assessment of the flood consequences of the development to third parties for an appropriate range of fluvial flows and coastal flood levels (including climate change) up to and including the 0.1% annual probability of occurrence (1 in 1000 in any given year).

If a development covers an area of combined fluvial (river) and coastal flood risk then agreement with NRW's Operational Flood Risk Analysis team must be made about the combinations of joint probability to be assessed. Please note, where a development is located in an area at risk from any other source of flooding (incl. surface water <sup>4</sup>/ groundwater), the FCA should include an assessment of this risk. Information pertaining to surface water or groundwater flooding will be assessed by the Local Authority in their role

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<sup>4</sup> <http://naturalresources.wales/flooding/managing-flood-risk/whats-my-flood-risk/?lang=en>

as Lead Local Flood Authority (LLFA), as per the Floods and Water Management Act 2010.

Section A1.12 of TAN15 states that any new development must show 'no flooding elsewhere'. Current national policy suggests this should include a flood event with a 0.1% (1 in 1000) annual probability of occurrence (including climate change for coastal flood levels).

TAN15 also advises that a FCA can be used to establish whether appropriate mitigation measures can be incorporated within the design of a development to ensure that it minimises risk to life, damage to property and disruption to people living and working on the site or elsewhere in the floodplain. NRW will review the FCA and hydraulic modelling and advise the LPA on the submissions technical competence and the merits of the proposed mitigation. Our assessment of the FCA will have two key aims:

- to identify whether the flood risks to both to the development itself and elsewhere have been fully identified and quantified.
- to advise the LPA on whether every reasonable mitigation measure has been included in the final proposed design to ensure the development is as safe as possible and that the consequences of flooding meets the requirements of current planning policy.

NRW advice on flood risk matters is intended to assist the LPA in making a fully informed decision based on the merits of a proposed development.

### 3. Interaction with NRW for Flood Data and Technical Advice

The first point of contact for provision of NRW hydraulic model data is via the organisation's 'Access to Information' team who can be contacted via email at: [datadistribution@cyfoethnaturiolcymru.gov.uk](mailto:datadistribution@cyfoethnaturiolcymru.gov.uk). They will liaise with the Operational Flood Risk Analysis teams, who are the custodians of the organisation's hydraulic models.

If a NRW hydraulic model already exists in the area of interest, we can provide the starting model (under licence if required) and provide advice on the scope of any work that may be required to achieve the objectives of the hydraulic modelling work. Please note that provision of this information may incur a cost.

If a hydraulic model does not exist at the area of interest, our Operational Flood Risk Analysis teams can assist with defining the scope of the hydrological and hydraulic model required.

Pre application discussions with the relevant Flood Risk Analysis team is strongly recommended as they can provide local knowledge, data and advice on the suitability of a hydraulic model's fitness for purpose.

A hydraulic model may also be used to provide design water levels. Site specific hydraulic model accuracy and safety margins (freeboard) should also be discussed and agreed with the relevant Flood Risk Analysis team.

If a development project has a long duration or a flood event occurs, it may be necessary to review the hydrology, hydraulic model calibration and blockage scenarios being considered in light of new data becoming available.

NRW will also specify final data deliverables that are required if changes to the Flood Map are to be requested as part of the development proposal.

Please note that NRW will not accept a hydraulic model for review and consideration to be included within our library of hydraulic models, or as part of a FCA, unless it is accompanied by a hydraulic modelling technical/user report, log, record and results files.

## 4. Mitigation Evidence

It is usually necessary to undertake mitigation work to address any increased flood risk elsewhere. The following evidence is required as part of the FCA/development appraisal to ensure a full assessment of the risks and impacts to third parties of any development, and to pass the acceptability criteria in line with the requirements of current planning policy.

- An appropriate baseline hydraulic model must be constructed to represent current conditions and include the latest hydraulic modelling software (if a hydraulic model is used), topography and flood flow estimates available at the time of the planning application.
- A proposed hydraulic model must be developed where the proposed permanent and temporary works have been integrated with the baseline hydraulic model.
- Both the baseline and proposed hydraulic models must produce, where possible for the model software and hydrological input, outputs that clearly calculate the flood risk in terms of depth, velocity, rate of rise, speed of inundation and extent for the appropriate range of flood flows chosen.
- A comparison of Baseline and Proposal results.
- An appropriate range of flood flows “up to and including” the maximum event should be considered, particularly around the threshold of flooding, if considered to be critical to the results.
- An appropriate allowance for climate change must be considered in line with current government guidance at the time of application.

## 5. Increased Flood Risk and its Measurable Limit

Calculations will be carried out to the appropriate numerical precision; however, for the purposes of determining any flooding impact, depth and level results will be produced in metres to two decimal places due to model resolution. For example; a baseline water level would be calculated to 100.000m Above Ordnance Datum (AOD), the proposed change in water level would be calculated as 100.004m AOD and therefore reported as 100.00mAOD. That is, no reported change.

Conversely in the same example, should the calculated proposed water level be 100.005mAOD, then this would be reported as a change in water level with a proposed water level of 100.01mAOD. This is a positive change in water level from the baseline.

Velocity, rate of rise of flood water and hazard values must also be measured in metres to one decimal place.

To demonstrate that a proposed development has not increased flood risk elsewhere the FCA and hydraulic modelling must show:

- No increased depth, velocity, rate of rise or extent for flood water outside the river channel, or agreed flood storage area.
- No change to the onset of flooding.
- No impact to infrastructure within or connected hydraulically to the river channel.

Where parts 1, 2 and 3 cannot be fully met, all appropriate evidence must be provided within the FCA to enable NRW to advise the LPA on the merits and acceptability of the development proposal in comparison to any demonstrated increased flood risk elsewhere. The FCA must therefore clearly identify the residual increase in flood risk elsewhere and provide comprehensive detail on depth, velocity, rate of rise, speed of inundation and /or extent and the number and type of property and/or infrastructure affected.

NRW technical advice to the LPA will be based on the evidence presented in the FCA.