



Developers' Guide:
The Impact of Water Management on
Planning and Development

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Who We Are

The Syntegra Group are a specialist planning & multi-disciplinary engineering design consultancy. Launched in 2008, we have a proven track record of providing innovative and commercially viable sustainability and energy efficiency solutions to the built environment across the United Kingdom and internationally.

2019 marks our 11th year of trading and the company is recognised by Goldman Sachs as a fast growth company - currently employing around 35 members of full time staff at our locations in London, Reading, Tonbridge and Bristol. We are members of Construction-line, ANC, CIBSE, Energy Institute and the UK Green Building Council.

Our experience within the built environment and our contribution to many nationally-recognised forward thinking developments has led to over 28 awards and accolades, including:

- Winner RIBA 2019 London & National Award – 168 Upper Street
- Selected as finalists in the Constructing Excellence SECBE Awards 2019
- Shortlist RIBA Stirling Award 2017 – Spruce Apartments
- Winner AJ Retrofit Awards 2017 – Print House Works
- Energy Consultant of the Year – Energy Efficiency Homes 2017
- Shortlist RIBA awards 2016 and Winner Hackney Design Awards 2016
- Awarded ‘Sustainability Company of the year’ by the Thames Valley Chamber of Commerce in 2014
- Identified as a SME growth company by Goldman Sachs and awarded strategic support under the 10ksb programme (2013 – ongoing)
- Winner of the Green Apple built environment awards 2013
- Winner of the Smarta 100 Awards 2013

 <p>To date we have saved our clients £125m+</p>	 <p>Our team is currently working on 100+ live projects!</p>	 <p>50% of our team have a post graduate degree</p>
 <p>Syntegra offers in excess of 55 services</p>	 <p>Live UK Project Value of £3 Billion GDV</p>	 <p>Live Overseas Project Value of £100 Million</p>

NHBC Drainage Guidance

With climate change to the fore of the public psyche, increasing attention is being paid to tackling energy and emissions, sustainable development and reducing waste.

In the built environment sector, it is the responsibility of all stakeholders from the planning stage onwards to put environmental issues centre stage of their activities, especially now that the Government has set ambitious house-building targets with developments.



With that in mind, as soon as a site is earmarked for development, before the first shovel of soil has been lifted, it is critical to identify how to tackle a key environmental issue – that of water usage and waste as existing systems will be placed under increasing pressure.

Syntegra’s Director of Civils and Infrastructure, Arwyn Norris, said: ‘We often see schemes drawn up by architects with no thought about where they’re going to put the scheme and it becomes a battle where they have to squeeze everything to make space for it and they lose value because they’re not getting as much on the site as they expected.



‘If you get us on board early, we can get a better, more sustainable drainage scheme that everyone can live with, not just an afterthought as has been the case before.

‘It’s actually a key thing that can make or break a site.’

Flooding has become a tangible product of global warming in recent years and now developers need to incorporate effective measures into all schemes to mitigate any flood risk. And retrofit projects are also ripe for water efficiencies.

Reducing water usage and treatment features in legislation such as Article 6 of the Groundwater Directive and The Floods and Water Management Act and is regulated by bodies such as the Environment Agency and local authorities.

The Environment Agency estimated that two-thirds of the 57,000 flood affected homes in the summer of 2007 were damaged because of surface water run-off overloading existing drainage systems. The Pitt review Learning Lessons from the 2007 Floods, which caused tens of millions of pounds of damage, highlighted the risk of surface water flooding and made a series of recommendations to reduce the chance of homes, businesses and services being damaged by floods in the future and to prevent the loss of services such as water and power due to floods.

Millions of existing homes remain at risk of flood damage, with the risk of such catastrophic events becoming more frequent due to climate change. The Cabinet Office claims as many as 10% of all homes are built on a floodplain.



The Building Regulations Approved Document H provides the regulatory framework for drainage of rainwater. There must be adequate provision to carry rainwater from the roof of the buildings; paved areas around the building must be adequately drained; and rainwater should be discharged, preferably to an adequate soakaway or some other adequate infiltration system. But where this is not practicable rainwater should be discharged to a watercourse or, if that is not reasonably practicable, a sewer.

In its document, [A Simple Guide to Sustainable Drainage Systems for Housingⁱ](#), the NHBC Foundation gives developers and engineers tips and rationale for implementing Sustainable Drainage Systems (SUDS) – now covered by mandatory regulations in Wales with the introduction this year (January 2019) of Schedule 3 of the Flood and Water Management Act 2010.

They have replaced conventional piped drainage solutions which have seen pipes silt up and contribute themselves to localised flooding and depleting natural groundwater sources.

SUDS are proven to be effective flood control measures and cover environmental, social, and economic requirements for a site development to provide a sustainable, healthy, pleasurable environment for the new housing community as well as adequate management of surface water drainage by attenuating excess stormwater flow to reduce the risk of flooding having an impact on the social community, the guidance says.

SUDS also treat wastewater meaning there is less negative impact on local water quality which, in turn, could be harmful to wildlife habitats.

SUDS improve the natural drainage of surface water and provide a green habitat which enhances biodiversity in a community.

Incorporating them into construction project design not only aids general environmental improvement but also helps the construction industry avoid fines or prosecution due to discharges of wastewater on building sites.

Syntegra can work with developers to liaise with planning authorities and regulators in relation to their requirements and the most appropriate solution for a specified site and in turn with designers to ensure SUDS design in accordance with regulations.

The inclusion of pervious paving solutions for car parks and pavements and natural filter trenches or soakaways around development sites are minimally invasive in terms of space for new builds and help projects achieve higher level certifications in the planning application process.

Devices for SUDS include stormwater design features, pervious paving, soakaways, swales, infiltration trenches, filter strips, sand filters, bioretention filters/ areas, green roofs, water harvesting systems, infiltration basins, detention basins, ponds and stormwater wetlands, silt removal devices, pipes and conduits, and subterranean storage.

To ensure effective operation of the water run-off attenuation measures, drainage facilities must discharge half their volume within 24 to 48 hours of the storm event in readiness for any subsequent storm inflow, unless advised otherwise by a statutory body.

Green roofs are roofs that are intentionally planted with vegetation as part of the building design, including a rooftop garden planted with flowers and shrubs or patches of mosses. They contribute to a company's corporate social responsibility by providing habitats to encourage and enhance biodiversity and can be developed as part of a retrofit on some properties, not just at the initial construction stage.

The NHBC guidance describes a green roof as consisting of a multilayer system that includes vegetation top layer, soil or a suitable substrate, drainage, protection, waterproofing, and insulation layers.

They provide green spaces in densely populated urban city centres or in housing developments where space for gardens and landscaped greenery for communal amenity is limited and should be developed in partnership with structural engineers, landscape architects, horticulturalists, and SUDS drainage experts.

Green roofs can reduce run-off rates and volumes from roofs to reduce pressure on the surface water management and other local drainage systems.

Benefits to building owners include longer life expectancy of the roofing systems, water attenuation/retention, enabling rainwater harvesting, thermal insulation of buildings, and more efficient long-term maintenance cost compared with conventional flat roofs, 'as well as providing a pleasant green space in urban environments and contributing positively to reduce CO2 emissions to the atmosphere,' says the NHBC guidance.

The vegetation layer of green roofs protects the roofing system from ageing by environmental exposure to temperature stresses during summer and winter, the degradation caused by UV radiation of the sunlight, and varying ozone intensity of urban environments. The waterproofing layer also provides protection from direct mechanical stresses caused by hail, rain and wind.

The incorporation of a green roof extends the life expectancy of an ordinary flat roof system (which has a life expectancy of about 15 to 25 years) because of the protection provided by the vegetation and soil (or growing medium) layer.

Rainwater can be successfully harvested from a green roof or pervious paving on the ground, relieving pressure on natural resources, and systems can be integrated into new builds and existing buildings for purposes other than drinking.



Collecting rainwater for daily household activities can reduce demand of potable water from the water supply by approximately 33%, resulting in significant water meter charges for building owners.

Harvested water can be used for flushing toilets, washing clothes, washing cars, and watering gardens without further treatment.

Planning Policy Statement 25: Taking Flood Risk Into Account In The Planning Process

Following publication of the Cabinet Office’s report on learning lessons from the 2007 floods, the Government published a national policy on development on floodplains (PPS25). It promotes a strategic approach to managing flood risk: ensuring that flood risk is considered at all stages of the planning process; stressing the importance of flood risk assessments and consideration of all sources of flooding and ensures all local authorities have in place a strategic flood risk assessment, available to members of the public.

PPS25 encourages developers and local authorities to seek “opportunities to reduce the overall level of flood risk in the area through the layout and form of the development” and actively encourages SUDS development.

Environment Agency ‘Building a Better Environment’

The Environment Agency has published guidance for developers ‘building a better environment’ which sets out the key considerations for developers in relation to PPS25 and flags up the importance of flood risk assessments. The Royal Institute of British Architects is also producing guidance called ‘Living with Water: Sustainable design for areas at risk of flooding’ for architects to encourage the development of more innovative solutions to development in flood risk areas.

When making an individual planning application, a developer should submit an appropriate Site Flood Risk Assessment. Many planning applications are objected to by the Environment Agency on the basis of a lack of a flood risk assessment. The assessment of the site in question will provide more detail on the individual site risk and the impact of the proposed development on its own flood risk and that of neighbouring areas. If Local Development Documents are clear about the local planning authorities’ approach to flooding, individual planning applications should reflect this both in terms of type of development proposed and any mitigation strategies (if in a flood risk area), says PPS25.

Applications for development in flood plain areas, with appropriate ‘sequential assessment’ documentation can still succeed as it is understood flood risks are also being tackled by flood defences in flood zones and extra resilience measures embedded in new building designs.

Some authorities now encourage the use of permeable surfaces, such as gravel, for new developments and are considering a move to require planning permission if impermeable surfaces are proposed.



By law, local planning authorities must consult the Environment Agency before granting planning permission for developments in areas at risk of flooding (as defined in the Town and Country Planning (Development Management Procedure) (England) Order 2010). If the authority is minded to grant permission for “major development” against Environment Agency advice, then it must notify the secretary of state who may decide to “call-in” the application for its own determination (The Town and Country Planning (Consultation) (England) Direction 2009). In this context, “major development” means, in respect of residential

development, the provision of 10 or more dwellings, or a site of 0.5 hectares or more. In respect of non-residential development, the threshold is new floorspace of 1,000 sq m or more, or a site of 1 hectare or more.ⁱⁱ

It will need to be shown that run-off from the proposed development will not increase flood risk elsewhere (e.g. by giving priority to the use of SUDS). The Floods and Water Management Act 2010 led to the creation of a Sustainable Drainage Systems Approving Body in unitary or county councils which must approve drainage systems in new developments and re-developments before construction begins.

From the outset of selecting a development site, you will, therefore, have to prove that the local flood plain will not be compromised by any new property.

These are areas of land that are designed to collect floodwater and prevent it from flowing onto higher ground, and their storage capacity can be reduced if they're heavily developed and covered in buildings.

Fitting an early warning sensor system and alarm in a building near a flood risk area on a lower level than the ground floor. They will alert occupants if a flood is expected, allowing time to move some possessions upstairs.

On certain properties, certainly self-build homes in flood risk areas, it is wise to install flood defence barriers across window and door frames which can be slotted in whenever there is a risk of water entering the building.

To avoid the potential for raw sewage to enter a building in the event of a flood, non-return valves can be fitted to all the drainage routes.

It's possible to install waterproof skirtings in new builds and a dado rail can divide lower level plasterboard cladding from the higher level, to reduce any post-flood replacement work, advises the self-build journal Build It.ⁱⁱⁱ The Building Regulations already require plugs and sockets to be at a high level in any new rooms, and this should be followed through for existing ones, too, it recommends.

Any initial assessment of a site for its water management issues will feature an ecological overview – another service Syntegra is proud to provide to clients throughout the planning and design phases of potential projects.

As well as identifying wildlife habitats which need to be preserved by law, this team also recommends measures and design features to provide enhancements to the site's biodiversity which, in turn, can lead to higher levels of planning and regulatory certification.

We have a wide range of specialists delivering infrastructure design and civil engineering services across a diverse range of projects, using their technical skills and expertise to add lasting social value to the communities in which we work UK-wide.

We are focused on delivering best value appraisals on development sites to offer commercially viable solutions but also to address planning requirements and user needs. It's a fine balance that has to be struck and the solutions we provide reflect how experienced our team is at engaging with all stakeholders and interested parties, and working collaboratively with regulatory authorities to ensure everyone involved is satisfied with the outcome.

Syntegra has experts specialising in flood risk, below ground drainage design, highways design, transportation, foul sewage and utilities assessment, geotechnics and land quality to inform critical decisions on infrastructure design. It's an illustration of the importance of getting infrastructure right to ensure a site works seamlessly for all parties and provides 'best value' engineering.

Through all stages of the development cycle our team will advise you on a range of essential infrastructure and civil engineering issues, including:

- Flood risk assessments/flood consequences assessments and flood mitigation strategies in accordance with the latest NPPF and PPG guidance.
- Foul sewage assessment and surface water drainage strategy development and detailed design including attenuation and pollution control proposals in accordance with latest guidance, Building Regulations and Sewers for Adoption.
- Advice on sustainable urban drainage techniques (SuDS) and incorporation of treatment components due to our skilled below ground drainage design experts.
- Adoptable drainage designs, requisitions and diversions via Section 104, 106, 184 and Section 98 legal agreements.
- On-site and off-site highway and infrastructure designs, including junction alterations, highways improvement works and pavement design.
- Local authority and Highway legal agreements via Section 38 and 278 Agreements.
- External works designs, cut and fill analysis including assessing finished floor levels, design of retaining walls and slope stabilisation.
- Utility assessments, and negotiations and approvals relating to connections and protection / re-routing options.

For developers and landowners, we conduct utility assessments on sites at feasibility and pre-planning stages of development and provide pre-planning advice in relation to Flooding, Drainage and Highways.

The main guidance documents for implementing water management systems are: Construction Industry Research and Information Association (CIRIA) publications: C582: Source Control Using Constructed Pervious Surfaces C625: Model Agreements for Sustainable Water Management Systems. Model Agreements for SUDS C626: Model Agreements for Sustainable Water Management Systems. Model Agreement for Rainwater and Greywater Use Systems C630: Sustainable Water Use in Land Use Planning C697: The SUDS Manual C698: Site Handbook for the Construction of SUDS RP664: Model Agreements for Sustainable Water Management – Review of Existing Legislation RP697: SUDS updated Guidance on Technical Design and Construction Interim Code of Practice for Sustainable Drainage Systems Funding and Charging Arrangements for Sustainable Urban Drainage Systems.

Syntegra Links

Syntegra SUDS news:

<https://syntegragroup.com/2018/10/suds-approval-to-be-mandatory-in-wales/>

<https://syntegragroup.com/2018/09/drainage-is-key-to-sustainable-site-development-warns-new-team-member/>

<https://syntegragroup.com/2014/03/suds-design-for-planning/>

<https://syntegragroup.com/2011/03/sustainable-urban-drainage-systems/>

<https://syntegragroup.com/2011/03/green-roofs-flood-and-water-management-act/>

ⁱ <https://www.nhbcfoundation.org/publication/sustainable-drainage-systems/>

ⁱⁱ <http://www.constructionmanagermagazine.com/management/building-flood-risk-sites-what-law-says/>

ⁱⁱⁱ <https://www.self-build.co.uk/building-a-house-in-a-flood-zone/>