

Enborne Flood Risk Mitigation

Flooding has been an issue over the past few years, becoming increasingly common in many parts of Britain, broadcast on to the nation's TV screens. The reasons are complex but probably include climate change and inappropriate development in the past. Areas at flood risk should not be developed or should be reserved for less vulnerable uses, such as agriculture or sports fields, near urban areas. Large impermeable surfaces that increase runoff should be avoided or measures taken to mitigate their effects. During the first part of this century, Government introduced measures designed to tackle the problem and reverse the legacy of inappropriate development.

Legal Requirements

English law requires that flood risk is considered within the Planning process. In particular, flood risk to people at a proposed development should be assessed as part of a Flood Risk Assessment (FRA). That principle is extended to people or property elsewhere and the FRA needs to ensure that flood risk to third parties is not increased. Detail is included within the National Planning Policy Framework, the NPPF, last updated in 2021 and available here¹. Guidance on NPPF flood risk requirements is published online², with additional publications that focus on the detail and special cases.

Sources of Flood Risk

Flood risk may be complex and typically includes one or more of the following categories of flooding, from:

- 1) Rivers and the sea
- 2) Surface water
- 3) Groundwater
- 4) Sewers
- 5) Infrastructure failure

Any FRA would search for records of flooding locally and assess how features of the site may influence it. The Environment Agency publishes mapping of flood risk from rivers and the sea, known as the Flood Map for Planning³ and from other sources, as long-term flood risk mapping⁴. This information is necessarily general in its nature and forms a starting point for any site-specific FRA. Flood risk elsewhere often involves surface water leaving the site and should be managed using techniques, collectively known as sustainable drainage systems or "SuDS". The most authoritative document that describes these is the SuDS Manual, which can be downloaded from⁵.

Flood Risks at Poors Field and beyond

Proposals to build a solar farm at Poors Field have been assessed in this way. Solar farms have a low vulnerability, since they typically do not involve additional people living at the site, although people may visit for construction and maintenance. All the above sources of flood risk were investigated and the main risk, perhaps the only significant risk was found to be from surface water flooding. This is mapped under the long-term flood risk link below. Click on the link to "view a map showing areas at risk of flooding" and selecting a local post code (eg. RG20 0PR). Drop down the list on the left and select the extent of flooding from surface water. Find Spring Gardens and you will see a flood flow path coloured light blue, extending from the land to the north (Poors Field) and passing through Spring Gardens.

¹ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

² <https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications>

³ <https://flood-map-for-planning.service.gov.uk/>

⁴ <https://www.gov.uk/check-long-term-flood-risk>

⁵ <https://www.ciria.org/ItemDetail?iProductCode=C753F&Category=FREEPUBS>

The key shows that this colour indicates a low risk of flooding from surface water. Click on the map to see that “Low Risk” is defined as “*each year this area has a chance of flooding of between 0.1% and 1%*”. On average, the blue area would flood only once over a 100-year period, at most. Local witnesses suggested that in reality, flooding along this route is more common. The FRA considers why surface water flooding occurs in this area and how it may be affected by a solar farm. This detail is described under “Surface water management”, Section 6 of the FRA. It is not clear whether or to what extent flood risk would be affected by solar panels but there already is a risk to Spring Gardens and the solar farm development may be an opportunity to reduce it.

Reducing Surface Water Flood Risk

The best way to manage surface water would be to allow it to infiltrate into the soil. If the surface of Poors Field was more permeable, this may be possible and structures such as soakaways or infiltration trenches could be constructed to promote it. Since the field is underlain by London Clay, infiltration is limited and an alternative strategy will be required. The alternative recommended by the SuDS Manual and the FRA is “runoff attenuation”, in which overland flow is detained temporarily within an “attenuation pond”. A flow control is used to release it gradually. This allows runoff from a high magnitude rainstorm, lasting hours to outflow over a day or two, keeping it below levels that could cause flooding.

Fully Rural, Greenfield Runoff

Greenfield runoff is flow that would occur from the site in its undeveloped and undisturbed or “fully rural” state. As such, it is a theoretical concept, since almost none of Britain exists in an entirely undeveloped and undisturbed state. Over the years, various methodologies have been developed to calculate this benchmark, expressed in litres per second per hectare. The current favoured method is ReFH2⁶. It is recommended by CIRIA, the Construction Industry Research and Information Association, who publish the SuDS Manual. The ReFH2 method uses catchment data, provided by the Flood Estimation Handbook (FEH).

Using the map on the FEH website⁷, it is possible to navigate to Enborne or any other point in Britain, to download the catchment data that ReFH2, uses to calculate the Greenfield rate, for any rainstorm. The attenuation pond volume and flow control device would be designed using industry-standard MicroDrainage software⁸, to outflow at or below Greenfield rates, at all return periods.

Wilderness Area

Attenuation ponds are often constructed in less-permeable areas, with a risk of surface water flooding. The pond would be dug into the surface and the margins raised using some of the exhumed material. A weir would be set below the pond margin, designed to lead any overflow along a safe route. This is not expected to be used but could become important, in the event of blockage at the normal outflow.

Most attenuation ponds dry out between rainstorms but with a little more work, the pond can be dug deeper than required, allowing a wetland habitat to develop within it and around it. Since Spring Gardens is located relatively close to where the pond would be built, this step was recommended within the FRA. With planting and maintenance, the area would be colonised by wetland plants and animals over a few years and birds should be attracted to it. In this way, the biodiversity would be increased locally, to the benefit of nature and with a knock-on benefit for nearby gardens. With appropriate security guarantees, the area could become a leisure facility, for picnickers and dog-walkers.

⁶ <https://www.hydrosolutions.co.uk/knowledge-base/can-i-estimate-greenfield-post-development-runoff-using-refh2/>

⁷ <https://fehweb.ceh.ac.uk/GB/map>

⁸ <https://www.innovyze.com/en-us/products/microdrainage>

Regulation

The job of ensuring that Greenfield rates have been correctly calculated and the attenuation pond has been appropriately designed is undertaken by the Local Planning Authority (LPA). This is usually done with the advice of specialists from the County, such as the Lead Local Flood Authority (LLFA), the County hydrologist or their Flood Risk and Drainage team and the Internal Drainage Board (IDB). These organisations are usually statutory consultees to the Planning process, they may raise concerns and recommend changes or Planning conditions, as necessary.

The LPA for instance could require important elements of the scheme to be put in place before the infrastructure of the solar farm is installed on the site, in order to ensure that surface water management was in place from the start. It would also be possible to include the establishment of a wilderness area and the provision of suitable community facilities as part of the Planning conditions. I have found Calleva Community Energy to be very positive about the idea of a wilderness area but if I lived in Spring Gardens, I would be looking for this sort of assurance.

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