

7. Drainage Strategy

7.1 General Design

The NPPF requires that flood risk to land and property is not increased as a result of development.

Changes in the volume and rate of surface water runoff from the development as a result of increases in impermeable land uses could increase the risk of flooding downstream unless sufficient steps are taken within the Proposed Development to prevent this happening.

A fundamental principle of sustainable development in terms of flood defence is the reduction of surface water run-off from new developments. It is best practice that the surface water drainage arrangements should be such that the volumes and peak discharge rates of surface water leaving a development site are no greater than the rates prior to the Proposed Development, and where possible are returned to those associated with the greenfield conditions of the site. Any increase in run-off (rates and/or volumes) above the pre-development (or greenfield) volumes must be attenuated on site.

The drainage network is to be designed as a gravity system to accommodate run off from a:

- 1 in 2 year storm event with no surcharge,
- The network is to be checked for a 1 in 30-year storm event with surcharge permitted but with no surface flooding,
- The network is to be checked for a 1 in 100-year storm event with surface flooding permitted providing that there is no risk of flooding to buildings and there is no off site overland flow.

7.2 Existing Site Drainage Regime

The site is classified as a Greenfield development, with a gross area of approximately 12 ha. The site is not currently served by an existing sewer system; therefore, it is assumed that the site drains via infiltration and overland flows towards watercourses on the boundaries of the site.

As the Proposed Development area is less than 50ha, the Institute of Hydrology (IoH) Report 124

Flood Estimation for Small Catchments (1994) method has been used to estimate the Greenfield site peak flow rate, which is an approved methodology specified within the Environment Agency's Rainfall Runoff Management for Developments Report4.

Table 4 summarises the Greenfield discharge rates for 1 ha of developable area and the estimated discharge rates for the current site. Full calculations are provided in the drainage calculation pack in Appendix.

Table 4 – Greenfield Runoff Rates

Annual Rainfall Event	Greenfield Runoff Rates (litres/sec/ha)	Development Runoff Rates (litres/ sec)
Qbar	2.90	34.20
1 in 1 year	2.40	28.30
1 in 30 year	6.50	76.70
1 in 100 year	9.10	107.40

7.3 Proposed Drainage Strategy

For the purposes of this Planning Application the site has been split into two phases. Phase 1 is seeking full planning permission with an area of 6.492ha and Phase 2 is seeking only outline permission with a total area of 5.512ha.

The Proposed Development will result in a net increase of impermeable area at the Application site. Of the total site area, an area of 8.3 ha will be developed. It has been assumed that the Percentage Impervious (PIMP) factor at the site will be 80% of the developed area. Therefore, it has been assumed for this drainage strategy that the Proposed Development will have a total impermeable area of 6.65ha.

It is proposed that the development will discharge to the watercourse flowing along the Western boundary of the site; Aldingbourne Rife (Ordinary Watercourse). In order to comply with the guidance for providing long-term storage as outlined in the Environment Agency's Rainfall Runoff Management for Developments, the proposed discharge rate from the Site has been restricted to 2 l/s/ha.

Table 5 – Proposed Peak Surface Water Discharge Flow Rates

Annual Rainfall Event	Proposed Flow Rates (litres/ sec)	Proposed Betterment (%)
1 in 1 year	23.60	17%
1 in 30 year	23.60	70%
1 in 100 year	23.60	78%
1 in 100 year +45% C/C	23.60	N/A

Due to the requirement to provide a betterment on the existing surface water discharge rates post development for all storm events up to and including the 100-year return period +45% allowance for climate change, the surface water will be restricted via flow control devices and attenuated with a total required storage volume of approximately 7,650m³. There is potential scope for the storage volume to be rationalised at a later stage following detailed design and further hydraulic modelling.

It is proposed that onsite attenuation will be provided by a series of attenuation basins and permeable pavements. The site control structures will be located primarily in the topographical low points of each catchment. These will be in the form of retention/detention basins.

These structures will be designed to attenuate flow prior to discharge to the ordinary watercourse via a control structure to achieve the maximum allowable peak discharge rates for the 1 in 1 the 1 in 30 and 1 in 100-year events (plus a 45% allowance for climate change). The location of the retention/detention basin will not be within an area designated as public open space. It will however provide significant ecological and amenity benefit for the residents.

The site has been split into three catchment areas each with individual outfalls to the watercourse. The proposed surface water discharge rates and attenuation requirements are further broken down in Table 6 below:

Table 6 – Proposed Peak Surface Water Discharge Flow Rates

Catchment	Proposed Flow Rates (litres/ sec)	Proposed Attenuation (m ³)
1	11.30	3900
2	2	500
3	10.30	3250

As per the Environment Agency's Rainfall Runoff Management for Developments, long term storage can be provided to store the additional runoff caused by the development compared to the volume that would have been contributed from the Site in its Greenfield state. The current design rule is to use the 100-year 6-hour event to determine this additional volume.

Long term storage can be incorporated through one of three basic approaches:

1. Ensure that the drainage system provides sufficient infiltration volume to dispose of the volume difference,
2. Design a storage system which only comes into effect above a storm size threshold (effectively an off-line design) which captures the required volume and discharges at the appropriate rate,
3. Design a storage system which comes into effect for all events (effectively an on-line design) that captures the required volume difference which is designed to empty at a rate of less than 2 l/s/ha.

Approaches 1 and 2 provide the long-term storage volume in a separate system from the attenuation storage or offset the volume of runoff via infiltration devices. This allows the long-term storage to be activated for specific events and the volume difference discharged at the appropriate rate or infiltrated to ground, in order to mimic the behaviour of the Site in its Greenfield state.

The drainage strategy for the site proposes to adopt approach 3. By storing the additional volume in a central storage area, the long-term storage volume will be appropriately activated and discharged at a

rate (2 l/s/ha) that would mimic the Greenfield behaviour of the Site, which is the overall aim of providing long term storage.