Surface Water Drainage Pro-forma for new developments

This pro-forma accompanies our advice note on surface water drainage. Developers should complete this form and submit it to the Local Planning Authority, referencing from where in their submission documents this information is taken. The pro-forma is supported by the Defra/EA guidance on Rainfall Runoff Management and uses the storage calculator on www.UKsuds.com. This pro-forma is based on current industry best practice and focuses on ensuring surface water drainage proposals meet national and local policy requirements. The pro-forma should be considered alongside other supporting SuDS Guidance.

1. Site Details

Site	Former Belsize Fire Station
Address & post code or LPA reference	36 Lancaster Grove, London NW3 4PB
Grid reference	TQ 270 850
Is the existing site developed or Greenfield?	Developed
Is the development in a LFRZ or in an area known to be at risk of surface or ground water flooding?	No
Total Site Area served by drainage system (excluding open space) (Ha)*	0.143ha (1433m^2)

***** The Greenfield runoff off rate from the development which is to be used for assessing the requirements for limiting discharge flow rates and attenuation storage from a site should be calculated for the area that forms the drainage network for the site whatever size of site and type of drainage technique. Please refer to the Rainfall Runoff Management document or CIRIA manual for detail on this.

2. Impermeable Area

	Existing	**Proposed**	**Difference (Proposed-Existing)**	**Notes for developers**
Impermeable area (ha)	0.143	0.143	0.0	If proposed > existing, then runoff rates and volumes will be increasing. Section 6 must be filled in. If proposed ≤ existing, then section 6 can be skipped & section 7 filled in.
Drainage Method (infiltration/sewer/ watercourse)	Storm Sewer	Storm Sewer with 1 or more storm cells	N/A	If different from the existing, please fill in section 3. If existing drainage is by infiltration and the proposed is not, discharge volumes may increase. Fill in section 6.

3. Proposing to Discharge Surface Water via

	Yes	No	Evidence that this is possible	Notes for developers
Infiltration		No	Site is underlain by impermeable London Clay	e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed
Watercourse		No	There is no watercourse nearby	e.g. Is there a watercourse nearby?
Surface water sewer	Yes		Yes as existing	The Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above	Yes		To include on site attenuation	e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.

4. Peak Discharge Rates – This is the maximum flow rate at which storm water runoff leaves the site during a particular storm event. Assumed to be the 6 hour storm. The proposed rates are all with CC.

	Existing Rate (l/s)	Proposed Rate (l/s)	Difference (l/s)	% Diff	Notes for developers
Greenfield QBAR	0.8	N/A	N/A	N/A	QBAR is approx. 1 in 2 storm event. Provide this if Section 6 (QBAR) is proposed.
1 in 1	0.6	0.6	0	0	Proposed discharge rates (with mitigation) should aim to be equivalent to greenfield rates for all corresponding storm events. As a minimum, peak discharge rates must be reduced by 50% from the existing sites for all corresponding rainfall events.
1 in 30	2.8	2.8	0	0	
1in 100	3.8	3.8	0	0	
1 in 100 +CC	N/A				The proposed 1 in 100 +CC peak discharge rate (with mitigation) should aim to be equivalent to greenfield rates. As a minimum, proposed 1 in 100 +CC peak discharge rate must be reduced by 50% from the existing 1 in 100 runoff rate sites.

5. Calculate additional volumes for storage –The total volume of water leaving the development site. New hard surfaces potentially restrict the amount of stormwater that can go to the ground, so this needs to be controlled so not to make flood risk worse to properties downstream. The 6 hour storm assumed. The proposed volumes are all with 30% increase in rainfall to account for CC

	Existing Volume (m3)	**Proposed Volume (m3)**	**Difference (m3)**	**Notes for developers**
GREENFIELD RUN OFF VOLUME	N/A			N/A
1 in 1	13.3	17.3	4.0	Proposed discharge volumes (with mitigation) should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable and as a minimum should be no greater than existing volumes for all corresponding storm events. Any increase in volume increases flood risk elsewhere. Where volumes are increased section 6 must be filled in.
1 in 30	59.6	77.5	7.9	
1in 100 6 hour	82.5			
1 in 100 6 hour +CC	99.1	107.3	8.1	The proposed 1 in 100 +CC discharge volume should be constrained to a value as close as is reasonably practicable to the greenfield runoff volume wherever practicable. As a minimum, to mitigate for climate change the proposed 1 in 100 +CC volume discharge from site must be no greater than the existing 1 in 100 storm event. If not, flood risk increases under climate change.

6. Calculate attenuation storage – Attenuation storage is provided to enable the rate of runoff from the site into the receiving watercourse to be limited to an acceptable rate to protect against erosion and flooding downstream. The attenuation storage volume is a function of the degree of development relative to the greenfield discharge rate. The 100 yr 6 hour storm is assumed,

		Notes for developers
Storage Attenuation volume (Flow rate control) required to meet greenfield run off rates (m3)	22.0	Volume of water to attenuate on site if discharging at a greenfield run off rate.
Storage Attenuation volume (Flow rate control) required to reduce rates by 50% (m3)	33.5	Volume of water to attenuate on site if discharging at a 50% reduction from existing rates.
Storage Attenuation volume (Flow rate control) required to meet [OTHER RUN OFF RATE (as close to greenfield rate as possible] (m3)		Volume of water to attenuate on site if discharging at a rate different from the above – please state in 1st column what rate this volume corresponds to. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate.
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m3	6.6	Volume of water to attenuate on site if discharging at existing rates.

7. How is Storm Water stored on site?
Storage is required for the additional volume from site but also for holding back water to slow down the rate from the site. This is known as attenuation storage and long term storage. The idea is that the additional volume does not get into the watercourses, or if it does it is at an exceptionally low rate. You can either infiltrate the stored water back to ground, or if this isn't possible hold it back with on site storage. Firstly, can infiltration work on site?

			Notes for developers
Infiltration	State the Site's Geology and known Source Protection Zones (SPZ)	London Clay, no GPZs	Avoid infiltrating in made ground. Infiltration rates are highly variable and refer to Environment Agency website to identify and source protection zones (SPZ)
	Are infiltration rates suitable?	No	Infiltration rates should be no lower than 1x10 -6 m/s.
	State the distance between a proposed infiltration device base and the ground water (GW) level	Not Reqd	Need 1m (min) between the base of the infiltration device & the water table to protect Groundwater quality & ensure GW doesn't enter infiltration devices. Avoid infiltration where this isn't possible.
	Were infiltration rates obtained by desk study or infiltration test?	Not Reqd	Infiltration rates can be estimated from desk studies at most stages of the planning system if a back up attenuation scheme is provided..
	Is the site contaminated? If yes, consider advice from others on whether infiltration can happen.	No	Advice on contaminated Land in Camden can be found on our supporting documents webpage Water should not be infiltrated through land that is contaminated. The EA may provide bespoke advice in planning consultations for contaminated sites that should be considered.
In light of the above, is infiltration feasible?	Yes/No? If the answer is No, please identify how the storm water will be stored prior to release	No. Storage in Storm cells	If infiltration is not feasible how will the additional volume be stored?. The applicant should then consider the following options in the next section.

Storage requirements

The developer must confirm that either of the two methods for dealing with the amount of water that needs to be stored on site.

Option 1 Simple – Store both the additional volume and attenuation volume in order to make a final discharge from site at the greenfield run off rate. This is preferred if no infiltration can be made on site. This very simply satisfies the runoff rates and volume criteria.

Option 2 Complex – If some of the additional volume of water can be infiltrated back into the ground, the remainder can be discharged at a very low rate of 2 l/sec/hectare. A combined storage calculation using the partial permissible rate of 2 l/sec/hectare and the attenuation rate used to slow the runoff from site.

	Notes for developers
Please confirm what option has been chosen and how much storage is required on site.	The developer at this stage should have an idea of the site characteristics and be able to explain what the storage requirements are on site and how it will be achieved.

8. Please confirm

		Notes for developers
Which Drainage Systems measures have been used?	Storm cells	SUDS can be adapted for most situations even where infiltration isn't feasible e.g. impermeable liners beneath some SUDS devices allows treatment but not infiltration. See CIRIA SUDS Manual C697.
Drainage system can contain in the 1 in 30 storm event without flooding	Yes	This a requirement for sewers for adoption & is good practice even where drainage system is not adopted.
Drainage system can contain in the 1 in 100 storm event without flooding	Yes	National standards require that the drainage system is designed so that flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.
	Yes	Drainage system can contain in the 1 in 100 +CC storm event without flooding
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.	Yes	**Safely:** not causing property flooding or posing a hazard to site users i.e. no deeper than 300mm on roads/footpaths. Flood waters must drain away at section 6 rates. Existing rates can be used where runoff volumes are not increased.
How are rates being restricted (vortex control, orifice etc	Storm cell outlet	

Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners	Site owner	Detail of how the flow control systems have been designed to avoid pipe blockages and ease of maintenance should be provided.
How is the entire drainage system to be maintained?	Site owner	If these are multiple owners then a drawing illustrating exactly what features will be within each owner's remit must be submitted with this Proforma.
	Yes	If the features are to be maintained directly by the owners as stated in answer to the above question please answer yes to this question and submit the relevant maintenance schedule for each feature. If it is to be maintained by others than above please give details of each feature and the maintenance schedule. Clear details of the maintenance proposals of all elements of the proposed drainage system must be provided. Details must demonstrate that maintenance and operation requirements are economically proportionate. Poorly maintained drainage can lead to increased flooding problems in the future.

9. Evidence Please identify where the details quoted in the sections above were taken from. i.e. Plans, reports etc. Please also provide relevant drawings that need to accompany your proforma, in particular exceedance routes and ownership and location of SuDS (maintenance access strips etc

Pro-forma Section	**Document reference where details quoted above are taken from**	**Page Number**
Section 2	Impermeable Area - SWDS	Section 1.3 and 1.3
Section 3	Proposed Discharge route - SWDS	Section 1.3
Section 4	Peak Discharge Rates	Section 3.1 – existing Section 3.1 – greenfield Section 3.1 – developed without SUDS
Section 5	Additional volumes for storage	Based on attenuation calcs Section 4.5
Section 6	Attenuation storage	Based on attenuation calcs Section 4.5
Section 7	How is Storm Water stored on site?	Section 4.5
Section 8	Please confirm	Section 4.6

The above form should be completed using evidence from the Flood Risk Assessment and site plans. It should serve as a summary sheet of the drainage proposals and should clearly show that the proposed rate and volume as a result of development will not be increasing. If there is an increase in rate or volume, the rate or volume section should be completed to set out how the additional rate/volume is being dealt with.

This form is completed using factual information from the Flood Risk Assessment and Site Plans and can be used as a summary of the surface water drainage strategy on this site.

Form Completed By	Dr Paul N Garrad, Consultant Hydrologist
Qualification of person responsible for signing off this pro-forma	BSc, PhD
Company	Paul Garrad
On behalf of (Client's details)	Vulcan Properties Limited
Date	4 Feb 2016