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Surface Water Drainage Pro-forma

254 Kilburn High Road, London

Enclosed Documents:

Completed LBC Surface Water Drainage Pro-forma
Supporting Evidence and Calculations Sheet
Drainage Management and Maintenance Plan

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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	254 KILBURN HIGH ROAD
Address & post code or LPA reference	NW6 2BS.
Grid reference	OS 524992/184221
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?	PART OF THE SITE IS SHOW AS AT LOW TO MEDIUM RISK OF SURFACE WATER FLOODING AS DISCUSSED IN THE SITE SPECIFIC FLOOD RISK ASSESSMENT.
Total Site Area served by drainage system (excluding open space) (Ha)*	0.203 ha.

* 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)	0.203	0.203	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)	SEWER	SEWER	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				e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse				e.g. Is there a watercourse near by?
To surface water sewer	✓		EXISTING SITE DRAINS TO SEWER.	Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above				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.

	Existing Rates (l/s)	Proposed Rates (l/s)	Difference (l/s) (Proposed-Existing)	% Difference (difference /existing x 100)	Notes for developers
Greenfield QBAR	0.97	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	18.6	2.2	-16.4	-88%	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	45.6	3.6	-42.0	-92%	
1in 100	59.3	4.2	-55.1	-93%	
1 in 100 plus climate change	N/A	4.8	N/A	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.

	Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3) (Proposed-Existing)	Notes for developers
GREENFIELD RUN OFF VOLUME	N/A.	N/A	N/A	
1 in 1 6 hour	25	25		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 6 hour	115	115	0	
1in 100 6 hour	163	163	0	
1 in 100 6 hour plus climate change	212	212	0	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.

		Notes for developers
Storage Attenuation volume (Flow rate control) required to meet greenfield run off rates (m^3) (5 L/sec).	100 m^3	Volume of water to attenuate on site if discharging at a greenfield run off rate. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to reduce rates by 50% (m^3)	N/A	Volume of water to attenuate on site if discharging at a 50% reduction from existing rates. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to meet [OTHER RUN OFF RATE (as close to greenfield rate as possible**] (m^3)**	N/A	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. Can't be used where discharge volumes are increasing
Storage Attenuation volume (Flow rate control) required to retain rates as existing (m^3	N/A.	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing

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.	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?	UNLIKELY.	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	UNKNOWN	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?	DESK STUDY.	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.	UNKOWN.	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 Environment Agency 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 - STORMWATER WILL BE STORED WITHIN ATTENUATION TANKS.	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.	SIMPLE - 100m³	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?	ATTENUATION TANKS.	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.
Drainage system can contain in the 1 in 100 +CC storm event without flooding	YES	
Any flooding between the 1 in 30 & 1 in 100 plus climate change storm events will be safely contained on site.		**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)	VORTEX CONTROL	Detail of how the flow control systems have been designed to avoid pipe blockages and ease of maintenance should be provided.
Please confirm the owners/adopters of the entire drainage systems throughout the development. Please list all the owners.	254 KILBURN HIGH ROAD LLP.	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.
How is the entire drainage system to be maintained?	PLEASE REFER TO DRAINAGE MAINTENACE PLAN (ATTACHED).	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	Existing and proposed site plans.	-
Section 3	Existing site plan and flood risk assessment.	10
Section 4	Appendix A of FRA and supporting evidence (attached).	14
Section 5	Supporting evidence (attached).	-
Section 6	Appendix A of FRA.	14
Section 7	Chapters 4.2 and 5 of FRA and Appendix A.	6, 10, 14
Section 8	Chapters 5 and Appendix A and attached Drainage maintenance plan.	10, 14

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..LUCINDA HAZELL.....
Qualification of person responsible for signing off this pro-forma MASTERS DEGREE IN CIVIL ENGINEERING (MENG).

Company..PRICE & MYERS.....
On behalf of (Client's details) ..254 KILBURN HIGH ROAD LLP.....
Date:..16.06.2015.....

KILBURN HIGH ROAD

SURFACE WATER DRAINAGE PROFORMA - SUPPORTING EVIDENCE.

SECTION 1:

Refer to existing and proposed site plans and P&M Flood Risk Assessment.

SECTION 2:

Refer to existing and proposed site plans.

SECTION 3:

Refer to existing site plan and Flood Risk Assessment.

SECTION 4:

GREENFIELD QBAR - Refer to UKSUDS calculation sheet, appendix A of the FRA.

EXISTING RATES ($Q = 2.78 \times i \times A$).

(NOTE: Rainfall intensities taken from MicroDrainage Software).

$Q_1 = 2.78 \times 33 \times 0.203 = 18.6$

$Q_{30} = 2.78 \times 80.8 \times 0.203 = 45.6$

$Q_{100} = 2.78 \times 105 \times 0.203 = 59.3.$

PROPOSED RATES - Refer to MicroDrainage calculation sheets Appendix A of the FRA.

SECTION 5 :

EXISTING VOLUMES (V = Rainfall Depth x Site Area).

1 in 1 yr, 6hr = $12.4 \times 10^{-3} \times 2,030 = 25 m^3$

1 in 30yr, 6hr = $56.7 \times 10^{-3} \times 2,030 = 115 m^3$

1 in 100yr, 6hr = $80.3 \times 10^{-3} \times 2,030 = 163 m^3$

1 in 100yr +30%, 6hr = $80.3 \times 10^{-3} \times 1.3 \times 2,030 = 212 m^3$.

(NOTE : Rainfall Depths taken from FEH Software).

SECTION 6 :

Refer to Microdrainage calculation Sheets, appendix A of the FRA.

SECTION 7:

Refer to chapters 4.2 and 5 of the FRA and Micro drainage calculation Sheets (Appendix A of the FRA).

SECTION 8 :

Refer to chapter 5 and Appendix A of the FRA and Drainage Management and Maintenance Plan

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254 Kilburn High Road

Drainage Maintenance and Management Plan

This long-term Drainage network maintenance and management plan should be implemented at the proposed development at 254 Kilburn High Road to ensure that the drainage network functions as designed. This plan is intended to cover all on-site drainage structures. The site owner possesses the primary responsibility for overseeing and implementing the maintenance and management plan and designating a person who will be responsible for the proper operation and maintenance of the foul and stormwater structures.

Stormwater Runoff Quality

The stormwater management system protects and enhances the stormwater runoff water quality through the removal of sediment and pollutants. The attenuation tank allows for settlement of sediments and silt trapped gullies significantly reduce the amount of pollutants entering the system. Preventive maintenance of the system will include a comprehensive source reduction program of regular sweeping and litter removal, prohibitions on the use of pesticides, and maintenance of bin areas.

Drainage System

Maintenance and cleaning of gullies, drain manholes and attenuation tanks will assure adequate performance. This maintenance program is outlined below.

Maintenance Program

The site maintenance staff will conduct the operation and maintenance program set forth in this document. The management company will ensure that inspections and record keeping are timely and accurate. Inspection & Maintenance Log Forms (attached) should include the date and physical conditions of the structures, depth of sediment in structures, evidence of overtopping or debris blockage and maintenance required of each structure. Records of maintenance will be kept on file at the site management company's office and copies of Inspection & Maintenance Log sheets indicating all work and inspections will be available to the Council or any other stakeholder upon request.

Concurrent with inspection and cleaning, all litter shall be picked up and removed from the parking areas and landscaped areas.

Regular maintenance should include:

1. Inspect gully inlet grates and remove any debris monthly or as determined to be reasonable based on experience with the installed systems to ensure that the gullies are working in their intended capacity and that they are free of debris. Quarterly, inspect gully sumps and bottom of drain manholes; if depth of sediment in sumps exceeds 50% capacity, sediment must be removed. Excessive sediment shall be removed and properly disposed by a licensed drainage cleaning company.

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2. Inspection of bin and recycling enclosures for spillage and scattered litter must be performed on a regular basis to prevent the spread of pollutants into the stormwater management system. Long-term management practices include monthly sweeping of parking and landscaped areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during rain events and transported to the drainage system. Pavement sweeping is a highly effective source control measure for reducing pollutant loading in stormwater. All sweepings will be disposed of in a legal manner. This activity is vital for the efficient operation of the drainage system, considering the presence of trees in this area.

3. Attenuation tank inlets, outlet and vents should be checked annually and after large storms to ensure that they are in good condition and operating as designed. Regular maintenance includes inspection and identification of any areas that are not operating correctly monthly for the first 3 months and then every 6 months after.

4. Fill all internal gullies with water every 3 month to reduce the risk of dryng out and releasing unpleasant smells.

Winter Maintenance Program

Ensure that drainage structures are not blocked by ice, snow, debris or rubbish during winter months.

Fertiliser Use

Only slow-release organic low-phosphorous fertilisers will be used in any landscaped areas in order to limit the amount of nutrients that could enter the stormwater system.

Prepared by:	Lucinda Hazell MEng
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Drainage Operation and Maintenance Log

Site Maintenance Supervisor:_____ Date:_____

☐ Routine ☐ Response to rainfall event ___ in ☐ Other:_____

BMP	Frequency	Date Performed	Comments
Gullies and Manholes	Monthly Inspections		
	Maintenance Quarterly and as necessary		
Pavement Areas (parking, service areas)	Monthly Sweeping		
	Rubbish & Litter Removal as Necessary		
Landscaped Areas	Maintenance as necessary		
Attenuation Tanks	Inspect and identify areas not operating property every 3 months (for the first 3 months) and every 6 months after		
	Full bi-annual inspection		