1 store rainwater for later use
2 use infiltration techniques, such as porous surfaces in non-clay areas
3 attenuate rainwater in ponds or open water features for gradual release
4 attenuate rainwater by storing in tanks or sealed water features for gradual release
5 discharge rainwater direct to a watercourse
6 discharge rainwater to a surface water sewer/drain
7 discharge rainwater to the combined sewer.

2.6 The hierarchy above seeks to ensure that surface water run-off is controlled as near to its source as possible to mimic natural drainage systems and retain water on or near to the site, in contrast to traditional drainage approaches, which tend to pipe water off-site as quickly as possible.

2.7 Before disposal of surface water to the public sewer is considered all other options set out in the drainage hierarchy should be exhausted. When no other practicable alternative exists to dispose of surface water other than the public sewer, the Water Company or its agents should confirm that there is adequate spare capacity in the existing system taking future development requirements into account.

2.8 Best practice guidance within the non-statutory technical standards for the design, maintenance and operation of sustainable drainage systems will also need to be followed. Runoff volumes from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the **greenfield runoff volume** for the same event.

2.9 Camden Development Policy 23 (Water) requires developments to reduce pressure on combined sewer network and the risk of flooding by limiting the rate of run-off through sustainable urban drainage systems. This policy also requires that developments in areas known to be at risk of surface water flooding are designed to cope with being flooded. Camden's SFRA surface water flood maps, updated SFRA figures 6 (LFRZs), and 4e (increased susceptibility to elevated groundwater) , as well as the Environment Agency updated flood maps for surface water (ufmfsw), should be referred to when determining whether developments are in an area at risk of flooding.

2.10 Camden Planning Guidance 3 (CPG3) requires developments to achieve a greenfield run off rate once SuDS have been installed. Where it can be demonstrated that this is not feasible, a minimum 50% reduction in run off rate across the development is required. Further guidance on how to reduce the risk of flooding can be found in CPG3 paragraphs 11.4-11.8.

2.11 Where an application is part of a larger site which already has planning permission it is essential that the new proposal does not compromise the drainage scheme already approved.

3. Further information and guidance

3.1 Applicants are strongly advised to discuss their proposals with the Lead Local Flood Authority at the pre-application stage to ensure that an acceptable SuDS scheme is submitted.

3.2 For general clarification of these requirements please Camden's Local Planning Authority or Lead Local Flood Authority

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	Abbey Road Phase 2 - Catchment A
Address & post code or LPA reference	Abbey Road, Camden, London, NW6 4DP
Grid reference	525,822 (E) 183,966 (N)
Is the existing site developed or Greenfield?	Developed, although large areas within the site remain greenfield. These areas comprise grass and soft landscaping. Ref. to Stantec catchment plan.
Is the development in a LFRZ or in an area known to be at risk of surface or ground water flooding? If yes, please demonstrate how this is managed, in line with DP23?	No
Total Site Area served by drainage system (excluding open space) (Ha)*	0.223

* 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	0.175	0.175 (however "impermeable" areas are brown roof & porous paving)	If the proposed amount of impermeable surface is greater, then runoff rates and volumes will increase. Section 6 must be filled in. If proposed impermeability is equal or less than existing, then section 6 can be skipped and 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
Existing and proposed MicroDrainage calculations	X		MicroDrainage calculation attached in Appendix C	Please provide MicroDrainage calculations of existing and proposed run-off rates and volumes in accordance with a recognised methodology or the results of a full infiltration test (see line below) if infiltration is proposed.
Infiltration		X	See Section 5.0 in Surface Water Drainage Statement	e.g. soakage tests. Section 6 (infiltration) must be filled in if infiltration is proposed.
To watercourse		X	See Section 5.0 in Surface Water Drainage Statement	e.g. Is there a watercourse nearby?
To surface water sewer	X			Confirmation from sewer provider that sufficient capacity exists for this connection.
Combination of above		X		e.g. part infiltration part discharge to sewer or watercourse. Provide evidence above.
Has the drainage proposal had regard to the SuDS hierarchy?	X		See Section 5.0 in Surface Water Drainage Statement Table 5.1	Evidence must be provided to demonstrate that the proposed Sustainable Drainage strategy has had regard to the SuDS hierarchy as outlined in Section 2.5 above.
Layout plan showing where the sustainable drainage infrastructure will be located on site.	X		See plans attached in Appendix A	Please provide plan reference numbers showing the details of the site layout showing where the sustainable drainage infrastructure will be located on the site. If the development is to be constructed in phases this should be shown on a separate plan and confirmation should be provided that the sustainable drainage proposal for each phase can be constructed and can operate independently and is not reliant on any later phase of development.

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	1.1	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	1.0	1.9 (2 year)	1.0		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	2.0	-0.8		
1in 100	3.7	2.0	-1.7		
1 in 100 plus climate change	N/A	2.0	2.0		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.

	Greenfield runoff volume (m^3)	Existing Volume (m^3)	Proposed Volume (m^3)	Difference (m^3) (Proposed-Existing)	Notes for developers
1 in 1					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					
1in 100 6 hour					
1 in 100 6 hour plus climate change					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.

Interception of the first portion of runoff from all catchments will be achieved by the brown roof, porous paving & soft landscaping.
Refer to Stantec's Surface Water Drainage Statement

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)	130m3	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)	-	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)	-	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)	-	Volume of water to attenuate on site if discharging at existing rates. Can't be used where discharge volumes are increasing
Percentage of attenuation volume stored above ground,	-0% (see * below)	Percentage of attenuation volume which will be held above ground in swales/ponds/basins/green roofs etc. If 0, please demonstrate why.

(*) storage is available above ground in external areas as described in Stantec's Surface Water Drainage Statement

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)**	-	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?	Refer to Stantec's Surface Water Drainage Statement	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	-	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?	Refer to Stantec's Surface Water Drainage Statement	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.	Refer to Stantec's Surface Water Drainage Statement	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**	Refer to Stantec's Surface Water Drainage Statement	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.	Option 1	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, including green roofs?	Brown roof, porous paving, soft landscaping and attenuation tank	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.
Will the drainage system contain the 1 in 100 +CC storm event? If no please demonstrate how buildings and utility plants will be protected.	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.
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 will exceedance events be catered on site without increasing flood risks (both on site and outside the development)?	Site levels are designated to direct flows away from the buildings and towards areas such as public realm, or formal landscaping where temporary shallow flooding can occur.	**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. Exceedance events are defined as those larger than the 1 in 100 +CC event.
How are rates being restricted (vortex control, orifice etc)	Vortex flow control HydroBrake or similar	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.	London Borough of Camden	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?	Refer to Stantec's SuDS Maintenance Plan	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	Stantec SW Drainage Statement	
Section 3	Stantec SW Drainage Statement	
Section 4	Stantec SW Drainage Statement	
Section 5	Stantec SW Drainage Statement	
Section 6	Stantec SW Drainage Statement	
Section 7	Stantec SW Drainage Statement	
Section 8	Stantec SW Drainage Statement	

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……Gurveer Jutte & Michael Duffy……
Qualification of person responsible for signing off this pro-forma ……Graduate Engineer & Principal Engineer……

Company……Stantec UK Ltd……,……
On behalf of (Client's details) ……Wates London Residential……
Date:……03/12/20……

Appendix E – Thames Water Pre-development Enquiry Response

Simone Pinna-Nossai
Stantec UK
33 Bowling Green Lane
London
EC1R 0BJ

Water pre-planning
Our ref DS6068771

03 January 2020

Pre-planning enquiry: Confirmation of sufficient capacity

Dear Mr. Pinna-Nossai

Thank you for providing information on your development consisting of a Community Centre (826 sqm) and a Health Centre (965 sqm).

If your proposals progress in line with the details you've provided, we're pleased to confirm that there will be sufficient supply capacity to serve your development.

This confirmation is valid for 12 months or for the life of any planning approval that this information is used to support, to a maximum of three years.

You'll need to keep us informed of any changes to your design – for example, an increase in the number or density of homes. Such changes could mean there is no longer sufficient supply capacity.

What happens next?

Please make sure you submit your connection application, giving us at least 21 days' notice of the date you wish to make your new connection/s.

If you've any further questions, please contact me on 0800 009 3921.

Yours sincerely

Nick Lazarow

Thames Water

Appendix F – Fabrik Landscape Masterplan

J:\JOB FILES\2019 PHASE 2, ABBEY AREA ESTATE, CAMDEN\DRAWINGS\07 FABRIK\02 PHOTOSHOP\[APP_220919-FAB-P2-XX-DR-L-1000.JNDD

LEGEND

- TARMAC
- THRESHOLD CLAY BLOCK PAVING
- CONCRETE BLOCK PAVING
- CONCRETE STEP UNIT
- EXISTING CONCRETE TO BE RETAINED
- SELF BINDING GRAVEL
- RESIN BOUND GRAVEL
- SPECIES RICH WILDFLOWER MEADOW
- SPECIES RICH AMENITY LAWN
- PERENNIAL PLANTING
- PRAIRIE PLANTING
- STEPPE PLANTING
- SHRUB PLANTING
- PROPOSED TREE PLANTING
- PROPOSED TREE PLANTING
- EXISTING TREE TO BE RETAINED
- PROPOSED EQUIPPED PLAY
- PROPOSED CYCLE SHELTER

READ THIS FIRST

NOTE FOR CONTRACTORS
This drawing should be considered along with the risk information contained in the CDM Pre-construction Information. This information will include details of the SIGNIFICANT risks which fabrik has identified which may arise from constructing their designs shown on this drawing. A Competent Contractor should be aware of the typical risks associated with doing this work.

NOTE FOR WORKERS
DO NOT START YOUR WORK unless you know the Risks and Controls relating to the work on this drawing (including SAFE SEQUENCES OF WORK and EQUIPMENT).

Do not issue copies of parts of this drawing without the above Note for Workers (unless you are sure that the Workers can undertake the work safely).

REV.	DESCRIPTION	APP.	DATE
P01	ISSUED FOR STAGE 03	JC	05.06.20
L01	ISSUED FOR PLANNING	JC	07.05.20
PR01	DRAFT ISSUE FOR CLIENT REVIEW	JN	22.05.20

PROJECT TITLE
ABBEY AREA PHASE 2, CAMDEN, LONDON

DRAWING TITLE
ILLUSTRATIVE COLOUR LANDSCAPE MASTERPLAN

ISSUED BY	Alton	T: 01420 593 250	
DATE	MAY 2020	**DRAWN**	JN
SCALE@A0	1:200	**CHECKED**	MB
STATUS	DRAFT	**APPROVED**	MB

DWG. NO. 440300-FAB-S1-XX-DR-L-9001

Notes:
1. This drawing is the property of fabrik ltd. It must not be copied or reproduced without written consent.
2. Only figured dimensions are to be taken from this drawing. All contractors must visit site and be responsible for taking and checking all dimensions related to the works shown on this drawing.

Appendix G – SuDS Maintenance Plan

SuDS Maintenance Plan

Project: 46830 Abbey Road Phase 2

Note No: 46830/TN-FRA-003

Date: December 2020

Prepared by: Gurveer Jutte & Michael Duffy

1. Introduction

This Maintenance Plan has been prepared by Stantec to set out the principles for the maintenance of the proposed surface water Sustainable Drainage Systems (SuDS) proposed as part of the Abbey Road Phase 2 Development.

The surface water drainage strategy has been developed to incorporate the appropriate SuDS techniques for the site to enhance biodiversity and amenity of the proposed development while minimising the impacts from the quantity and quality of the surface water run-off.

This TN references the latest technical SuDS maintenance guidance within 'CIRIA Report C753 The SuDS Manual (2015)'.

2. SuDS Maintenance Schedules

A range of SuDS have been included in the detailed drainage design for the site. Proposed maintenance schedules for each SuDS feature is provided below.

Brown Roofs

Brown roofs will reduce both the rate and volume of surface water run-off from the roofs as well as treating water and enhancing biodiversity.

A brown roofs is proposed for the new building as shown on AHR Architect's drawings 440300-AHR-B1-RF-DR-A-2600 and 2601

Table 2.1 below details the proposed maintenance regime for the brown roof.

Table 2.1: Maintenance Schedule for Brown Roof

Maintenance Schedule	Required Action	Recommended Frequency
Regular Inspections	Inspect all components including soil substrate, vegetation, drains, membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance of roof drainage system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular Maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly and annually or as required
	During establishment (i.e. year one), replace dead plants as required	Monthly (but usually responsibility of manufacturers)
	Post establishment, replace dead plants as required (where > 5% of coverage)	Annually (in autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required

	Remove insurance and invasive vegetation, including weeds	Six monthly or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly or as required
Remedial Actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

Soft Landscaping

Soft landscaping helps to reduce run off rates and volumes, by promoting the infiltration of surface water into the ground. Such features also reduce surface water pollution by providing natural surface water treatment.

Table 2.2 details the proposed maintenance regime for the soft landscaping areas.

Table 2.2: Maintenance Schedule for Soft Landscaping Areas

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect soft landscape areas for silt build up.	Twice yearly, or as required
Occasional Maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Attenuation Tanks

The surface water outfall from both sites is to be restricted to match greenfield runoff rates using a flow control device and a geocellular attenuation tank. Table 2.3 details the proposed maintenance regime for the geo-cellular attenuation tank.

Table 2.3: Maintenance Schedule for Geo-Cellular Attenuation Tanks

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months and then 3 monthly intervals
	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures (i.e. catch pits proposed immediately upstream of the geo-cellular tanks)	3 monthly intervals, as required
Remedial actions	Repair/rehabilitation of inlets, outlets, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after major storms

Vortex Flow Control Device

Table 2.4 details the proposed maintenance regime for the Vortex Flow Control Device.

Table 2.4: Maintenance Schedule for Geo-Cellular Attenuation Tanks

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspect the device for blockages and silt build up.	Twice yearly, or as required
Remedial actions	Remove debris, silt and undertake any repairs in accordance with the manufactures recommendations.	As required
Monitoring	Monitor the device to ensure it is good working order and 'free flowing'.	Annually and after major storms