

Croydon Lead Local Flood Authority

Advice to Planning Applicants

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Introduction

This document provides a summary of information and a developer's checklist ([Appendix 2](#)), as well as a London Sustainable Drainage Proforma ([Appendix 3](#)) to assist applicants with producing a satisfactory surface water drainage assessment for their development in accordance with national and local planning policy. It is strongly advised that applicants seek pre-application advice from the Local Planning Authority (LPA) prior to submission of their application. Solely meeting the requirements of this document will not guarantee permission being granted for the development, but will assist the Lead Local Flood Authority (LLFA) in assessing the application and lead to a more streamlined assessment process.

This document covers matters relating to surface water drainage only, and does not outline other considerations we may take into account such as works affecting Ordinary Watercourses¹ or specific requirements of Flood Risk Assessments (FRAs)².

For all Major Planning Applications a surface water drainage assessment should be carried out to demonstrate that the proposed development makes use of sustainable drainage systems (SuDS) and will not create an increased risk of flooding from surface water to the development site and the surrounding area. The Drainage Strategy should be carried out in accordance with the [London Plan 2016](#) and the [Sustainable Design and Construction Supplementary Planning Guidance \(SPG\)](#), the [National Planning Policy Framework \(NPPF\)](#) and the [Planning Practice Guide \(PPG\)](#) and the adopted [Croydon Local Plan \(2018\)](#). All development should make use of SuDS and give preference to infiltration over discharge to a watercourse, which in turn is preferable to discharge to surface water sewer and in turn combined sewer. Further, the design of the proposed drainage system should adhere to the [Defra Non-Statutory Technical Standards \(NSTS\)](#).

Guidance on the preparation of surface water strategies can be found in the [Defra/Environment Agency R&D Technical Report W5-074/A/TR/1 Revision E "Preliminary rainfall runoff management for developments"](#).

Other documents which may be relevant, including industry best practice and guidance, are listed in [Requirement 9](#).

The decision on whether a particular form or type of sustainable drainage system would be inappropriate in relation to a particular development proposal is a matter of judgement for the LPA, based on advice from the LLFA, including on what sort of sustainable drainage system they would consider to be reasonably practicable, by reference to the NSTS and Paragraph 082 of the PPG.

Drainage Strategy Submission Requirements

A Surface Water Drainage Strategy should be submitted to support all Major Planning Applications, setting out the surface water drainage assessment and proposals for the site and demonstrating accordance with the above policies; the Drainage Strategy can either form part of the Flood Risk Assessment for the site or can be submitted as a separate document. [Appendix 1](#) sets out the LLFA's application requirements for Outline and Full Planning Applications (including conversions and refurbishments), with further guidance provided in the [Requirements](#) section below.

To assist the applicant in ensuring all relevant information has been submitted, a checklist has been developed which should be completed by each applicant and submitted to the LPA with the Drainage Strategy. A copy of the checklist is provided in [Appendix 2](#). The [Requirements](#) section provides further guidance on the Criteria set out in this and the LLFA's expectations.

¹ <https://www.croydon.gov.uk/sites/default/files/articles/downloads/ow-guidance.pdf>

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

The Greater London Authority has also developed the London Sustainable Drainage Proforma, which should be completed by each applicant and submitted to the LPA with the Drainage Strategy. A copy of the latest Proforma is provided in [Appendix 3](#). This Proforma is intended to accompany a drainage strategy prepared for a planning application where required by national or local planning policy. It should be used to summarise the key outputs from the strategy to allow assessing officers at the LLFA to quickly assess compliance with SuDS planning.

Requirements

We require that the Drainage Strategy demonstrates accordance, as a minimum, to the following requirements, in accordance with the policy and guidance outlined above and the Criteria set out in [Appendix 1](#).

1. [Runoff rates](#)
2. [Storage volume](#)
3. [Sustainable Drainage Systems \(SuDS\)](#)
4. [Exceedance Flows](#)
5. [Climate Change allowances](#)
6. [Infiltration](#)
7. [Maintenance and operation](#)
8. [General Recommendations](#)
9. [References and Guidance](#)

Requirement 1. Runoff rates

This section provides guidance on Criteria b of the Outline Planning Application requirements and Criteria c(i), c(ii), c(iii) and d of the Full Planning Application requirements in [Appendix 2](#).

Peak discharge rates from site will not increase as a result of the proposed development, up to a 1 in 100 chance in any year including an allowance for climate change storm event (see [Requirement 5](#)).

We expect all applicants to achieve better than greenfield runoff rates for greenfield development sites and to aim to achieve better than greenfield runoff rates for all brownfield sites in line with the Croydon Local Plan Policy DM25.3, London Plan Policy 5.13 and NSTS S2 and S3, to reduce the impact of the development on the surface water drainage infrastructure.

Croydon Local Plan Policy DM25.3

Sustainable drainage systems are required in all development and should:

- a) Ensure surface run-off is managed as close to the source as possible;*
- b) Accord with the London Plan Sustainable Drainage Hierarchy;*
- c) Achieve better than greenfield runoff rates;*
- d) Be designed to be multifunctional and incorporate sustainable drainage into landscaping and public realm to provide opportunities to improve amenity and biodiversity;*
- e) Achieve improvements in water quality through an sustainable drainage system management train; and*
- f) Be designed with consideration of future maintenance.*

London Plan Policy 5.13

Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:

- 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.*

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

Defra Non-Statutory Technical Standards

S2 *For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.*

S3 *For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.*

Sustainable Design and Construction SPG

Para. 3.4.10 - *All developments on greenfield sites must maintain greenfield runoff rates. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. The only exceptions to this, where greater discharge rates may be acceptable, are where a pumped discharge would be required to meet the standards or where surface water drainage is to tidal waters and therefore would be able to discharge at unrestricted rates provided unacceptable scour would not result.*

Para. 3.4.8 - *Most developments referred to the Mayor have been able to achieve at least 50% attenuation of the site's (prior to re-development) surface water runoff at peak times. This is the minimum expectation from development proposals.*

Where greenfield rates are not considered to be achievable, the applicant must provide robust justification and evidence in line with Para 3.4.7 of the Sustainable Design and Construction SPG. Robust justification could include analysis of storage requirements required to achieve greenfield runoff rates in comparison to site area or a cost analysis. It should be noted that the climate change allowance referred to in Para 3.4.7 has been superseded by the Environment Agency guidance on Climate Change allowances, published in February 2016 (see [Requirement 5](#)).

Sustainable Design and Construction SPG

Para. 3.4.7 *If greenfield runoff rates are not proposed, developers will be expected to clearly demonstrate how all opportunities to minimise final site runoff, as close to greenfield rate as practical, have been taken. This should be done using calculations and drawings appropriate to the scale of the application. In order to achieve this, applicants should:*

- *consider the permeability of all existing and proposed surfaces on the application site;*
- *assess the existing surface water and foul drainage networks and their discharges; and*
- *assess a range of return periods (the probability of a rainfall event of a particular size occurring and resulting in flooding) up to and including the 1 in 100 year plus climate change critical storms (an additional 20-30%).*

Where an applicant is proposing to discharge to a sewer, they must contact the sewer owner, in most cases Thames Water, at the earliest opportunity to confirm the agreed discharge rate and connection point. It is not acceptable to leave this until detailed design. In advance of detailed design, an agreement in principle i.e. through a Development Enquiry, should be made and correspondence provided as part of the drainage assessment.

With regards to the minimum discharge rate for discharge to sewer, it is not acceptable to state that <5 l/s is unachievable due to blockage. Recent industry research has demonstrated that a rate less <5l/s is achievable, and constrained sites in Croydon have demonstrated they can achieve a rate of between 1 - 2l/s. If 'maintenance burden' is given as a reason for not providing a <5l/s discharge rate to sewer, evidence to support this claim must be provided.

To demonstrate accordance with the above and Criteria b of Outline Planning Permission and Criteria c(i), c(ii), c(iii) and d of Full Planning Permission checklists, the applicant should provide the following;

- Impermeable and site areas for the pre and post development scenarios;
- Calculations in accordance with the Developers Guidance Checklist in [Appendix 2](#) including:
 - Greenfield Runoff Rate (Q_{BAR});
 - Existing Discharge Rate (if known);
 - 1 in 1 year, 1 in 30 year and 1 in 100 year storm event runoff rates for the pre developed site; and
 - Proposed site discharge rate and percentage betterment from the existing site runoff rates for the 1 in 1 year, 1 in 30 year and 1 in 100 year storm event.
- Calculations should be completed using industry standard software; and,
- Calculations should be verified by a suitably qualified engineer.

Requirement 2. Storage volumes

This section provides guidance on Criteria b of Outline Planning Permission requirements and Criteria c(iv) and c(v) of Full Planning Permission requirements as shown in [Appendix 2](#).

Storage volumes, to achieve better than greenfield runoff, for all events up to a 1 in 100 chance in any year including an allowance for climate change storm event for greenfield, or as close as reasonably practicable to the greenfield runoff (for brownfield sites), will be provided on site utilising above ground storage where practicable, in accordance with Croydon Local Plan Policy DM25.3 and NSTS S4, S5 and S6.

Defra Non-Statutory Technical Standards

S4 *Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.*

S5 *Where reasonably practicable, for developments which have been previously developed, the runoff volume 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, but should never exceed the runoff volume from the development site prior to redevelopment for that event.*

S6 *Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S4** or **S5**, the runoff volume must be discharged at a rate that does not adversely affect flood risk.*

Consideration should be made of the need for long term storage; for greenfield sites greater than 1 hectare, the volume of runoff generated by the proposed development during the 1 in 100 year, 6 hour storm event that is additional to the greenfield runoff volume for the same event, should be attenuated onsite. For brownfield sites greater than 1 hectare, the additional volume generated by the proposed development during the 1 in 100 year, 6 hour storm event that is additional to the existing runoff volume for the same event, must be attenuated onsite. Where insufficient space exists to accommodate long term storage, the applicant should provide clear and robust justification as to why long term storage cannot be accommodated.

The applicant must demonstrate that the site will not flood from surface water up to a 1 in 100 year chance in any year including an allowance for climate change event, or surface water flooding will be safely contained on site up to this event, ensuring that surface water runoff will not increase flood risk to the development or third parties. There should be no flooding within the site for up to and including the 1 in 30 year rainfall event.

Defra Non-Statutory Technical Standards

S7 *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.*

S8 *The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, 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.*

To demonstrate accordance with the above and Criteria b of the Outline Planning Permission requirements and Criteria c(iv) and c(v) of the Full Planning Permission requirements checklists, the applicant should provide the following;

- Calculations for the existing and post developed site runoff volumes for the 1 in 100 year 6 hour storm event;
- Calculations for the storage requirements of the 1 in 100 year + Climate Change storm event;
- Calculations of the proposed attenuation storage volumes for all SuDS features;
- Calculations demonstrating the site does not flood for events up to the 1 in 30 year storm event;
- Analysis of storage requirements to demonstrate they meet the above standards;
- Calculations and analysis of long term storage requirements for the site; and
- Long term storage requirement – an assessment should be made of long term storage requirements if the site is greater than 1ha:

- For greenfield sites, calculations of the 1 in 100 year 6 hour storm event greenfield runoff volume and the volume of runoff generated by the proposed development for the same event should be provided;
- For brownfield sites, calculations of the 1 in 100 year 6 hour storm event pre and post development runoff volumes;
- Confirmation of the proposed on-site storage volume; and,
- If adequate storage cannot be provided, clear justification as to why should be outlined within the Drainage Strategy.

Requirement 3. Sustainable drainage systems (SuDS)

This section provides guidance on Criteria d of the Outline Planning Permission requirements and Criteria e and f of the Full Planning Permission requirements as detailed in [Appendix 2](#).

All development must utilise Sustainable Drainage Systems (SuDS) to reduce surface water runoff, in accordance with the Croydon Local Plan Strategic Policy SP6.4(c), Croydon Local Plan Detailed Policy DM25.3, London Plan Policy 5.13 and the NPPF Para. 103.

Croydon Local Plan 2013 Strategic Policy 6.4 (c) *All development, including refurbishment and conversions, to utilise sustainable drainage systems (SUDs) to reduce surface water run off and provide water treatment on site.*

National Planning Policy Framework

Para. 103 *When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that:*

- *within the site, the most vulnerable development is located in areas of lowest flood risk unless there are overriding reasons to prefer a different location; and*
- *development is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed, including by emergency planning; and it gives **priority to the use of sustainable drainage systems.***

SuDS are an approach to managing surface water runoff which seeks to mimic natural drainage systems and retain water on or near the site as opposed to traditional drainage approaches which involve piping water off site as quickly as possible. SuDS offer significant advantages over conventional piped drainage systems in reducing flood risk by attenuating the rate and quantity of surface water runoff from a site, promoting groundwater recharge and biodiversity benefits, as well as improving water quality and amenity value.

The drainage hierarchy, as set out in London Plan Policy 5.13 and in accordance with PPG Para 080, must be followed.

Planning Practice Guidance Para. 080 *Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:*

- *into the ground (infiltration);*
- *to a surface water body;*
- *to a surface water sewer, highway drain, or another drainage system;*
- *to a combined sewer.*

Particular types of sustainable drainage systems may not be practicable in all locations

London Plan Policy 5.13 A *Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:*

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 watercourse*
6. *discharge rainwater to a surface water sewer/drain*
7. *discharge rainwater to the combined sewer*

Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.

Consideration should be given to ensuring that the most sustainable options are given priority. The methods at the top of the hierarchy are preferred because they are beneficial in terms of sustainability, water quality and biodiversity. Information should be provided on the associated benefits the drainage proposals bring in terms of water quality, environmental and social benefits as detailed in Paragraph 3.4.13 of the Sustainable Design and Construction SPG.

Sustainable Design and Construction SPG

Para. 3.4.13 *Development should utilise SuDS unless there are practical reasons for not doing so. The aspiration is to deliver SuDS schemes that provide multiple benefits, in addition to reducing flood risk...SuDS schemes should also aim to improve amenity, and therefore the quality of life of Londoners, as well as contribute to the wider goals relating to green infrastructure, biodiversity, water efficiency and recreation.*

The hierarchy should be used in descending order, with any obstacles to the use of SuDS methods clearly justified. If the 'lack' of space is given as a reason for not implementing SuDS we will require evidence that an alternative layout and consideration of other SuDS techniques has been considered. If the 'cost' is given as a reason for not implementing a SuDS system evidence to support this claim must be provided.

A site's drainage design can be made up of a range of SUDS techniques. The variety of SuDS techniques available means that any development should be able to include a scheme based around these principles. These should be explored **early** in the design of any development, to ensure they are an integral part of the site layout. Further information on SuDS can be found in:

- [CIRIA C753 SuDS manual](#);
- [CIRIA C687 Planning for SuDS](#);
- [CIRIA C609B Sustainable Drainage Systems - Hydraulic, structural and water quality advice](#); and
- [The Interim Code of Practice for Sustainable Drainage Systems](#).

To demonstrate accordance with the above, Criteria d of the Outline Planning Permission requirements and Criteria e and f of the Full planning Permission requirements checklist, the applicant should provide the following;

- An assessment of the London Plan Policy 5.13 drainage hierarchy, detailing each level of the hierarchy and whether opportunities exist for incorporation of these into the proposed development;
- Where an opportunity for incorporation of each level of the hierarchy does not exist within the proposed development, clear and robust justification as to why should be provided; and
- The Drainage Strategy should detail the benefits of the proposed drainage scheme addressing improvements in water quality and any social and environmental benefits that maybe realised due to the proposed Drainage Strategy.

Requirement 4. Exceedance Flows

This section provides guidance on Criteria h of the Full Planning Permission requirements in [Appendix 2](#).

The applicant must demonstrate that exceedance flows can be managed and contained safely on site should any drainage features fail (e.g. pumps or hydrobrakes) or during an extreme storm event (ie greater than a 1 in 100year storm event). The location, depth and flow routes of any over ground flooding should be clearly shown on a plan in accordance with NSTS S9.

Defra Non-Statutory Technical Standard

S9 *The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.*

To demonstrate accordance with the above and Criteria h of the Full Planning Permission requirements, the applicant should provide the following;

- A site plan, with final site levels, demonstrating flows paths during storm events above the 1 in 100 year + climate change storm event for the post developed site;
- Consideration of how flows above the 1 in 100 year + climate change storm event would be mitigated onsite (i.e. are exceedance flows stored in car park areas and away from buildings? etc.); and
- Detail of how exceedance flows are managed to ensure people and property are not at risk of flooding.

Requirement 5. Climate change allowances

This section provides guidance on Criteria b of the Outline Planning Permission requirements and Criteria c(iii), c(iv) and h of the Full Planning Permission requirements as detailed in [Appendix 2](#).

Climate change must be considered for the 1 in 100 year event for all development proposals in line with Para. 3.4.7 of the Sustainable Design and Construction SPG and Planning Practice Guidance Para. 085.

Guidance on consideration of climate change in flood risk planning can be found within the [PPG](#).

We expect developers to use the upper end allowance for rainfall intensity as set out in the [Environment Agency guidance \(February 2016\)](#). Typically, most developments should adopt a 40% climate change allowance, although each applicant should assess their development design life to determine the appropriate climate change allowance.

Planning Practice Guidance

Para. 085 *Any sustainable drainage system should be designed so that the capacity takes account of the likely impacts of climate change and likely changes in impermeable area within the development over its lifetime and continues to provide effective drainage for properties.*

Environment Agency Climate Change Guidance (February 2016)

Table 2 peak rainfall intensity allowance in small and urban catchments (use 1961 to 1990 baseline)

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Requirement 6. Infiltration rates

This section provides guidance on Criteria c of the Outline Planning Permission requirements and Criteria i of the Full planning Permission requirements as detailed in [Appendix 2](#).

Infiltration rates should be determined in accordance with **BRE Digest 365**. If it is not feasible to access the site to carry out soakage tests before planning approval is sought, a desktop study should be undertaken looking at the underlying geology of the area, however experience has shown that these should not be used for site-specific analysis. We will therefore require you to assume a worst-case infiltration rate for that site and provide a feasible alternative drainage scheme which gives priority to above ground SuDS techniques. Where it is proposed to undertake infiltration testing at a later stage of the planning process, the applicant should provide an alternative drainage strategy in the event infiltration is deemed infeasible through testing.

If the site lies within Source Protection Zone 1 and 2, development proposals must account for groundwater contamination in accordance with Croydon Strategic Policy 6.4(d). The developer must contact the Environment Agency at the earliest opportunity to discuss any potential constraints, especially where infiltration SuDS are proposed.

BRE Digest 365 Section 3.2

Site investigation and testing should be carried out prior to design or construction work taking place; this is part of the design process. Ground conditions, even in the same location, can vary especially on previously-used brownfield land. The site investigation (including desk research and ground investigation) will be required to assess the following:

- *water table depth and perched water table presence/depth (based on the worst annual case, ie during April or May)*
- *chemical contamination risks*
- *suitability of strata for soakaway discharges, including permeability.*

Croydon Strategic Policy 6.4 (d) *development proposals to account for possible groundwater contamination in Source Protection Zones 1 and 2.*

Sustainable Design and Construction SPG

Para. 3.4.17 *Infiltration methods need to consider:*

- *soil permeability;*
- *ground stability;*
- *depth to water table;*
- *soil attenuation, both flow and quality;*
- *contaminants present in ground; and*
- *local hydrogeology and risk of groundwater contamination.*

To demonstrate accordance with the above, Criteria c of the Outline Planning Permission requirements and Criteria i of the Full planning Permission requirements detailed in the Developer's Checklist, the applicant should provide the following;

- Infiltration testing in accordance with BRE365;
- A desktop study detailing underlying geology, borehole records, groundwater levels (if known) and susceptibility to groundwater flooding. The study should conclude whether infiltration is a viable option (where infiltration testing has been unable to be undertaken) for the Drainage Strategy;
- An alternative Drainage Strategy should infiltration be proposed at a later stage of the planning process;
- Determination of infiltration rates; and
- Analysis of infiltration testing and viability of infiltration SuDS to be incorporated within the proposed development.

Requirement 7. Maintenance and operation

This section provides guidance on Criteria k of the Full Planning Permission requirements as detailed in [Appendix 2](#).

A maintenance plan must be submitted with all drainage proposals, and in advance of construction, outlining the management and maintenance of all surface water drainage features over the lifetime of the development. A site specific maintenance plan should be provided, including identification of the party who will be responsible for maintenance. Provision of generic, non site-specific maintenance and operation plans will not be acceptable to meet the requirements of the LLFA.

Sustainable Design and Construction SPG

Para. 3.4.18 Drainage designs incorporating SuDS measures should include details of how each SuDS feature, and the scheme as a whole, will be managed and maintained throughout its lifetime.

Planning Practice Guidance

Para. 085 When planning a sustainable drainage system, developers need to ensure their design takes account of the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any personnel, vehicle or machinery access required to undertake this work.

To demonstrate accordance with the above and Criteria k of the Full Planning Permission requirements as detailed in the Developer's Checklist, the applicant should provide the following;

- A maintenance schedule tailored to the post development SuDS measures should be provided. A generic plan adopted from guidance documents will not be accepted;
- Frequency of maintenance for all SuDs should be stated; and
- The owner responsible for maintenance requirements of all SuDs measures should be provided.

Requirement 8. General Recommendations

8.1 Calculations Presentation

In order to summarise calculations presented as per Requirements 1 and 2 above, Criteria b of the Outline Planning Permission requirements and Criteria c(i), c(ii), c(iii), c(iv), c(v) and d of the Full Planning Permission requirements as detailed in [Appendix 2](#), it is suggested the applicant present results within their Drainage Strategies in tables similar to

Table 1 and Table 2 below.

Table 1 Runoff Rates and Volumes

Greenfield Runoff Rate (Q_{BAR})(l/s)	x l/s		
Existing Discharge Rate (l/s)	x l/s		
Proposed Total Attenuation Volume (m³)	x m ³		
Site Runoff and Storage Volume	Runoff/Discharge rate (l/s) and betterment (%)		Required Storage Volume (m³)
	Existing Runoff Rate	Proposed Discharge Rate (% Betterment)	
1 in 1 year	x l/s	x l/s (x %)	N/A
1 in 30 year	x l/s	x l/s (x %)	N/A
1 in 100 year	x l/s	x l/s (x %)	N/A
1 in 100 year + CC	N/A	N/A	x m ³

Table 2 Long Term Storage Requirements (for sites >1ha)

Storm Event	Greenfield Runoff Volume	Existing Site Runoff Volume	Post Developed Site Runoff Volume	Long Term Storage Requirement
1 in 100 year 6 hour	x m ³	x m ³	x m ³	x m ³

8.2 Drainage Strategy Layout Plan

This section provides guidance on Criteria d of the Outline Planning Permission requirements and Criteria g of the Full Planning Permission requirements as detailed in [Appendix 2](#).

Outline Planning Permission

A conceptual drainage plan should be provided of the proposed strategy including the following:

- Identification of SuDS locations and dimensions;
- Any connection/discharge locations to sewer networks or watercourses; and
- Indicative pipe layout to demonstrate how SuDS measures will be connected to the site drainage network.

Full Planning Permission

A drainage plan (to scale) should be provided of the proposed strategy including the following:

- Surface Water discharge locations;
- Invert Levels of Drainage Infrastructure (including off-site connection point);
- Pipe Sizes and Pipe Falls/Gradients (where known);
- For all proposed SuDS (including green roofs);
 - Location;
 - Dimensions and Storage Volumes;
- Thames Water Infrastructure, connection point to Thames Water Infrastructure and proposed discharge rate (if applicable to the site); and
- Discharge Control device details.

Requirement 9. References and Guidance

The following list of documents should be used by the applicant to develop and inform the preparation of their drainage strategy for submission to the LPA for planning permission:

- [London Borough of Croydon Strategic Flood Risk Assessment \(SFRA\);](#)
- [London Borough of Croydon Surface Water Management Plan \(SWMP\);](#)
- [London Borough of Croydon Local Flood Risk Management Strategy \(LFRMS\);](#)
- [Section 19 Investigations;](#)
- [Thames River Basin District Flood Risk Management Plan \(FRMP\);](#)
- [Building Regulations 2010 – Part H Drainage and waste Disposal;](#)
- [CIRIA 753 – SuDS Manual;](#)
- [CIRIA 687 – Planning for SuDS;](#)
- [Sewers for Adoption \(7th Edition\); and](#)
- [Rainfall runoff management for development \(DEFRA and Environment Agency Guidance\).](#)

Appendix 1

LLFA Planning Application Requirements

Detailed below are the LLFAs requirements with respect to the type of planning permission being applied for. The level of assessment should be considered depending on the scale, proportion and nature of the development.

Outline Planning Application

Whilst we recognise that Outline planning applications do not require full details of the proposed development (i.e. layout, access etc.), to manage drainage it is imperative that this is established prior to the layout being developed. We therefore require an Outline Drainage Strategy to be submitted in support of the planning application, including the following as a minimum;

- a) Site drainage patterns – examination of the current and previous drainage patterns on site including an understanding of how surface water would flow across the site;
- b) Indicative existing runoff rates during 1 in 1 year, 1 in 30 year, 1 in 100 year storm events, post development discharge rates during 1 in 1 year, 1 in 30 year, 1 in 100 year, 1 in 100 year + 40% Climate Change storm events, greenfield runoff rate (Q_{BAR}) and water storage capacity of the proposed drainage features to attenuate the 1 in 100 year + 40% Climate Change event;
- c) Infiltration assessment – where you do not yet have access to the site, include an assessment of soil types and geology for infiltration potential. The Croydon SWMP can support this; an alternative strategy for drainage for the site, should infiltration not be feasible, should be detailed in the drainage strategy and should include the proposed location of any discharge points, the proposed discharge rates, as well as the volume and location of any required storage; and,
- d) Concept surface water management strategy including a rationale for SuDS selected in line with the London Plan Policy 5.13 (including the aim to achieve greenfield runoff rates, and adherence to the drainage hierarchy). Indicative layouts and sizing of SuDS on the site should be provided.

Full Planning Application

As part of the Full Planning Applications, the drainage strategy must include the following as a minimum;

- a) Detailed site layout at an identified scale;
- b) Topographical survey of the site, with contours with a demonstrated understanding of how surface water would flow across the site pre-development;
- c) Calculations of the following with demonstration that they meet the requirements of the NPPF and Planning Practice Guidance, London Plan Policy (2016), its supporting document; Sustainable Design and Construction Supplementary Planning Guidance (2014) and the SuDS Non-Statutory Technical Standards (2015);
 - i. change in impermeable areas between the current site and proposed site;
 - ii. greenfield runoff rate (Q_{BAR})
 - iii. existing runoff rates during 1 in 1 year, 1 in 30 year, 1 in 100 year storm events and post development discharge rates during 1 in 1 year, 1 in 30 year, 1 in 100 year, 1 in 100 year + 40% Climate Change storm events;
 - iv. water storage capacity of the proposed drainage features to attenuate the 1 in 100 year + 40% Climate Change event; and

- v. consideration of long term storage requirements for sites greater than 1 hectare, with volumes specified for the 1 in 100 year 6 hour storm event for the greenfield, existing and post developed site. Robust evidence must be provided to support proposals where long term storage is deemed inappropriate.
- d) Demonstration that the proposals aim to meet greenfield runoff rate in line with London Plan Policy 5.13. Where greenfield runoff rates cannot be achieved, detailed justification as to why will be required;
- e) Demonstration that the proposed form of drainage has regard to the drainage hierarchy in the London Plan Policy 5.13 and industry best practice. Robust evidence must be provided to support proposals where SuDS are deemed inappropriate, e.g. If infiltration is deemed not viable;
- f) A statement on the benefits the proposed drainage strategy brings in terms of water quality, environmental and social benefits;
- g) Layout Plan of the proposed drainage scheme including dimensions, storage volumes, pipe sizes/cover/inlet levels, gradients, proposed discharge rate (if applicable) and flow control features in accordance with the submitted calculations;
- h) Consideration of how exceedance flows for events greater than the 1 in 100 year + 40% Climate Change event will be managed and mitigated on site without significantly increasing flood risks (both on site and outside the development). This should be supported by a site plan demonstrating the post developed site (with site levels shown) and indicative flowpaths for exceedance flows;
- i) Where infiltration SuDS are proposed,
 - i. they should be supported by infiltration testing in accordance with BRE365. Where infiltration testing is not possible at the full planning stage, a desktop study should be undertaken to consider the potential for infiltration SuDS at the site as well as an alternative drainage strategy proposed in the event infiltration is determined not to be viable through infiltration testing.
 - ii. if the site lies within groundwater Source Protection Zones 1 or 2 (as defined by the Environment Agency), the risk of contaminating groundwater and control measures required to mitigate this should be considered, in accordance with the Croydon Local Plan Strategic policy 6.4(d). We expect developers to provide evidence that they have consulted with the Environment Agency regarding the drainage proposals.
- j) Details of any offsite works required, together with necessary consents (where relevant) – we expect developers to have consulted with Thames Water and/or the Environment Agency depending on the method of surface water discharge, and provide evidence of agreed points of connection and acceptable discharge rates; and,
- k) A site specific maintenance and ownership Plan for proposed SuDS – including details of the management and maintenance for all SuDS and how they will be secured for the lifetime of the development. An example of an appropriate management plan can be found on [Susdrain - Useful frameworks and checklists](#).

Planning Application for Conversions or Refurbishments where there is no change in building footprint

To demonstrate accordance with the Croydon Local Plan Strategic Policy 6.4(c) and Croydon Local Plan Detailed Policy DM25.3, applications for conversions or refurbishments, with no change in building footprint or hardstanding area, should be supported by a drainage statement containing the following as a minimum;

- a. A rationale for incorporating SuDS on-site in line with the drainage hierarchy set out in Policy 5.13 of the London Plan. Where SuDS are not deemed suitable or feasible, justification should be provided. In considering the feasibility for infiltration SuDS, assessment should be made to the soil types and geology for infiltration potential.

- b. A site layout plan showing indicative layouts and sizing (dimensions and volumes) of SuDS proposed, any connection/discharge locations to sewer networks or watercourses and indicative pipe layout to demonstrate how SuDS measures will be connected to the onsite drainage network.

Planning Application for Conversions or Refurbishments where there is a change in building footprint

To demonstrate accordance with the adopted Croydon Local Plan Strategic Policy 6.4(c) and Croydon Local Plan Detailed Policy DM25.3, applications for conversions or refurbishments, with a change in building footprint or hardstanding area, should be supported by a drainage statement containing the following as a minimum;

- a) Detailed site layout at an identified scale;
- b) Topographical survey of the site, with contours with a demonstrated understanding of how surface water would flow across the site pre-development;
- c) Calculations of the following with demonstration that they meet the requirements of the NPPF and Planning Practice Guidance, London Plan Policy (2016), its supporting document; Sustainable Design and Construction Supplementary Planning Guidance (2014) and the SuDS Non-Statutory Technical Standards (2015);
 - i. change in impermeable areas between the current site and proposed site;
 - ii. greenfield runoff rate (Q_{BAR})
 - iii. existing runoff rates during 1 in 1 year, 1 in 30 year, 1 in 100 year storm events and post development discharge rates during 1 in 1 year, 1 in 30 year, 1 in 100 year, 1 in 100 year + 40% Climate Change storm events; and
 - iv. water storage capacity of the proposed drainage features to attenuate the 1 in 100 year + 40% Climate Change event.
- d) Demonstration that the proposals aim to meet greenfield runoff rate in line with London Plan Policy 5.13. Where greenfield runoff rates cannot be achieved, detailed justification as to why will be required;
- e) A statement on the benefits the proposed drainage strategy brings in terms of water quality, environmental and social benefits;
- f) Layout Plan of the proposed drainage scheme including dimensions, storage volumes, pipe sizes/cover/inlet levels, gradients, proposed discharge rate (if applicable) and flow control features in accordance with the submitted calculations;
- g) Where infiltration SuDS are proposed,
 - i. they should be supported by infiltration testing in accordance with BRE365. Where infiltration testing is not possible at the full planning stage, a desktop study should be undertaken to consider the potential for infiltration SuDS at the site as well as an alternative drainage strategy proposed in the event infiltration is determined not to be viable through infiltration testing.

Appendix 2

Developer's Checklist

To assist you in delivering an adequate surface water drainage assessment we have provided you with checklists for both Outline and Full Planning Permission below. These should be completed by the applicant and submitted as part of the Drainage Strategy when applying for Outline or Full Planning permission.

Outline Planning Permission Checklist

Criteria	Section of Submitted Drainage Strategy	Comments
a) Site drainage patterns – examination of the current and previous drainage patterns on site including an understanding of how surface water would flow across the site.		
b) Indicative existing runoff rates during 1 in 1 year, 1 in 30 year, 1 in 100 year storm events, post development discharge rates during 1 in 1 year, 1 in 30 year, 1 in 100 year, 1 in 100 year + 40% Climate Change storm events, greenfield runoff rate (Q_{BAR}) and water storage capacity of the proposed drainage features to attenuate the 1 in 100 year + 40% Climate Change event.		
c) Infiltration assessment – where you do not yet have access to the site, include an assessment of soil types and geology for infiltration potential. The Croydon SWMP can support this; an alternative strategy for drainage for the site, should infiltration not be feasible, should be detailed in the drainage strategy and should include the proposed location of any discharge points, the proposed discharge rates, as well as the volume and location of any required storage.		
d) Concept surface water management strategy including a rationale for SuDS selected in line with the London Plan Policy 5.13 (including the aim to achieve greenfield runoff rates, and adherence to the drainage hierarchy). Indicative layouts and sizing of SuDS on the site should be provided.		

Full Planning Permission Checklist

Criteria	Section of Submitted Drainage Strategy	Comments
a) Detailed existing site layout at an identified scale.		
b) Topographical survey of the site, with contours, with a demonstrated understanding of how surface water would flow across the site pre-development.		
c) Calculations of the following (using industry standard software):		
i. change in impermeable areas between the current site and proposed site.		
ii. greenfield runoff rate (Q_{BAR})		
iii. existing runoff rates during 1 in 1 year, 1 in 30 year, 1 in 100 year storm events and post development discharge rates during 1 in 1 year, 1 in 30 year, 1 in 100 year, 1 in 100 year + Climate Change ³ storm events.		
iv. water storage capacity of the proposed drainage features to retain the 1 in 100 year + Climate Change ² storm event.		
v. Consideration of long term storage requirements for sites greater than 1 hectare, with volumes specified for the 1 in 100 year 6 hour storm event for the greenfield, existing and post developed site. Robust evidence must be provided to support proposals where long term storage is deemed inappropriate		
d) Demonstration that the proposals aim to meet or better greenfield runoff rates in line with London Plan Policy 5.13 and Croydon Council Local Plan policy DM 25.3. Where greenfield runoff rates cannot be achieved, detailed justification as to why will be required.		
e) Demonstration that the proposed form of drainage has regard to the drainage hierarchy in the London Plan Policy 5.13 and industry best practice. Robust evidence must be provided to support proposals where SuDS are deemed inappropriate, e.g. If infiltration is deemed not viable.		
f) A statement on the benefits the proposed drainage strategy brings in terms of water quality, environmental and social benefits.		

³ Climate Change allowances adopted should be aligned with the Environment Agency's latest guidance available on the .gov.uk website. Typically, most developments should adopt a 40% climate change allowance although each applicant should assess their development design life to determine the appropriate Climate Change allowance. It is expected Upper End values are used for all climate change allowances.

Criteria	Section of Submitted Drainage Strategy	Comments
g) Layout Plan of the proposed drainage scheme including dimensions, storage volumes, pipe sizes/cover/inlet levels, gradients, <u>proposed discharge rate</u> (if applicable) and flow control features in accordance with the submitted calculations.		
h) Consideration of how exceedance flows for events greater than the 1 in 100 year + Climate Change ² event will be managed and mitigated on site without significantly increasing flood risks (both on site and outside the development). This should be supported by a site plan demonstrating the post developed site (with site levels shown) and indicative flowpaths for exceedance flows.		
i) Where infiltration SuDS are proposed; i. they should be supported by infiltration testing in accordance with BRE365. Where infiltration testing is not possible at the full planning stage, a desktop study should be undertaken to consider the potential for infiltration SuDS at the site as well as an alternative drainage strategy proposed in the event infiltration is determined not to be viable through infiltration testing		
ii. if the site lies within groundwater Source Protection Zones 1 or 2 (as defined by the Environment Agency), the risk of contaminating groundwater and control measures required to mitigate this should be considered, in accordance with Croydon Local Plan Strategic policy 6.4(d). We expect developers to provide evidence that they have consulted with the Environment Agency regarding the drainage proposals.		
j) Details of any offsite works required, together with necessary consents (where relevant) – we expect developers to have consulted with Thames Water and/or the Environment Agency depending on the method of surface water discharge, and provide evidence of agreed points of connection and discharge rates.		
k) A site specific maintenance and ownership Plan for proposed SuDS – including details of the management and maintenance for all SuDS and how they will be secured for the lifetime of the development.		

Appendix 3

The London Sustainable Drainage Proforma

The Proforma is divided into 4 sections, which are intended to be used as follows:

1. Site and project information - Provide summary details of the development, site and drainage
2. Proposed discharge arrangement – Summarise site ground conditions to determine potential for infiltration. Select a surface water discharge method (or mix of methods) following the hierarchical approach set out in the London Plan.
3. Drainage strategy – Prioritise SuDS measures that manage runoff as close to source as possible and contribute to the four main pillars of SuDS; amenity, biodiversity, water quality and water quantity.
4. Supporting information – Provide cross references to the page or section of the drainage strategy report where the detailed information to support each element can be found. This may be more than one reference for each item.

1. Project & Site Details	Project / Site Name (including sub-catchment / stage / phase where appropriate)				
	Address & post code				
	OS Grid ref. (Easting, Northing)		E		
			N		
	LPA reference (if applicable)				
	Brief description of proposed work				
	Total site Area			m ²	
	Total existing impervious area			m ²	
	Total proposed impervious area			m ²	
	Is the site in a surface water flood risk catchment (ref. local Surface Water Management Plan)?				
	Existing drainage connection type and location				
	Designer Name				
	Designer Position				
Designer Company					
3. Drainage Strategy	3a. Discharge Rates & Required Storage				
		Greenfield (GF) runoff rate (l/s)	Existing discharge rate (l/s)	Required storage for GF rate (m ³)	Proposed discharge rate (l/s)
	Qbar				
	1 in 1				
	1 in 30				
	1 in 100				
	1 in 100 + CC				
	Climate change allowance used		40%		
	3b. Principal Method of Flow Control				
	3c. Proposed SuDS Measures				
		Catchment area (m ²)	Plan area (m ³)	Storage vol. (m ³)	
	Rainwater harvesting	0		0	
	Infiltration systems	0		0	
	Green roofs	0	0	0	
	Blue roofs	0	0	0	
	Filter strips	0	0	0	
	Filter drains	0	0	0	
Bioretention / tree pits	0	0	0		
Pervious pavements	0	0	0		
Swales	0	0	0		
Basins/ponds	0	0	0		
Attenuation tanks	0		0		
Total	0	0	0		

2. Proposed Discharge Arrangements	2a. Infiltration Feasibility		
	Superficial geology classification		
	Bedrock geology classification		
	Site infiltration rate		m/s
	Depth to groundwater level		m below ground level
	Is infiltration feasible?		
	2b. Drainage Hierarchy		
		Feasible (Y/N)	Proposed (Y/N)
	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.		
	2c. Proposed Discharge Details		
	Proposed discharge location		
Has the owner/regulator of the discharge location been consulted?			
4. Supporting Information	4a. Discharge & Drainage Strategy		Page/section of drainage report
	Infiltration feasibility (2a) – geotechnical factual and interpretive reports, including infiltration results		
	Drainage hierarchy (2b)		
	Proposed discharge details (2c) – utility plans, correspondence / approval from owner/regulator of discharge location		
	Discharge rates & storage (3a) – detailed hydrologic and hydraulic calculations		
	Proposed SuDS measures & specifications (3b)		
	4b. Other Supporting Details		Page/section of drainage report
	Detailed Development Layout		
	Detailed drainage design drawings, including exceedance flow routes		
	Detailed landscaping plans		
	Maintenance strategy		
	Demonstration of how the proposed SuDS measures improve:		
	a) water quality of the runoff?		
	b) biodiversity?		
	c) amenity?		