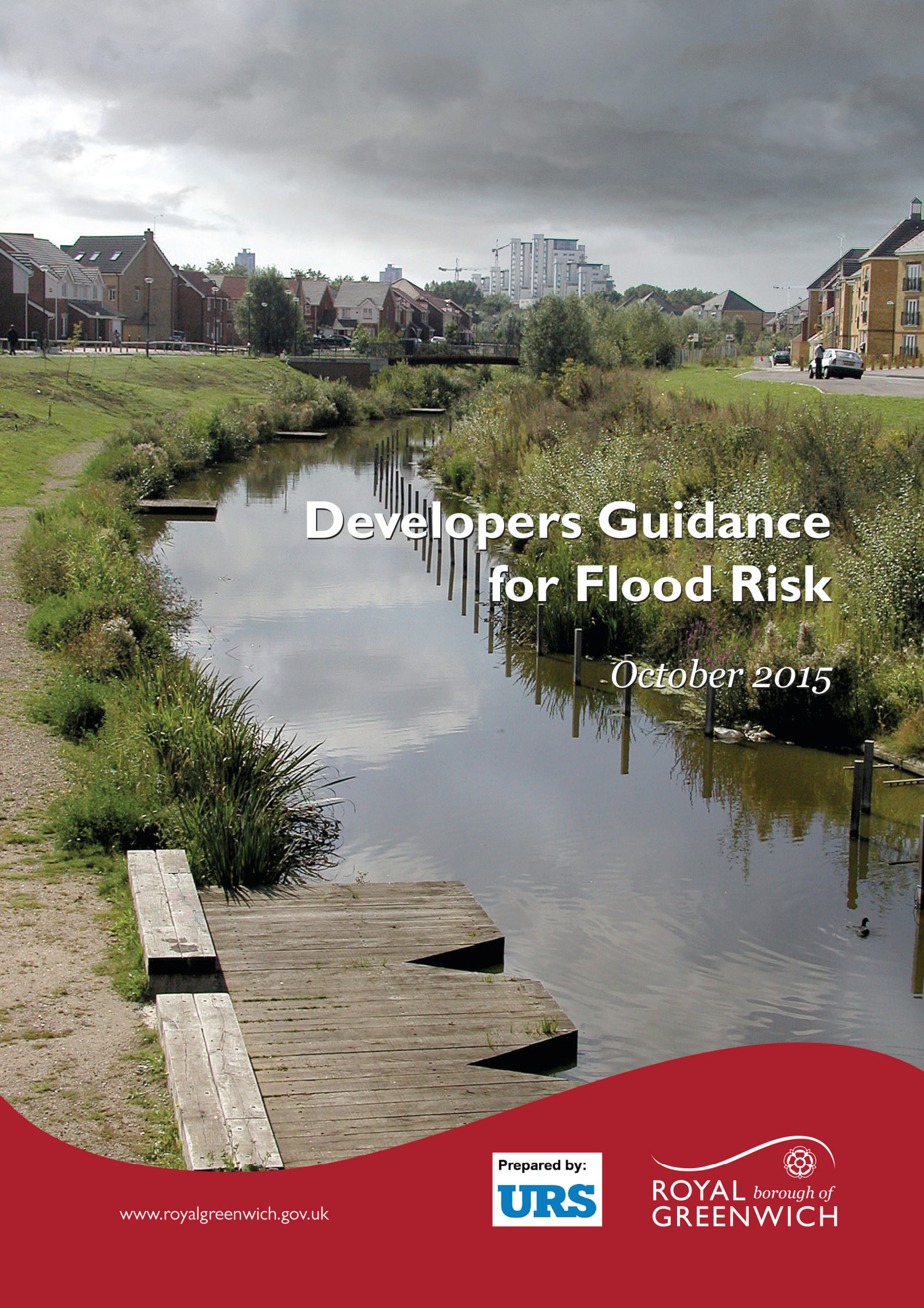




Developers Guidance for Flood Risk

October 2015

www.royalgreenwich.gov.uk

Prepared by:
URS


ROYAL borough of
GREENWICH

Quality Management

Report Name: The Royal Borough of Greenwich Developers Guidance for Flood Risk

Project Number: 47069773

Report Status: Final

Report produced by: URS Infrastructure & Environment UK Ltd
Scott House, Alencon Link, Basingstoke, RG21 7PP
Telephone: +44(0)1256 310 200

Revision Schedule:

Rev	Date	Details	Prepared by	Checked by	Approved by
0.1	June 2014	Draft for Review	Joanna Bolding Assistant Hydrologist	Sarah Kelly Principal Consultant	Carl Pelling Associate Director
1.0	February 2015	Final	Sarah Kelly Principal Consultant	Carl Pelling Associate Director	Carl Pelling Associate Director

Foreword

This document provides guidance to developers on flood risk management in the Royal Borough of Greenwich. It identifies the relevant information required for developers to make informed decisions and applications, and sets out what is expected by the Royal Borough for assessments of flood risk for new or redevelopment. Relevant legislation, policies and strategies have been clearly signposted and these should be used to support assessments and applications.

Specifically the guidance outlines the requirements for submitting the following to the Royal Borough:

- *Flood Risk Assessments*
- *Flood Warning and Evacuation Plans*
- *Surface Water Management (SuDS) arrangements*
- *Ordinary Watercourse Consent applications*

Appendix D of the guidance provides advice to developers and residents on producing a Flood Risk Assessment to support small planning developments, including household extensions.

Table of Contents

1. Introduction	3
1.1. Overview of Guidance Document	3
1.2. Flood Risk Management within Royal Greenwich	3
1.3. Importance of flood risk considerations for development	2
1.4. Consultation with the Royal Borough	3
2. Flood Risk Assessment Guidance	4
2.1. Overview	4
2.2. Background	4
2.3. Flood Risk Overview for Royal Greenwich	6
2.4. Datasets to be used in Flood Risk Assessments	8
2.5. Flood Risk Assessment Requirements	9
3. Flood Warning and Evacuation Plan Guidance	21
3.1. Overview	21
3.2. Background	21
3.3. Flood Warning and Evacuation Plan Requirements	21
4. Surface Water Management Guidance (SuDS)	25
4.1. Overview	25
4.2. Background	26
4.3. SuDS Requirements and Guidance	26
4.4. Planning Application Checklist – Surface Water Management Arrangements	28
5. Ordinary Watercourse Flood Defence Consenting Guidance	30
5.1. Overview	30
5.2. Background	30
5.3. Ordinary Watercourse Flood Defence Consenting Requirements	30
Appendix A – National and Local Planning Policies	36
A.1 National Policy	36
A.2 Local Policy, Guidance and Plans	39
Appendix B – Contacting the Royal Borough & Other Stakeholders	46
Appendix C – Fees and Charges	47
Appendix D – Guidance for Producing a Simple Flood Risk Assessment	48
Appendix E – Site Specific Flood Risk Assessment Checklist	52
Appendix F – SuDS Guidance and Best Practice	54

1. Introduction

1.1. Overview of Guidance Document

This document provides guidance to developers on local flood risk management in the Royal Borough of Greenwich (the Royal Borough'), identifying the relevant information required for developers to make informed decisions and applications, and setting out what is expected by the Royal Borough for assessments of flood risk for new or redevelopment.

The guidance provides information and advice on the requirements and expectations for:

- Preparing Flood Risk Assessments ([Section 2](#)),
- Preparing Flood Warning and Evacuation Plans ([Section 3](#)),
- Surface Water Management (SuDS) ([Section 4](#)),
- Getting consent for undertaking works in watercourses ([Section 5](#)),

Relevant legislation, policies and strategies have been clearly signposted throughout the guidance and are summarised in [Appendix A](#).

1.2. Flood Risk Management within Royal Greenwich

1.2.1. The Royal Borough

The Royal Borough has a number of roles relating to local flood risk management, including:

- **Lead Local Flood Authority** - under the Flood and Water Management Act 2010, the Royal Borough is the Lead Local Flood Authority (LLFA) for Royal Greenwich. As such, the Royal Borough has a number of duties and discretionary powers in relation to management of local sources of flooding, namely surface water, groundwater and smaller watercourses and ditches, known as ordinary watercourses, which includes a responsibility for issuing consents for any works undertaken in Ordinary Watercourses. Further information is included within [Appendix A.2](#). The LLFA will also be a statutory consultee to the local planning authority on planning applications for surface water management including Sustainable Drainage Systems (SuDS) from 6 April 2015.
- **Highways Authority** - the highway drainage system is integral in the management and behaviour of surface water during rainfall events. As a Highways Authority, the Royal Borough is required by the [Highways Act 1980](#) to ensure that highways are effectively drained of surface water and where necessary maintain all drainage systems. This excludes Red Routes, which are the responsibility of Transport for London (TfL). The Highway Authority is identified as a Risk Management Authority (RMA) under the Flood and Water Management Act 2010.
- **Emergency Responder** – the Royal Borough are a Category 1 Responder under the [Civil Contingencies Act 2004](#) and therefore have a responsibility, along with other organisations for developing emergency plans, contingency plans and business continuity plans to help reduce, control or ease the effects of an emergency in Royal Greenwich.
- **Local Planning Authority** – the Royal Borough has a responsibility to consider flood risk in strategic land use planning and the development of the Local Plan and a Strategic Flood Risk Assessment to support this. The Royal Borough is the 'decision maker' on flood risk for planning applications, taking into consideration technical advice from other risk management authorities as statutory consultees (see below). From 6 April 2015, the Royal Borough, as the

local planning authority, will be required to ensure that SuDS for the management of surface water run-off are put in place for major development¹. Further information is included in [Section 4](#).

- **Asset Owner** – the Royal Borough are responsible for the maintenance of Royal Borough owned assets which have a role in flood risk management. These include structures such as drainage ditches, gullies, trash screens, culverts, bridges and retaining walls.

1.2.2. Other Risk Management Authorities

Other Risk Management Authorities, as defined under the Flood and Water Management Act 2010, within Royal Greenwich include:

- **Environment Agency** - responsible for managing fluvial flooding from main rivers (such as the River Quaggy, River Ravensbourne and Deptford Creek) and tidal flooding (such as from the River Thames) and has a responsibility to provide a strategic overview for all flooding sources and coastal erosion.
- **Thames Water** - as the statutory water and sewerage undertaker serving Royal Greenwich. Thames Water is responsible for surface water drainage from development via adopted sewers and for maintaining public sewers into which much of the highway drainage connects.
- **Transport for London (TfL)** - as the Highways Authority for the Transport for London Road Network (TLRN) Red Routes. TfL are responsible for ensuring that highways are drained of surface water and where necessary maintain all drainage systems for Red Routes within London.

1.3. Importance of flood risk considerations for development

Developing in areas which are at risk of flooding has the potential to not only result in significant risks to a development, but also to site users and surrounding areas. This is particularly true of downstream settlements which may face further flood and water management issues as a result of development pressures upstream. Additionally, surface water and sewer flooding can pose as cross boundary issues, encroaching upon the boundaries of other local authorities.

It is possible to reduce the risk posed by developments through the incorporation of mitigation measures; however, these do not remove the flood risk altogether and developments situated in a floodplain will always be at risk from flooding. This creates Health and Safety considerations, possible additional costs and potential displacement of future residents during flood events, which could result in homes and businesses being uninhabitable for substantial periods of time.

This guidance document identifies the requirements of Flood Risk Assessments (FRA), Flood Warning and Evacuation Plans, Ordinary Watercourse Consents and SuDS Drainage Applications. The production of these documents is important for the following reasons:

- Failure to consider wider plans prepared by the Environment Agency or other Risk Management Authorities may result in a proposed scheme being objected to,
- Failure to identify flood risk issues early in a development project could necessitate redesign of the site to mitigate flood risk, and delay relevant planning permissions, and completion of development,
- Failure to adequately assess all flood risk sources and construct a development that is safe over its lifetime could increase the number of people at risk from flooding and/or increase the risk to existing populations,

¹ Major development is defined as developments of 10 dwellings or more, or equivalent non-residential or mixed development, as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010.

- Failure to mitigate the risk arising from development may lead to claims against the developer if an adverse effect can be demonstrated (i.e. flooding didn't occur prior to development) by neighbouring properties/residents),
- Failure to provide a safe access and egress route could result in the inability of occupants to exit buildings and reach safe refuge during a flood event, and prevent the emergency services from accessing those that require help, delaying the rescue and recovery process. This could ultimately lead to increased distress for the occupants, injuries or fatalities.
- Properties may be un-insurable and therefore un-mortgageable if flood risk management is not adequately provided for the lifetime of the development,
- For unconsented works within or adjacent to an Ordinary Watercourse², the Royal Borough (as LLFA) can take action to see that the Ordinary Watercourse is put back to the condition it was in beforehand or remedial action taken. The Environment Agency have similar powers yet for the management of main rivers³,
- By installing SuDS without arranging for their adoption or maintenance, there is a risk that they will eventually cease to operate as designed and could therefore present a flood risk to the development and/or neighbouring property, and,
- The restoration of river corridors and natural floodplains can significantly enhance the quality of the built environment whilst reducing flood risk. Such an approach can significantly reduce the developable area of sites or lead to fragmented developments, however positive planning and integration throughout the master planning process should resolve these potential issues.

1.4. Consultation with the Royal Borough

Developers should engage early with the Royal Borough to discuss plans. This offers the opportunity to ensure that the most appropriate flood risk and water management practices are incorporated at the beginning of the planning process and feed into wider flood risk management across Royal Greenwich.

Contact details for the Royal Borough to discuss any development plans relating to an FRA, Flood Warning and Evacuation Plan or consent for undertaking works in ordinary watercourses are available in [Appendix B](#).

The Royal Borough will undertake pre-application meetings to discuss any development plans relating to a FRA, Flood Warning and Evacuation Plans or consent for undertaking works in ordinary watercourses. There may be a charge for this in accordance with [Appendix C](#).

² An ordinary watercourse is every river, stream, ditch, drain, cut, dyke, sluice, sewer (other than a public sewer) and passage through which water flows, but which does not form part of a main river. The Royal Borough, as the LLFA, has powers on ordinary watercourses similar to the Environment Agency's powers on main rivers.

³ Main rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. In England Defra decides which watercourses are main rivers. Main rivers are marked on an official document called the main river map. Environment Agency local offices have copies of these maps. Main rivers can include any structure that controls or regulates the flow of water in, into or out of the channel.

2. Flood Risk Assessment Guidance

2.1. Overview

A Flood Risk Assessment (FRA) should be undertaken in line with Policy E2 in the [Royal Greenwich Local Plan Core Strategy with Detailed Policies \(July 2014\)](#), Policy 5.12 of the London Plan, the [National Planning Policy Framework \(NPPF\)](#) and associated guidance on flood risk, and have regard to the [Thames Estuary 2100 Plan](#). The FRA should assess the risk of flooding to the development and identify options to mitigate flood risk to the development, site users and the surrounding area, and be developed in liaison with the Environment Agency. Section 9 of the [Royal Greenwich Strategic Flood Risk Assessment](#), which has informed the [Royal Greenwich Local Plan](#), provides guidance for developers.

Pre-Application Discussions should be undertaken with the Royal Borough. Early discussions may result in improved flood risk management for the site and surrounding area.

As recommended by the [National Planning Policy Framework 2012](#) (NPPF), discussions between the Royal Borough, as the local planning authority; the Environment Agency; Catchment Partnership members and Thames Water, as the water and sewerage company, from the outset are advised. This will enable water supply and quality issues and the need for new water and wastewater infrastructure to be identified, both on and off-site. Specifically, developers should engage with Thames Water at the earliest convenience if they wish to connect surface water to the Thames Water sewer network.

2.2. Background

In accordance with the NPPF, a site-specific FRA must be produced to support applications for development proposed in flood risk areas or where proposed development may increase flood risk to third parties.

The NPPF states that a site-specific FRA is required to accompany a planning application for a site:

- within Flood Zones⁴ 2 or 3, or
- where the site lies within Flood Zone 1 and is greater than 1 hectare in area, or,
- in an area in Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency), or,
- where a change of use of land or buildings increases the flood vulnerability of the development, as defined by the NPPF, where it may be subject to other sources of flooding.

In addition to the NPPF requirements, supporting information for Policy E2 of the [Royal Greenwich Local Plan: Core Strategy with Detailed Policies](#) recommends that a site-specific FRA should be undertaken for developments in Flood Zone 1:

- Where surface water flooding is shown as 0.3m or deeper, or,
- Within 100m of a sewer flooding incident ,or
- Within 250m of a groundwater flooding incident.

The objectives of the site-specific FRA is to:

⁴ A Flood Zone is the extent of how far flood waters are expected to reach, and can be assessed using the [Flood Map for Planning \(Rivers and Sea\)](#) on the Environment Agency's website.

- Assess the risks for all sources of flooding to and from development,
- Provide evidence for the Royal Borough to apply the Sequential Test⁵ (if appropriate) as required by the NPPF,
- Show that the development is safe and passes the Exception Test⁶ (if applicable) as required by the NPPF, and,
- Demonstrate that flood risk to the development can be managed now and over the lifetime of the development, taking climate change into account,
- Demonstrate that the development does not increase the risk of flooding to third parties from all sources,

Section 9 of the [Royal Greenwich Strategic Flood Risk Assessment](#) (SFRA), provides a series of recommendations to be considered when undertaking future developments within Royal Greenwich. This guidance can be applied to new developments and redevelopments, including the many sites within Royal Greenwich that have already been given outline planning permission.

A supplementary study to support the SFRA, the [Guidance of Housing Design in Areas of High Residual Flood Risk](#), was undertaken to consider possible measures to address the challenge of achieving safe development alongside other objectives for place-making and sustainable development in these areas. This guidance is reproduced as Appendix F of the SFRA and is of key importance to significant areas of Royal Greenwich.

The Environment Agency provides guidance on the requirements of and how to complete an FRA as part of a planning application:

- Environment Agency Planning Application Advice: <https://www.gov.uk/planning-applications-assessing-flood-risk>

This includes information on when an FRA is required and advice on the contents of FRAs for different development types in Flood Zones 1, 2 and 3. **Applicants for planning permission within Royal Greenwich should follow this advice when preparing a site-specific FRA.**

They also provide Flood Risk Standing Advice: <https://www.gov.uk/flood-risk-standing-advice-frsa-for-local-planning-authorities>

Additionally, the Environment Agency can provide pre-application advice to developers, at a cost. Further information is available here:

- Pre-planning application advice: <https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion>
- Detailed planning advice: <https://www.gov.uk/government/publications/planning-advice-environment-agency-standard-terms-and-conditions>

⁵ The Sequential Test ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. Further information is provided in the [NPPF](#) and the [NPPG – Sequential Test](#)

⁶ The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. Further information is provided in the [NPPF](#) and the [NPPG – Exception Test](#)

2.3. Flood Risk Overview for Royal Greenwich

Table 2-1 – Overview of Sources of Flooding in Royal Greenwich

Source	Risk Management Authority	Description <i>Information on studies and datasets that contain information on the different flooding sources is provided in Section 2.4.</i>
Surface Water	Royal Borough	Surface water modelling, undertaken as part of the Royal Greenwich Surface Water Management Plan (SWMP) and more recently as a national mapping exercise by the Environment Agency, has highlighted areas of Royal Greenwich that are potentially at risk from surface water flooding. These include areas of Eltham, Kidbrooke, Greenwich Peninsula, Charlton Riverside, Royal Arsenal East, Plumstead and Abbey Wood.
Groundwater	Royal Borough	Royal Greenwich is underlain by a large area of minor aquifer, which coincides with the sand silt and gravel bedrock, and a small area of major chalk aquifer. This area of major aquifer has been classified by Defra as a groundwater emergence zone and could be at risk from significant ground water flooding when the water table is high.
Fluvial	Environment Agency	Fluvial flood risk, while limited to defined river corridors, affects areas of Royal Greenwich alongside the Rivers Quaggy, Ravensbourne, Shuttle, Deptford Creek, Kyd Brook, Wickham Valley Watercourse and Butts Canal. Some channel modifications and flood alleviation works have taken place in Royal Greenwich, most notably the flood alleviation scheme on the River Quaggy at Sutcliffe Park.
Tidal	Environment Agency	Royal Greenwich is defended from tidal flooding from the River Thames by existing defences of the Thames Barrier and raised defences such as walls and concrete capped embankments. However, a breach in the raised defences together with an extreme tide level, although a low probability of occurrence, would have significant consequences, causing flooding to most areas in Royal Greenwich in the north that border the Thames, but in particular to Thamesmead, Charlton Riverside and the Greenwich Peninsula. The eastern areas would be at the greatest risk due to low ground elevations, the absence of any natural topographic barriers and the presence of canals in the area.
Sewer Flooding	Thames Water	Sewer flooding is not considered a significant risk across the majority of Royal Greenwich but areas such as Eltham have experienced problems in the past. However, across the borough, many sewers may be at capacity, and therefore Thames Water will need to confirm that any new developments will not exceed sewer capacity and subsequently increase flood risk for individual developments.
Artificial Sources	Various	Artificial sources of flooding within Royal Greenwich include two pumping stations at Gallions and Tripcock and five covered reservoirs; two at Woolwich Common, and one each at Greenwich Park, Castlewood and Oxleas Wood. The reservoirs are covered and some are empty, and are therefore at low risk of flooding. Further, there is a Thames Water Reservoir at Eltham High Street. Additionally, Royal Greenwich could be impacted from the flood alleviation schemes at Weigall Road and Sutcliffe Park, and open reservoirs located in adjacent boroughs should they fail, as mapped on the Environment Agency's website .

2.4. Datasets to be used in Flood Risk Assessments

When producing FRAs, **all sources of flooding must be assessed**. Table 2.2 identifies the primary dataset that should be used to assess each source of flooding. See [Appendix A.2](#) for further information on Royal Greenwich-specific datasets listed.

Table 2-2 – Datasets for each source of flooding

Information	Flooding Source						Datasets
	Tidal	Fluvial	Surface Water (inc. Ordinary Watercourses)	Groundwater	Sewer	Artificial Sources	
Historic Flooding	✓	✓				✓	Royal Greenwich SFRA
			✓	✓			Royal Greenwich SWMP Royal Greenwich PFRA
					✓		Thames Water (direct)
Flood Risk	✓	✓				✓	Environment Agency (direct): Flood Zones and modelled flood levels Environment Agency (website): Flood Map for Planning (rivers and sea) Environment Agency (website): Risk of Flooding from Reservoirs Royal Borough of Greenwich SFRA London Regional Flood Risk Assessment Thames CFMP / FRMP
			✓	✓			Royal Greenwich SFRA Royal Greenwich LFRMS Royal Greenwich SWMP London Regional Flood Risk Assessment Environment Agency (website): Risk of Flooding from Surface Water Map
					✓		Thames Water (direct) London Regional Flood Risk Assessment
	✓						Royal Greenwich SFRA Thames Estuary 2100 Plan Environment Agency (direct)
Wastewater & Water Supply Infrastructure					✓		Thames Water (direct)
Critical Drainage Areas (surface water)			✓				Royal Greenwich SWMP
SuDS Suitability Assessment			✓	✓			Royal Greenwich SFRA Royal Greenwich SWMP On-site / site specific assessment
Proposed Flood Alleviation Measures	✓	✓	✓	✓			Royal Greenwich SFRA Royal Greenwich LFRMS Environment Agency (website): Flood Risk Management Activities Thames Estuary 2100 Plan

Information	Flooding Source						Datasets
	Tidal	Fluvial	Surface Water (inc. Ordinary Watercourses)	Groundwater	Sewer	Artificial Sources	
Local Flood Risk Management Objectives			✓	✓			Royal Greenwich SFRA Royal Greenwich LFRMS Royal Greenwich FRMP Thames River Basin District FRMP
Environment Sites & Designations	✓	✓	✓	✓	✓	✓	Royal Greenwich SFRA Natural England
Water Framework Directive Status	✓	✓	✓	✓	✓		Thames RBMP Environment Agency (website): River Basin Management Plan - Rivers Royal Greenwich Ordinary Watercourses Survey (direct)

2.5. Flood Risk Assessment Requirements

Site-specific FRAs should be proportionate to the degree of flood risk and make optimum use of readily available guidance and information, including the [National Planning Policy Guidance](#) (NPPG), Environment Agency Standing Advice and the mapping presented within the [Royal Greenwich SFRA](#), [Royal Greenwich SWMP](#) and available through the [Environment Agency website](#).

2.5.1. Proportionate Approach

FRAs should be appropriate to the scale, nature and location of the development. For example, the Royal Borough would generally need a less detailed assessment to be able to reach an informed decision on the planning application where the development is an extension to an existing house (for which planning permission is required) as this is unlikely to significantly increase the number of people in an area at risk of flooding. For a new development comprising a greater number of houses in a similar location, or one where the flood risk is greater, the Royal Borough would require a more detailed assessment.

Further information for residents on completing a Flood Risk Assessment to support small planning developments, including household extensions, is provided in [Appendix D](#).

2.5.2. General Requirements

When an applicant submits an FRA for a development within Royal Greenwich it must be ensured that it is delivered as stipulated below:

- Be prepared in accordance with national, regional and local planning policy (as stated in [Appendix A](#));
- Be written in such a way as to be understandable for those who will be reading it and auditable for those who will be checking it;
- Document sources of data and information and verify the reliability/authenticity of the information;

- Document the assessment methods adopted, including technical descriptions of any models used and their application. Where checklists, flow charts, etc. have been used these should be included in an appendix;
- Clearly identify assumptions and uncertainties in data, assessment methods and results and explain the precautionary approach adopted to manage such uncertainties; and,
- Show that at all stages, the Royal Borough, and where necessary the Environment Agency and/or the Thames Water as the statutory water and sewerage undertaker have been consulted to ensure that the FRA provides the necessary information to fulfil the requirements for Planning Applications.

In addition, the FRA should conform with submission requirements; using the site specific FRA checklist included in [Appendix E](#), and the accompanying guidance included in the Specific Requirements below.

FRA within Flood Zone 1

FRAs for sites located within Flood Zone 1 should:

- Take consideration of how the development would change the natural/existing drainage of the site to ensure surface water generated by the site is managed in a sustainable manner and does not increase the burden/seeks to alleviate burdens upon existing infrastructure and/or flood risk to neighbouring property;
- Consider current and future groundwater levels to ensure that surface water management solutions such as Sustainable Drainage Systems (SuDs) will be effective;
- Consider if the new development is liable to flooding from local sources; and,
- Demonstrate that the proposed development will not increase flood risk either on or off-site and seeks to reduce risk overall.

The assessment of surface water flood risk should take account for the impact of climate change over the lifetime of the development and should also consider the impact of factors such as urban creep.

FRA within Flood Zone 2 and 3

In addition to the consideration of how surface water will be effectively managed, FRAs for sites within Flood Zones 2 and 3 will also be required to conduct an assessment of all sources of flood risk and provide evidence that the Sequential Test⁷ / a sequential approach has been applied. FRAs should demonstrate that proposals will not increase flood risk and where possible will seek to overall reduce the risk. As a minimum requirement groundwater levels, local reservoirs, and main sewers on-site and in the vicinity should be identified. The Environment Agency and Thames Water should also be consulted on flood management proposals. For sites within the functional and defended floodplain of the River Thames, and other main rivers in Royal Greenwich including the River Quaggy, River Ravensbourne and Deptford Creek, applicants should consult the Environment Agency to obtain the most up to date information on the modelled flood levels associated with these watercourses. Where this information is of suitable quality, modelled flood levels should be compared with site topographic information to more accurately delineate Flood Zones across the development site (using the definitions in the NPPF and NPPG).

⁷ The Sequential Test ensures that a sequential approach is followed to steer new development to areas with the lowest probability of flooding. Further information is provided in the [NPPF](#) and the [NPPG – Sequential Test](#)

2.5.3. Specific Requirements

In accordance with the NPPF and accompanying NPPG the site specific FRA must include the following topics in the appropriate detail for the development. It should be noted that organisations listed within the following tables may be able to provide sources of data to support the FRA but will not undertake the investigations for developers.

A checklist is provided in [Appendix E](#).

1. Development Description and Location

Requirements	Notes
a. What type of development is proposed and where will it be located?	<i>e.g. a new development, an extension to existing development, a change of use etc.</i> <i>If the application is for a basement development, see below.</i>
b. What is its flood risk vulnerability classification?	<i>The FRA should identify the vulnerability classification of the proposed development, as set out in the NPPG.</i>
c. Does the development proposal comply with Royal Greenwich Development Plan policies and follow supplementary planning guidance?	<i>Refer to Appendix A:</i> <i>A.2 Local Policy, Guidance and Plans</i>
d. What evidence can be provided that the Sequential Test and where necessary the Exception Test has/have been applied in the selection of this site for this development type?	<i>Royal Greenwich Local Plan: Core Strategy with Detailed Policies (July 2014)</i>
e. Will the proposal increase overall the number of occupants and/or users of the building/land, or the nature or times of occupation or use, such that it may affect the degree of flood risk to these people?	<i>Particularly relevant to minor developments (alterations and extensions) and changes of use.</i>

Basement Dwellings

Basement dwellings are classified as Highly Vulnerable under the NPPF and as such the following should be adhered to within the FRA:

- Basements dwellings are discouraged within areas at risk of fluvial, surface water or groundwater flooding risk.
- Basement dwellings are not permitted within Flood Zone 3a and Flood Zone 3b.
- For Flood Zone 2, basement dwellings must pass the Sequential and Exception Tests.
- Where basement dwellings are constructed, access must be situated 300mm above the design flood level, and developers are required to install protection to prevent surcharge from the public network into the property. This is often achieved by the installation of a positively pumped system in the basement
- Waterproof construction techniques should be employed to avoid seepage during flood events.
- An assessment of groundwater conditions is required to inform the structural integrity of the basement construction. Similar problems can also occur where excessive surface water ponding occurs close to the sides of buildings, leading to significant infiltration.

- Surface water flow paths should be assessed to inform the strategic location of SuDS and techniques to route flows around the edge of buildings.

2. Identifying Flood Sources

Requirements		Notes
a.	What sources of flooding could affect the site? Assess all potential sources of flooding.	See Table 2-1: Overview of sources of flooding See Table 2-2: Datasets for each source of flooding
b.	For each identified source in 2a above, describe how flooding would occur, with reference to any historic records where these are available.	See Table 2-2: Datasets for each source of flooding Royal Greenwich SFRA Royal Greenwich SWMP Royal Greenwich PFRA
c.	What are the existing surface water drainage arrangements for the site? Assess the hydraulic performance of the existing and proposed artificial drainage system.	<i>Thames Water (direct)</i> <i>Developers must be able to demonstrate that there would be no increased risk of pluvial flooding either on or off site as a result of the proposed development. Where an increased risk exists, developers need provide a Drainage Strategy to demonstrate how they intend to address this, by what methods, over what timeframe and how such works would be funded.</i>

3. Probability

Requirements		Notes
a.	Which Flood Zone (or zones) is the site within?	Flood Map for Planning (Rivers and Sea) on the Environment Agency's website Royal Greenwich SFRA
b.	What is the probability of the site flooding?	Flood Map for Planning (Rivers and Sea) on the Environment Agency's website Risk of Flooding from Rivers and Sea on the Environment Agency's website Risk of Flooding from Surface Water on the Environment Agency's website – this should be used to indicate potential surface water flood risk for the site. Royal Greenwich SFRA Royal Greenwich SWMP - groundwater flood risk <i>Where the quality and/or quantity of information for any of the flood sources affecting a site is insufficient to enable a robust assessment of the flood risks, further investigation may be required. For example, where hydraulic modelling is not available for small watercourses, the scope of the FRA should be increased to include modelling to ensure details of flooding mechanisms are fully understood and that the proposed development incorporates appropriate mitigation measures.</i>
c.	What are the existing rates and volumes of surface water run-off generated by the site? Assess the sequence of flooding across the site, rate of rise of water level, flow velocities, depths and the duration of flood (existing and post-development).	<i>Rates and volumes of runoff for a range of storm events up to and including the 1 percent (1 in 100) annual probability event (including an allowance for climate change) should be calculated. These can be supported using industry-standard software, such as WinDes, and the outputs from these submitted with the FRA. However, all headline figures used in the calculations must be presented separately including</i>

Requirements	Notes
Assess the potential impact on fluvial morphology and long-term stability and sustainability.	<i>the method used.</i>
d. Estimate the volume of runoff likely to be generated by the development.	<i>As for 3c above.</i>
e. What is the probability of a breach of the existing flood defences and how will it be mitigated? Consider the benefit afforded to the site from any existing flood alleviation measures.	<i>See the 'Breach of existing flood defences' section below. An assessment of the floodwater level during a breach incident should be undertaken and compared against the proposal. The Environment Agency may have breach model outputs which could be used for this purpose. However, where suitable information is not available, a developer will have to conduct their own assessment and ensure it is proportionate to the scale and risk of development proposed.</i>

Breach of Existing Flood Defences

Although much of Royal Greenwich along the River Thames falls within Flood Zones 2 and 3, it is currently defended from tidal flooding by existing defences of the Thames Barrier and raised defences such as walls and concrete capped embankments, with only a few instances of functional floodplain. However, a breach in the raised defences together with an extreme tide level, although a very low probability of occurrence, would have extreme consequences, causing flooding of parts of Thamesmead, Charlton Riverside, and the Greenwich Peninsula. The eastern areas would be at the greatest risk due to low ground elevations, the absence of any natural topographic barriers and the presence of canals in the area. Any proposals for new development in such areas with a residual risk, must firstly confirm that the Royal Borough has, through the Local Plan, applied the sequential test in order to determine the appropriateness of development within this location and if the sequential test has been passed, then provide evidence to support the application of the Exception Test, and consider the requirements of Policies E2 and E3 in the [Royal Greenwich Local Plan](#).

4. Climate Change

Requirements	Notes
a. How is flood risk at the site likely to be affected by climate change?	<i>Use available datasets to assess the potential impacts of climate change including:</i> Royal Greenwich SFRA Environment Agency's 'Climate Change allowances for planners' guidance NPPF

5. Detailed Development Proposals

Requirements	Notes
a. Demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding (include details of the development layout).	<i>Flood risk should be considered at an early stage in deciding the layout and design of a site to provide an opportunity to reduce flood risk within the development. Most large development proposals include a variety of land uses of varying vulnerability to flooding. The sequential approach should be applied within development sites to locate the most vulnerable elements of a development in the lowest risk areas e.g. residential developments should be restricted to areas at lower probability of flooding whereas parking, open space or proposed</i>

		landscaped areas can be placed on lower ground with a higher probability of flooding.
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6. Flood Risk Management Measures

Requirements	Notes
a. How will the site/building be protected from flooding, including the potential impacts of climate change, over the development's lifetime?	Developers constructing new developments in lower flood risk areas are required to manage the flood risk by conforming to NPPF and the NPPG and considering the design and construction in line with: • Improving the Flood Performance of New Buildings - Flood Resilient Construction Guidance hierarchy: Flood Avoidance, Flood Resistance and Flood Resilience (DCLG/Environment Agency's 2007) or latest version and, • Property Level Protection measures (see guidance text below for further information).
	Development should ensure that surface water run-off is managed in line with Royal Greenwich's surface water management requirements, as set out in Section 4 of this document.
	The design life of the proposed development should be considered with respect to climate change as: • 75 years – up to 2090 for commercial / industrial developments; and • 100 years – up to 2115 for residential developments
	Consideration should be given to the following (further detail is provided below): • Finished floor levels, in particular for habitable rooms of more vulnerable uses • Uses of buildings • Flood resistance and resilience design • Existing flood defences.
b. Where new or modified structural measures are proposed, an assessment of their behaviour in extreme events greater than those for which they are designed should be provided.	The use of raised floor levels and, in particular, raised bedrooms, can minimise the impact of internal flooding in the event of a breach of tidal defences. It is recommended that if these measures are used, that the building design should be resilient to flooding from a breach event in the 1 in 200 year tidal scenario, considering climate change. Structural strengthening of buildings should be considered, where this could reduce risk to life. This should incorporate building design that is resistant to flooding up to 0.6m. It is important that the cumulative impact of any structural measures is considered and it must be ensured that the measures proposed do not increase flood risk to other areas.

Finished Floor Levels

Where developing in fluvial or tidal flood risk areas is unavoidable, the recommended method of mitigating flood risk to people, particularly with More Vulnerable (residential) land uses, is to ensure internal floor levels are raised a freeboard distance above peak flood water levels. The following are required:

- For More Vulnerable (residential) land uses, finished floor levels should be set a minimum of 300mm above the design event peak flood level. The peak flood water level should be

derived for the immediate vicinity of the site (i.e. relative to the extent of a site along a watercourse as flood levels are likely to vary with increasing distance downstream) as part of a site-specific FRA. The design event peak flood level will vary according to the presence of defences and the source of flood risk as follows:

- For undefended fluvial floodplain, the design event is the 1 in 100 year plus climate change,
 - For undefended tidal floodplain, the design event is the 1 in 200 year plus climate change,
 - For defended fluvial floodplain, flood levels in the event of a breach should be derived for the 1 in 100 year event plus climate change (please see below for further information), and
 - For defended tidal floodplain, flood levels in the event of a breach should be derived for the 1 in 200 year event plus climate change (please see below for further information).
- For Less Vulnerable commercial and industrial units finished internal floor levels may not be required to be raised. However, it is strongly recommended that internal access is provided to upper floors (first floor or a mezzanine level) to provide safe refuge in a flood event. Such refuges will have to be permanent and accessible to all occupants and users of the site.

In certain situations (e.g. for proposed extensions to buildings with a lower floor level or conversion of existing historical structures with limited existing ceiling levels), it could prove impractical to raise the internal ground floor levels to sufficiently meet the general requirements. The Environment Agency has provided [Standing Advice](#) on extensions and floor levels.

Residential Development in Defended Fluvial or Tidal Floodplain

In such locations where the council is of the view that habitable rooms be provided at ground level, the design should be in a manner that discourages sleeping accommodation being retrofitted into those rooms in the future. For example by having rooms such as kitchens on the ground floor. Unobstructed internal access to higher ground above the breach level should also be provided.

Flood Resistant and Resilient Design, including Property Level Protection

Flood resistant and resilient design should be undertaken in line with the Department for Communities and Local Government Guidance: [Improving the Flood Performance of New Buildings, Flood Resilient Construction](#). This provides specific advice on how to improve the resilience of new properties in low or residual flood risk areas and suitable materials and construction techniques for floors, walls, doors and windows and fittings.

Materials can be used which allow the passage of water whilst retaining their structural integrity and they should also have good drying and cleaning properties. Alternatively sacrificial materials can be included for internal and external finishes; for example the use of gypsum plasterboard which can be removed and replaced following a flood event. Flood resilient fittings should be used to at least 0.1m above the design flood level. Resilience measures are either an integral part of the building fabric or are features inside a building that will limit the damage caused by floodwaters.

Property level protection measures are affordable flood resistant and resilience measures that homeowners can deploy to help prevent and limit the damage caused by flood water. Information on property level protection can be found on the [National Flood Forum website](#), the [Environment Agency](#)

[website](#) and The University of Manchester and Manchester Metropolitan University's [Six Steps to Property Level Flood Resilience](#)⁸

Existing Defences

Tidal and fluvial defences are an essential means of protecting low-lying areas from flooding. Where development relating to the tidal defences is permitted, the Royal Borough may wish to use this opportunity to extend the public access to the waterside and protect and enhance existing ecological features.

Development should take into account the need to raise these defences and otherwise accommodate increased river levels in the future and must be sufficiently set back from them to allow for their inspection, maintenance and renewal. Horizontal set-back distances should be calculated relative to the landward extent of the defences, in order to allow for a range of engineering options for future works. Development should aim to be 16 metres behind the flood wall. Site specific constraints may affect the amount of setback that can be achieved, for example where sites are very narrow (less than 40 metres) and run parallel to the river. In these instances, a smaller set back may be acceptable.

[The Thames Estuary 2100 Flood Risk Management Plan](#) sets out the strategic plan for managing tidal flood risk in the Thames Estuary to the end of the century. The plan recommends the required flood risk management measures and when and where these will be needed, based on climate changes and sea level rises.

7. Off-Site Impacts

Developers should be able to demonstrate that proposed developments will not increase flood risk off-site and/or downstream. Where possible, developments should seek to reduce overall flood risk both on and off site. If there is to be an increased risk of flooding either on or off site, developers must detail how they are going to address such pressures, what mitigation measures they propose and how these measures would be allocated and funded.

Requirements	Notes
a. Assess the change in flooding conditions progressively away from the site boundary (both upstream and downstream), including volume of displaced water as well as flood levels.	<i>Where proposed development results in an increase in building footprint, the developer must ensure that it does not impact upon the ability of the floodplain to store water and or floodwater flow conveyance.</i>
b. How will it be ensured that the proposed development and the measures to protect the site from flooding will not increase flood risk elsewhere?	<i>Consider measures such as:</i> <i>Floodplain Compensation Storage - where ground levels are elevated to raise the development out of the floodplain or there is a loss of storage from additional structures and buildings, compensatory floodplain storage within areas that currently lie outside the floodplain must be provided to ensure that the total volume of the floodplain storage is not reduced.</i> <i>Flood Routing - development in the floodplain will need to prove that flood routing is not adversely affected by the development, for example giving rise to backwater affects or diverting floodwaters onto other properties.</i> <i>Riverside Development - development in or</i>
c. How will run-off from the completed development be prevented from causing an impact elsewhere?	

⁸ Six Steps to Property Level Flood Resilience:
http://www.sed.manchester.ac.uk/research/cure/research/documents/Property_owners_booklet_v1_print_000.pdf?bcsi_scan_A_B11CAA0E2721250=0&bcsi_scan_filename=Property_owners_booklet_v1_print_000.pdf

Requirements	Notes
	<i>adjacent to a watercourse has the potential to impact flow conveyance and increase flood risk elsewhere. All works within or adjacent to a watercourse require consent.</i> <i>Further information is provided below.</i>
d. Are there any opportunities offered by the development to reduce flood risk elsewhere?	<i>Discussions should be undertaken with the Royal Borough.</i> <i>Opportunities for delivering wider environmental benefits, including water quality, Water Framework Directive and pollution reduction should also be considered.</i>

Floodplain Compensation Storage

Floodplain compensation should be provided ideally as level for level, volume for volume basis on land which does not already flood and is within the site boundary. Where land is not within the site boundary, it must be in the immediate vicinity, in the applicant's ownership or management and hydrologically linked to the site. Floodplain compensation must be considered in the context of the 1 in 100 year flood level for fluvial sources and 1 in 200 for tidal sources including an allowance for climate change.

Floodplain storage compensation will not normally be sought where the site benefits from existing flood alleviation measures which are expected to remain over the duration of the lifetime of the development and that protect the site to a standard of:

- Fluvial flooding 1 percent (1 in 100) annual probability with a suitable allowance for the potential impacts of climate change.
- Tidal flooding 0.5 percent (1 in 200) annual probability with a suitable allowance for the potential impacts of climate change.

The requirement for no loss of floodplain storage means that it is not possible to modify ground levels on sites which lie completely within the floodplain (when viewed in isolation), as there is no land available for lowering to bring it into the floodplain. It is possible to provide off-site compensation within the local area e.g. on a neighbouring or adjacent site, however, this would be subject to detailed investigations and agreement with the Environment Agency to demonstrate that the proposals would improve and not worsen the existing flooding situation.

'Level for Level' Floodplain Compensation

Floodplain compensation is the matching of the lost storage volumes in the floodplain caused from development with new floodplain volume, by lowering adjacent ground levels. This compensatory storage is a form of risk substitution, however, it should not be used to advocate development where sites in lower risk flood zones are available. In general, compensation should only be applied to areas where flood water is stored; flood flow routes should be protected.

Compensation works can be divided into 'direct' and 'indirect' methods. These terms are used in CIRIA report 624 'Development and flood risk - guidance for the construction industry' (CIRIA, 2004). Direct or 'level for level' methods re-grade land at the same level as that taken up by the development, hence providing a direct replacement for the lost storage. Indirect methods rely on water entering a storage area, which then releases the water back at a controlled rate, in a manner similar to surface water attenuation schemes. Indirect schemes are complex to design and construct, and require a much more intensive maintenance regime, which needs to be carried out in perpetuity, so are generally opposed to.

Compensatory volume must be provided at the same level as the lost storage for it to be 'level for level'. An equal volume of flood plain must be created to that taken up by the development. This equal volume must apply at all levels between the lowest point on the site and the design flood level (the 1% annual probability floodwater level with an allowance for the potential impacts of climate change).

The height between the lowest point of the development and the floodwater design levels is split into a series of bands (commonly at 0.2 metre intervals). The volume of lost floodplain storage space as a result of the development is then calculated individually for each of these bands. Elsewhere on-site, existing ground levels are then lowered at the same band levels, such that, for each band level, the lowered areas equate to at least the volume lost, as illustrated in Figure 2-1.

The compensation areas provided should be able to freely fill and drain.

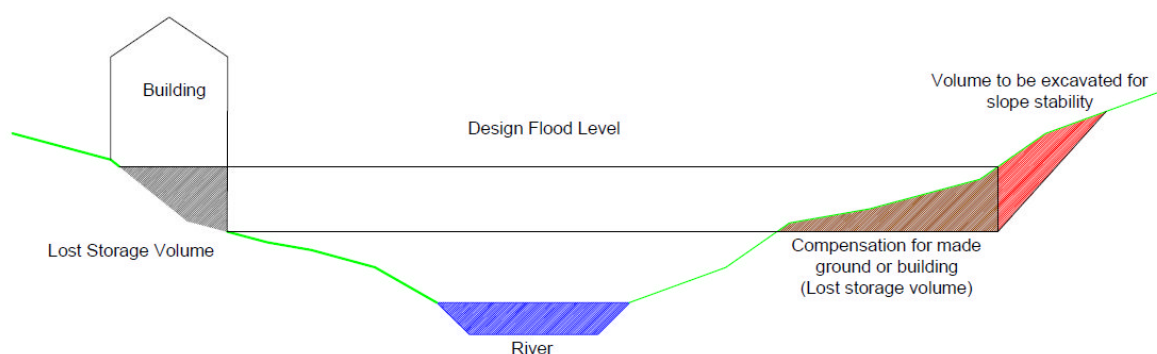


Figure 2-1 – Level for level Flood Compensation (Source: Royal Borough of Greenwich)

Unacceptable options for compensatory flood storage:

- Excavation of a hole in the ground, as this will become full before the time in the flood event when the compensation is needed.
- Providing a compensation area within a landlocked location, that is connected by a narrow access or a culvert. These links are more prone to blockages and maintenance can be an issues.
- Works that will damage sensitive habitats or the heritage of the site.
- Works that may place surrounding properties at risk. For example, lowering the ground level close to 'at risk' properties, thereby increasing their flood risk further.

Designing for Exceedance

Applicants should consider using design for exceedance approaches by using urban areas and infrastructure to help manage local flooding. This can include temporarily using roads to channel water, open spaces such as car parks to store water and erect temporary barriers to make homes and businesses flood resilient and resistant. Further information on designing for exceedance is available in the [CIRIA \(C738a\) Managing Urban Flooding from Heavy Rainfall Guidance](#).

Flood Routing

Potential overland flow paths should be determined and appropriate solutions proposed to minimise the impact of the development, for example by configuring road and building layouts to preserve existing flow paths and improve flood routing, whilst ensuring that flows are not diverted towards other properties elsewhere.

Careful consideration should be given to the use of fences and landscaping walls so as to prevent causing obstruction to flow routes and increasing the risk of flooding to the site or neighbouring areas.

Riverside Development

Under the Land Drainage Act 1991 and subsequent local bylaws, any works within 8 metres of any statutory main river (both open channels and culverted sections) and within 16m of a flood defence requires Environment Agency consent.

In addition, the Environment Agency would seek an 8 metre wide undeveloped buffer strip alongside main rivers, and would also ask developers to explore opportunities for river restoration as part of any development.

The Royal Borough, as the LLFA, is responsible for consenting of works on ordinary watercourses under Section 23 of the Land Drainage Act 1991 (as amended by the Flood and Water Management Act 2010). Guidance on the requirements and process for submitting a Flood Defence Consent for Ordinary Watercourses in Royal Greenwich is included in [Section 5](#).

8. Residual Risks

Requirements	Notes
a. What flood-related risks will remain after the necessary mitigation measures to protect the site from flooding have been implemented?	<i>Residual risks should be identified. These could be associated with a number of potential risk factors including (but not limited to):</i> <i>a flooding event that exceeds that for which the flood risk management measures have been designed e.g. flood levels above the designed finished floor levels,</i> <i>the structural deterioration over time or breach of flood defence structures (including informal structures acting as a flood defence), and/or</i> <i>general uncertainties inherent in the prediction of flooding.</i> <i>Specific considerations in relation to tidal defences are outlined below.</i> Guidance for Housing Development in Areas of High Residual Risk (Appendix F of the Royal Greenwich SFRA)
b. How, and by whom, will these risks be managed over the lifetime of the development?	<i>Steps should be taken to manage the residual risks over the lifetime of the development such as through the use of flood warning and evacuation procedures. See Section 3: Flood Warning and Evacuation Plan Guidance</i>
c. If the development is in an area protected by flood defences, but has a high residual risk classification, the following must be provided: - Details of indicative breach flood water levels, - Ground levels, - Ground, first and second floor levels in metres AOD and the floor level for bedrooms, - Safe refuges, providing justification for the options chosen, and - A Flood Warning and Evacuation Plan.	<i>See Policy E3 in the Royal Greenwich Local Plan in Appendix A:</i> A.2 Local Policy, Guidance and Plans <i>Guidance on the requirements for Flood Warning and Evacuation Plans is provided in Section 3 of this document.</i>

Residual Risk from Tidal Defences

The residual risk from a breach of the tidal flood defences in Royal Greenwich is very low. It is therefore appropriate to rely on these tidal defences, but the risk to life should still be managed through effective emergency planning, structural measures and/or design. 'Guidance for housing development in areas of high residual risk' (Appendix F of the [Greenwich SFRA](#)) has been prepared for Royal Greenwich, which provides more detail on development in areas of residual risk. When determining the steps to take to reduce residual risk in development, developers should refer to this guidance. Although the guidance is specifically aimed at residential development, many of the principles and design options discussed also have relevance for other forms of development.

9. Plans and Cross-Sections

In addition to the below requirements for plans and cross-sections, all plans should explicitly indicate the extent of the floodplain on the site for the design event.

Requirements	
a.	A site location plan, including geographical features, street names and all water bodies.
b.	Topographical plans of both the existing site and the site post-development.
c.	A plan identifying the location of existing defences or other flood alleviation measures, with reference to standards of protection and condition.
d.	A plan of any structures that may influence hydraulic conditions at the site or the surrounding area, with reference to maintenance and operation.
e.	A plan of available historic flood information, such as recorded levels, flood extent, dates, photos, etc. Any changes to the site since the last event should be identified.
f.	A plan identifying safe access and exit routes.
g.	Cross-sections of post-development finished floor and road levels relative to flood levels.
h.	A plan showing drainage proposals and arrangements
i.	A plan showing flow paths and flood receptors both within and surrounding the development site, incorporating receptors identified as being impacted by flow paths from / to the development site.

3. Flood Warning and Evacuation Plan Guidance

3.1. Overview

When submitting FRAs for developments within flood risk areas, developers are required to make reference to local flood warning and emergency procedures to demonstrate their development will not impact on the ability of the Royal Borough and the emergency services to safeguard the current population.

One of the considerations to ensure that any new development is safe, including where there is a residual risk of flooding, is whether adequate flood warnings would be available to people using the development. Flood warning and evacuation plans should be provided for undefended sites as well as those with only residual risk.

The requirement of producing a Flood Warning and Evacuation Plan should be agreed with the Royal Borough during **pre-application discussions**. A Flood Warning and Evacuation Plan should be prepared for all developments that are at risk of residual flooding and will need to be consulted on and agreed by the Emergency Planning and Resilience Unit at the Royal Borough.

3.2. Background

The Flood Warning and Evacuation Plan will need to take account of the likely impacts of climate change, e.g. increased water depths and the impact on how people can be evacuated. Even with defences in place, if the probability of inundation is high, safe access and egress should be maintained for the lifetime of the development. The practicality of safe evacuation from an area will depend on:

- the type of flood risk present, and the extent to which advance warning can be given in a flood event,
- the number of people that would require evacuation from the area potentially at risk,
- the adequacy of both evacuation routes and identified places that people could be evacuated to (and taking into account the length of time that the evacuation may need to last), and,
- sufficiently detailed and up to date (annually reviewed by the developer / owner at a minimum) evacuation plans being in place for the locality that address these and related issues.

Safe access and egress is required to enable the evacuation of people from the development, provide the emergency services with access to the development during times of flood and enable flood defence authorities to carry out any necessary duties during periods of flood. A safe access/egress route should allow occupants to safely enter and exit the buildings and be able to reach land outside the flooded area using public rights of way without the intervention of emergency services or others during design flood conditions, including climate change allowances. Safe refuge should also be made available and should be accessible for evacuation.

3.3. Flood Warning and Evacuation Plan Requirements

3.3.1. General Requirements

The Flood Warning and Evacuation Plan:

- Should warn and raise awareness of flood risk to residents and building users as individual preparedness is essential, it could be that residents are able to sign up for flood alerts etc.,
- Should aim to ensure that the appropriate evacuation and flood response procedures are in place to manage the residual risk associated with an extreme flood event,
- Consider the feasibility of evacuation from the area should it be flooded, including the location of safe refuges,
- Maintain safe access and egress for the lifetime for the development, and
- Provide access for the Emergency Services.

3.3.2. Specific Requirements

The Flood Warning and Evacuation Plan should cover the following topics:

1. Introduction

Requirements		Notes
a.	Purpose, aim and objectives of the Flood Warning and Evacuation Plan.	
b.	Identify the hazards and dangers associated with flooding.	
c.	Summary of consultations with relevant organisations (e.g. Royal Borough, Environment Agency)	

2. Site Description

Requirements		Notes
a.	Location and current site use: • Include Site Location Plan • Include Site Layout Plan	
b.	Provide an overview of the proposed development.	

3. Flood Risk

Requirements		Notes
a.	Summarise the sources of flooding and conclusions from the development site-specific FRA • Include Flood Zone Map	<i>Site specific FRA</i>
b.	Assess the Flood Hazard rating • Include Flood Hazard Map	<i>Flood Risk Assessment Guidance for New Developments (FD2320, Defra / Environment Agency 2005)</i>
c.	Asses the rate of onset of flooding	<i>This should link with how timely warnings are going to be provided (as set out in Requirement 5 – Flood Warning Service)</i>

4. Flood and Emergency Plans

Requirements		Notes
a.	Summarise any existing emergency plans and guidance that cover the development site	<i>Royal Borough Generic Emergency and Business Continuity Management Plan; Royal Greenwich Multi Agency Flood Plan</i>

b.	Outline any existing or proposed mitigation schemes that can be deployed at the site	
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5. Flood Warning Service

Requirements		Notes
a.	Is the site covered by the Environment Agency Floodline Warnings Direct service?	<i>This should include warning services for different flood risks and also show where there are flood risks but no warnings available</i>
b.	Describe what the Environment Agency flood warnings are, how they are used, and what actions to take	Environment Agency website: Flood Warnings Summary
c.	Explain the Environment Agency flood warning codes	Environment Agency website: Flood Warnings Summary
d.	Discuss the likelihood for timely warning to flooding, specific to the development site	<i>e.g. local watercourses such as the River Quaggy have relatively rapid responding catchment compared with larger watercourses around the country. As such there may be less time locally afforded for responders to act.</i>
e.	Provide information on how to access the Flood Warning Service and receive automatic flood warnings.	Environment Agency website: Flood Warnings Direct
f.	How will the flood warnings be communicated to everyone on site? How will it be ensured that residents sign up to any available warning service(s)?	

6. Emergency Route and Safe Refuge

Requirements		Notes
a.	Identify a route for evacuation from the site based on Flood Zone 3 (including climate change allowances). Include evacuation route map and detailed directions.	<i>Evacuation routes must be accessible to all members of the community such as wheelchair users.</i>
b.	Refer to safe access and egress guidance	‘FRA Guidance for new Developments FD 2320’ (Defra and Environment Agency, 2005). <i>The requirements for safe access and egress from new developments are as follows in order of preference:</i> <i>Safe, dry route for people and vehicles.</i> <i>Safe, dry route for people.</i> <i>If a dry route for people is not possible, a route for people where the flood hazard, in terms of depth and velocity of flooding, is low and should not cause risk to people.</i> <i>If a dry route for vehicles is not possible, a route for vehicles where the flood hazard (in terms of depth and velocity of flooding) is low to permit access for emergency</i>

Requirements		Notes
		<i>vehicles. Consideration should be given so that the bough waves do not increase the residual flood risk.</i>
c.	Procedures for responding to a flood warning, self-evacuation plan and assisted evacuation plan.	
d.	Safe refuge and assembly site	<i>Including how people would reach dry land and the timescales for this.</i>
e.	What can be done to protect the development and contents?	<i>e.g. deploy flood barriers across doors, relocate items (e.g. cars, furniture)</i>

7. Roles and Responsibilities during a Flood Event

Requirements		Notes
a.	Roles and responsibility of the Royal Borough	<i>Royal Borough Generic Emergency and Business Continuity Management Plan; Royal Greenwich Multi Agency Flood Plan</i>
b.	Suggested Flood Coordinator Responsibilities: - Monthly or as required - Prior to a flood event - During a flood event requiring Self-Evacuation - During a flood event requiring Assisted-Evacuation - Residents and Businesses	

8. Practical Guidance in the Event of a Flood

Requirements		Notes
a.	List all practical advice on what to do if a flood is predicted, e.g. turn off gas and electricity, alert neighbours etc.	<i>Useful information is provided through the following:</i> Environment Agency website National Flood Forum Public Health England Know your flood risk Thames Water Website
b.	Flood kit advice	
c.	List of key contacts	

4. Surface Water Management Guidance (SuDS)

4.1. Overview

The Royal Borough of Greenwich sees Sustainable Drainage Systems (SuDS) as an integral element to all development and actively encourages incorporation of SuDS. The Royal Borough is committed to work in partnership with developers to maximise the uptake and introduction of SuDS.

Suitable surface water mitigation measures should be incorporated into new development and redevelopment plans in order to reduce and manage surface water flood risk to, and posed by the proposed development and provided amenity, aesthetic, water quality, biodiversity and ecology benefits.

From 6 April 2015 the Royal Borough, as the local planning authority, will be expected to ensure that local planning policies and decisions on planning applications relating to major development (see below) include sustainable drainage systems (SuDS) for the management of surface water run-off, unless demonstrated to be inappropriate.

Under these arrangements, in considering planning applications, the Royal Borough planning team, as the Local Planning Authority, will need to:

- Consult the flood risk management team (as the LLFA) on the management of surface water,
- Satisfy themselves that the proposed standards of operation are appropriate, and
- Ensure through the use of planning conditions or planning obligations that there are clear arrangements in place for ongoing maintenance over the lifetime of the development.

The SuDS should be designed to ensure that the maintenance and operation requirements are economically proportionate.

Though the legislative change relates only to major developments, the Royal Borough see SuDS as an integral element to **all** development, including minor development, and actively encourages incorporation of SuDS. As such, the Royal Borough is committed to work in partnership with developers to maximise the uptake and introduction of SuDS.

Major Development

The definitions of Major and Minor developments are set out in the [Town and Country Planning Order 2010](#).

	Major Development	Minor Development
Residential	10+ dwellings or Site area greater than 0.5 hectares	1 - 9 dwellings or Site area less than 0.5 hectares
Office, Industrial, Retail	Floor space greater than 100m ² or Site area greater than 1 hectare	Floor space less than 100m ² or Site area less than 1 hectare

The requirement to include SuDS for the management of run-off will apply to all Major developments from 6 April 2015.

Any planning application for major development must contain the full design, construction, operation and maintenance details of a drainage system to manage surface water, please refer to the drainage application checklist below.

In preparing planning applications for Major developments, developers should include SuDS in line with:

- The policies set out in the Royal Greenwich Local Plan,
- The London Plan, and
- Guidance and best practice as set out in [Section 4.3](#) of this report.

Pre-Application Discussions should be undertaken with the Royal Borough and other relevant bodies in advance of submitting an application. Early discussions may result in improved flood risk management and drainage for the development and surrounding area.

4.2. Background

Surface water management measures that take account of water quantity (flooding), water quality (pollution) and amenity issues are collectively referred to as Sustainable Drainage Systems (SuDS). SuDS aim to mimic nature and typically manage rainfall close to where it falls. SuDS can be designed to slow water down (attenuate) before it enters watercourses or sewer, provide areas to store water in natural contours and allow water to soak (infiltrate) into the ground or evaporate. Benefits can include reducing flood risk, minimising diffuse pollution, maintaining or restoring natural flow regimes, improving water resources and enhancing amenity. Incorporation of SuDS measures can contribute to sustainable development and improve urban design, by balancing the different issues that influence the development of communities, whilst delivering wider environmental benefits.

4.3. SuDS Requirements and Guidance

Developers should ensure that design and implementation of SuDS complies with SuDS policies, guidance and local considerations within the Royal Borough. This can be achieved by ensuring that designs are in accordance with the current version of the [SuDS Manual](#), with particular reference being made to the Urban Chapter and supporting technical chapters.

The underlying ground conditions of a development site can determine the type of SuDS approach to be used, however it is not a barrier to SuDS being incorporated within a development. This will need to be determined through ground investigations carried out on-site, including infiltration tests in accordance with tests, such as BRE 365. Additional requirements are as follows:

- A plan is required to illustrate the management train and treatment stages for the SuDS design application, with reference to the [SuDS Manual](#),
- Identification of flow paths and receptors,
- Where proprietary products are proposed they must be used in accordance with the manufacturers guidance, and,
- For SuDS designs submitted with proprietary software design outputs, although these outputs will be accepted to support any designs, they will not be accepted solely on the basis that the SuDS proposed will work.

4.3.1. SuDS Policies

Development proposals must ensure that surface water runoff complies with Royal Greenwich Development Plan policies, in particular the sustainable drainage hierarchy set out in London Plan Policy 5.13.

4.3.2. SuDS Guidance and Best Practice

Further, SuDS should comply with BS 8582:2013 Code of Practice for Surface Water Management for Development Sites, or subsequent documents. BS 8582 gives recommendations on the planning, design, construction and maintenance of surface water management systems for new developments and redevelopment sites in:

- a. Minimising and/or mitigating flooding and other environmental risks arising from:
 1. Site surface water run-off as a result of rain falling onto the development site
 2. Run-off conveyed across or arising on the site from other sources
- b. Maximising the potential societal and environmental benefits arising from the:
 1. Use of surface water run-off to protect and enhance local water resources and supplies
 2. Contribution of surface water management systems in mitigating climate risks associated with urbanisation
 3. Integration of surface water management systems with planning processes and urban design in delivering amenity and community value and in repairing, protecting and enhancing landscape and/or townscape character.
 4. Repair, protection and enhancement of biodiversity.

There are a number of SuDS Guidance documents available that should guide the design and implementation of SuDS measures in Royal Greenwich, examples of which are included in [Appendix F](#).

4.3.3. SuDS Considerations

Royal Greenwich is underlain by bands of permeable chalk, sand and gravel to the north and south, and an area of impermeable clay and silt through the centre. SuDS suitability should be assessed as part for the drainage design for the site.

Site specific assessments, based on local ground conditions, should be undertaken to inform the suitability of different SuDS for the specific development site. The [Royal Greenwich SWMP](#) provides a high-level overview of where infiltration SuDS may be suitable across Royal Greenwich. Figure D6 in the [Royal Greenwich SWMP](#) identifies three permeable bands across Royal Greenwich that could be suitable for infiltration SuDS. For the areas where infiltration SuDS are unsuitable, attenuation SuDS should be considered. Where infiltration SuDS are proposed, a site investigation of ground conditions should be carried out.

The [British Geological Society \(BGS\)](#) provide a number of datasets that can be used to assist and inform the SuDS suitability assessment.

Further information on SuDS suitability within Royal Greenwich is provided in the [Royal Greenwich SFRA](#).

Every site and location in Royal Greenwich is not the same and as such SuDS should not be ruled out based on assumptions of underlying geology. Both soft SuDS, such as rain gardens and swales, and proprietary products can work together and complement each other, proprietary products can offer solutions in constrained sites and can be as efficient.

SuDS can be incorporated into many different elements within a development, and can often utilise other existing uses and provide additional benefits, ranging from green roof's, open space/sports pitches, play areas, grass verges, parking areas, garages, out buildings, roads, playgrounds and other public realm spaces. There are several examples from around the world where proprietary systems have been used to incorporate SuDS in existing public realm spaces, such as using geocellular storage in playgrounds in Holland. Examples of such uses are available through the [Susdrain website](#).

As with any drainage system, traditional or SuDS, on any development consideration must be given to access, cleansing/maintenance regimes and repairs or replacement

Opportunities should be sought to incorporate [Water Sensitive Urban Design](#) (WSUD) into development. WSUD can assist in sustainable development through integrating water cycle management with the built environment through planning and urban design. SuDS are vital components of water sensitive urban design (WSUD).

4.4. Planning Application Checklist – Surface Water Management Arrangements

The following will be required as part of any major development planning application submitted to the Royal Borough outlining the proposed surface water management for the development site, these requirements should also be proportionately considered for all development within the Royal Borough and considered best practice.

Requirements	
a.	Detailed site layout at an identified scale.
b.	Topographical survey of the site, including cross-sections of any adjacent water courses for appropriate distance upstream and downstream of discharge point, if appropriate.
c.	Full design calculations and design parameters to demonstrate conformity with the design criteria for the site.
d.	Long sections and cross sections for the proposed drainage system
e.	Suitable construction details.
f.	Plan of proposed drainage system with catchment areas including impermeable areas and phasing.
g.	Details of connections (including flow control devices) to watercourses, sewers, public surface water sewers, highways drains and SuDS.
h.	Details of any offsite works required, together with any necessary consents.
i.	Operation characteristic of any mechanical features including maintenance and energy requirement.
j.	Plan demonstrating flooded areas for the 1 in 100 year storm plus climate change when the system is at capacity and demonstrating flow paths for design for exceedance.
k.	Access arrangements for all proposed drainage systems.
l.	Management plan for all non-adopted drainage (more applicable for a single property).
m.	Landscape planting scheme if proposing vegetated drainage system.
n.	Plan for management of construction impacts including any diversions, erosion control, phasing and maintenance period (pre-adoption).
o.	Health and safety plan, if appropriate, considering areas of open water and confined space entry.

Requirements	
p.	Ground investigation, including infiltration test results, where appropriate.
q.	Water quality details.
r.	Indicative maintenance schedule.
s.	Programme for construction.
t.	Full details of individual development plot discharge and storage constraints (for a large site or multi-plot development).

4.4.1.

5. Ordinary Watercourse Flood Defence Consenting Guidance

5.1. Overview

Developers and land owners proposing to undertake any works within or adjacent to an ordinary watercourse within Royal Greenwich that have the potential to impact the flow or cross section of the watercourse are required to obtain consent from the Royal Borough prior to commencing any works.

Any works proposed on main rivers, will require the consent of the [Environment Agency](#).

Pre-Application Discussions should be undertaken with the Royal Borough. Early discussions may result in improved flood risk management and negate the need for consentable works.

5.2. Background

As the Lead Local Flood Authority (LLFA) for Royal Greenwich, the Royal Borough has responsibility for issuing consents for works on Ordinary Watercourses under Section 23 of the Land Drainage Act 1991, as amended by the Flood and Water Management Act 2010 (see [Appendix A](#) for further information). The Environment Agency has responsibility for issuing consents for works on main rivers.

Main rivers are usually larger streams and rivers, but some of them are smaller watercourses of local significance. Main rivers are the responsibility of the Environment Agency and are identified on the Environment Agency's main river map, available via the [Environment Agency's website](#).

An **Ordinary Watercourse** is a watercourse that does not form part of a main river. According to the Land Drainage Act, a watercourse "includes all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows".

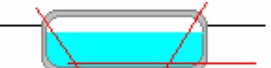
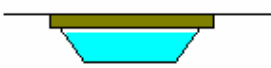
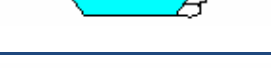
Within Royal Greenwich, the main rivers are the River Thames, River Quaggy, River Ravensbourne, River Shuttle, Deptford Creek, Kid Brook and Butt's Canal; all other watercourses are classified as Ordinary Watercourses and fall under the remit of the Royal Borough.

Activities on Ordinary Watercourses or main rivers that will require consent are those likely to cause an obstruction to flow or restrict storage and have the potential to increase flood risk to people and property, such as culverting, bridges and weirs.

5.3. Ordinary Watercourse Flood Defence Consenting Requirements

Table 4-1 shows simple cross sections which represent works that will require consent from the Royal Borough. A consent will be required for permanent works, temporary works or both. Separate consents will be required for permanent works and any temporary works that do not form part of the permanent works. Temporary works could include cofferdams (watertight enclosures) across a watercourse or temporary diversions of water while work is carried out.

Table 4-1 – Ordinary Watercourse Flood Defence Consent Requirements

Cross Section	Description	Consent Required?	Notes
	Pipe Culvert (including extension and removal of)	✓	<i>Land Drainage Act 1991 Section 23 1(b)</i>
	Oversized Box Culvert (including extension and removal of)	✓	<i>Land Drainage Act 1991 Section 23 1(b)</i>
	Trash Screens	✓	<i>Land Drainage Act 1991 Section 23 1(c) - it is an alteration to a culvert and has the potential to obstruct flow.</i>
	Pipe Crossing (in channel)	✓	<i>Land Drainage Act 1991 Section 23 1(a) if placed on bed</i> <i>Land Drainage Act 1991 Section 23 1(b) if placed above bed</i>
	Weir/Dam or impoundment or temporary works that obstruct flow	✓	<i>Land Drainage Act 1991 Section 23 1(a)</i>
	Bridge (where soffit level is below bank top level)	✓	<i>Land Drainage Act 1991 Section 23 1(b) - it acts like a culvert.</i>
	Bridge (abutments restricting flow)	✓	<i>Land Drainage Act 1991 Section 23 1(b) - it acts like a culvert.</i>
	Bank Protection Works	×	<i>Temporary works may require consent.</i>
	Pipe Crossing (above bank)	×	<i>It does not affect the watercourse.</i>
	Pipe Crossing (below bed)	×	<i>It does not affect the watercourse.</i> <i>Temporary works may require consent.</i>
	Protruding Pipe Outfall	×	<i>It will not act like a dam/weir or like obstruction.</i>
	Outfall within Bank profile	×	<i>It does not act like a mill dam or weir.</i>
	Bridge(abutments not reducing flow area/width)	×	<i>It does not interfere with flow.</i>
	Clear span bridge	×	<i>It does not affect the watercourse.</i>
	Bridge with support in channel	×	<i>It will not act like a dam / weir or obstruction. However, the Royal Borough will need to consider the size of pier against the size of watercourse To agree</i>

Cross Section	Description	Consent Required?	Notes
			<i>whether consent is required.</i>

5.3.1. General Requirements

An application for an Ordinary Watercourse Flood Defence Consent must be submitted to the Royal Borough and be accompanied by the appropriate fee as set out in [Appendix C](#). It must contain sufficient information to demonstrate it will not have an adverse effect on flood risk or the environment, and be accompanied by appropriate drawings, assessments and method statements.

The Royal Borough has up to **two months** to consider an application from the date it is validated.

Until otherwise available from the Royal Borough, developers should complete the [Environment Agency Flood Defence Consent Application Form and Guidance Notes](#) and submit to the Royal Borough for approval.

Consent will be refused if the works would result in an increase in flood risk, a prevention of operational access to the watercourse and/ or they pose an unacceptable risk to nature conservation.

5.3.2. Specific Requirements

An application must assess whether the proposed works will have an adverse effect on flood risk or the environment and consider the following topics:

1. The nature of the works

Requirements	Notes
a. Are the works temporary, permanent or both?	
b. For any temporary work, the applicant must submit a Method Statement detailing: - How they intend to carry out the work, - The specific measures they plan to take to keep disruption to a minimum, - How they will reduce any unwanted effects while the work is being carried out, and - State when they are proposing to carry out the works and how long it will take.	<i>Technical documents and guidance that may be of use:</i> - o ‘Living on the Edge’ - Riparian owners guide - o The fluvial design guide - o Building a better environment - a guide for developers - o Culvert design and operation guide

2. The location of the works and any planning permissions required

Requirements	Notes
a. Location map and grid reference for the proposed works.	
b. Determine the conditions of the existing site and the potential impacts (and feasibility) of the proposed scheme.	
c. What permissions may be required for works in relation to designated sites (Sites of Special Scientific Interest, Special Areas of Conservation and Special Protection Areas) and/or protected species. Where protected species may be affected by works, the Applicant should contact Natural England directly in case works need to be licensed under the protected species legislation.	Appendix 6 of the Ordinary Watercourse Regulation Advice Note

3. Existing flood risk and potential impacts of the works

Requirements	Notes
a. Assess the existing flood risk to and from the watercourse or site and potential impacts of the works to this.	Royal Greenwich SFRA
	Flood Map for Planning (Rivers and Sea) on the Environment Agency's website
	Royal Greenwich SWMP

4. Any potential impacts on the environment, including Water Framework Directive (WFD) impacts

Requirements	Notes
a. Determine both direct and indirect potential environmental impacts of the proposed works.	
b. Identify any specific measures to keep potential environmental impacts to a minimum and reduce any unwanted effects while the work is being carried out.	<i>This should include an awareness of invasive species in the area and what impact the development may have. Refer to the Environment Agency's Guidance.</i>
c. Identify opportunities for how the development could improve the environmental value of the site.	<i>This may include creating water features, planting trees and shrubs that would normally grow at the site, incorporating living roofs/walls, providing bird nesting boxes or creating sustainable places for wildlife to live. Refer to Greener Greenwich SPD and Biodiversity Action Plan</i>
d. With regards to the Water Framework Directive 2000/60/EC (WFD), assess whether the proposed works will: • Cause deterioration of WFD status, or • Lead to failures to achieve ecological objectives. Impacts leading either to deterioration in the status of a water body or to the water body being unable to achieve its WFD objectives are unlikely to be permitted.	Thames River Basin Management Plan
	Environment Agency's ' River Basin Management Plans – Rivers
	Appendix 7 of the Ordinary Watercourse Regulation Advice Note

5. Any potential impacts on other legislation and the requirements of this

Requirements	Notes
a. Determine whether the site or works fall under any other legislation and the requirements of this. Other legislation includes: • The Wildlife and Countryside Act 1981 (as amended), • Natural England and Rural Communities Act 2006, • The EU Habitats Directive 1992, • The Countryside and Rights of Way Act 2000, and • The Environment Act 1995.	
b. Determine the invasive species and the management thereof prior to any works taking place	
c. The Applicant must ensure that the current requirements of the Construction (Design and Management) (CDM) Regulations are complied with.	Further information can be found on Health and Safety Executive website

6. Plans and cross-sections

Requirements	
a.	Location Plan
b.	Site Plan (general arrangement) • The existing site, including any watercourse, • The proposals, • The position of any structures which may influence local river hydraulics, including bridges, pipes and ducts, ways of crossing the watercourse, culverts and screens, embankments, walls, outfalls and so on, and • Existing fish passes or structures intended to allow fish to pass upstream and downstream;
c.	Cross Sections: • Both upstream and downstream of the proposed works, and • Include details of existing and proposed features and water levels.
d.	Longitudinal Sections: • Both upstream and downstream of the proposed works, and • Include details of existing and proposed features including water levels, bed levels and structures.
e.	Detailed Drawings (details of the existing and proposed features): • The materials to be used for any structures, • The location of any proposed service pipes or cables which may affect the future maintenance of the watercourse, • Details of any tree, shrub, hedgerow, pond or wetland area that may be affected by the proposed works, • Details of any planting or seeding, and • Dams and weirs (A plan showing the extent of the water impounded (held back) under normal and flood conditions is required so that the possible effect on land next to the river can be assessed. The plan must also show any land drains to be affected.).

5.3.3. Application Fee

An application fee must be submitted with the consent application, as outlined in [Appendix C](#).

Appendix A – National and Local Planning Policies

A.1 National Policy

Developers are required to use the following national planning policies in the production of any planning applications, flood warning and evacuation plans, drainage applications, or applying for consent for undertaking works in ordinary watercourses within Royal Greenwich:

- **National Planning Policy Framework 2012**
- **The Flood and Water Management Act 2010**
- **The Flood Risk Regulations 2009**
- **The National Standards for Sustainable Drainage Systems (SuDS)**
- **The Water Framework Directive 2000**

National Planning Policy Framework 2012

The [National Planning Policy Framework](#) (NPPF) and accompanying [National Planning Practice Guidance](#) (NPPG) set out the Government's requirements for new development. These emphasise the responsibility of Local Planning Authorities (LPAs) to ensure that flood risk is understood and managed effectively using a risk-based approach throughout all stages of the planning process. The NPPF requires LPAs to undertake Strategic Flood Risk Assessments (SFRAs) to support the preparation of their Local Plan.

The overall approach to flood risk is broadly summarised in NPPF paragraph 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 FRA 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.”*

Links to:

National Planning Policy Framework 2012 (NPPF):

<https://www.gov.uk/government/publications/national-planning-policy-framework--2>

National Planning Practice Guidance for Flood Risk and Coastal Change:

<http://planningguidance.planningportal.gov.uk/blog/guidance/flood-risk-and-coastal-change/>

The Flood and Water Management Act 2010

The Flood and Water Management Act came into effect in April 2010 and designates Unitary Authorities and County Councils as Lead Local Flood Authorities (LLFAs). Under the Act, the Royal Borough, as LLFA for Royal Greenwich, has a number of responsibilities relating to flood risk management from local sources, namely:

- **Groundwater** – all water which is below the surface of the ground and in direct contact with the ground or subsoil,
- **Surface runoff** – rainwater (including snow and other precipitation) which, (a) is on the surface of the ground (whether or not it is moving), and (b) has not entered a watercourse, drainage system or public sewer, and,
- **Ordinary watercourses** – a watercourse that does not form part of a main river.

Under the Act, the Royal Borough has a number of duties and discretionary powers relating to local flood risk management in Royal Greenwich. Of particular relevance to developers are:

- **Development of a Local Flood Risk Management Strategy** – the Royal Greenwich Local Flood Risk Management Strategy sets out the local flood risk within Royal Greenwich and how this will be managed over future years. All development activities will be required to comply with this Strategy.
- **Ordinary Watercourse Regulation (consenting and enforcement)** – all works on Ordinary Watercourses within Royal Greenwich must be consented by the Royal Borough prior to commencement, and the Royal Borough has powers of enforcement where unregulated works are undertaken. The Flood and Water Management Act 2010 has amended the Land Drainage Act 1991, to transfer the powers from this duty from the Environment Agency to the LLFA.

Link to:

The Flood and Water Management Act 2010: <http://www.legislation.gov.uk/ukpga/2010/29/contents>

The Flood Risk Regulations 2009

The Flood Risk Regulations came into force in 2009 and set out the requirements of the European Union Floods Directive (2007/60/EC). The Regulations outline the roles and responsibilities of flood management authorities consistent with the Flood and Water Management Act 2010, in the preparation of a range of reports and mapping outputs.

Under the regulations, LLFAs within nationally defined Flood Risk Areas are required to produce and publish:

- **Preliminary Flood Risk Assessments (PFRA)** which identify past floods and the possible harmful consequences of future floods from sources other than that from the sea, main rivers and reservoirs. The [Royal Greenwich PFRA](#) was published in December 2011;
- **Flood Risk and Hazard Maps** (produced and published by the Environment Agency in December 2013).
- **Flood Risk Management Plans** which identify how significant flood risks are to be mitigated. This must be prepared for each Flood Risk Area to detail the management of significant flood risk by December 2015.

The Greater London Area has been designated as a single Flood Risk Area, and as such the Royal Borough, in collaboration with the Environment Agency and other London LLFAs, is required to produce the above outputs.

Links to:

The Flood Risk Regulations 2009: <http://www.legislation.gov.uk/ukxi/2009/3042/contents/made>

EU Floods Directive (2007/60/EC): http://ec.europa.eu/environment/water/flood_risk/key_docs.htm

Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS) & Best Practice Guidance

In March 2015 Government announced that from the 6 April 2015 the Lead Local Flood Authority will be a statutory consultee for major developments within Royal Greenwich. All major development will have to include SuDS for the management of surface water run-off.

Link to:

Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS):

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf

Non-Statutory Technical Standards for Sustainable Drainage Systems – Best Practice Guidance:

<http://www.lasoo.org.uk/?publications=non-statutory-technical-standards-for-sustainable-drainage>

Water Framework Directive 2000 (WFD)

The [Water Framework Directive](#) (WFD) is a European Directive (2000/60/EC) which introduced a strategic planning process to manage, protect and improve the water environment. The WFD was transposed into UK national law through [The Water Environment Regulations 2003](#). The overall requirement of the directive is that all waterbodies in the UK must achieve “Good Status”. The definition of a waterbody’s ‘status’ is a complex assessment that combines standards for water quality with standards for hydromorphology (i.e. habitat and flow quality) with ecological requirements.

The overall requirement of the directive is that all river basins must achieve ‘good ecological status’ by 2015 or by 2027 if there are grounds for derogation. The WFD, combines water quantity and water quality issues and sets an integrated approach to the management of all freshwater bodies, groundwaters, estuaries and coastal waters at the river basin level.

The Environment Agency is the body responsible for the implementation of the WFD in the UK. The Environment Agency is responsible for preparing management plans for river basin districts (RBMP) in England and Wales. Those plans must be prepared in line with the requirements of the WFD. The plans outline the characteristics of the river basin district, identify the pressures that the local water environment faces and actions to improve or manage these. Further information on the Thames RBMP, covering the Royal Borough, is provided in [Appendix A.2](#).

Links to:

The Water Framework Directive Regulations 2003:

<http://www.legislation.gov.uk/ukxi/2003/3242/contents/made>

The Water Framework Directive (2000/60/EC):

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0060:EN:NOT>

A.2 Local Policy, Guidance and Plans

Developers are required to use the following local planning policies and guidance in the production of any planning applications, flood warning and evacuation plans, drainage applications, or applying for consent for undertaking works in ordinary watercourses within Royal Greenwich:

- **The London Plan: Spatial Strategy for Greater London**
- **All London Green Grid Supplementary Planning Guidance**
- **Sustainable Design and Construction Supplementary Planning Guidance**
- **London Regional Flood Risk Assessment – First Review and Flood Risk Maps (2014)**
- **Royal Greenwich Local Plan: Core Strategy with Detailed Policies**
- **Greener Greenwich Supplementary Planning Document**
- **Royal Greenwich Strategic Flood Risk Assessment**
- **Royal Greenwich Surface Water Management Plan**
- **Royal Greenwich Preliminary Flood Risk Assessment**
- **Royal Greenwich Local Flood Risk Management Strategy**
- **Royal Greenwich Flood Risk Management Plan**
- **Royal Greenwich Biodiversity Action Plan**
- **Thames Catchment Flood Management Plan (CFMP)**
- **Thames Estuary 2100**
- **Thames River Basin Management Plan**
- **London Borough of Lewisham River Corridor improvement Plan**

London Plan: Spatial Strategy for Greater London

The London Plan: Spatial Strategy for Greater London was adopted in July 2011. This replaced the London Plan (consolidated with alterations since 2004) which was published in February 2008. The plan sets out an integrated economic, environmental, transport and social framework for the development of London for the next 20-25 years. The London Plan forms part of Royal Greenwich's Development Plan and should be considered in full alongside the Royal Greenwich Local Plan. In addition, the London Plan Supplementary Planning Guidance (SPG) is also a material planning consideration. The following policies are, however, most relevant to flood risk management and sustainable water management within Royal Greenwich:

- **Policy 5.3** - Sustainable Design and Construction
- **Policy 5.10** - Urban Greening
- **Policy 5.11** - Green Roof and Development Site Environs
- **Policy 5.12** - Flood Risk Management
- **Policy 5.13** - Sustainable Drainage
- **Policy 5.14** - Water Quality and Wastewater Infrastructure

Development must be undertaken in accordance with the policies in the London Plan: Spatial Strategy for Greater London.

The London Plan is available through the **Greater London Authority's website:**

<http://www.london.gov.uk/priorities/planning/london-plan>

All London Green Grid Supplementary Planning Guidance

The All London Green Grid Supplementary Planning Guidance (SPG) was published in March 2012 and promotes the development of Green Infrastructure across London. It is a supportive document for the London Plan policies on green infrastructure and urban greening, and those relating to open spaces, biodiversity, trees and woodland, and river corridors. The All London Green Grid forms part of the Green Infrastructure and Open Spaces Supplementary Planning Guidance.

Royal Greenwich is included within GGA6 South East London Green Chain Plus.

The All London Green Grid SPG is available through the **Greater London Authority's website**:

<https://www.london.gov.uk/priorities/planning/publications/all-london-green-grid-spg>

Sustainable Design and Construction Supplementary Planning Guidance

The Mayor's Sustainable Design and Construction SPG was published in April 2014. It provides detailed guidance to the implementation of London Plan policies, with section 3.4 being particularly relevant to flood risk management.

London Regional Flood Risk Assessment – First Review and Flood Risk Maps (2014)

This First Review of the Regional Flood Risk Appraisal (RFRA) updates the original version that was published in October 2009. It includes an overview of the different types of flood risk in London and provides a spatial analysis of tidal, fluvial and surface water flood risk against major development locations, key infrastructure assets and services.

Royal Greenwich Local Plan: Core Strategy with Detailed Policies (2014)

The Royal Borough adopted the *Royal Greenwich Local Plan: Core Strategy with Detailed Policies* in July 2014. The Core Strategy is the foundation document within the Royal Greenwich Local Plan, and sets out requirements for development in Royal Greenwich in the period 2013 to 2028. In addition, adopted supplementary planning documents (SPDs) are also a material planning consideration when making decisions on development proposals.

The following policies in relation to flood risk management and sustainable water management are of particular relevance:

- **Policy DHI - Design:**
 - xiii. Demonstrate measures that reduce surface water flood risk and landscape the environment in a way that provides for permeable surfaces
- **Policy DH(k) - Thames Policy Area:**
 - v. Protect the integrity of existing flood defences to minimise flood risk
- **Policy E2 - Flood Risk**
- **Policy E3 - Residual Flood Risk**
- **Policy E(f) - Living Roofs and Walls**

Development must be undertaken in accordance with the Royal Borough's Development Plan.

The adopted *Royal Greenwich Local Plan: Core Strategy with Detailed Policies*, is available to view on the **Royal Borough website** :

http://www.royalgreenwich.gov.uk/info/1004/planning_policy/869/local_development_framework

Greener Greenwich Supplementary Planning Document

The Greener Greenwich Supplementary Planning Document (SPD) provides guidance on how new development in Royal Greenwich should be designed and built so that it has a positive impact on the environment and achieves the highest standards of sustainable design and construction. Sections 9 and 9.1 of the SPD identify the planning application requirements for flood risk and SuDS in Royal Greenwich.

The sustainability checklist in Section 2 should be used to assist applicants applying for planning permission to comply with the principles set out in the Greener Greenwich SPD.

Link to:

Greener Greenwich Supplementary Planning Document:

http://www.royalgreenwich.gov.uk/downloads/file/2464/greener_greenwich_supplementary_planning_document_-_adopted_17_sep_2014

Biodiversity Action Plan

The Greenwich Biodiversity Action Plan provides direction and coordination for the conservation of biodiversity in Greenwich and aims 'to secure the conservation, enhancement and public appreciation of the biodiversity in the London Borough of Greenwich'. The BAP contains Action Plans for six priority species and six priority habitats.

Royal Greenwich Strategic Flood Risk Assessment (SFRA)

The Royal Greenwich Strategic Flood Risk Assessment (SFRA) is an evidence based document, which identifies areas at risk from flooding in Royal Greenwich and supports the Royal Borough in taking spatial planning decisions. The SFRA provides the basis for the Royal Borough's application of the sequential test on the Local Plan sustainable development locations, includes guidance on applying the Exception Test, preparing Site Specific Flood Risk Assessments and Emergency Planning. Of particular relevance are: Section 9 – guidance for developers; and Appendix F – guidance for housing development in areas of high residual flood risk.

Since the publication of the Royal Greenwich SFRA in 2011, there have been a number of significant changes to the policy and guidance documents, such as the introduction of the National Planning Policy Framework (NPPF) and availability of surface water and groundwater flood risk information, as contained in the Royal Greenwich Surface Water Management Plan (2011) and Local Flood Risk Management Strategy (2014). However, most of the SFRA remains relevant and, as stated in the Core Strategy Policy E2, 'must be used to inform development'.

Link to:

Royal Greenwich Strategic Flood Risk Assessment:

http://www.royalgreenwich.gov.uk/downloads/download/475/strategic_flood_risk_assessment

Royal Greenwich Surface Water Management Plan (SWMP)

The Royal Greenwich Surface Water Management Plan (SWMP) was produced in 2011. The SWMP assesses the surface water flood risk across Royal Greenwich using both historical information and

undertaking pluvial modelling to determine the future flood risk for a range of rainfall events. The plan identifies the areas of significant surface water and groundwater risk, options to address the risk and an Action Plan for taking these options forward.

Link to:

Royal Greenwich Surface Water Management Plan (2011): <http://www.royalgreenwich.gov.uk>

Royal Greenwich Preliminary Flood Risk Assessment (PFRA)

The Royal Greenwich Preliminary Flood Risk Assessment (PFRA) was published in December 2011. It provides a high level summary of significant flood risk across Royal Greenwich including surface water, ordinary watercourses and groundwater through collation of information on past (historic) and future (potential) floods. The PFRA is a requirement of the Flood Risk Regulations 2009 and must be updated every six years. The next update of the Royal Greenwich PFRA will be December 2017.

Link to:

Royal Greenwich Preliminary Flood Risk Assessment (2011):

<http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/flho1211bvkt-e-e.pdf>

Royal Greenwich Local Flood Risk Management Strategy (LFRMS)

The Royal Greenwich Local Flood Risk Management Strategy sets out a plan for the management of local flood risk from surface water, groundwater and ordinary watercourses across Royal Greenwich over future years. The Strategy outlines the roles and responsibilities of different Risk Management Authorities in Royal Greenwich, the objectives for management of local risk and the measures proposed to deliver these objectives.

Link to:

Royal Greenwich Local Flood Risk Management Strategy (2014):

<http://www.royalgreenwich.gov.uk>

Thames Catchment Flood Management Plan (CFMP) / Thames Flood Risk Management Plan (FRMP)

The Thames Catchment Flood Management Plan was published by the Environment Agency in December 2009 and will be superseded by the Thames Flood Risk Management Plan, which is due to be published by December 2015. It provides a high-level overview of the main sources of flood risk for the catchment and identifies flood risk management policies in terms of sustainable flood management solutions whilst also considering local land use changes and effects of climate change. It sets out the preferred plan for sustainable flood risk management over the next 50 to 100 years.

Link to:

Thames Catchment Flood Management Plan (2009):

<https://www.gov.uk/government/publications/thames-catchment-flood-management-plan>

Thames Estuary 2100 (TE2100)

The Thames Estuary 2100 (TE2100) Flood Risk Management Plan produced by the Environment Agency sets out the strategic plan for managing tidal flood risk in the Thames Estuary to the end of the century. The plan recommends the required flood risk management measures and when and where these will be needed, based on climate changes and sea level rises. The plan, which is adaptive, currently sets out recommended future flood defence levels for the tidal frontages in Royal Greenwich and will be an important factor in planning sustainable development in areas at risk of flooding in future years.

Link to:

Thames Estuary 2100 (TE2100):

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/289969/LIT7540_43858f.pdf

Thames River Basin Management Plan

The Thames River Basin Management Plan (RBMP) was published by the Environment Agency in December 2009. It summarises the state of river catchments within the Thames River Basin, and outlines the actions required to protect and improve the water environment, including mitigating the effects of floods. The Environment Agency is in the process of reviewing and updating the RBMP, and the revised documents will be published in December 2015.

Link to:

Thames River Basin Management Plan (2009):

<https://www.gov.uk/government/publications/thames-river-basin-management-plan>

London Borough of Lewisham's River Corridor Improvement Plan

The Environment Agency are currently working with the London Borough of Lewisham planning team to extend this document to all Lewisham's rivers with the aim of getting it adopted as a Supplementary Planning Document.

Link to:

London Borough of Lewisham River Corridor Improvement Plan:

<http://www.lewisham.gov.uk/myservices/planning/policy/LDF/evidence-base/Pages/LDFevidence-base-environment.aspx>

Appendix B – Contacting the Royal Borough & Other Stakeholders

Royal Borough

To discuss any development plans relating to an FRA, Flood Warning and Evacuation Plan or consent for undertaking works in ordinary watercourses please contact the following in the first instance:

Name: *Flood Risk Manager*
Telephone: *(available 9am – 5pm, Monday to Friday only): 020 8854 8888*
Write to: *Flood Risk manager, The Woolwich Centre, 35 Wellington Street, London, SE18 6HQ*

Environment Agency

E-mail: enquiries@environment-agency.gov.uk
Telephone: 0370 8506 506
Monday to Friday, 8am to 6pm

Thames Water

Developer Services <http://www.thameswater.co.uk/developers/1319.htm>

Appendix C – Fees and Charges

Pre-Application Fees

The Royal Borough charges the following pre-Application Fees for flood risk discussions:

Activity	Cost (£)
Attendance at Meeting at Royal Borough Offices	<i>Current fee structure minimum 2 hour</i>
Attendance at Site	<i>Current fee structure minimum 2 hour + 1 hour for travelling</i>
Review of preliminary designs, or assessments	<i>Current fee structure minimum 2 hour</i>

Ordinary Watercourse Consent Fees

A consent application requires the payment of a fee which is fixed in Statute and requires a Ministerial Order to change it. The fee attached to the consent application is set in the Land Drainage Act 1991 at **£50 for each structure**.

Appendix D – Guidance for Producing a Simple Flood Risk Assessment

Position Statement – October 2015

This section should be reviewed and updated by the Royal Borough as required.

By following this guidance residents should be able to carry out a simple Flood Risk Assessment for themselves.

Purpose

Residents and developers need to demonstrate to the Royal Borough, as the local planning authority, that they have considered and taken steps to manage flood risk as part of their development proposal.

The Environment Agency website [Planning Applications: Assessing Flood Risk](#)⁹ contains information on which developments require a Flood Risk Assessment (FRA), why an FRA needs to be completed, and how to complete an FRA, and should be consulted when you are completing an FRA to support a planning application.

This guidance note provides a summary of the Environment Agency guidance, and useful steps to help residents or small developers consider the flood risk to their property or site when applying for planning permission.

What is a Flood Risk Assessment (FRA)?

An FRA identifies the level of flood risk to a property or site. This will enable you to identify measures (if any) that are necessary to make your property or site safer. It will also enable the Royal Borough to assess to what extent that risk is a consideration where determining the planning application.

Which developments need a flood risk assessment?

A FRA must be completed if the proposed development:

- includes building or engineering works in zone 2 or 3 of [areas at risk of flooding from rivers or the sea](#) – see section below for further information.
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problems - more information is available from the [Royal Borough of Greenwich](#).
- changes the use of land or buildings in a place at risk of flooding from rivers or the sea, or with critical drainage problems
- changes the use of land or buildings in a way that increases [flood vulnerability](#) of the development where it may be subject to other sources of flooding
- is larger than 1 hectare

⁹ Environment Agency website – Planning Applications: Assessing Flood Risk available here: <https://www.gov.uk/planning-applications-assessing-flood-risk>

These requirements are described more fully in [footnote 20 of the National Planning Policy Framework \(NPPF\)](#).

Why you need to do an FRA?

You must complete an FRA so that the Royal Borough of Greenwich, as the local planning authority, will know:

- what the flood risks are and how they will change in the future,
- whether your project will increase flood risk, and,
- how you intend to manage any flood risk.

The Royal Borough will use this information to consider your planning application.

What do you need to do?

Depending on the flood risk, FRAs can be as simple as a short written statement, or may need detailed hydraulic modelling. The level of risk will depend on the type of development, the size of site and its location in relation to flood plain areas (or 'flood zones') and also the amount of surface water runoff the site will discharge. **Flood Zones** can be found by entering the site postcode or place name on the Environment Agency website: <http://maps.environment-agency.gov.uk/wiyby> and select Flood Map for Planning (Rivers and Sea).

If you do not have access to the internet or wish to talk about flood risk, you can contact your local Environment Agency office or the Royal Borough. Any other sources of flood (e.g. surface water, groundwater, reservoir) that you are aware of should also be included in your FRA. Further information on the potential sources of flooding to your site is available through the Environment Agency and Royal Borough websites:

- [Risk of flooding for rivers and the sea](#)
- [Risk of flooding from surface water](#)
- [Risk of flooding from reservoirs](#)
- [Royal Borough of Greenwich website](#)

Section 2.4 of the Royal Greenwich Developers Guidance for Flood Risk contains a full list of information available to inform FRAs in Royal Greenwich.

You must include your FRA with your planning application.

Simple Flood Risk Assessment

Where development meets the following criteria a simple flood risk statement should be sufficient to meet the Royal Borough local planning authority requirements.

Fluvial Flood Zone	Colour on Environment Agency Flood Map for Planning (Rivers and Sea)	Development Size
Zone 1 (little or no risk)	White	All development less than 5 ha
Zone 2 (low to medium risk)	Light blue	All development less than 1 ha

Developers Guidance for Flood Risk

Zone 3 (high risk)	Dark blue	Domestic, commercial and industrial extensions less than 250m ³
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A simple FRA may often take the form of a short written statement. The following information is a guide to arriving at that statement.

i.	What flood zone is the site in?	Go to http://maps.environment-agency.gov.uk/wiyby and select Flood Map for Planning (Rivers and Sea). Enter your postcode or place name to find out which flood zone your site is in.
ii.	What is the flood level, if known?	You can contact your local Environment Agency office for information where this is available. A charge may apply.
iii.	Is the site protected by flood defences - if so what standard do they provide?	You can check with Environment Agency or Royal Borough of Greenwich for information. The Government requires protection from flood risk to new development to be a minimum of 1 in 100 year (1% probability) for river flooding and 1 in 200 year (0.5% probability) for sea flooding. Further information may be available in the Royal Greenwich Strategic Flood Risk Assessment (SFRA) and Royal Greenwich Local flood Risk Management Strategy (LFRMS), both available through the Royal Greenwich website.
iv.	What other flood risks are there to your site?	List out any other known risks from surface water, groundwater, small watercourses or ditches, and reservoirs. Information on these risks can be found through the Environment Agency website (http://maps.environment-agency.gov.uk/wiyby) for risk of flooding from surface water and reservoirs, and published flood risk documents on the Royal Greenwich website including: • Royal Greenwich Strategic Flood Risk Assessment (SFRA) • Royal Greenwich Local flood Risk Management Strategy (LFRMS) • Royal Greenwich Preliminary Flood Risk Assessment See Section 2.4 of the Royal Greenwich Developers Guidance for Flood Risk for a full list of available data / studies.
v.	What is the existing ground level of the site Above Ordnance Datum (AOD)?	Levels can be found on ordnance survey maps. You may need a survey to Ordnance Datum Level.
vi.	What are the proposed levels of your development?	<i>i.e. finished floor levels, ground levels and road levels - to ordnance datum.</i>
vii.	How will surface water be drained?	Describe / illustrate how surface water will be drained e.g. mains drainage or Sustainable Drainage Systems (SuDs, which could include soakaways, swales, attenuation etc. which will help control of the rate of discharge. Further information on SuDS measures are available via the Susdrain website and a number of other documents as listed in Appendix E of the Royal Greenwich Developers Guidance for Flood Risk.
viii.	Where a change of use of an existing building is proposed, or there is a risk to the site, an option may be to use damage limitation and flood protection products.	For further information see the following guidance documents and / or websites: • Improving the Flood Performance of New Buildings - Flood Resilient Construction Guidance hierarchy: Flood Avoidance, Flood Resistance and Flood Resilience

	• Environment Agency website • National Flood Forum website • Six Steps to Property Level Flood Resilience
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Detailed Flood Risk Assessment

For all other types of development not identified in this guide, prior to carrying out a FRA you should consult the Royal Borough to agree the FRA's scope and requirements.

Please note that the completion of a Flood Risk Assessment will not automatically mean that the development is acceptable in flood risk terms.

Useful Contacts

Royal Borough of Greenwich

Refer to Appendix B

Environment Agency

E-mail: enquiries@environment-agency.gov.uk

Telephone: 0370 8506 506
Monday to Friday, 8am to 6pm

Appendix E – Site Specific Flood Risk Assessment Checklist

The following checklist should be used when preparing a site specific Flood Risk Assessment (FRA) and submitted to the Royal Borough along with the FRA.

1. Development Description and Location

a.	What type of development is proposed and where will it be located?
b.	What is its flood risk vulnerability classification?
c.	Does the development proposal comply with Royal Greenwich Development Plan policies and follow supplementary planning guidance?
d.	What evidence can be provided that the Sequential Test and where necessary the Exception Test has/have been applied in the selection of this site for this development type?
e.	Will the proposal increase overall the number of occupants and/or users of the building/land, or the nature or times of occupation or use, such that it may affect the degree of flood risk to these people?

2. Identifying Flood Sources

a.	What sources of flooding could affect the site? Assess all potential sources of flooding.
b.	For each identified source in 2a above, describe how flooding would occur, with reference to any historic records where these are available.
c.	What are the existing surface water drainage arrangements for the site? Assess the hydraulic performance of the existing and proposed artificial drainage system.

3. Probability

a.	Which Flood Zone (or zones) is the site within?
b.	What is the probability of the site flooding?
c.	What are the existing rates and volumes of surface water run-off generated by the site? Assess the sequence of flooding across the site, rate of rise of water level, flow velocities, depths and the duration of flood (existing and post-development). Assess the potential impact on fluvial morphology and long-term stability and sustainability.
d.	Estimate the volume of runoff likely to be generated by the development.
e.	What is the probability of a breach of the existing flood defences and how will it be mitigated? Consider the benefit afforded to the site from any existing flood alleviation measures.

4. Climate Change

a.	How is flood risk at the site likely to be affected by climate change?
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5. Detailed Development Proposals

a.	Demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding (include details of the development layout).
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6. Flood Risk Management Measures

a.	How will the site/building be protected from flooding, including the potential impacts of climate change, over the development's lifetime?
b.	Where new or modified structural measures are proposed, an assessment of their behaviour in extreme events greater than those for which they are designed should be provided.

7. Off-site Impacts

a.	Assess the change in flooding conditions progressively away from the site boundary (both upstream and downstream), including volume of displaced water as well as flood levels.
b.	How will it be ensured that the proposed development and the measures to protect the site from flooding will not increase flood risk elsewhere?
c.	How will run-off from the completed development be prevented from causing an impact elsewhere?
d.	Are there any opportunities offered by the development to reduce flood risk elsewhere?

8. Residual Risks

a.	What flood-related risks will remain after the necessary mitigation measures to protect the site from flooding have been implemented?
b.	How, and by whom, will these risks be managed over the lifetime of the development?
c.	If the development is in an area protected by flood defences, but has a high residual risk classification, the following must be provided: • Details of indicative breach flood water levels, • Ground levels, • Ground, first and second floor levels in metres AOD and the floor level for bedrooms, • Safe refuges, providing justification for the options chosen, and • A Flood Warning and Evacuation Plan.

9. Plans and Cross-sections

a.	A site location plan, including geographical features, street names and all water bodies.
b.	Topographical plans of both the existing site and the site post-development.
c.	A plan identifying the location of existing defences or other flood alleviation measures, with reference to standards of protection and condition.
d.	A plan of any structures that may influence hydraulic conditions at the site or the surrounding area, with reference to maintenance and operation.
e.	A plan of available historic flood information, such as recorded levels, flood extent, dates, photos, etc. Any changes to the site since the last event should be identified.
f.	A plan identifying safe access and exit routes.
g.	Cross-sections of post-development finished floor and road levels relative to flood levels.
h.	A plan showing drainage proposals and arrangements

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| i. | A plan showing flow paths and flood receptors both within and surrounding the development site, incorporating receptors identified as being impacted by flow paths from / to the development site. |
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Appendix F – SuDS Guidance and Best Practice

There are a number of SuDS Guidance documents available that should guide the design and implementation of SuDS measures in Royal Greenwich. These include:

- [The SuDS Manual \(C697\)](#), CIRIA, 2007. This is being updated in 2015.
- [Retrofitting to Manage Surface Water \(C713\)](#), CIRIA, 2012.
- [Designing for exceedance in urban drainage - good practice \(C635\)](#), CIRIA, 2006.
- [Cambridge Sustainable Drainage Design and Adoption Guide](#) – produced by Cambridge City Council.
- [Essex Sustainable Drainage Systems – Design and Adoption Guide](#) – produced by Essex County Council.
- [South East Seven - Water. People. Places. A guide for master planning sustainable drainage into developments](#)
- [Trees in Hard Landscapes: A Guide for Delivery](#), – Trees and Design Action Group, September 2014.
- [Greener Greenwich Supplementary Planning Document \(Public Consultation Draft\)](#) –Royal Borough of Greenwich, March 2014.

A full list and links to SuDS resources, including policy, guidance, best practice, evidence on the performance of SuDS components or scheme, and case studies across the UK and overseas are available through the [Susdrain website](#).

Guidance is available across the UK, USA, Australia. Any guidance used, and where it is available, should be referenced so it can be checked for suitability.

The Drain London Forum and London Drainage Engineers Group are producing a SuDS Guidance document for London which will form the Urban Chapter of the updated SuDS Manual. When published (expected 2015), these will be the minimum standards for SuDS required within Royal Greenwich and all SuDS will be required to comply with the SuDS Manual.

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