



Royal Borough of Greenwich

Developer Guide for Flood Risk and Surface Water Management

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This Developer Guide provides assistance to developers in relation to flood risk management in the Royal Borough of Greenwich. It sets out clear expectations and relevant information for use by developers to inform the preparation of robust planning applications. Legislation, policies and strategy documents that should be used to support assessments and applications have been signposted throughout.

Specifically the guidance sets out requirements for:

- Site Specific Flood Risk Assessments
- Development options for areas of high residual flood risk
- Preparing Flood Warning and Evacuation Plans
- Arrangements for Surface Water Management including sustainable drainage (SuDS)
- Environmental Permit Applications

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Quality information

Document name	Ref	Prepared for	Prepared by	Date	Reviewed by	Approved by
Developer Guide for Flood Risk and Surface Water Management – Draft Report	60484258-DEV-GUIDE	Royal Borough of Greenwich Council	Mark Stevenson Edward Byers	March 2017	Emily Craven	Jon Robinson
Developer Guide for Flood Risk and Surface Water Management – Final Report	60484258-DEV-GUIDE	Royal Borough of Greenwich Council	Hannah Booth	August 2017	Joanna Bolding	Sarah Kelly

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Introduction

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1. Introduction

This chapter sets out the structure of the Developer Guide, identifies organisations and individuals responsible for the management of flood risk in Royal Borough (RB) of Greenwich, and highlights the reasons for considering flood risk during the planning and development process.

What does this Developer Guide contain?

This Guide provides key information and clear expectations for developers when considering the effective management of flood risk as part of proposals for development in the RB of Greenwich. The Guide provides information and guidance on the requirements for preparing:

- Flood Risk Assessments ([Chapter 2](#))
- Flood Warning and Evacuation Plans ([Chapter 3](#))
- Arrangements for Surface Water Management (SuDS) ([Chapter 4](#))
- Environmental Permit Applications ([Chapter 5](#)).

Throughout the Guide, relevant legislation, policies and strategy documents have been signposted, references for which are provided in [Appendix A](#).

Contact information can be found in [Appendix B](#) and key fees and charges associated with Environmental Permits in [Appendix C](#). Guidance on producing a simple Flood Risk Assessment (FRA) for lower risk sites is provided in [Appendix D](#), a more detailed site specific FRA in [Appendix E](#) and guidance documents specific for SuDS schemes are given in [Appendix F](#).

Who is responsible for managing flood risk in Royal Greenwich?

Royal Borough of Greenwich

The RB of Greenwich 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 RB of Greenwich is the Lead Local Flood Authority (LLFA) for Royal Greenwich. As such, the RB of Greenwich 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 permission for any works undertaken in Ordinary Watercourses. Further information is included within [Appendix A.2](#). The LLFA is a statutory consultee to the local planning authority, which for Royal Greenwich is also the RB of Greenwich, on planning applications for surface water management including [Sustainable Drainage Systems \(SuDS\)](#).

Highways Authority – the highway drainage system is integral in the management and behaviour of surface water during rainfall events. As a Highways Authority, the RB of Greenwich is required by the [Highways Act 1980](#) to ensure that highways are effectively drained of surface water. 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 RB of Greenwich is a Category 1 Responder under the [Civil Contingencies Act 2004](#) and therefore has 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 RB of Greenwich has a responsibility to consider flood risk in strategic land use planning and in the development of a Local Plan. A [Strategic Flood Risk Assessment](#) has been prepared to inform this process. The RB of Greenwich 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 RB of Greenwich, as the local planning authority, is required to ensure that

SuDS are put in place for the management of surface water run-off from major development¹. Further information is included in [Chapter 4](#).

Asset Owner – the RB of Greenwich is responsible for the maintenance of RB of Greenwich 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.

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 (including the River Quaggy, River Ravensbourne and Deptford Creek) and tidal flooding (including the River Thames) and has a responsibility to provide a strategic overview for all flooding sources and coastal erosion. The Environment Agency is also responsible for the issue of Environmental Permits relating to Flood Risk Activities relating to main rivers and flood defences (tidal and fluvial).

[Thames Water Utilities Ltd](#) – 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 is responsible for maintaining any drainage and ditches associated with Red Routes within Greenwich

Why do developers and applicants need to consider flood risk?

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

It is possible to reduce the flood risk posed to and from 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 a greater risk of 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 Developer Guide identifies the requirements of site specific Flood Risk Assessments (FRA), Flood Warning and Evacuation Plans, Environmental Permitting for flood risk activities and SuDS Drainage Applications. The preparation 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 development design could necessitate re-design 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;
- Failure to mitigate the potential flood 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;

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.

- 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 RB of Greenwich (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 for the management of main rivers through the Environmental Permitting requirements³;
- 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.

How do I consult with Royal Borough of Greenwich?

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

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

Developers should engage as early as possible with the Royal Borough of Greenwich to discuss proposed plans. This offers the opportunity to ensure that the most appropriate flood risk and water management practices are incorporated at the start of the planning process and are integrated within the wider management of flood risk across Royal Greenwich.

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 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.

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Preparing Flood Risk Assessments

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2. Preparing Flood Risk Assessments

A Flood Risk Assessment (FRA) may need to be undertaken for a proposed development, in accordance with the requirements of the National Planning Policy Framework (NPPF) and supporting Planning Practice Guidance; Policy E2 of the Royal Greenwich Local Plan: Core Strategy with Detailed Policies (July 2014); and Policy 5.12 of the London Plan (March 2016).

A FRA should assess the risk of flooding to the development from all sources, and detail any measures required to mitigate the risk of flooding to the development, site users and surrounding area.

This chapter sets out when a FRA is required, what it should contain, and guidance on a range of mitigation measures that are typically applied to development in areas of flood risk, including residual flood risk.

Who should I consult at the pre-application stage?

Pre-Application Discussions should be undertaken with the RB of Greenwich. Early discussions may result in improved flood risk management for the site and surrounding area to ensure the required and correct documentation is prepared and submitted.

As recommended within the [National Planning Policy Framework](#) 2012 (NPPF) and supporting [Planning Practice Guidance](#) (PPG), discussions between the RB of Greenwich, as the local planning authority and LLFA; the Environment Agency 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.

When is a Flood Risk Assessment required?

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)⁵, or;
- where the proposed development or a change of use to a more vulnerable class 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 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.

⁴ A Flood Zone is defined as the probability of river and sea flooding, ignoring the presence of defences, and can be accessed using the [Flood Map for Planning \(Rivers and Sea\)](#) on the Environment Agency's website.

⁵ A critical drainage area in this context is defined under the Town and Country Planning Order 2006 as an area within Flood Zone 1 which has critical drainage problems and has been notified to the Local Planning Authority (LPA) by the Environment Agency. This is separate to critical drainage areas (CDAs) that may be highlighted in Surface Water Management Plans (SWMP) which are defined by a local authority when there is a cluster of surface water flood hotspots.

In such instances a simple flood risk statement should be sufficient to meet the RB of Greenwich local planning authority requirements. See Appendix C and D for guidance on completing a simple FRA and site-specific FRA.

What are the objectives of a Flood Risk Assessment?

The objectives of a site-specific FRA are to:

- Assess the risks for all sources of flooding to and from development.
- Provide evidence ([where required in the PPG](#)) to apply the Sequential Test⁶ to individual developments and demonstrate to the LPA that this has been applied (based on specific guidance from the LPA).
- Show that the development is safe and passes the Exception Test⁷ (if applicable) as required by the NPPF.
- Demonstrate that flood risk to the development can be managed now and over the lifetime of the development, taking climate change into account, and;
- Demonstrate that the development does not increase the risk of flooding to third parties from all sources.

The Planning Practice Guidance section 10 on flood risk and coastal change provides detail on the requirements of a site-specific flood risk assessment, and the application of the sequential and exception tests:

- **Planning Practice Guidance section 10:**
<http://planningguidance.communities.gov.uk/blog/guidance/flood-risk-and-coastal-change/site-specific-flood-risk-assessment/>

It additionally includes the considerations that need to be made to meet the wider sustainability benefits to the community and the safety of the development if it is to satisfy the exceptions test.

- **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 also 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 both the PPG and EA advice when preparing a site-specific FRA.

General Flood Risk Standing Advice can also be useful to consult as it is this guidance

⁶ 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 [PPG – Sequential Test](#)

⁷ 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 [PPG – Exception Test](#)

What are the main sources of flood risk in Royal Greenwich?

Table 2-1: Sources of Flooding in Royal Borough of Greenwich

Source	Risk Management Authority	Description
Surface Water	Royal Borough	Surface water modelling, undertaken as part of the Royal Greenwich Surface Water Management Plan (SWMP) ⁸ and more recently as a national mapping exercise ⁹ by the Environment Agency, has highlighted areas of Royal Greenwich that are potentially at risk from surface water flooding (see RB Greenwich Level 1 SFRA Appendix A Figure 8A-8D). 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 sand, silt and gravel underlying bedrock. In addition a small area of major chalk aquifer (the Greenwich Fault) runs from Mitcham, through West Norwood, Lewisham and Greenwich to Beckton. Within Greenwich the main wards influenced by the shallowest chalk aquifer are Greenwich West, Peninsula and parts of Woolwich Riverside and Thamesmead Moorings. 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 (see RB Greenwich Level 1 SFRA Appendix A Figure 5 and Figure 6). 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. Such an event would cause flooding to most areas in Royal Greenwich in the north that border the Thames, in particular to Thamesmead, Charlton Riverside and the Greenwich Peninsula (RB Greenwich Level 1 SFRA see Appendix C). The eastern areas would be at the greatest risk due to low ground elevations, the absence of any natural topographic barriers and the

⁸ The SWMP is available by request from the Flood Risk Manager. Contact details are provided in Appendix B.

⁹ In 2013 the Environment Agency, working with Lead Local Flood Authorities (LLFAs), produced national mapping 'Risk of Flooding from Surface Water'.

Source	Risk Management Authority	Description
		presence of canals in the area.
Sewer Flooding	Thames Water	Sewer flooding is not considered a significant risk across the majority of Royal Greenwich. Thames Water will need to confirm that any new developments will not exceed sewer capacity and subsequently increase flood risk.
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. 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

What datasets can be used in Flood Risk Assessments?

When producing FRAs, **all sources of flooding must be assessed**. Table 2.2 identifies the available sources of information that can be referred to; [Appendix A.2](#) provides further references to the available documents.

Table 2-2: Datasets for each Source of Flooding

Information	Source						Datasets
	Tidal	Fluvial	Surface Water (incl. Ordinary Watercourses)	Groundwater	Sewer	Artificial Sources	
Historic Flooding	✓	✓				✓	Royal Greenwich SFRA
			✓	✓			Royal Greenwich SWMP⁸ ; 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 Appraisal 2009 ; Thames CFMP / FRMP
			✓	✓			Royal Greenwich SFRA; Royal Greenwich LFRMS ; Royal Greenwich SWMP⁸ ; London Regional Flood Risk Appraisal 2009 ; Environment Agency (website): Risk of Flooding from Surface Water Map
					✓		Thames Water (direct) London Regional Flood Risk Appraisal

Information	Source						Datasets
	Tidal	Fluvial	Surface Water (incl. Ordinary Watercourses)	Groundwater	Sewer	Artificial Sources	
							2009
Tidal Flood Defences Breach Modelling & Risk	✓						Royal Greenwich SFRA; Thames Estuary 2100 Plan ; Environment Agency (direct)
Wastewater & Water Supply Infrastructure					✓		Thames Water (direct)
Critical Drainage Areas (surface water- Drain London Definition)			✓				Royal Greenwich SWMP ⁸
SuDS Suitability Assessment			✓	✓			Royal Greenwich SFRA; Royal Greenwich SWMP ⁸ ; BGS Infiltration SuDS Map ; On-site / site specific assessment
Proposed Flood Alleviation Measures	✓	✓	✓	✓			Royal Greenwich SFRA; Royal Greenwich LFRMS , Local Flood Risk Management Plan. Environment Agency (website): Proposal of flood and coastal erosion risk management schemes ; Thames Estuary 2100 Plan
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: Catchment data explorer (website): River Basin Management Plan – Annex A Current status ; Royal Greenwich Ordinary Watercourses Survey (direct)

How detailed should a FRA be?

Site-specific FRAs should be **proportionate to the degree of flood risk and appropriate to the scale, nature and location of the development**. The report should make optimum use of readily available guidance and information, including the Planning Practice Guidance (PPG), Environment Agency Standing Advice and

the mapping presented within the Royal Greenwich SFRA, Royal Greenwich SWMP and available through the Environment Agency website.

FRAs should also be **appropriate to the scale, nature and location of the development**. For example, the RB of Greenwich 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). For a new development comprising a greater number of houses in a similar location, or one where the flood risk is greater, the RB of Greenwich would require a more detailed assessment.

Guidance for residents completing Flood Risk Assessments to support small planning developments, including household extensions, is provided in Appendix D.

FRA Specific requirements checklist

The PPG contains a model FRA checklist which has been used as a basis of the Greenwich FRA checklist outlined below. Where appropriate, additional flood risk issues requiring attention and relating specifically to Greenwich have been added.

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 for use when preparing and submitting FRAs is provided in Appendix E.

1. Development description and location

Table 2-3: Development requirements

Requirements		Notes
a.	What type of development is proposed, and where will it be located?	Site information; it is important at this stage to ensure that sufficient plans are provided showing the site boundary, features including ground levels, watercourses and other bodies of water as well as any structures which may influence the flow of flood water. A site survey may be necessary to ensure all such structures are identified. If the application is for a basement development, refer to text below.*
b.	What is its flood risk vulnerability classification?	The FRA should identify the vulnerability classification of the proposed development, as set out in Table 2 of the PPG .
c.	Does the proposed development comply with Royal Greenwich Development Plan policies and follow supplementary planning guidance?	Refer to Appendix A: A.2 Local Policy, Guidance and Plans
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?	Royal Greenwich Local Plan: Core Strategy with Detailed Policies (July 2014)
e.	Will the proposal increase overall the number of occupants and/or users of the building/land, or the	Particularly relevant to minor developments (alterations and extensions) and changes of

Requirements		Notes
	nature or times of occupation or use, such that it may affect the degree of flood risk to these people?	use.

***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 sewer 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 ground conditions is required to inform the structural integrity of the basement construction. This should include consideration of groundwater conditions, as well as flow paths and the potential for excessive surface water to pond at the side of buildings with the potential to infiltrate and compromise structural integrity;
- 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

Table 2-4: Identifying Flood Sources in Royal Borough of Greenwich

Requirements		Notes
a.	What sources of flooding could affect the site? Assess all potential sources of flooding.	Refer Table 2-1: Overview of sources of flooding Refer Table 2-2: Datasets for each source of flooding
b.	For each source identified in 2a, 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 ⁸ Royal Greenwich PFRA
c.	What are the existing surface water drainage arrangements for the site?	Thames Water (direct) Developers must be able to demonstrate that there would be no increased risk of surface water flooding either on or off site as a result of the proposed development. Where an increased risk exists, developers need to provide a Drainage Strategy to demonstrate how they intend to address this, by what methods, over what timeframe and how maintenance of such works would be funded over its lifetime.

3. Probability

Table 2-5: Probability of flooding in Royal Borough of Greenwich

Requirements		Notes
a.	Which Flood Zone (or zones) is the site within?	Flood Map for Planning (Rivers and Sea) & through the Long Term Flood Risk Assessment Search on the Environment Agency's website Royal Greenwich SFRA
b.	If there is a Strategic Flood Risk Assessment (SFRA) covering this site, what does it show?	Royal Greenwich SFRA & SWMP ⁸
c.	What is the probability of the site flooding?	Environment Agency online flood risk mapping. 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 Lead Local Flood Authority (LLFA, Royal Greenwich) and the Environment Agency should be contacted for pre application advice to see if the scope of the site specific FRA needs to be increased to include modelling to ensure details of flooding mechanisms are fully understood and that the proposed development incorporates appropriate mitigation measures.
d.	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).	Rates and volumes of runoff for a range of storm events up to and including the 1 in 100 year (1% annual exceedance probability (AEP) event (including an allowance for climate change) should be calculated. Where the scale of development as advised by Royal Greenwich requires calculation of rates and volumes of runoff this 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 the method used. For fluvial flood risk, detailed information on rate of onset of flooding, velocities, depths and duration of flooding may be informed by hydraulic modelling carried out by the Environment Agency. Where such information is currently unavailable, the Environment Agency will advise on the requirement for further investigation. For groundwater flood risk, Potential Groundwater Flooding Zones mapping within the SFRA should be consulted for potential areas of groundwater flooding. It may be necessary to carry out groundwater

Requirements		Notes
		<p>monitoring on-site to confirm groundwater levels.</p> <p>Thames Water should be contacted regarding flood risk from sewers.</p>
e.	<p>Is the site at residual risk of flooding, e.g. in the event of a failure of the fluvial or tidal flood defences? What level of flood risk could be experienced on the site during such an event?</p> <p>Consider the benefit afforded to the site from any existing flood alleviation measures.</p>	<p>Refer to Royal Greenwich SFRA for breach modelling outputs.</p> <p>Obtain breach modelling flood levels from the Environment Agency for the worst case breach location for the site. Consult the Environment Agency regarding the suitability of the available breach locations in relation to the site. Where a suitable location has not been modelled, a developer may have to conduct their own assessment of the residual risk, in a manner that is proportionate to the scale and nature of development proposed. It is recommended that probabilistic modelling is used to take into consideration both the probability of failure at a range of water levels, and the consequences of flooding.</p> <p>Refer to the 'Breach of existing flood defences' section below.</p>

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 areas of functional floodplain to the riverside of these defences (areas available to view on the [Flood Map for Planning for Rivers and Sea](#)).

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 RB of Greenwich 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](#). Developers should also ensure existing assets and defences are renewed to ensure that they will last the lifetime of the development. Enhancement opportunities should also be taken when renewing assets to ensure that the development is protected from the impacts of climate change.

4. Climate Change

Sites located in lower risk areas (Flood Zone 2) could in future be located in higher risk areas (Flood Zone 3a) when the impacts of climate change are taken into account. This predicted greater risk needs to be addressed within a FRA demonstrating that the proposal is safe, does not increase the risk of flooding or impede flows over the lifetime of the development. The FRA must be completed in accordance with latest Environment Agency guidance.

Table 2-6: Flood Risk and Climate Change in Royal Borough of Greenwich

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

5. Detailed Development Proposals

Table 2-7: land uses in relation to flooding in Royal Borough of Greenwich

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).	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 landscaped areas can be placed on land with a higher probability of flooding.

6. Flood Risk Management Measures

Mitigation measures should be seen as a last resort to address flood risk issues to new development.

However, where development takes place in an area at risk of flooding, it must be demonstrated, through the production of a FRA, that it is:

- Safe for its lifetime
- Does not increase the risk of flooding elsewhere
- Where possible reduced flood risk overall

Table 2-8: Flood Management Measures in Royal Borough of Greenwich

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 PPG 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) 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 Chapter 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 (0.5% AEP) 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.

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 600mm above the known or modelled 1 in 100 year (1% AEP) flood level for rivers or 1 in 200 year (0.5% AEP) flood level for tidal sources, including a suitable allowance for climate change (see Environment

Agency [Standing Advice](#)). Floor levels may not need to be raised for other types of development where buildings can be designed to be floodable e.g. Less Vulnerable development.

Table 2.9 Finished Floor Levels

Development Type	Flood Zone 3	Flood Zone 2
Minor residential development (number of dwellings to be constructed is less than 10 or the site area is less than 0.5 hectares)	Floor levels within the proposed development will be set no lower than existing levels AND, flood proofing of the proposed development should be incorporated OR, Floor levels within the extension will be set 300mm above the known or modelled 1 in 100 year (1% AEP) flood level including climate change for fluvial flood risk and the 1 in 200 year (0.5% AEP) event including climate change for tidal flood risk.	Floor levels within the proposed development will be set no lower than existing levels AND, flood proofing of the proposed development should be incorporated.
Other development - residential	Where appropriate, subject to there being no other planning constraints (e.g. restrictions on building heights), finished floor levels should be set at whichever level is higher: <ul style="list-style-type: none"> – 300mm above the general ground level of the site – 600mm above the estimated river or sea level. This level should be defined as the 1 in 100 year (1% AEP) flood level including climate change for fluvial flood risk and 600mm above the 1 in 200 year (0.5% AEP) flood level including climate change for tidal flood risk. For defended fluvial floodplain, flood levels in the event of a breach should be derived for the 1 in 100 year (1% AEP) event plus climate change and for defended tidal floodplain, flood levels should be derived for the 1 in 200 year (0.5% AEP) event plus climate change. Where ground floor levels cannot be set above the estimate river or sea level, sleeping accommodation should be restricted to the first floor or above to offer the required 'safe places'. Internal ground floors below this level could however be occupied by either Less Vulnerable commercial premises, garages or non-sleeping residential rooms (e.g. kitchen, study, lounge) (i.e. applying a sequential approach within a building)	
Other development – non residential	Finished floor levels may not need to be raised. For example, Less Vulnerable developments can be designed to be floodable instead of raising floor levels, and this may be beneficial to help minimise the impact of the development on the displacement of floodwater and the risk of flooding to the surrounding area. 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 and a Flood Warning and Evacuation Plan should be prepared to document the actions to take in the event of a flood. Other flood resilience and resistance measures may also be required.	
Basement dwellings	Basements, basement extensions, conversions of basements to a higher vulnerability classification or self-contained units are not permitted in Flood Zone 3b. Self-contained residential basements and bedrooms at basement level are not permitted in 3a. Internal access to a higher floor situated 300mm above the 1 in 100 year (1% AEP) flood level including climate change must be provided for all other basements, basement extensions and conversions.	All basements, basement extensions and conversions must have internal access basement higher floor situated 300mm above the 1 in 100 year (1% AEP) flood level including climate change.

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.

Where an area benefits from the presence of flood defences, the fluvial and/or tidal risk is considered to be residual. Resilience measures should be promoted in these areas.

Residential Development in Defended Fluvial or Tidal Floodplain

In areas at risk of a breach in the tidal defences, development in such locations where the council is of the view that habitable rooms may 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.

As a minimum structural measure, this will require an internal safe-haven within each unit to be built with a floor level at least- 300mm above the maximum water level caused by a defence breach during a 0.5% annual probability event plus climate change event. This additional height is referred to as 'freeboard'.

Flood Resistant and Resilient Design, including Property Level Protection

Flood resistant measures aim to keep water out and give occupants time to relocate ground floor contents. 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](#)¹⁰.

Development adjacent to Existing Defences

Tidal and fluvial defences are an essential means of protecting low-lying areas from flooding. Where development directly adjacent to the tidal defences is permitted, the Environment Agency and the RB of Greenwich may wish to use this opportunity to extend 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 a tidal flood wall, and 8m behind a fluvial flood wall. Site specific constraints may affect the amount of setback that can be achieved, in these instances, a smaller set back may be acceptable following discussion and agreement from the Environment Agency / LPA.

¹⁰ Six Steps to Property Level Flood Resilience. Available at: <http://www.smartfloodprotection.com/>

[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.

The EA are a statutory consultee for planning applications where development is within 20m of a main river (<http://www.legislation.gov.uk/ukxi/2015/595/schedule/4/made>). Permission is required for any work activity within 8m of a flood defence or culvert on a main river, or within 16m of a tidal river or tidal defence (<https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>).

The RB of Greenwich, as the LLFA, is responsible for consenting of works in ordinary watercourses under Section 23 of the [Land Drainage Act 1991](#) (as amended by the [Flood and Water Management Act 2010](#)). An offset distance of 6m should be maintained for work near ordinary watercourses.

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.

Table 2-9: Potential offsite flooding impacts and mitigation measures

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.	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.
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?	<p>Consider measures such as:</p> <p>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.</p> <p>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.</p> <p>Riverside Development - development in or 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.</p> <p>Further information is provided below.</p>
c.	How will run-off from the completed development be prevented from causing an impact elsewhere?	<p>Consider measures such as:</p> <p>SuDS – runoff from the site can be managed using SuDS to reduce the impact of urbanisation on flooding.</p>

Requirements		Notes
d.	Are there any opportunities offered by the development to reduce flood risk elsewhere?	Discussions should be undertaken with the Royal Borough. Opportunities for delivering wider environmental benefits, including water quality, Water Framework Directive and pollution reduction should also be considered.

Construction of flood defences and land raising in a new development

The construction of flood walls to protect the development are not considered to be an appropriate strategic option for Royal Greenwich as residual risk of flooding will still remain. However, if a development is to include the construction of flood defences, designs should include details of access for pedestrians and vehicular access to the elevation of the development, impacts on the streetscape and challenges of perceived isolation, land-take for the use of access routes and embankments and challenges to site drainage and surface water runoff.

Land raising can ensure that development is located above the design flood level. However land raising can increase risk to neighbouring communities, reduce community place-making and can require high land-take. Where land raising is proposed within flood risk areas, compensatory storage should be provided on a level for level/volume for volume basis.

Developers should engage as early as possible with the RB of Greenwich and the Environment Agency to confirm whether new defences and/or land raising would be acceptable in principle. This reduces the potential for abortive work, delays in relevant planning permissions and completion of development.

When considering development proposing to raise land, Royal Greenwich will consider the following potential impacts:

- Changes to the topography of the area following a redevelopment could lead to an increase in water level to other parts of the area during a flood event following a defence breach;
- For the exception test to be passed to allow development in a flood risk zone it must be demonstrated that the development will not increase flood risk elsewhere;
- Wider scale use of land raising or secondary defences across Royal Greenwich could require detailed breach modelling and potentially compensatory flood storage, which is unlikely to be suited to the densely urbanised area.

Floodplain Compensation Storage

Where a proposed development results in a change in building footprint, the developer must ensure that it does not impact on the ability of the floodplain to store water, and in areas of higher risk e.g. Flood Zone 3b, should seek opportunities to provide betterment.

Similarly, where ground levels are elevated to raise the development out of the floodplain, 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.

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 less favourable.

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.

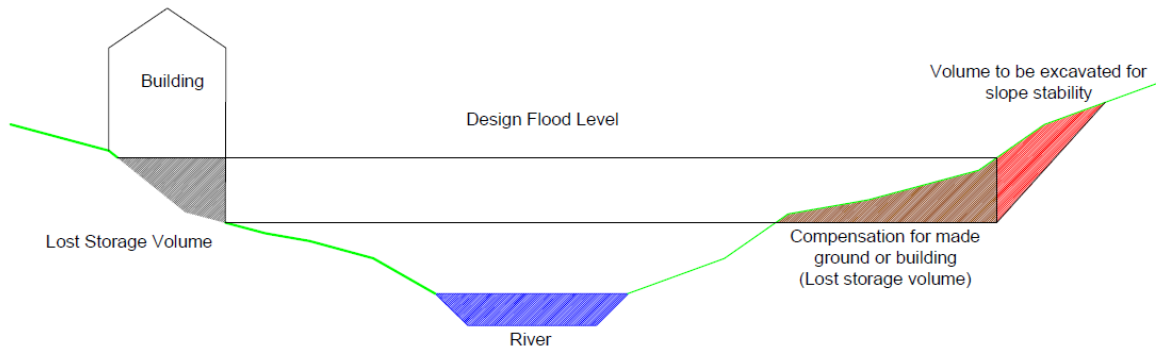


Figure 2-1 – Level for level Flood Compensation (Source: Royal Borough of Greenwich)

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 by creating new flow routes.

Designing for Exceedance and Flood Routing

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](#) and the [RP991 Managing urban flooding from heavy rainfall – encouraging the uptake of designing for exceedance](#).

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 [Environmental Permitting \(England and Wales\) Regulations 2016](#) and associated regional byelaws, any works within 8 metres of a statutory main river (defended or otherwise) and within 16m of a tidal river or flood defence requires an Environment Agency Flood Risk Activity Permit depending on the specific activity proposed. 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. An offset distance of 6m should be maintained for work near ordinary watercourses.

The RB of Greenwich, 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](#)). For ordinary watercourse flood defence consent requirements it is specific activities detailed in Table 6-1 (see

chapter 6) that necessitate the consent of the RB of Greenwich. However, primarily in order to ensure access to ordinary watercourses is maintained, consultation with Royal Greenwich is recommended for any work within 4 meters of an ordinary watercourse so that advice can be provided.

Detailed guidance on the requirements and process for submitting an Environmental Permit to the Environment Agency or on how to get permission to work in or near an Ordinary Watercourses in Royal Greenwich is included in [Chapter 5](#)

8. Residual Risks

Table 2-10: Residual risk requirements

Requirements	Notes
<p>a. What flood-related risks will remain after the necessary mitigation measures to protect the site from flooding have been implemented?</p>	<p>Residual risks should be identified. These could be associated with a number of potential risk factors including (but not limited to):</p> <ul style="list-style-type: none"> - 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, - the structural deterioration over time or breach of flood defence structures (including informal structures acting as a flood defence), and/or - general uncertainties inherent in the prediction of flooding. <p>Specific considerations in relation to tidal defences are outlined below.</p> <hr/> <p>See Chapter 3 on residual risk in this document</p>
<p>b. How, and by whom, will these risks be managed over the lifetime of the development?</p>	<p>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 Chapter 4: Flood Warning and Evacuation Plan Guidance</p>
<p>c. If the development is in an area protected by flood defences, but has a high residual risk classification, the following must be provided:</p> <p>Details of indicative breach flood water levels,</p> <p>Ground levels,</p> <p>Ground, first and second floor levels in metres AOD and the floor level for bedrooms,</p> <p>Safe refuges, providing justification for the options chosen, and</p> <p>A Flood Warning and Evacuation Plan.</p>	<p>See Policy E3 in the Royal Greenwich Local Plan in Appendix A:</p> <p>A.2 Local Policy, Guidance and Plans</p> <hr/> <p>Guidance on the requirements for Flood Warning and Evacuation Plans is provided in Chapter 4 of this document.</p>

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. More detail on development in areas of residual risk is provided in [Chapter 3](#) of this guide.

Definition of a safe refuge

A safe place of refuge should be a dry, habitable space that is internally accessible at all times. Typically, the designation of a safe place of refuge would be an upper floor enabling residents to wait until rescue or the subsidence of water levels. Evacuation should be considered prior to use of a safe place of refuge. However, in areas of high expected flood level, and possible rapid inundation as is possible in parts of in Royal Greenwich (e.g. Thamesmead) following a breach of the Thames (low probability) then the local flood plan may recommend remaining within a structurally resilient development. Integrating a safe place of refuge in a development plan cannot guarantee that a proposal will be approved.

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.

Table 2-11 – Requirements for plans and cross-sections

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.

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Preparing Flood Warning & Evacuation Plans

03

3. Preparing Flood Warning & Evacuation Plans

When is a Flood Evacuation Plan required?

For all developments (excluding minor developments and change of use) proposed in areas at risk of fluvial or tidal flooding (Flood Zone 2 or 3), a Flood Warning and Evacuation Plan should be prepared to demonstrate what actions site users will take before, during and after a flood event to ensure their safety, and to demonstrate their development will not impact on the ability of the local authority and the emergency services to safeguard the current population.

For all sites in Flood Zone 1 where the area surrounding the site and/or any potential egress routes away from the site may be at risk of flooding from any source (dry island) or where it is directly affected by any other source of flooding it may also be necessary to prepare a Flood Evacuation Plan. Surface water hazard maps should be included in the flood evacuation plan.

General Requirements

A 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.;
- Seek 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 details of access arrangements for the Emergency Services.

The Environment Agency has a tool on its website to create a Personal Flood Plan¹¹. The Plan comprises a checklist of things to do before, during and after a flood and a place to record important contact details. Where proposed development comprises non-residential extension of less than 250m² and householder development (minor development), it is recommended that the use of this tool to create a Personal Flood Plan will be appropriate.

Specific Requirements

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

1. Introduction

Table 3-1 – Requirements of the introduction of a Flood Warning and Evacuation Plan

Requirements	
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

¹¹ Environment Agency Tool 'Make a Flood Plan'. <https://www.gov.uk/government/publications/personal-flood-plan>

	Agency)
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2. Site Description

Table 3-2 – Requirements of the site description of a Flood Warning and Evacuation Plan

Requirements	
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

Table 3-3 – Requirements of the flood risk section of a Flood Warning and Evacuation Plan

Requirements	Notes	
a.	Summarise the sources of flooding and conclusions from the development site-specific FRA Include Flood Zone Map	Site specific FRA
b.	Assess the Flood Hazard rating Include Flood Hazard Map, where available	Flood Risk Assessment Guidance for New Developments (FD2320, Defra / Environment Agency 2005)
c.	Asses the rate of onset of flooding	This should link with how timely warnings are going to be provided (as set out in Requirement 5 – Flood Warning Service)
d.	Assess the expected duration of flooding & anticipated water dispersal following event	Fluvial modelling and the presence of barriers to flow paths (e.g. defences) can help determine the developments anticipated self-sufficiency requirements.

4. Other Flood and Emergency Plans

Table 3-4 – Outline of other existing Flood and Emergency Plans

Requirements	Notes	
a.	Summarise any existing emergency plans and guidance that cover the development site	Royal Borough Generic Emergency and Business Continuity Management Plan ;
b.	Outline any existing or proposed mitigation schemes that can be deployed at the site	

5. Flood Warning Service

Table 3-5 – Description of the available Flood Warning Service at the site

Requirements		Notes
a.	Is the site covered by the Environment Agency Floodline Warnings Direct service?	This should include warning services for different flood risks and also show where there are flood risks but no warnings available
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	e.g. local watercourses such as the River Quaggy have relatively rapid responding catchments compared with larger watercourses around the country. As such there may be less time locally afforded for responders to act.
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)?	
g.	Information on the rate of onset of flooding and the available flood warning time	Locally specific flood warning method of delivery for vulnerable locations

6. Emergency Route and Safe Refuge

Table 3-6 – Requirements of a Flood and Emergency Plan – description of the 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.	Evacuation routes must be accessible to all members of the community such as wheelchair users.
b.	Refer to safe access and egress guidance	‘FRA Guidance for new Developments FD 2320’ (Defra and Environment Agency, 2005). The requirements for safe access and egress from new developments are as follows in order of preference: Safe, dry route for people and vehicles.

Requirements		Notes
		<p>Safe, dry route for people.</p> <p>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.</p> <p>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 vehicles. Consideration should be given so that the bough waves do not increase the residual flood risk.</p>
c.	Measures to ensure occupant awareness of the likely frequency and duration of flood events, including the potential need to evacuate	
d.	Clearly planned safe access routes to and from the development in the event of a flood	Evacuation routes should be designed into the development planning, ensuring access for emergency vehicles able to cope with expected flood levels.
e.	If containment is the likely scenario - will there be measures to ensure key services are maintained during a flood?	Resilience measures should be considered at the design stage of the build
f.	Refer to design flood guidance to demonstrate that development will be safe to satisfy the second part of the Exception Test.	<p>The PPG guidance on safe access to and from the development requires:</p> <p>The voluntary and free movement of people during a 'design flood'.</p> <p>Potential for evacuation before a more extreme flood.</p> <p>The access route should allow occupants to exit dwellings in a design flood & enable vehicular access.</p> <p>Safe access routes above design routes to avoid flow paths.</p> <p>Appropriate signage to guide people to the safest routes.</p> <p>The safe 'design flood' areas of a development will depend on flooded velocities and the risk of debris in floodwater, specific to the location assessed.</p>
g.	Procedures for responding to a flood warning, self-evacuation plan and assisted evacuation plan.	
h.	Safe refuge and assembly site	Including how people would reach dry land and the timescales for this.

Requirements		Notes
i.	What can be done to protect the development and contents?	e.g. deploy flood barriers across doors, relocate items (e.g. cars, furniture)
j.	Anticipated duration of flood based on expected inundation in area of residual risk.	To inform the expected self-sufficiency of the safe refuge taking into account the position of the development. e.g. where natural flow paths are hindered by existing defences inundation events may be prolonged and require extended (>72 hour) safe refuge backup support (provision of heat, food, water, sanitation).

7. Roles and Responsibilities during a Flood Event

Table 3-7 – Roles and responsibilities during a flood event

Requirements		Notes
a.	Roles and responsibility of the Royal Borough	Royal Borough Generic Emergency and Business Continuity Management Plan ;
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

There is the potential for people to be cut off during times of flooding therefore a designated place of refuge which includes necessary supplies should be included in a flood and emergency plan. A designated community facility could act as a drop off point for clean water and food supplies that could then be distributed to vulnerable people.

Table 3-8 – Requirements for 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.	Useful information is provided through the following: 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	
d.	Estimated time to re-establish site to normal use following a flood event	Clean-up times, time to re-establish services

9. Protection and resilience of the development during flooding

Table 3-9 – Requirements for practical guidance in the event of a flood

Requirements		Notes
a.	Advice on the storage of valuable items within the development?	Recommendation above the maximum flood level
b.	Plans on the isolation and resilience of utilities	e.g. Gas, electricity, water supplies
c.	Flood protection and resilience measures	e.g. floorboards, airbrick covers
d.	Notes on the structural integrity of the building and its resilience in the event of a flood event	Vulnerable locations, safety areas above the maximum flood level

Who should be consulted?

- The requirements for producing a Flood Warning and Evacuation Plan should be agreed with the Royal Borough during pre-application discussions.

There is no statutory requirement for the Environment Agency or the emergency services to approve evacuation plans. RB of Greenwich is accountable via planning conditions or agreement to ensure that plans are suitable. This should be done in consultation with the Emergency Planning and Resilience Unit at the RB of Greenwich.

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Arrangements for Surface Water Management

04

4. Arrangements for Surface Water Management

Background on SuDS

Surface water management measures that take account of water quantity (flooding), water quality (pollution) and amenity issues are collectively referred to as 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 sewers, 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.

SuDS Requirements and Guidance

All developments should ensure there is no increase in surface water runoff, and where possible, should demonstrate an improvement in terms of rates and volumes of surface water runoff. SuDS should be used to reduce and manage surface water run-off to and from proposed developments as near to source as possible.

The [RB of Greenwich Local Plan](#) states that: “Development should ensure that surface water run-off is managed in line with the London Plan’s sustainable drainage hierarchy (policy 5.13)”

Policy 5.13 of the [London Plan](#) (2016) outlines requirements for development with regards to drainage and use of SuDS, as follows:

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

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

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

The [Sustainable Design and Construction Supplementary Planning Guidance \(2014\)](#) supports that developers will be expected to clearly demonstrate how all opportunities to minimise final site runoff, as close to greenfield rates as practical, have been taken.. As noted above London Plan Policy 5.13 states that development should aim to achieve greenfield runoff rates.

Developers should ensure that design and implementation of SuDS complies with SuDS policies, guidance and local considerations within the RB of Greenwich. 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

As LLFA, the RB of Greenwich is a statutory consultee for drainage aspects of Major Development¹² and is responsible for providing guidance in relation to surface water drainage (Flood and Water Management Act 2010). Under these arrangements, in considering planning applications, the RB of Greenwich planning team, as the LPA, will:

- Consult the flood risk management team (as the LLFA) on the management of surface water;
- Satisfy themselves that the proposed minimum 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 RB of Greenwich sets additional requirements with regard to development and drainage, beyond those set out in national and regional policy. The RB of Greenwich requires all development sites exceeding 0.25ha in area to submit a SuDS strategy (see [Local Information Requirements List for Planning Applications](#)).

In addition, the RB of Greenwich see SuDS as an integral element to all development, including minor development, and actively encourage the incorporation of SuDS. As such, the RB of Greenwich is committed to work in partnership with developers to maximise the uptake and introduction of SuDS.

Please refer to the drainage application checklist at the end of this chapter for information on what should be included in a surface water drainage strategy.

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,**
- **Ministerial Statement**
- **Guidance and best practice as set out in 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.

SuDS Considerations

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 BRE 365.

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.

The [Royal Greenwich SWMP](#)⁸ provides a high-level overview of where infiltration SuDS may be suitable across Royal Greenwich. Figure D6 in the [Royal Greenwich SWMP](#)⁸ 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 \(BGS\)](#) provides 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 updated 2016 [Royal Greenwich SFRA](#) of which this document is an appendix.

¹² Major Development is defined in the Town and Country Order (2015)

Planning Application Checklist – Surface Water Management Arrangements

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

Table 5-1 – Requirements for surface water management.

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. These can be supported by modelled software outputs
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 (1% AEP) 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.
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).

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Environmental Permit Applications

05

5. Environmental Permit Applications and Ordinary Watercourse Consent

Developers and land owners proposing to undertake developments on or near any main rivers are required to obtain an Environmental Permit from the Environment Agency. For work in Ordinary Watercourses, consent is required from the RB of Greenwich prior to commencing any works.

Environmental Permitting rules from the Environment Agency need to be followed if work is proposed:

- on or near a main river;
- on or near a flood defence structure;
- in a flood plain;
- on or near a sea defence.

Consent will be required from the RB of Greenwich prior to commencing any work if work will be:

- in or near an ‘ordinary watercourse’.

Background

Updated 2016 guidance from the [Environment Agency and DEFRA](#) needs to be followed to ensure that developers have obtained the relevant environmental permit from the EA prior to commencing any work to avoid breaking the law. Any works proposed in, over, under or near a main river and any flood defences, will require an Environmental Permit from the [Environment Agency](#).

Pre-Application Discussions should be undertaken with the RB of Greenwich and the Environment Agency. Early discussions may result in improved flood risk management and help focus applications on local conditions.

For works that do not involve a main river, but are located in or near an ordinary watercourse permission may need to be obtained from the RB of Greenwich. As the LLFA for Royal Greenwich, the RB of Greenwich has responsibility for issuing consents for works in 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).

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:

- River Thames
- River Quaggy
- River Ravensbourne,
- Deptford Creek

- Kid Brook
- Butt's Canal

Work in or near these rivers would require an Environmental Permit from the Environment Agency. All other watercourses are classified as Ordinary Watercourses and fall under the remit of the RB of Greenwich.

Environmental Permitting requirements from the Environment Agency

Permission must be sought from the Environment Agency if you propose to carry out the following activities, as noted in recent [2016 guidance](#)¹³:

- erecting any temporary or permanent structure in, over or under a main river, such as a culvert, outfall, weir, dam, pipe crossing, erosion protection, scaffolding or bridge;
- altering, repairing or maintaining any temporary or permanent structure in, over or under a main river, where the work could affect the flow of water in the river or affect any drainage work;
- building or altering any permanent or temporary structure designed to contain or divert flood waters from a main river;
- dredging, raising or removing any material from a main river, including when you are intending to improve flow in the river or use the materials removed;
- diverting or impounding the flow of water or changing the level of water in a main river;
- quarrying or excavation within 16m of any main river, flood defence (including a remote defence) or culvert;
- any activity within 8m of the bank of a main river, or 16m if it is a tidal main river;
- any activity within 8m of any flood defence structure or culvert on a main river, or 16m on a tidal river;
- any activity within 16m of a sea defence structure;
- activities carried out on the floodplain of a main river, more than 8m from the river bank, culvert or flood defence structure (or 16m if it's a tidal main river), if you don't have planning permission.

Excluded activities

The following activities are [excluded](#) from requiring an Environmental Permit, as noted in the Environment Agency's guidance, though the activity must be carried out within the description and conditions of the exclusion:

- Work in an emergency.
- If a Marine Management Organisation licence has been applied the EA will decide if the work does not require a Permit in writing.
- Using ladders and scaffold towers.
- Services crossing a river within an existing structure.
- Flood protection devices attached to buildings.
- Minor works for highways and rights of way on or near bridges and culverts.
- Post and rail or post and wire fencing in a floodplain.
- Temporary use of small fish traps.
- Noticeboards more than 2m from the top of a river bank.
- Clearing out a purpose-built sediment trap.
- Site investigation boreholes and trial pits.

¹³ Environment Agency and Defra (2016). Flood risk activities: environmental permits guidance. Available at: <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>

Ways to get permission


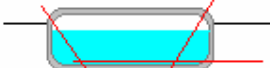



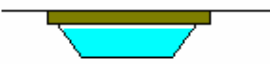





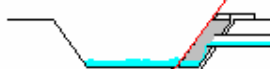
There are different types of permission from the [Environment Agency](#) to carry out work under the Environmental Permitting (England and Wales) regulations 2016:

1. Check that your work meets the requirements of an [exemption](#) and [register](#) this with the Environment Agency for approval. All of the terms and conditions of the Statutory Guidance for the specific works must be met for the exemption to be legal. Applicants must register 'exemptions' with the Environment Agency in advance before conducting any of these activities to ensure the works meet the specific requirements of the guidance.
2. If your work meets all the fixed set of rules associated with the [Standard Rules Permit](#) for specific activities then you can apply using [Form part B11, Form part A and Form part F3](#) [Form part B11, Form part A and Form part F3](#) from the Environment agency. For your work to be covered by the standard rules you should:
 - Contact the Environment Agency for locally relevant advice and to check if the proposed works are too close to a flood defence structure or environmentally sensitive location.
 - Clearly ensure your works meet all of the 'description of activities' and 'limit of activities' sections of each [guidance document](#).
 - Ensure your activities comply and adhere to the generic safety risk assessments in the [guidance document](#).
 - Prepare and log a [management system](#) including for larger projects a site infrastructure plan, clear method of work plan and effective planning for equipment, maintenance, contingency and accidents. Scope should also be included to investigate and learn from potential complaints and ensure staff training and competence is relevant to the activities proposed.
 - Prepare a site plan with a clear boundary line
3. If the activities cannot be covered by, an exemptions an exclusion or the Standard Rules Permit you must apply for a [Bespoke Permit](#). Bespoke Permits require a greater level of detailed planning, supporting information and surveys. You should:
 - Ensure a detailed risk assessment is completed to check that the proposal will not increase flood risk, impact drainage or harm the environment.
 - Prepare a detailed [management system](#), specific to the exact activities planned.
 - Prepare a site plan with a clear boundary line
 - The forms that are required include the [Part B10](#) Bespoke Permit application form, form [EPA-Part A](#) 'about you' and the [Part F3](#) 'charging for flood risk' form which should be completed together with a clear method of work statement and a detailed risk assessment.
4. [Fees](#) are payable for Standard Rules and Bespoke Permit. For each permit application received:
 - An application charge of £170 applies for the first activity (standard rule or bespoke);
 - An additional charge of £40 applied for each subsequent activity (standard rules or bespoke).
5. Compliance charges
 - A compliance charge of £70 applies for all types of permits (for any number of standard rule or bespoke activities).
 - The charge is invoiced and becomes payable when the compliance check is carried out.
 - The compliance charge applies for each year in which there is a compliance check. Normally there will be one compliance check for permitted flood risk activity. In some cases, for example, where permit conditions are ongoing over a period of time, we may need to carry out compliance checking on multiple occasions. Where this is the case, we will apply this charge once in each financial year in which compliance work is carried out.



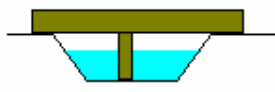
Ordinary Watercourse Flood Defence Consenting Requirements

Table 6-1 shows simple cross sections which represent works that will require consent from the RB of Greenwich. 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. An offset distance of 6m should be maintained for work near ordinary watercourses.

Table 5-1 – Ordinary Watercourse Flood Defence Consent Requirements¹⁴

Cross Section	Description	Consent Required?	Notes
	Pipe Culvert (including extension and removal)	YES	Land Drainage Act 1991 Section 23 1(b)
	Oversized Box Culvert (including extension and removal of)	YES	Land Drainage Act 1991 Section 23 1(b)
	Trash Screens	YES	Land Drainage Act 1991 Section 23 1(c) - it is an alteration to a culvert and has the potential to obstruct flow.
	Pipe Crossing (in channel)	YES	Land Drainage Act 1991 Section 23 1(a) if placed on bed Land Drainage Act 1991 Section 23 1(b) if placed above bed
	Weir/Dam or impoundment or temporary works that	YES	Land Drainage Act 1991 Section 23 1(a)
	Bridge (where soffit level is below bank top level)	YES	Land Drainage Act 1991 Section 23 1(b) - it acts like a culvert.
	Bridge (abutments restricting flow)	YES	Land Drainage Act 1991 Section 23 1(b) - it acts like a culvert.
	Bank Protection Works	Contact Royal Borough	Temporary works may require consent .
	Pipe Crossing (above bank)	NO	It does not affect the watercourse.
	Pipe Crossing (below bed)	Contact Royal Borough	It does not affect the watercourse. Temporary works may require consent .
	Protruding Pipe Outfall	NO	It will not act like a dam/weir or like obstruction.
	Outfall within Bank profile	NO	It does not act like a mill dam or weir.

¹⁴ Environment Agency (2012). Ordinary Watercourse Regulation Appendix to Advice Note. Appendix 2, Cross sections of consentable activities. Available at: <https://www.gov.uk/government/publications/ordinary-watercourse-regulation-advice-note>

Cross Section	Description	Consent Required?	Notes
	Bridge(abutments not reducing flow area/width)	NO	It does not interfere with flow.
	Clear span bridge	NO	It does not affect the watercourse.
	Bridge with support in channel	Contact Royal Borough	Not act like a dam/weir or obstruction. However, the RB will need to consider the size of pier against the size of watercourse To agree whether consent is required.

General Requirements

An application for an Ordinary Watercourse Flood Defence Consent must be submitted to the RB of Greenwich 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 RB of Greenwich has up to **two months** to consider an application from the date it is validated.

Developers should provide the following information to the RB of Greenwich for approval, complete with a signed declaration:

- Applicant and agent name, address and contact details.
- Site address and description and purpose of work, together with a justification why alternative measures are not appropriate.
- Specific confirmation of land ownership.
- Consideration of associated planning permission applications.
- A statement of the works impact on the environment.
- Planning for the future maintenance of the structure.
- Clear plans and scheduling of works.

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.

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

Table 5-2 – Nature of the work being completed

Requirements	Notes
a. Are the works temporary, permanent or both?	
b. For any 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	Technical documents and guidance that may be of use: ‘Living on the Edge’ - Riparian owners guide

Requirements		Notes
	<p>minimum,</p> <p>How they will reduce any unwanted effects while the work is being carried out, and</p> <p>State when they are proposing to carry out the works and how long it will take.</p>	<p>The fluvial design guide</p> <p>Building a better environment - a guide for developers</p> <p>Culvert design and operation guide</p>

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

Table 5-3 – Location of the work being completed

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.	<p>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.</p> <p>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.</p>	Appendix 6 of the Ordinary Watercourse Regulation Advice Note

3. Existing flood risk and potential impacts of the works

Table 5-4 – Potential impact of works on flood risk

Requirements		Notes
a.	Assess the existing flood risk to and from the watercourse or site and potential impacts of the works to this.	<p>Royal Greenwich SFRA</p> <p>Flood Map for Planning (Rivers and Sea) & through the Long Term Flood Risk Assessment Search on the Environment Agency's website</p> <p>Royal Greenwich SWMP⁸</p>

4. Existing flood risk and potential impacts of the works

Table 5-5 – Potential impact of works on flood risk

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.	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 .

Requirements		Notes
c.	Identify opportunities for how the development could improve the environmental value of the site.	This may include creating water features, planting trees and shrubs that would normally grow at the site, providing bird nesting boxes or creating sustainable places for wildlife to live.
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

Table 5-6 – Potential impacts on legislation

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

Table 5-7 – Potential impact of works on flood risk

Requirements	
a.	Location Plan
b.	<p>Site Plan (general arrangement)</p> <p>The existing site, including any watercourse,</p> <p>The proposals,</p> <p>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</p> <p>Existing fish passes or structures intended to allow fish to pass upstream and downstream;</p>
c.	<p>Cross Sections:</p> <p>Both upstream and downstream of the proposed works, and</p> <p>Include details of existing and proposed features and water levels.</p>
d.	<p>Longitudinal Sections:</p> <p>Both upstream and downstream of the proposed works, and</p> <p>Include details of existing and proposed features including water levels, bed levels and structures.</p>
e.	<p>Detailed Drawings (details of the existing and proposed features):</p> <p>The materials to be used for any structures,</p> <p>The location of any proposed service pipes or cables which may affect the future maintenance of the watercourse,</p> <p>Details of any tree, shrub, hedgerow, pond or wetland area that may be affected by the proposed works,</p> <p>Details of any planting or seeding, and</p> <p>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.).</p>

Application Fee

An application fee should be submitted with the consent application currently £50 per structure, as outlined in [Appendix C](#).

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Appendix A – National and Local Planning Policies

A

Appendix A- National and Local Planning Policies and legislation

A1. National Policy

Developers are required to use the following national planning policies and legislation 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
- National Planning Practice Guidance 2015
- Environment Agency guidance on FRA climate change allowances 2016
- The Flood and Water Management Act 2010
- The Flood Risk Regulations 2009
- The National Standards for Sustainable Drainage Systems (Defra 2015)
- [Non-Statutory Technical Standards for Sustainable Drainage: Practice Guidance](#) (LASOO 2016)
- The Water Framework Directive 2000

National Planning Policy Framework 2012 and Planning Practice Guidance 2016

The NPPF and accompanying updated (2016) PPG set out the Government's requirements for new development. These emphasise the responsibility of 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 SFRA's 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.”

The recently updated [Planning Practice Guidance \(PPG\)](#) additionally outlines guidance on:

- How flood risk should be taken into account during the preparation of Local Plans;
- Detailed guidance on the requirements for meeting the sustainability and safety elements of the Exception Test;
- Detailed guidance on the scope of a Strategic Flood Risk Assessment (SFRA);
- Detailed guidance on the scope of a site specific Flood Risk Assessment (FRA);
- Guidance on structural and non-structural methods of flood resilience and flood resistance.

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 (2016 update):

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

Environment Agency guidance on climate change allowances 2016

The Environment Agency additionally has provided guidance (2016) on the climate change allowances that should be used in SFRA and FRA to ensure future developments are resilient with future anticipated changes.

Climate change allowances give predictions of anticipated change for:

- Peak river flow by river basin district;
- Peak rainfall intensity;
- Sea level rise;
- Offshore wind speed and extreme wave height.

Each development type has a specific flood risk vulnerability classification which can be combined with the flood risk of the local area to help advise the planning process.

Links to:

Environment Agency guidance on FRA climate change allowances (2016):

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

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 RB of Greenwich, 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 RB of Greenwich 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 in Ordinary Watercourses within Royal Greenwich must be consented by the RB of Greenwich prior to commencement, and the RB of Greenwich 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 prepared by [Royal Greenwich in 2015](#).

The Greater London Area has been designated as a single Flood Risk Area, and as such the RB of Greenwich, 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

Royal Greenwich Flood Risk Management Plan 2015:

<https://consultations.royalgreenwich.gov.uk/uploadedfiles/Local%20Flood%20Risk%20M>

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 RB of Greenwich, is provided in [Appendix A.2](#).

Links to:

The Water Framework Directive Regulations 2003:

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

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

<http://ec.europa.eu/environment/water/water-framework/>

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
- Greener Greenwich Strategy
- Charlton Riverside Supplementary Planning Document
- 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

The London Plan 2016

The London Plan 2016 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.

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.

The Mayor's Sustainable Design and Construction SPG is available through the Greater London Authority's website:

<https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/supplementary-planning-guidance/sustainable-design-and>

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.

The First Review of the Regional Flood Risk Appraisal (RFRA) is available through the Greater London Authority's website:

https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/Regional%20Flood%20Risk%20Assessment%20-%20First%20Review%20-%20August%202014.pdf

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

The RB of Greenwich 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

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:

Greener Greenwich Supplementary Planning Document

The adopted [Greener Greenwich Supplementary Planning Document \(SPD\) \(2014\)](#) 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 of the Greener Greenwich SPD should be used to assist applicants applying for planning permission to comply with the principles adopted by the RB of Greenwich.

The Greener Greenwich Supplementary Planning Document is available at:

http://www.royalgreenwich.gov.uk/downloads/download/651/greener_greenwich_supplementary_planning_document

Royal Greenwich Strategic Flood Risk Assessment (SFRA)

The Royal Greenwich Strategic Flood Risk Assessment (SFRA) updated in 2016 is an evidence based document, which identifies areas at risk from flooding in Royal Greenwich and supports the RB of Greenwich in taking spatial planning decisions. The SFRA provides the basis for the RB of Greenwich'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.

The latest Royal Greenwich Strategic Flood Risk Assessment integrates 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). The aim of the SFRA is to guide and inform development within the RB of Greenwich.

This Developers Guide forms an appendix to the Royal Greenwich Strategic Flood Risk Assessment (SFRA) 2016.

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.

The Royal Greenwich Surface Water Management Plan (2011) is available by request from the Flood Risk Manager. Contact details are provided in Appendix B

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 Consultation (2015):

<https://consultations.royalgreenwich.gov.uk/uploadedfiles/Local%20Flood%20Risk%20Management%20Strategy%20report.pdf>

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 has been superseded by the [Thames Flood Risk Management Plan Part C](#) (2015). The FRMP 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 Flood Risk Management Plan (2015):

<https://www.gov.uk/government/publications/thames-river-basin-district-flood-risk-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/LIT_7540_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 reviewed and updated the RBMP in 2015 outlining the progress made since the previous plan and updating targets and planning for future changes.

Link to:

Thames River Basin Management Plan (2009):

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

Updated Thames River Basin Management Plan (2015):

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

A.3 SuDS Policy and Guidance

Ministerial Statement on SuDS

In accordance with the NPPF and PPG, all applicants for major developments must give priority to the provision of Sustainable Drainage Systems (SuDS) unless demonstrated to be inappropriate. The PPG also states that: *“When considering major development the local planning authority should consult the lead local flood authority on surface water drainage.”*

Additionally, the government published a ministerial statement ([HCWS161](#)) on sustainable drainage systems on 18 December 2014 whereby decisions on planning applications relating to major development must ensure that SuDS for the management of runoff are put in place, unless demonstrated to be inappropriate. The applicant must demonstrate that the proposed minimum standards of operation are appropriate and that there are clear arrangements in place for ongoing maintenance. The ministerial statement is currently referenced by Defra as Sustainable Drainage Systems Policy to be used in conjunction with the NPPF.

The LLFA role as statutory consultee to planning is created by the Town and Country Planning (Development Management Procedure) (England) Order 2015. Specifically Schedule 4 of this statutory instrument sets out the consultations before the grant of permission and paragraph (ze) states that the LLFA should be consulted on "major development with surface water drainage".

Under these arrangements, in considering planning applications, the RB of Greenwich planning team, as the LPA, will need to:

- Consult the flood risk management team (as the LLFA) on the management of surface water;
- Satisfy themselves that the proposed minimum 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.

The definitions of Major development are set out in the [Town and Country Planning \(Development Management Procedure\) \(England\) Order 2015](#):

- Residential development of 10+ dwellings or site area greater than 0.5 hectares
- Development of a building or buildings where the floor space to be created by the development is 1,000m² or more
- Development on a site exceeding 1ha in area

The requirement to include SuDS for the management of run-off applies to all Major developments unless otherwise deemed unsuitable. Developments in areas of flood risk should also give priority to SuDS. Any planning application for major development must contain the full design, construction, operation and maintenance details of a drainage system to manage surface water.

The London Plan

Policy 5.13 of the [London Plan](#) (2016) outlines requirements for development with regards to drainage and use of SuDS, as follows:

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

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

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

The [Sustainable Design and Construction Supplementary Planning Guidance \(2014\)](#) supports that developers will be expected to clearly demonstrate how all opportunities to minimise final site runoff, as close to greenfield rate as practical, have been taken. The minimum expectation for development proposals is to achieve at least 50% attenuation of the site’s (prior to re-development) surface water runoff at peak times. As noted above London Plan Policy 5.13 states that development should aim to achieve greenfield runoff rates.

Royal Borough Policy on SuDS

The RB of Greenwich sets additional requirements with regard to development and drainage, beyond those set out in national and regional policy. The RB of Greenwich requires all development sites exceeding 0.25ha in area to submit a SuDS strategy (see [Local Information Requirements List for Planning Applications](#)).

In addition, the RB of Greenwich see SuDS as an integral element to all development, including minor development, and actively encourage the incorporation of SuDS. As such, the RB of Greenwich is committed to work in partnership with developers to maximise the uptake and introduction of SuDS.

National Standards for Sustainable Drainage Systems (SuDS)

In March 2015 DEFRA produced guidance on the technical standards for sustainable drainage systems (SuDS), which should be used in conjunction with the NPPF and PPG. The document covers design, maintenance and operations of SUDS, and specifically covers guidance on:

- Reducing flood risk where practicable;
- Specific guidance for peak flow and volume control;
- Structural integrity and maintenance considerations;
- Construction considerations when connecting SuDS to existing infrastructure.

The Local Authority SuDS Officer Organisation (LASOO) produced guidance on the Non-Statutory technical standards for SuDS. The document covers guidance on:

- Runoff Destinations
- Flood Risk Outside Development
- Peak Flow Control
- Volume Control
- Flood Risk Within Development
- Structural Integrity
- Design for Maintenance Considerations
- Construction

Links to:

The National Technical Standards for Sustainable Drainage Systems (SuDS):

<https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards>

LASOO Non-Statutory Technical Standards for Sustainable Drainage:

http://www.susdrain.org/files/resources/other-guidance/lasoo_non_statutory_suds_technical_standards_guidance_2016_.pdf

SuDS Guidance and Best Practice

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

1. Minimising and/or mitigating flooding and other environmental risks arising from:
 - (i) Site surface water run-off as a result of rain falling onto the development site
 - (ii) Run-off conveyed across or arising on the site from other sources
2. Maximising the potential societal and environmental benefits arising from the:
 - (iii) Use of surface water run-off to protect and enhance local water resources and supplies
 - (iv) Contribution of surface water management systems in mitigating climate risks associated with urbanisation
 - (v) 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.
 - (vi) Repair, protection and enhancement of biodiversity.

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**Appendix B –
Contacting the Royal
Borough & Other Stakeholders**

B

Appendix B – Contacting the Royal Borough and Other Stakeholders

Royal Borough

To discuss any development plans relating to a 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, Highways Asset Group, Royal Borough of Greenwich

Telephone (available 9am – 5pm, Monday to Friday): 020 8854 8888

Write to: The Woolwich Centre, 35 Wellington Street, London SE18 6HQ

Environment Agency

National Customer Contact Centre

PO Box 544

Rotherham

S60 1BY

Email: enquiries@environment-agency.gov.uk

Telephone (available 8am – 6pm, Monday to Friday): 03708 506 506

Minicom: (for the hard of hearing) 03702 422 549

Thames Water

Thames Water

PO Box 286

Swindon

SN38 2RA

Email: customer.feedback@thameswater.co.uk

Telephone (available 8am – 8pm, Monday to Friday & 8am – 6pm Saturday): 0800 316 9800

Appendix C – Fees and Charge

C

Appendix C – Fees and Charges

Pre-Application Fees

The RB of Greenwich 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 to the RB of Greenwich for activity in an Ordinary Watercourse 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**.

Environmental Permit Fees

The [Environment Agency charges fees for a](#) Standard Rules or Bespoke Flood Risk Activity Permit.

For each permit application received:

- An application charge of £170 applies for the first activity (standard rule or bespoke);
- An additional charge of £40 applied for each subsequent activity (standard rules or bespoke).

Compliance charges

- A compliance charge of £70 applies for all types of permits (for any number of standard rule or bespoke activities).
- The charge is invoiced and becomes payable when the compliance check is carried out.
- The compliance charge applies for each year in which there is a compliance check. Normally there will be one compliance check for permitted flood risk activity. In some cases, for example, where permit conditions are ongoing over a period of time, we may need to carry out compliance checking on multiple occasions. Where this is the case, we will apply this charge once in each financial year in which compliance work is carried out.

Link to:

Environment Agency Environmental Permitting charging scheme:

<https://www.gov.uk/government/publications/environmental-permitting-ep-charges-scheme-april-2014-to-march-2015>

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**Appendix D – Guidance for
Producing a Simple Flood Risk
Assessment**

D

Appendix D – Guidance for Producing a Simple Flood Risk Assessment

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 RB of Greenwich, 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](#)¹⁵ contains information on which developments require a Flood Risk Assessment (FRA), why a FRA needs to be completed, and how to complete a FRA, and should be consulted when you are completing a 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 RB of Greenwich 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 Flood Zone 2 or 3 of [areas at risk of flooding from rivers or the sea](#) – see section below for further information;
- changes in the use of land or buildings in a place at risk of flooding from rivers or the sea (as classified by the Environment Agency), or with critical drainage problems as classified by the EA;
- 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, and/or;
- is larger than 1 hectare;

These requirements are described more fully in [footnote 20 of the National Planning Policy Framework \(NPPF\)](#) and the [Planning Practice Guidance \(PPG\)](#) on flood risk.

Why do you need to complete a FRA?

You must complete a FRA so that the RB 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 RB of Greenwich will use this information to consider your planning application.

¹⁵ Environment Agency website – Planning Applications: Assessing Flood Risk. Available: <https://www.gov.uk/planning-applications-assessing-flood-risk>

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 selecting the Flood Map for Planning (Rivers and Sea). Alternatively, the [long-term flood risk assessment search tool](#) can be used to navigate to the map of river and sea flood risk.

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 RB of Greenwich. 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 RB of Greenwich websites:

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

[Chapter 2](#) 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 RB of Greenwich 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
Zone 3 (high risk)	Dark blue	Domestic, commercial and industrial extensions less than 250m ³

A simple FRA may often take the form of a short written statement. The following information is a guide to arriving at that statement.

Descriptor	Notes
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) or https://flood-warning-information.service.gov.uk/long-term-flood-risk/ and select view map of river and sea risk. Enter your postcode or place name to find out which flood zone your site is in.

Descriptor		Notes
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?	<p>You can check with Environment Agency or RB of Greenwich for information. The Government requires protection from flood risk to new development to be a minimum of 1 in 100 year (1% AEP) for river flooding and 1 in 200 year (0.5% AEP) for sea flooding.</p> <p>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.</p>
iv.	What other flood risks are there to your site?	<p>List out any other known risks from surface water, groundwater, small watercourses or ditches, and reservoirs.</p> <p>Information on these risks can be found through the Environment Agency website (http://maps.environment-agency.gov.uk/wiyby) through the long term Flood Risk search tool (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). These searches enable the viewing of maps showing risk of flooding from surface water and reservoir. Additional information can be found in published flood risk documents on the Royal Greenwich website including:</p> <p>Royal Greenwich Strategic Flood Risk Assessment (SFRA) – The document for which this report is an appendix.</p> <p>Royal Greenwich Local flood Risk Management Strategy (LFRMS)</p> <p>Royal Greenwich Preliminary Flood Risk Assessment</p> <p>See Chapter 2.4 of the Royal Greenwich Developers Guidance for Flood Risk for a full list of available data / studies.</p>
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.e. finished floor levels, ground levels and road levels - to ordnance datum.
vii.	How will surface water be drained?	<p>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.</p> <p>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.</p>

Descriptor		Notes
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.	<p>For further information see the following guidance documents and / or websites:</p> <p>Improving the Flood Performance of New Buildings - Flood Resilient Construction Guidance hierarchy: Flood Avoidance, Flood Resistance and Flood Resilience</p> <p>Environment Agency website</p> <p>National Flood Forum website</p> <p>Six Steps to Property Level Flood Resilience</p>

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 RB of Greenwich 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

Flood Risk Manager, Highways Asset Group,
Royal Borough of Greenwich

Write to: The Woolwich Centre, 35 Wellington
Street, London SE18 6HQ

Telephone: 020 8854 8888
Monday to Friday, 9am to 5pm

Environment Agency

Customer Service Centre

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**

E

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

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?

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.

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.

Climate change	
a.	How is flood risk at the site likely to be affected by climate change?

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).

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.

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?

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.	<p>If the development is in an area protected by flood defences, but has a high residual risk classification, the following must be provided:</p> <ul style="list-style-type: none"> – 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.

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
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. Finished floor levels and predicted flood levels should also be included within the plan.

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**Appendix F – SuDS Guidance
and Best Practice**

F

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 (C753) – **CIRIA 2015.**
- SuDS in London: a Design Guide – **Transport for London, 2016.**
- Non Statutory Technical Standards for Sustainable Drainage – LASOO
http://www.susdrain.org/files/resources/other-guidance/lasoo_non_statutory_suds_technical_standards_guidance_2016_.pdf
- Retrofitting to Manage Surface Water (C713) – **CIRIA, 2012.**
- Designing for exceedance in urban drainage - good practice (C635) – **CIRIA, 2006.**
- Managing urban flooding from heavy rainfall - encouraging the uptake of designing for exceedance - Recommendations and summary (C738a)
- Trees in Hard Landscapes: A Guide for Delivery – **Trees and Design Action Group, September 2014.**
- Greener Greenwich Supplementary Planning Document – **Royal Borough of Greenwich, March 2014.**
-
- 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

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 and Australia. Any guidance used, and where it is available, should be referenced so it can be checked for suitability.

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