Peterborough Draft Flood and Water Management Supplementary Planning Document (SPD)

This document is a version for Cabinet consideration on 17 June 2019. If approved by cabinet on 17 June, and if the Peterborough Local Plan is adopted by Full Council on 24 July 2019, then this text box will include the following text on the final publication SPD:

This supplementary Planning Document was approved by a meeting of Peterborough City Council's Cabinet on 17 June 2019, and brought into effect as an adopted document for the purpose of decision making on 25 July 2019.

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CONTENTS

1 Introduction…….. 1
1.1 Background…… 1
1.2 How to use this supplementary planning document……... 2
2 Setting the scene…… 4
2.1 Legislation, policy and guidance…… 4
2.2 Local context…… 5
2.3 National context…… 7
2.4 European context…… 9
3 Consultation with water and flood risk partners…….. 9
3.1 Principal water management partners and areas of interest…… 9
3.2 Pre-application advice…… 10
3.3 Contact information…….. 10
4 Site selection for sites within flood zones…….. 13
4.1 Introduction…… 13
4.2 Site vulnerability…… 13
4.3 Need for Sequential Test…… 13
4.4 Passing the relevant tests…….. 13
4.5 Consult city council…….. 16
4.6 Need for flood risk assessment…… 17
4.7 Water management consultees…… 18
4.8 Content of flood risk assessment…….. 18
4.9 Conclusions – responsibilities…… 19
5 Managing and mitigating risk…….. 21
5.1 Measures to control flood risk…… 21
5.2 Managing the residual risk…….. 24
6 Managing surface water drainage…….. 26
6.1 Introduction…… 26
6.2 Information for householder development …… 27
6.3 Consistency with FRA…….. 28
6.4 Drainage sub catchment…… 28
6.5 Submission and evidence requirements…… 29
6.6 Design principles…… 30
6.7 Requirements for surface water leaving a site…… 34
6.8 Water quality, biodiversity and habitat requirements……... 36
6.9 Health and safety, access and amenity requirements…… 38
6.10 Adoption and maintenance…….. 40
7 Water quality and aquatic environments…….. 41
7.1 Introduction…… 41
7.2 Requirements of the Water Framework Directive…… 41
7.3 Assessment of the impacts…… 45
7.4 How do people and development influence the WFD status of rivers?..... 45
7.5 Water supply, demand, abstraction and wastewater discharge…….. 46
7.6 Site drainage…… 47
7.7 Development location…… 48
7.8 Highways…….. 49
7.9 Land contamination…… 49
7.10 Minerals and waste planning…… 49
7.11 Tourism, recreation and navigation…….. 50
7.12 Community engagement…… 50
8 Consents and permissions…… 51
8.1 When is consent required for works affecting watercourses?..... 51
9 Implementation and monitoring…… 53
9.1 Delivery partners…….. 53
Appendix A - Internal Drainage Board areas…… 54
Appendix B - Using Sustainable Drainage Systems…….. 55
Appendix C - Water Framework Directive Assessment Guidance…….. 58

Appendix D - Glossary and acronyms…….……. 60
Appendix E - Sequential and Exception test criteria…….. 63

Abbreviations

Defra	Department for Environment, Food and Rural Affairs
DPD	Development Plan Document
FRA	Flood Risk Assessment
FWMA	Flood and Water Management Act (2010)
IDB	Internal Drainage Board
LDF	Local Development Framework
LLFA	Lead Local Flood Authority
NPPF	National Planning Policy Framework
PFRA	Preliminary Flood Risk Assessment
PPG	Planning Policy Guidance
SAB	Sustainable Drainage Systems Approving Body
SFRA	Strategic Flood Risk Assessment
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
WFD	Water Framework Directive
WRC	Water Recycling Centre

1 Introduction

1.1 Background

1.1.1 This Supplementary Planning Document (SPD) provides further guidance to support policy LP32 of the Peterborough Local Plan (July 2019) and focuses on managing flood risk and the water environment in and around new developments in Peterborough. In order to reduce the likelihood and consequences of flooding, it is necessary that development is located in a safe environment with appropriately designed and maintained drainage networks. This SPD is a material consideration in planning decisions.

1.1.2 It is predicted that climate change will bring more frequent short duration, high intensity rainfall and more frequent periods of long-duration rainfall, this combined with the additional pressures on the existing drainage network means both river and surface water flooding are likely to be an increasing problem. Realisation of this increased flood risk across the nation has led to the creation of the Flood and Water Management Act which caused Peterborough City Council to become a Lead Local Flood Authority. Firm application of national and local planning policy should mean risks can be managed allowing sustainable development to continue.

1.1.3 Under the Water Framework Directive water environments must also be protected and improved with regards to water quality, water habitats and biodiversity. There are also protective designations on a number of important sites across Peterborough.

1.1.4 Developers should initially consider the advice provided in this SPD. Thereafter, the city council offers a pre-application service. Further information on this service can be found on the city council's planning web pages[1].

1.1.5 To ensure that Peterborough has a consistent, locally appropriate approach to flood risk management, the SPD should be used by:

- developers when selecting new sites for development
- developers when preparing the brief for their design team to ensure drainage and water management schemes are sustainably designed
- consultants when carrying out site specific flood risk assessments
- design teams preparing masterplans, landscape and surface water drainage schemes
- development management officers when determining delegated planning applications, making recommendations to Committee and drawing up S106 obligations that include contributions for Sustainable Drainage Systems (SuDS)

1 https://www.peterborough.gov.uk/council/planning-and-development/

1.2 How to use this supplementary planning document (SPD)

This step by step guide aims to help guide developers and their agents through assessing the water environment considerations for new developments. The objectives are to ensure that the location and delivery of a development are sustainable and that no adverse effects to the water environment are created over the lifetime of the development.

Whatever stage the development is at, from master planning and pre application through to detailed design and construction we would recommend an early and continued conversation is had with the city council planning department, the necessary water management authorities and any organisation adopting the constructed drainage to ensure a smooth transition through this process.

The city councils pre-application advice service is provided by the Local Planning Authority and includes comments from bodies within the council such as the Lead Local Flood Authority. Other organisations such as the Environment Agency (EA), Internal Drainage Boards (IDBs) or Anglian Water (AW) would need to be contacted separately for their advice.

Step 1 – Development type and vulnerability

Confirm the type of development and its level of vulnerability, section 4.2.1, page 13. **Go to Step 2**

Step 2 – Assessment requirements

If the development type and location are allocated in the Local Plan then the applicant should check that the level of flood risk is unchanged from what is shown in the Strategic Flood Risk Assessment (SFRA). If the level of flood risk is unchanged then there will be no need for the site to pass through any sequential tests (section 4.3.1, page 18) but a site specific flood risk assessment may be required. **Go to Step 4**

If the site is not identified in the Local Plan or the level of flood risk has changed since the production of the SFRA it will mean the developer is required to pass a sequential test section 4.3.2, page 13. **Go to Step 3**

Step 3 – Sequential and Exception Tests

The **sequential** test looks to assess the site selection and potential vulnerability of the site against all sources of flood risk to ensure that development is appropriate section 4.4, page 13. **If a sequential test can be passed then go to step 4, if it cannot be passed then an exception test will be required, see below.**

The **exception** test requires the development to achieve wider sustainability benefits that outweigh the flood risk and demonstrate through a site specific flood risk assessment that flood risk can be managed and will not adversely affect adjacent property**. A site requiring an exception test will always require a Flood Risk Assessment, therefore if an exception test can be passed go to step 5.**

Step 4 – Is a Flood Risk Assessment (FRA) required?

Section 4.6, page 17 provides details of when a FRA is required for a site, this includes references to the requirements of the National Planning Policy Framework (NPPF), the EA and Middle Level Commissioners (MLC). These requirements apply to all sites including those which have passed through a sequential test. It is advised that the developers check the planning history for any site specific requirements which have been previously identified. **Go to step 5**

Step 5 – Pre-Application Consultations, FRA and Drainage Strategy

At this point we would recommend that the developer continue their consultation with the city council and also start to consult directly with other water management authorities such as the EA, IDBs or AW. Section 4.7, page 18.

This will help to set the scope of contents for the FRA and Drainage Strategy whilst also identifying any local knowledge of site constraints and highlighting permissions that may be required outside of the planning process to enable the development to take place.

A number of these considerations are detailed within the SPD including;

- Site characteristics and constraints (6.5, page 29)
- Design Principles (6.6, page 30)
- Where the water goes (6.7, page 34)
- Water Environment (6.8, page 36)
- Health and safety (6.9, page 40)
- Adoption and maintenance (6.10, page 41)
- Water Framework Directive assessment (7.2, page 41)
- Land contamination (7.9, page 49)
- Minerals and waste (7.10, page 49)
- Tourism, recreation and navigation (7.11, page 50)
-

For example a separate permission would be required from the owner of any sewer or watercourse that a developer intends to utilise to drain the site chapter 8, page 51.

Crucially the work carried out as a part of the FRA will inform the site design and feed into the Development of the Drainage Strategy. Guidance on what should be included within a FRA is described within section 4.8.4, pages 18 and 19.

At an early stage the Sustainable Drainage (SuDS) design principles should be set out with confirmation that the rainwater hierarchy has been followed. The SuDS solutions onsite can then be further developed as a part of the strategy and in consultation with the council and its partners. It is important to remember that when delivering the Drainage Strategy the SuDS on site should look to achieve multiple benefits.

2 Setting the scene

2.1 Legislation, policy and guidance

2.1.1 Flood and water management in Peterborough is influenced by legislation, national and local policy, technical studies and local knowledge. Figure 2 1 below attempts to summarise the main contributing documents with the rest of the chapter providing some brief commentary.

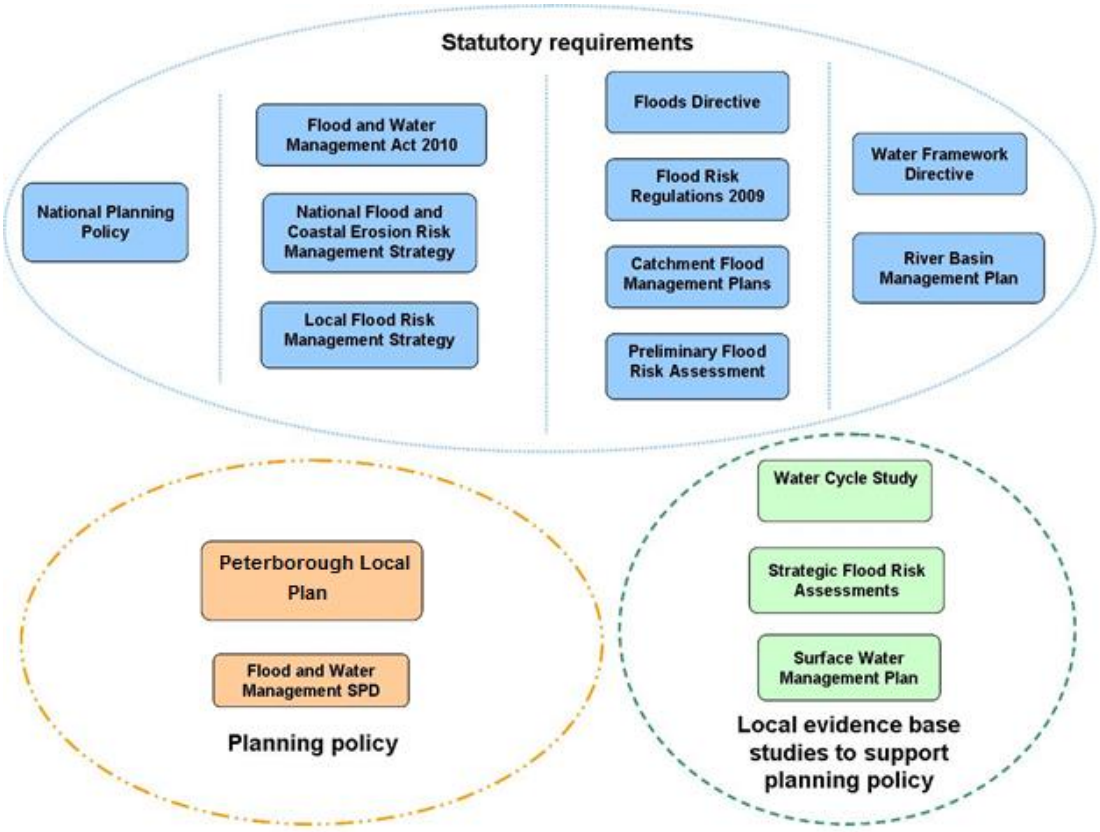


Figure 2 1: Linkages between relevant flood risk management documents and legislation

2.2 Local context

Local flood risk sources in Peterborough

2.2.1 Flood risk in Peterborough occurs from a variety of sources. These include:

- main rivers (18 of the watercourses in Peterborough, of a variety of sizes, have been classified as main river)
- ordinary watercourses
- surface runoff
- groundwater (high water table)
- reservoirs
- the sewerage network – sewers, rising mains and pumping stations

2.2.2 Landscape and flood risk characteristics vary across Peterborough. Notably the Fens area to the north and east varies from the rest of Peterborough because it is managed by Internal Drainage Boards (IDBs). In the 17th century the Fens were drained and IDBs now continuously manage the water levels in these areas. Without such management, the Fens would once again flood over.

The role of Peterborough City Council

2.2.3 The Lead Local Flood Authority (see 2.3.1, page 7) act as a statutory consultee on local flood risk as well as working with the Local Planning Authority to ensure that sustainable drainage systems (SuDS) are delivered on all major development. The council also continue to manage flood risk through their roles as a Land Drainage Authority and Local Highways Authority. The city council works with a wide range of other water and risk management partners in order to deliver its aims and duties in a co-ordinated way. Developing relevant planning policy and co-ordinating management procedures are important parts of reducing flood risk and ensuring that developments are appropriately drained.

The Environment Agency and Catchment Flood Management Plans

2.2.4 The Environment Agency has prepared catchment based guidance to ensure that main rivers and their respective flood risk have been considered as part of the wider river system in which they function. Catchment Flood Management Plans (CFMPs) discuss the management of flood risk for up to 100 years in the future by taking into account factors such as climate change, future development and changes in land management. As well as informing councils' planning policy and local flood management practises, the CFMPs will be part of the mechanism for reporting into the EU Floods Directive. The relevant CFMPs for Peterborough are for the River Nene, River Welland and River Ouse and these can all be accessed on the Environment Agency's Catchment Flood Management Plan web pages[2].

Peterborough Water Cycle Study and Strategic Flood Risk Assessment

2.2.5 The combined Water Cycle Study and Strategic Flood Risk Assessment (January 2018)[3] for Peterborough sets out a range of recommendations. Linked to some of those recommendations, guidance in this SPD is provided on:

- creating a link between development, the Water Framework Directive and biodiversity priorities
- ensuring there is consideration of the capacity of the existing drainage network
- use of SuDS including the incorporation of green roofs, permeable pavements, swales and attenuation schemes

[2] https://www.gov.uk/government/collections/catchment-flood-management-plans

[3] http://www.peterborough.gov.uk/waterdocuments

2.2.8 The WCS and SFRA document provides the essential information on allocated sites including; flood risk, water supply, waste water management and biodiversity and conservation considerations. This allows the sequential test to be properly applied. SFRAs produced for Peterborough are available online on the city council's web library of water management documents[3].

Peterborough Preliminary Flood Risk Assessment

2.2.9 The Peterborough Preliminary Flood Risk Assessment (PFRA) is a statutory document completed under the European Floods Directive. The PFRA process is aimed at providing a high level overview of flood risk from local flood sources, including surface runoff, groundwater, ordinary watercourses and public sewers. It is not concerned with flooding from main rivers or the sea.

2.2.10 The Peterborough PFRA report of June 2011 and subsequent addendum of 2017, confirms (based on the evidence collected) that there is no 'Flood Risk Area' of national significance within Peterborough's administrative area. However, the PFRA recognises that there are areas of flood risk with local significance that need further exploration. This is being undertaken as part of the Local Flood Risk Management Strategy (LFRMS)

Peterborough Local Flood Risk Management Strategy

2.2.11 The city council has adopted its LFRMS[3] (which is one of its duties under the FWMA). The strategy sets actions to increase understanding and partnership work to tackle issues of flood risk in Peterborough. This focuses on addressing existing risks and highlights known local issues which may influence the delivery of new developments.

Local planning policy

2.2.12 The Peterborough Local Plan (July 2019) sets out the overall growth target of the city to 2036 and identifies sites delivery the growth targets.

This SPD provides detailed guidance to help implement the following policies:

- LP28 - Biodiversity and Geological Conservation
- LP32 - Flood and Water Management
- LP34 - Development on Land Affected by Contamination

2.3 National context

Flood and Water Management Act 2010

2.3.1 The Flood and Water Management Act (FWMA) places the responsibility for co-ordinating 'local flood risk' management on the county or unitary authority, making them a Lead Local Flood Authority (LLFA). In this context, the Act uses the term 'local flood risk' to mean flood risk from:

- surface runoff
- groundwater and
- ordinary watercourses

2.3.2 Peterborough City Council is a LLFA. The FWMA contains a range of different duties for LLFAs, including the need to prepare a Local Flood Risk Management Strategy.

2.3.3 The Act did seek to encourage the uptake of sustainable drainage systems (SuDS) by agreeing new approaches to the management of drainage systems and providing for LLFAs to adopt SuDS for new developments and redevelopments. At the time of writing this part of the Act was not enacted and alternative arrangements have been provided through the Town and Country Planning Order.

Ministerial Statement on SuDS

2.3.4 A Ministerial Statement[4] was issued in December 2014 to *'make clear that the Government's expectation is that sustainable drainage systems will be provided in new developments wherever this is appropriate.'* This change took effect from 6th April 2015.

Non Statutory Technical Standards for Sustainable Drainage Systems

2.3.5 In March 2015 the Department for Environment, Food and Rural Affairs released the Non Statutory Technical Standards for Sustainable Drainage Systems[5]. These standards address the design, maintenance and operation of SuDS.

National planning policy

2.3.6 Section 14 of the National Planning Policy Framework (NPPF) of 2019 sets out the government's intention that planning should proactively help mitigation of, and adaption to, climate change including management of water and flood risk.

2.3.7 In 2019 the Government updated the NPPF, in this latest version Flood Risk is covered in Section 14, Paragraphs 155 to 165. The NPPG to support this is due to be updated and released in 2019.

2.3.8 The NPPF states that both Local Plans and planning applications decisions should ensure that flood risk is not increased and that development should only be considered appropriate in flood risk areas where it can be demonstrated that:

- a site specific flood risk assessment has been undertaken which follows the Sequential Test, and if required, the Exception Test;
- 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;
- development is appropriately flood resilient and resistant, including safe access and escape routes where required;
- it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;
- that any residual risk can be safely managed; and
- safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

[4]http://www.parliament.uk/documents/commons-vote-office/December%202014/18%20December/6.%20DCLG-sustainable-drainage-systems.pdf

[5] https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards

2.3.9 In 2012 the Government replaced the NPPF Technical Guidance with national Planning Practice Guidance (NPPG) to support the NPPF. The 2012 NPPG will need to continue to be used until such time as the guidance is published to support the updated 2019 NPPF. The PPG for Flood Risk and Coastal Change[6] advises on a series of tests that need to be met to ensure these risks are adequately considered for a development to be permitted. This includes steps to:

- assess the level the risk through Strategic Flood Risk Assessments and site specific flood risk assessments
- avoid the risk through sequential testing
- manage and mitigate against the risk using resilient design whilst incorporating flood risk management measures in developments

2.3.10 Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

- take account of advice from the lead local flood authority;
- have appropriate proposed minimum operating standards;
- have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
- where possible, provide multifunctional benefits.

Town and Country Planning Procedure Order 2015

2.3.11 The Lead Local Flood Authority became a statutory consultee through this order from 15th April 2015[7] and relates to surface water on major development.

2.4 European context

The Floods Directive

2.4.1 The EU Floods Directive - 2007/60/EC came into force due to a need for European Union countries (member states) to better understand and gather accurate data about the risks from surface water flooding. In the UK the Directive came into force via the Flood Risk Regulations 2009 which in turn sets the requirement for Preliminary Flood Risk Assessments (PFRA) to be produced by all unitary and county councils. Peterborough's PFRA is discussed below under the heading on local background.

The Water Framework Directive

2.4.2 The Water Framework Directive – 2000/60/EC (WFD) is a piece of EU legislation that came into force in December 2000 and was enacted into UK law in December 2003. The legislation requires member states to make plans to protect and improve the water environment. It applies to all surface freshwater bodies, including lakes, streams, rivers and canals; transitional bodies such as estuaries; groundwater; and coastal waters out to one mile from low water. There are four main aims of the WFD which are to:

- improve and protect inland and coastal waters drive wiser
- promote sustainable use of water as a natural resource
- create better habitats for wildlife that lives in and around water
- create a better quality of life for everyone

2.4.3 The Directive requires European Union member states to:

[6] https://www.gov.uk/guidance/flood-risk-and-coastal-change

[7] http://www.legislation.gov.uk/uksi/2015/595/pdfs/uksi_20150595_en.pdf

- prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- aim to achieve at least 'good ecological status' for all water bodies by 2015. If a water body has good ecological status it means that it has biological, chemical and structural characteristics similar to those expected under nearly undisturbed conditions. Where it is not possible to achieve this by 2015, and subject to criteria set out in the directive, aim to achieve good ecological status by 2021 or 2027;
- meet the requirements of the Water Framework Directive Protected Areas;
- promote sustainable use of water as a natural resource;
- conserve habitats and species that depend directly on water;
- progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants;
- contribute to mitigating the effects of floods or droughts.

2.4.4 River Basin Management Plans produced by the Environment Agency detail the pressures facing the water environment and what actions need to be taken in order for the WFD to be met in each area. The Anglian River Basin Management Plan 2009[8] covers Peterborough.

3 Consultation with water and flood risk partners

3.1 Principal water management partners and areas of interest

3.1.1 The city council recognises the importance of sharing expertise and information to be able to deliver effective and timely decisions. Flood risk should be factored into the earliest stages of applications and decisions.

3.1.2 A list of consultees and the relevant water related topics on which either the city council or the developer may need to consult them is presented in table 3-1.

Peterborough City Council

3.1.3 To date Schedule 3 of the Flood and Water Management Act 2010 has not been enacted, as such the anticipated SuDS Approving Body is not in place. April 6th 2015, Peterborough City Council as a Lead Local Flood Authority became statutory consultees for surface water flood risk to the Local Planning Authority. The city council manage a number of SuDS across the area and continue to adopt SuDS in new developments.

Drainage authorities in fenland areas

3.1.4 A large proportion of Peterborough is part of the Fen landscape and is specially managed to ensure that the area retains its significant agricultural, leisure and residential functions. The management is generally undertaken by Internal Drainage Boards (IDBs). IDBs are a type of operating authority which is established in areas of special drainage needs in England and Wales with permissive powers to undertake work to manage water levels within drainage districts.

3.1.5 There are four Risk Management Authorities managing the water levels in the fenland areas within the area of Peterborough City Council: North Level District IDB, Welland and Deeping IDB, Whittlesey and District IDB and the Middle Level Commissioners. The areas of each authority are illustrated in appendix A. Middle Level Commissioners is not technically an Internal Drainage Board but a Statutory Corporate. For ease of reference the Middle Level Commissioners have however agreed that the term IDB may be used loosely throughout this document to refer to all of the relevant drainage authorities.

Environment Agency

[8] https://www.gov.uk/government/collections/river-basin-management-plans-2015#anglian-river-basin-district-rbmp:-2015

3.1.6 The Environment Agency is non departmental public body and has responsibilities for protecting and enhancing the environment as a whole (air, land and water) and contributing to the government's aim of achieving sustainable development in England and Wales. The Environment Agency manages flood risk from main rivers, but also has a strategic overview role across all types of flooding.

3.1.7 The Environment Agency has produced a list which details when it needs to be consulted on specific issues. This consultation guide[9] is available on the Environment Agency website.

3.1.8 The Environment Agency has created standing advice[10] to help determine when they should be consulted. This is aimed at Local Authorities but could be of use to developer teams. For the larger, more complex developments, standing advice is not sufficient and the Environment Agency should be consulted on the development application with an accompanying FRA. For some, generally smaller, development types the city council makes its decision without advice from the Agency.

Water and sewerage provider

3.1.9 As the water and sewerage company in Peterborough, Anglian Water Services Limited has the responsibility to maintain foul, surface and combined public sewers so that they can effectively drain the area. When flows are proposed to public sewers, Anglian Water needs to ensure that the public system has capacity to accept these flows. This is therefore assessed when a developer applies for a sewer connection. Information about Anglian Water's development service is available on their website[11].

3.1.10 The Flood and Water Management Act 2010 intended to remove a developer's automatic right to discharge surface water to a public sewer. To date this has not been enacted.

3.2 Pre-application advice

3.2.1 Many of Peterborough's water management partners provide a pre-application advice service. There may be a charge for this service. The more information provided to the organisation about the site, its location and the proposed discharge points and drainage system, the better their advice can be. Some of the organisations have a specific form which needs completing. Peterborough City Council offer a pre-application service which is discussed in section 4.5 page 16.

3.3 Contact information

3.3.1 Table 3-1 provides an overview of the principal organisations which may need to be consulted during the development of a planning application. This list is not exhaustive.

3.3.2 Contact information and links for partner organisations are included on the city council's water management web pages[12].

[9] https://www.gov.uk/guidance/developers-get-environmental-advice-on-your-planning-proposals
[10] https://www.gov.uk/guidance/flood-risk-assessment-local-planning-authorities
[1111] http://www.anglianwater.co.uk/developers/planning-services.aspx
[12] http://www.peterborough.gov.uk/water

Table 3-1: A simplified table of partner organisations with which it would be useful to consult during preparation of the water related elements of a planning application.

Organisation	Flood risk	Drainage (quantity and quality)	Land contamination	Water habitat (WFD, biodiversity)
Environment Agency (EA)	The Environment Agency should be consulted on any development on land of one hectare or more and any development requiring Environmental Impact Assessment. They are also consulted on specifically water related issues as detailed below:			
	All major and residential minor development sites within Flood Zones 2 or 3, sites within Flood Zone 1 that have been previously identified as having drainage issues and sites within 20m of a main river.		Where risk exists that pollution of controlled waters (includes groundwater) may occur or may have occurred in the past.	Where the city council thinks there may be a risk of deterioration in WFD potential of freshwater systems
Internal Drainage Boards (IDBs)	Development in the Fens or where development may affect or use an IDB managed watercourse – see appendix A			
Anglian Water Services (AW)	Foul and/or surface water flood risk	Connection to surface water sewers or regarding foul discharge	Where flows to the public sewerage system may be affected.	
Peterborough City Council (PCC) –through the pre-application service or the application process	Surface water risk - Drainage Team/ Lead Local Flood Authority Residual risk - Emergency Planning Team	Site drainage - Drainage Team Highway drainage – Drainage Team and Highway Control	Risk to human health and property – Strategic Regulatory Services	Biodiversity, wildlife, WFD - Natural Environment Team
English Heritage	Where flood risk, drainage or contamination may affect a listed building, a conservation area or a Scheduled Ancient Monument.			
Natural England	Development is within or affecting a County Wildlife Site, SSSI, RAMSAR, SAC, SPA or protected species			
Wildlife Trust				Within or affecting a County Wildlife site, protected species or urban wildlife.

Organisation	Flood risk	Drainage (quantity and quality)	Land contamination	Water habitat (WFD, biodiversity)
Cambridge and Peterborough Local Resilience Forum (includes Emergency Services)	Where residual flood risk exists on larger sites or those with vulnerable users			
Highways England	surface water flood risk			
Other organisations	Other organisations may need to be consulted depending on issues arising on site.			

It should be noted at this point that developers may require consents or permissions from the organisations detailed above which lay outside of the planning process. More information on this is available in Chapter 8 of this document.

4 Site selection for sites within flood zones

4.1 Introduction

4.1.1 The aim of this section is to give advice to developers and decision makers on how to address flood risk in the planning process and implement the requirements of policy Local Plan LP32 (Flood and Water Management). The flow chart in section 1.2, page 2 sets out the steps a developer should take. This section applies to all scales of development. Explanatory notes are also provided, where necessary, for each of the steps. The notes in 4.2 to 4.9 below explain what is meant and/or required by steps 1-5 in the flow chart in section 1.2.

4.2 Site vulnerability

4.2.1 Identify how 'vulnerable' the proposed development is using the vulnerability classification in table 2 of the Technical Guide to the National Planning Policy Framework (2012)[13]. This is important because different types of development are acceptable in different flood risk situations. In simple terms, the more vulnerable the development type is, the more important it is to locate it in areas of the lowest possible flood risk.

4.3 Need for Sequential Test

4.3.1 **Are the type and location of development specifically allocated in the Local Plan?** If the site has been specifically allocated in the city council's Local Plan for the same land use type that is now being proposed, then an assessment of flood risk, at a strategic level, has already been done. This will have included assessing the site, against other alternative sites, as part of a sequential approach to flood risk.

4.3.2 **Are the vulnerability classification and flood zones still compatible?** However, there is a small chance that there has been a material change in the flood zoning of the development site since the adoption of the relevant part of the Local Plan. The site must therefore also pass confirm the vulnerability classification and flood zones are still compatible with the proposed development as set out in the National Planning Practice Guidance. For example, the site may have moved, in whole or part, from one flood band to another. If this has occurred, and the site has moved to a higher risk zone (e.g. from Flood Zone 1 to Flood Zone 2), it will be necessary to demonstrate that the proposed development passes the Sequential Test (see below).

4.3.3 While the Sequential Test covers all sources of flood risk, the flood zones are the starting point. Flood zones refer to the probability of sea and river flooding only, ignoring the presence of existing defences. To check whether there has been a change in flood zoning, please contact the Environment Agency. Flood Zones 2 and 3 are shown on the online Environment Agency Flood Map[14], with Flood Zone 1 being all the land falling outside Flood Zones 2 and 3. Peterborough's SFRA sets out which areas of Peterborough are protected by formal flood defences and assesses the hazard associated with the failure of these defences. This information should inform the Sequential Test and if necessary, the Exception Test – see 2.2.5, page 5 for more details on the SFRA.

4.4 Passing the relevant tests

Flood Risk Sequential Test (a sequential approach to site selection)

4.4.1 The Sequential Test is about applying a sequential approach to site selection putting sites with no or low flood risk ahead of those at higher risk. This applies for all sources of flood risk, as clarified by paragraph 101 of the NPPF and the accompanying Planning Practice Guidance for flood risk and coastal change.

[13] http://www.communities.gov.uk/documents/planningandbuilding/pdf/2115548.pdf
[14] https://flood-map-for-planning.service.gov.uk/

4.4.2 The starting point for the Sequential Test is the risk of sea and river flooding. If the site is within Flood Zone 2 or Flood Zone 3 the Sequential Test steps described by the NPPF[15], the agreed Sequential Test Process[16] note and 4.4.3 to 4.4.7 of this chapter should be undertaken.

4.4.3 Using the table below, developers are required to check whether the vulnerability classification of the proposed land use is appropriate to the flood zone in which the site is located. Table 4-1 taken from the Planning Practice Guidance[17] also shows when an Exception Test will be required.

4.4.4 However, this table cannot be taken as the final answer to whether or not a development is appropriate; the Sequential Test (and the Exception Test, where necessary) must be completed in full for all sources of flood risk. For example, if a 'more vulnerable' development is proposed to be located on a site in Zone 2 (and hence receives a ☑ in table 4-1) it will then be necessary for this site to be compared to other reasonably available similar sites within lower risk areas (i.e. for this example in Flood Zone 1).

4.4.5 For the comparison of reasonable available sites within the city centre the area of search will be Peterborough's city centre boundary. For regional infrastructure the area of search will be the East of England, Northamptonshire and Lincolnshire. For all other sites the area of search is the Peterborough Unitary Authority area. More details on how to search for comparable sites can be found in Appendix E.

4.4.6 The definition of the functional floodplain is land where water has to be stored in times of flood. It includes the land which would flood with an annual probability of 4% (1 in 25) and the associated water conveyance routes and flood storage areas (sometimes referred to as washlands). The annual probability has been formally agreed for Peterborough by Peterborough City Council and the Environment Agency, as recommended by national policy.

Table 4-1: Flood risk vulnerability and flood zone compatibility
(source: Flood Risk and Coastal Change Planning Practice Guidance, Paragraph 67, Table 3, March 2014)

Flood risk vulnerability classification	Essential infrastructure*	Water compatible*	Highly vulnerable*	More vulnerable*	Less vulnerable*
Zone 1	☑	☑	☑	☑	☑
Zone 2	☑	☑	Exception Test required	☑	☑
Zone 3a	Exception Test required	☑	X	Exception Test required	☑
Zone 3b 'functional flood plain'	Exception Test required	☑	x	x	X
Key: ✓= Development may be appropriate **x** = Development should not be permitted					

4.4.7 Once these steps have been undertaken, other sources of flood risk for the site must then be discussed. While there are not yet clearly agreed flood bands for other types of flooding, the Environment Agency has produced strategic scale modelling that may be of use in considering the risk both from surface water and groundwater flooding. The current mapping datasets in use are known as: the Flood Map for Surface Water; Areas Susceptible to Surface Water Flooding and

[15] https://www.gov.uk/government/publications/national-planning-policy-framework--2
[16] https://www.gov.uk/guidance/flood-risk-assessment-the-sequential-test-for-applicants
[17] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf

Areas Susceptible to Groundwater Flooding. Since the data is relatively new, it is updated regularly and those wishing to use the data should always enquire as to the latest version available and how this is being interpreted for Peterborough. The maps should be used in conjunction with discussions with the city council about any known surface, ordinary watercourse or groundwater issues.

Sequential approach to site layout

4.4.8 When designing a site layout, it is important that a sequential approach to flood risk is also used within the site, i.e. locating development in the areas of lowest flood risk within the site boundary. Use table 4-1 to guide this exercise.

Exception Test

4.4.9 As shown in table 4-1, the Exception Test can be applied in a number of instances. Application of the Exception Test ensures that new developments which are needed in medium or high flood risk areas will only occur where flood risk is clearly outweighed by other sustainability factors and the development will be safe for its lifetime, taking climate change into account. For the Exception Test to be passed:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared (see Appendix E for more guidance); and
- the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and , where possible, will reduce flood risk overall.

4.4.10 Peterborough City Council advises the use of the outcomes set within the Greater Peterborough Partnership Sustainable Community Strategy 2008-21 as the framework for demonstrating whether or not wider sustainability benefits can outweigh flood risk. There are sixteen outcomes (listed on page 11 and 12 of the Strategy) against which the development should be scored. These outcomes are those that Peterborough wishes to see delivered in order to benefit its communities. The Sustainable Community Strategy[18] has been adopted by the city council and its partners as the overarching and guiding strategy for Peterborough.

4.5 Consult city council

4.5.1 The city council offers a pre-application service that covers planning applications and sustainable drainage information. Further information on this service can be found on the city council's pre-application advice web page[19]. Developers are advised to use this service to discuss any potential issues that might arise as part of planning the development. It is recommended to consider the following at this stage:

- Which water management organisations is it necessary to consult with?
- Does the council confirm that the Sequential Test, and if required the Exception Test, that have been undertaken are appropriate?
- Is there potential for contamination on site which could affect site design and layout and the types of sustainable drainage components used?
- How the site can meet national and local SuDS requirements?
- Does the council confirm that the proposed development may be acceptable in principle from the perspective of flood risk and other planning constraints?
- Is a flood risk assessment is required? See step 5 below.

[18] https://www.peterborough.gov.uk/pdf/SustainableCommunityStrategySummary.pdf

[19] https://www.peterborough.gov.uk/council/planning-and-development/planning-and-building/apply-for-planning-building-permission/?topic=1

4.6 Need for flood risk assessment

4.6.1 National planning policy should be the first indicator of whether or not a site requires a FRA. Paragraph 103, footnote 20, of the National Planning Policy Framework[20] provides detail of this.

A site specific flood risk assessment is required for;

- proposals of 1 hectare or greater in Flood Zone 1,
- all proposals for new development in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems
- where proposed development, or a change of use to a more vulnerable class, may be subject to other sources of flooding.
- If the site may be at risk from the breach of a local defence (even the site is actually in flood zone 1). See section 4.6.2 for more information.
- Where the site is intended to drain to the catchment or assets of a drainage authority who requires an FRA
- Where the site's drainage system meets the criteria of the Middle Level Commissioners, as listed in 4.6.4.

4.6.2 In areas of Peterborough that are defended the residual risk of breaching of the defence can mean that locations in Flood Zone 1 could be at risk of flooding. While the recognised flood maps show the areas that would be at risk if there were no defences, the failure of such structures can produce different results. The pressure the water may be under at the time of breach and the pathway that it is forced to take may not be same as if water were naturally overtopping the river banks. For this reason a flood risk assessment may sometimes be required for sites proposing people-based uses in defended areas that are actually within Flood Zone 1. If this situation applies breach modelling is also likely to be required as part of the planning process since this would enable determination of the actual risk to a site (see SPD 5.2.2). Please seek advice from the Environment Agency or the city council if further explanation is required on this point.

4.6.3 A large part of Peterborough is fenland. Since management practises in this area vary, there are some scenarios not listed by the NPPF, where an FRA could be required within the Fens. Development meeting the following criteria is required to submit an FRA to the Middle Level Commissioners:

- development being either within or adjacent to a drain/watercourse, and/or other flood defence structure within the area of an IDB overseen by Middle Level Commissioners.
- development being within the channel of any ordinary watercourse within the Commissioner's area
- where a direct discharge of surface water or treated effluent is proposed into the Middle Level Commissioners' catchment.
- for any development affecting more than one watercourse in the Commissioner's area and having possible strategic implications in an area of known flood risk.
- development being within the maintenance access strips provided under the Commissioners' Byelaws.
- any other application that, in the opinion of the Middle Level Commissioners' Chief Engineer, has material drainage implications.

4.6.4 The requirement for FRA should not be confused with the requirement to consult the Environment Agency on certain types of planning application and FRA. Chapter 3 provides more information about when the Environment Agency should be consulted. For clarity, the requirement for site specific FRA where the Agency does not want to be consulted on applications is in practise much simpler, as the FRA need consist only of the basic information referred to by SPD 4.8.3, page 18.

4.6.5 Flood risk assessments that the Environment Agency will not be consulted upon will be reviewed by the city council. For householder development this could be as simple as ensuring the development is being designed with an understanding of how the floor levels should relate to flood event levels.

[20] https://www.gov.uk/government/publications/national-planning-policy-framework--2

For most development this is likely to be as part of agreeing an appropriate drainage strategy for the site.

4.6.6 Please note that passing the Sequential Test does not remove the need for FRA.

4.7 Water management consultees

4.7.1 Each water management organisation offers their own formal pre-application service for developers. It is recommended that this opportunity is taken to:

- agree the scope of an appropriate FRA, if relevant,
- find out about any major opportunities or constraints to the site with regards to the management of flood risk, drainage, contamination or the quality of related water environments
- agree the discharge points for site drainage
- obtain any data needed in order to prepare the FRA and drainage strategy

4.7.2 Chapter 3 provides information about water management organisations with which you are encouraged to consult during the preparation stages of a planning application. Which organisations you need to liaise with depends on where the development site is and what issues need to be discussed.

4.8 Content of flood risk assessment

4.8.1 Flood risk, site design and emergency access and aggress can affect the value of land, the cost of developing it and the cost of its future management and use. They should be considered, as part of the FRA, as early as possible in preparing development proposals.

Basic flood risk assessment for smaller application sites

4.8.2 A very simple FRA is required for the following types of development:

- householder development and alterations in Flood Zones 2 and 3
- non-residential extensions with a footprint of less than 250 square metres in Flood Zones 2 and 3
- development of less than 1 hectare in Flood Zones 2 and 3
- any change of use that results in the developments vulnerability class becoming higher risk (e.g. water compatible to less vulnerable or less vulnerable to more vulnerable)

4.8.3 The requirement for FRA consists only of the completion of a simple flood risk table which must be completed and submitted along with supporting evidence, as part of the planning application. The relevant tables can be found in the Environment Agency's online flood risk assessment[21] guidance by following the links from the relevant development type and flood zone.

Full flood risk assessment for other sites

4.8.4 The text box below sets out the requirements of a formal site specific FRA.

[21] https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

Flood risk assessments should:

a) take a **'whole system**' approach to drainage to ensure site discharge does not cause problems further along in the drainage sub-catchment/can be safely catered for downstream of the site;
b) **be proportionate** to the risk and appropriate to the scale, nature and location of the development;
c) consider the risk of **flooding arising from the development** in addition to the risk of flooding to the development. This includes considering how the ability of water to infiltration into the ground may change after development;
d) take the impacts of **climate change** into account;
e) be undertaken **as early as possible** in the particular planning process, by a competent person, to avoid abortive work raising landowner expectations where land is unsuitable for development;
f) consider both the potential adverse and beneficial **effects of flood risk management infrastructure** including raised defences, flow channels, flood storage areas and other artificial features together with the consequences of their failure;
g) consider the **vulnerability of occupiers and users** of the development, taking account of the Sequential and Exception Tests and the vulnerability classification, and include arrangements for safe access;
h) consider and quantify the **different types of flooding** (whether from natural or human sources and including joint and cumulative effects). The city council will expect links to be made to the management of surface water as described in chapter 6. Information to assist with the identification of surface water and groundwater flood risk is available from the city council and the Environment Agency;
i) identify relevant **flood risk reduction measures** for all sources of flood risk,
j) consider the effects of a range of flooding events including the **impacts of extreme events** on people, property, the natural and historic environments and river processes;
k) include assessment of the **'residual' (remaining) risk** after risk reduction measures have been taken into account and demonstrate that this risk is acceptable for the particular development or land use. Further guidance on this is given in chapter 5;
l) be supported by appropriate **evidence data** and information, including historical information on previous events.

4.8.5 It should be noted that even if the development passes the Sequential Test and Exception, there may be other material planning considerations that would render the development inappropriate. Likewise, if it is not possible to design a new development which is safe and which does not increase flood risk elsewhere, then it is unlikely that development will be permitted. Therefore pre-application discussions with the city council and other flood risk consultees are encouraged as soon as possible in the process.

4.9 Conclusions – responsibilities

4.9.1 Landowners have the primary responsibility for safeguarding their land and other property against natural hazards such as flooding. This applies during the construction period as much as it does when properties are sold or rented out. Individual property owners and users are also responsible for managing the drainage of their land in such a way as to prevent, as far as is reasonably practicable, adverse impacts on neighbouring land.

4.9.2 Developers proposing development in areas of flood risk have certain responsibilities as set out in the box below.

Those proposing development in areas of flood risk are responsible for:

- demonstrating that the proposed development is consistent with national and local planning policy (please refer to chapter 2);
- undertaking sufficient consultation with the flood risk consultees (chapter 3);
- providing a FRA, as part of the planning process, which meets the requirements of section 4.8.4;
- drawing up and building site designs that reduce flood risk to the development and elsewhere by incorporating appropriate flood management measures (chapter 5), including the use of sustainable drainage systems (chapter 6).
- ensuring that any necessary flood risk management measures are sufficiently funded to ensure that the site can be developed and occupied safely throughout its proposed lifetime;
- identifying opportunities to reduce flood risk, enhance biodiversity and amenity, protect the historic environment and seek collective solutions to managing flood risk (discussed throughout this document).

5 Managing and mitigating risk

5.1 Measures to control flood risk

5.1.1 This chapter covers ways of controlling and managing risk through site design to ensure that developments will be safe. The information in this chapter is intended for use only after it has been demonstrated that developing in flood risk areas has been avoided as much as possible and the site and location are appropriate for the chosen type of development. Site specific flood risk assessments and the Exception Test must detail how a site will be made safe and this chapter will assist with this requirement.

5.1.2 It should be noted that the city council's overarching planning policy, within the Core Strategy, does not support residential development in Flood Zone 3a unless the site consists of previously development land. The city council believes that without a site providing the benefits that regeneration, for example of previously developed city centre land can bring, it is very unlikely that residential development could be safe and sustainable in this location throughout its lifetime.

5.1.3 When undertaking a flood risk assessment or the Exception Test developers are strongly encouraged to work closely with the Environment Agency, the city council and Peterborough's emergency services partners (see chapter 3). Partners must agree that developments are safe and that flood risk management partners would be able to respond quickly and appropriately to any incidents.

Modelling and mapping

5.1.4 The following flood related factors can influence the design of new developments and should be considered in the site's FRA: flood source and mechanism, predicted flood level, flood duration, debris, frequency, velocity of flood waters, flood depth and amount of warning time.

5.1.5 If developers need to undertake more detailed modelling for their sites to be able to accurately demonstrate the timings, velocity and depth of water inundation to their site, then it is recommended that the scope of works is discussed with the Environment Agency.

5.1.6 There are two types of breach modelling:

- instantaneous breach: the maximum extent of one or more breaches. This information is generally required by the Environment Agency.
- progressive breach: this involves modelling a breach over time, as the breach size increases, so that the impact on a development site over time can be assessed. This type of mapping does not currently exist for Peterborough.

5.1.7 Some high level modelling of breaches and overtopping has been undertaken for the Lower Nene and can be viewed in the appendices of the Strategic Flood Risk Assessment Level 2[22]. The data relating to this mapping is held by the Environment Agency, from whom modelling for the Welland is also available.

Climate change information

5.1.8 For guidance on how to take climate change into account in flood risk assessments please refer to the National Planning Policy Framework and supporting national advice[23]. Table 1 provides the recommended sensitivity range for peak river flows, which should be used to plan for the impacts of climate change within the design of the development. For surface water management a 40% sensitivity range should be used for rainfall intensity when designing any developments unless agreed otherwise with the LLFA.

Site layout

[22] https://www.peterborough.gov.uk/council/planning-and-development/flood-and-water-management/water-data/
[23] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

5.1.9 The layout should consider natural flow paths for water and be designed to cater for safe exceedance flows both on the development and for neighbouring property. Chapter 6 provides more information on the design of drainage systems and exceedance events are covered in section 6.8.7, page 6.6.7.

5.1.10 The inclusion of good quality green infrastructure has the potential to significantly increase the profile and profitability of developments. Low lying ground can be designed to maximise benefits by providing flood conveyance and storage as well as recreation, amenity and environmental purposes. Where public areas are subject to flooding easy access to higher ground should be provided. Structures, such as benches, provided within the low lying areas should be flood resistant in design and firmly attached to the ground.

5.1.11 Short-term or employment related car parking may be appropriate in areas subject to flood risk provided that flood warnings and signs are in place. The ability of people to move their cars within the warning time should be considered (hence the unacceptability of long term and residential car parking where residents may be away from the area for long periods of time). Car parks should ideally not be subject to flood depths in excess of 300mm depth since vehicles can be moved by water of this depth and may cause obstruction and/or injury.

Raising levels

5.1.12 Where it is not possible to avoid flood risk or minimise it through site layout, raising floor levels above the flood level is a possible option to manage flood risk to new developments. This could include the placing of parking (see SPD 5.2.9, page 25) or other flood compatible uses at ground level with more vulnerable uses at higher levels. This will not be appropriate in all situations, but may be considered in conjunction with the city council and the Environment Agency. Ensuring that safe access and escape will always be available to upper floors will be an essential part of design and of the ongoing maintenance and legal agreements for the development.

5.1.13 Single storey residential development is generally more vulnerable to flood damage as occupants do not have the opportunity to retreat to higher floor levels. For this reason single storey housing in risk areas must provide safe refuge above the flood level.

5.1.14 In raising ground levels it is important that consideration is made for surrounding properties and what changes the new land height may have in diverting flood flows, influencing land drainage or preventing safe access for neighbours during a flood event.

Flood compensation

5.1.15 Any proposals to modify ground levels will need to demonstrate in the FRA that there is no increase in flood risk to the development itself or to any existing property in any location. Where land on site is raised above the level of the floodplain to protect properties, compensatory land must be returned to the floodplain. This is to ensure that new flood risk is not created elsewhere in an unknown or unplanned for location. For undefended sites floodplain compensation must be both 'level for level' and 'volume for volume'. For example, in Peterborough city centre. Direct (onsite or opposite bank) flood compensation is preferable since it is easier and cheaper to ensure it functions correctly. If off-site flood compensation is to be considered developers should liaise with the city council to understand whether storage sites are available that could protect multiple developments and potentially lead to shared costs. CIRIA's report C624 entitled 'Development and Flood Risk - Guidance for the Construction Industry (2004)' provides detailed advice on floodplain compensation.

5.1.16 In defended areas compensation need not normally be provided to the same extent. This applies, for example, to areas to the north and east of Peterborough in the IDB areas. Developers should however assess the risks to the area and undertake mitigating action if the raising of land has the potential to create additional risk elsewhere (especially to life). Consultation should be undertaken with flood risk partners to determine what type of compensation land or other mitigating actions would be appropriate.

New defences

5.1.17 The construction of new flood risk defences to enable development to take place needs to be very carefully considered with the Environment Agency and the city council. New defences create new residual risks that can take significant investment to fully understand and plan for. The Environment Agency is also not obliged to maintain defences and could potentially reprioritise or reduce expenditure in this area. Where defences are required maintenance agreements will need to be reached through section 106 of the Town and Country Planning Act 1990 or section 30 of the Anglian Water Authority Act 1977. The latter can be used by the Environment Agency to adopt flood defences directly.

5.2 Managing the residual risk

5.2.1 Residual risks are those remaining after the sequential approach has been applied to the layout of the different site uses and after specific measures have been taken to control the flood risk. At this stage management measures are no longer about reducing the risk, but about planning for flooding. Management of the residual risk must therefore be the very last stage of designing and planning a site, where all options for removing and reducing risk have already been addressed.

5.2.2 This document only provides an overview of residual risk related management measures. For more detailed information readers are encouraged to read C688 - Flood resilience and resistance for critical infrastructure (CIRIA, 2010) or refer to the Planning Practice Guidance paragraphs 41 and 42[24], - Improving the Flood Performance of New Buildings - Flood Resilient Construction[25] and Flood resilient building[26].

5.2.3 Where flood defence and drainage infrastructure has been put in place there will be risks associated with both its failure and with the occurrence of flood events more significant than the design level of the defence or system. These are residual risks which can be managed. The costs of managing residual risk may be low compared to the damage avoided. It should be noted that climate change is expected to increase the level of residual risk.

5.2.4 Different types of measures to manage residual risk include:

- developer contributions towards publically funded flood alleviation schemes
- designing sustainable drainage systems so that storm events which exceed the design standard are properly planned for and the exceedance routes are known and appropriate (requirement explained in section 5.1.10, page 22 and 6.6.7, page 32)
- flood resistance and resilience measures into building design
- flood warning and evacuation plans

5.2.5 Flood resistance stops water from entering a building and can be referred to as dry proofing. Measures include doorway flood barriers and airbrick covers. The effectiveness of flood resistance products depends upon the occupier understanding the features, putting them in place correctly when required and carrying out any needed maintenance. Water pressure and carried debris can also damage buildings and result in breaching of barriers. As a result these measures should be used with caution and accompanied by resilience measures.

5.2.6 Flood resilient construction accepts that water will enter the building but thorough careful design minimises the damage to allow the re-occupancy of the building as soon as possible. Resilient construction can be achieved more consistently than resistance measures and is less likely to encourage occupiers to remain in buildings that could be inundated by rapidly rising water levels. Under this heading, the use of water resistant fixtures and materials for floors and walls may be appropriate alongside the siting of sockets, cables and electric appliances at higher than normal levels.

5.2.7 Flood resilience also includes information based actions and planning such as:

- the use of clear signage within a development to explain residual risks or required responses such as displaying information on access doors, in car parks or on riverside walkways
- ensuring that appropriate flood insurance is available and is in place for buildings and contents. Further information and links about flood insurance are available on the Gov.UK website[27].
- businesses developing and maintaining business continuity plans. The city council encourages business continuity planning across all risk areas and can be contacted for further advice.

[24] https://www.gov.uk/guidance/flood-risk-and-coastal-change#address-residual-risk
[25] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7730/flood_performance.pdf
[26] https://www.brebookshop.com/details.jsp?id=326889
[27] https://www.gov.uk/prepare-for-flooding/get-insurance

- preparing and acting on flood warning and evacuation plans. These plans are an essential part of managing residual risk and advice should be taken from the Cambridge and Peterborough Local Resilience Forum[28] during preparation. Particular attention should be given to communicating warnings to and the evacuation of vulnerable people.

5.2.8 Evacuation plans must include dry access and egress routes wherever possible. Any variation in this, particularly the consideration of on-site refuge must be agreed by partners from the Local Resilience Forum. In this situation the city council will seek to organise a technical meeting with the Environment Agency's development and flood risk officer and flood risk management officers from Cambridgeshire's Fire and Rescue Service and the Police Force in order to agree whether the development's strategy for access, egress and refuge is appropriate.

5.2.9 The areas of Peterborough covered by the Environment Agency's flood warning scheme can be viewed on the Agency's online map[29]. While this scheme provides prompt telephone calls and SMS text messages to registered individuals, it is dependent on residents signing up to the scheme. Developers must also bear in mind that warning areas may not be extended to cover new development areas. The Environment Agency's scheme also only covers flooding from main rivers. Flooding from rainfall, surface runoff and groundwater often occur much more quickly, making warning more difficult. No specific local or national warning system currently exists for these more localised mechanisms and developers will need to consider this in ensuring developments will be safe.

[28] https://www.peterborough.gov.uk/business/commercial-information/Resilience/
[29] https://flood-warning-information.service.gov.uk/long-term-flood-risk

6 Managing surface water drainage

6.1 Introduction

This chapter is intended to:

- raise awareness of issues that may need to be discussed as part of pre-application planning discussions.
- be applicable to all development using or having the potential for sustainable drainage systems. While the bulk of the chapter is aimed at major development, minor development and minerals and waste management sites. Also specifically applies to householder development. All requirements will be considered by the council in proportion to the scale, nature and location of the site. Further advice on this can be provided by the council as part of the pre-application service.
- Designing site layouts to ensure that SuDS minimise local flood risk and are sustainable in the long term is an important part of the wider flood risk management strategy for a new development. This chapter therefore sets out what elements of drainage need to be considered to create a 'sustainable' system.

6.1.1 The expected increase in intense rainstorms (as a predicted result of climate change) and the nature of traditional drainage means that the likelihood of surface water flooding will increase over time in Peterborough, with or without development. Existing drainage systems are generally not designed to cater for more significant rainfall events (those greater than a 3.33% probability), although it should be noted that the drainage systems maintained by the Internal Drainage Boards have a design standard of around 1.3% to 1% depending on the specific drainage authority.

6.1.2 Loss of permeable (porous) ground through development, extensions and paving, will also increase surface runoff flow rates and associated flood risk. Therefore the city council requires the drainage systems for all scales of development to be 'sustainable' and include a % for urban creep. In this context the city council defines this as minimising flood risk, improving water quality, bringing wider benefits other than just site drainage (improved local environment and biodiversity and a safe public amenity) and being maintainable over the long-term.

6.1.3 The combination of urban creep, climate change and previous design standards highlight why it is important that redevelopment will require improvements from the existing site water management to ensure flood risk is not allowed to increase over time and a standard of protection is sustained.

6.1.4 Retrofitting of sustainable drainage systems (SuDS) particularly in the urban area is also something that the city council and its partners are looking to promote where possible.

6.1.5 The Flood and Water Management Act 2010 (FWMA) originally intended to create a SuDS Approving Body (SAB). If schedule three of the Act was enacted the SAB in Peterborough would be the city council and they would approve, inspect and adopt SuDS features in the area. To date this has not been enacted.

6.1.6 As confirmed in the NPPF, flood risk is a very important consideration in the determination of planning applications. There are often significant interactions between different sources of flooding, and in some locations surface water flooding may present a much greater risk to the development than risk from main rivers. For planning permission the city council must be content that the development will not increase risk from any sources of flooding and that it has a sustainable drainage system approved. An organisation adopting SuDS will have their own specific requirements about how the system will function, its construction and how it will be maintained, the requirement of such information will be set out side of the planning process.

6.1.7 By using this SPD to assist with the designing of sites for planning permission it should be possible to avoid late consideration of the flood risk and drainage during the site design process which can result in trying to find space for water and lead to expensive solutions.

6.1.8 Note about the use of planning conditions:

If it is decided by the city council during the planning process that any elements of drainage will be left to a planning condition, the same information will be required to discharge that condition as would have been required as part of the original process.

However, elements such as where the water goes, contamination and site permeability must still be explored as part of the application process before conditions can be applied to ensure that any significant constraints to site development and drainage are known about before potentially undeliverable site layouts are agreed.

6.2 Information for householder development

6.2.1 A simple drainage statement should accompany a householder planning application explaining where the site's surface water will go. There may, for example, be local options for connecting to a water course or a piped sewer. If the city council highlights that there may be capacity issues in the area the statement will need to consider simple measures to reduce the quantity and flow rate of water discharged. Advice can be sought from the council's Sustainable Drainage Team[30].

[30] http://www.peterborough-suds.org/

6.3 Consistency with FRA

6.3.1 It is important that there is consistency between the development's flood risk assessment and drainage strategy. Developers may want to consider working with the same design experts/consultants for both pieces of work. For example, if a flood risk assessment identifies surface water flood risk to a site, the city council and partners will expect to see the management of this flood risk addressed in the design of the site and its drainage system.

6.4 Drainage sub catchment

6.4.1 When water draining from a site leaves the development, the water may flow through a variety of watercourses or surface water sewers before reaching its destination in the Nene, Welland or Ouse main rivers. The rate and quality of flow can therefore easily affect locations downstream. For this reason a drainage strategy must take a catchment or sub catchment based approach and consider the route and impacts of flows after they leave a development site. Examples of how this could affect a drainage strategy would be:

- if the post-site flow route takes water into a wildlife site the water quality of the discharge might be particularly important
- if a change in flow rates or volumes increases the flood risk to properties upstream or downstream.

6.4.2 The city council is keen to understand more about the local catchments and make this information available to help those planning drainage schemes. Maps of Peterborough's sub catchments and some of the different characteristics of, and variations between, the sub catchments are therefore available online within the city council's water documents web page[31]. It is intended that the information will be updated as more information becomes available. Web links are also included to useful data sets such as the British Geological Society's SuDS Infiltration Maps.

6.4.3 Different sub catchments have very different characteristics and it will also be useful at any early stage to scope out the types of constraints and opportunities that may exist in the area around the site. Examples could be permeable soil which would allow site infiltration, or significant numbers of combined sewers and hence limited sewer capacity in the area.

[31] https://www.peterborough.gov.uk/council/planning-and-development/flood-and-water-management/water-data/

6.5 Submission and evidence requirements

Submission and evidence requirements

The application must be submitted with a detailed SuDS (Sustainable Drainage System) drainage strategy which includes the following;

(a) Confirm details of low flow conveyance, overflow and exceedance routes
(b) Confirm details of how run-off is collected from all hard surfaces to keep water at or near the surface
(c) Confirm details of Source Control feature for each sub-catchment
(d) Confirm details of each Site Control feature with flow control locations and details
(e) Confirm details of conveyance features from place to place
(f) Confirmation of final storage volumes and flow control rates
(g) Confirm detail design of Regional (Catchment) Controls in public open space where appropriate
(h) Confirm the outfall design for "the controlled flow of clean water" from the site
(i) Plan(s) showing detail of the SuDS including levels, detail locations, detail drawings

6.5.1 Site drainage is a key part of flood risk management and must be clearly discussed within a site specific FRA. It is therefore strongly encouraged that site drainage strategies are undertaken alongside the FRA and the rest of the planning application. If consultants are being used, it is also likely to be more cost efficient and result in better cross linkages for the same consultants to undertake both the drainage strategy and FRA. If drainage designs are submitted to the city council at the same time as the planning application, the process of receiving planning permission (and sustainable drainage approval when relevant) will be much more efficient. This significantly reduces the risk of abortive work being carried out at the expense of the developer through the site and highway design stages.

6.5.2 Standard drainage submission requirements, such as the inclusion of a clear site boundary and location plan, are listed on the council's planning portal web page[32].

6.5.3 Ground conditions such as instability or contamination can have a significant effect on the design of a site drainage system. For this reason testing should be carried out before the initial planning application submission so that it can be established whether the results will affect flood risk management, drainage or site design. Increases in or the spread of contamination must be avoided. Should contamination be a potential issue, policy 20 in the Planning Policies Development Plan Document must be followed and further advice should also be sought from the Environment Agency.

6.5.4 The developer should be aware that there are various methods for testing the infiltration capacities of the ground these are detailed in Appendix B. Also within IDB areas, some of the drainage authorities have their own standards for infiltration testing. If the site is within this area then please contact the drainage authority for more information.

6.5.5 In the IDB areas the drainage strategy or the planning application with which it is submitted should include information about the impacts of site drainage, during and after construction, on buried archaeological deposits. This is likely to involve consideration of groundwater levels, movement of water on and off the site and water quality. This will be especially important if the site is deemed to be in an area of high archaeological interest, or if it contains, or is close to, a Scheduled Ancient Monument, in which case planning will already require consideration of wider impacts on heritage. Developers should seek to avoid and/or mitigate any damage and hence the city council would

[32] https://www.peterborough.gov.uk/council/planning-and-development/planning-and-building/apply-for-planning-building-permission/

strongly encourage seeking advice from English Heritage at any early stage. For example when Flag Fen was designated as a Scheduled Ancient Monument it was listed as being at high risk of damage due to the drying out of its surrounding environment.

6.6 Design principles

Design principles

(a) A complete sustainable drainage system should meet all parts of **SuDS treatment train**. This is to ensure that the system functions exactly as it should and achieves the intended benefits.
(b) The number of **treatment stages** within a drainage system must be appropriate to the uses onsite.
(c) The **full range of SuDS techniques** must be considered for all sites with the most appropriate technique(s) taken forward.
(d) All drainage strategies must demonstrate **flow paths and exceedance routes, mimic natural drainage paths** and include appropriate mitigation measures.
(e) Allowances for **climate change and urban creep** must be factored into designs.
(f) There should be appropriate **storage** incorporated within the site to allow for rain events up to a 1% annual probability (1 in 100) and an allowance for climate change.
(g) Where applicable, previously **culverted watercourses should be opened up** to create more natural drainage and reduce the likelihood of bottlenecks/blockages that can occur and cause flooding in localised areas
(h) The **ease of maintenance** is an essential part of the design of sustainable drainage system
(i) As well as managing water quantity and quality, SuDS can and should enhance the wider environment by providing opportunities for a net gain in biodiversity and delivering public amenity. However it must be remembered that the **primary function** of SuDS is to effectively drain an area.
(j) The use of **permeable** surfaces on site (both green and paved) is encouraged.

6.6.1 The layout and design of SuDS and other flood risk management measures must be considered at the beginning of the development process using the design principles set out in this document. A key element to successful SuDS is integrating the design into the development master plan/site layout at an early stage, while also considering how SuDS will be maintained. Good SuDS design also requires early and effective consultation with all parties that are involved in the approval process including the city council and all other relevant stakeholders identified in chapter 3.

What is sustainable drainage?

6.6.2 Sustainable drainage means managing rainwater (including snow and other precipitation) as close to the surface as possible with the aim of :

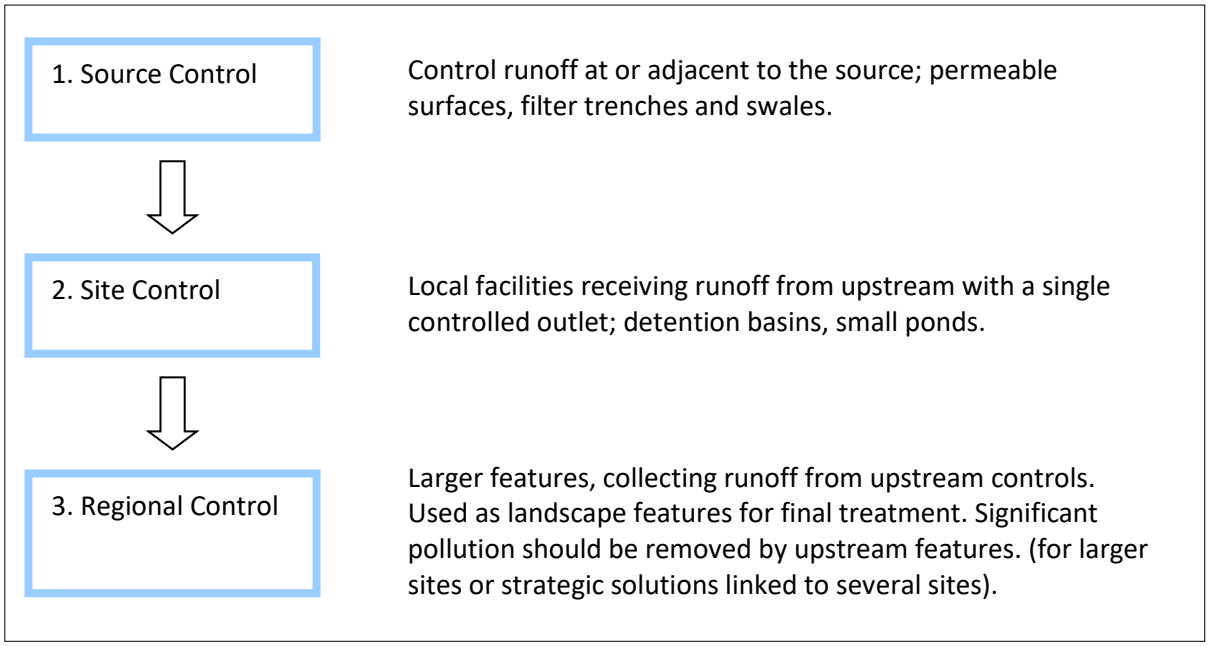
- reducing flooding
- improving water quality
- protecting and improving the environment
- providing amenity for the community
- ensuring the stability and durability of the drainage system

6.6.3 The primary function of SuDS is to provide effective drainage. SuDS replicate as closely as possible the natural drainage of the site before development. This reduces the risk of flooding downstream that could otherwise be caused when surface water with an increased flow rate leaves a development; helps to replenish groundwater; and removes pollutants gathered during runoff.

Management train and treatment stages

6.6.4 Different types of sustainable drainage components should be used in series throughout a development site in order to most effectively achieve the intended benefits of having SuDS. Figure 6-1 illustrates the hierarchy of use, known as the SuDS management train that should be followed when planning the drainage strategy. The benefits discussed in 6.6.2 and 6.6.3 of this document are more likely to be achieved if the management train is followed.

Figure 6 1: SuDS management train



6.6.5 There are a wide range of sustainable drainage components available each using slightly different techniques to manage water. It is likely therefore that there will be a technique and components suitable for each site. Bear in mind that it is still possible to include traditional or piped methods within sustainable drainage systems. The overall design just needs to ensure that the different components work well together to achieve the end aims of sustainable drainage. Appendix B provides advice on where to find more information the SuDS management train, different types of SuDS components and their characteristics.

6.6.6 Different land uses result in differing qualities of water leaving a site. For example water running off a petrol station may be considerably more polluted than water from a residential roof. Each time water runs through a particular SuDS component the flow will be treated in some way to help reduce pollution – this is called a treatment stage. A greater number of treatment stages are required for more polluting land uses. Table 6-1 below was taken from the 2007 CIRIA SuDS manual and gives an approximation for many treatment stages are required for different land uses. These are approximate guides and should not be used to guide developments that carry a higher level of risk from pollution spills such as those storing chemicals or managing waste.

Table 6 1: Number of treatment stages required for different land uses

Runoff catchment characteristic	Minimum number of treatment stages required
Roofs only	1
Residential roads, parking areas, commercial zones	2
Refuse collection, industrial areas, loading bays, lorry parks, highways	3

Designing SuDS features

6.6.7 An exceedance route is a flow route that water will take over land when the capacity of a drainage system is exceeded, for drainage this is a rain event with an annual probability of less than 3.33% (1 in 30). It is crucial to effective flood risk management that exceedance routes above 3.33% are understood so that unexpected residual risks are not created. If flow routes are known they can be directed (through site design) to areas of less vulnerability. The city council and emergency services can also be prepared with appropriate responses. The preferred option is for exceedance routes to flow to open space where surface flooding for short periods of time are acceptable. Layout and landscaping will route water away from vulnerable property and avoid creating hazards to principal access and egress routes. It is important to note that the need for exceedance flow routing is not limited to flows between the 3.33% and the 1% (1 in 100) design standards.

6.6.8 Local Plan policy LP28 states that the city council will not permit developments that do not take action to protect against the risk of Peterborough's international or European nature conservation sites being threatened by surface water drainage. This is referring to situations where there is the potential that surface run-off from the new development site could enter such sites. If this is the case, a sudden heavy downpour could cause flash flooding of the designated site, potentially destroying valuable habitat and nesting locations. An equally important issue is whether the quality of the water could change the habitat and kill sensitive species. Surface runoff can contain a wide range of pollutants that could harm the wildlife or habitats. The design of the site and its drainage system must take into account these issues, using SuDS to reduce the quantity of water and minimise pollutants, and including provision for acceptable exceedance routes away from the designated sites. This should be done in conjunction with the Environmental Impact Assessment.

6.6.9 A well designed surface water drainage system should ensure that there is no residual risk of property flooding during events that are well in excess of the capacity of the receiving system to which the site is discharging. No flooding of property should occur as a result of a storm of 1% annual probability (1 in 100) including climate change allowances. Much more detailed information can be obtained from Designing for exceedance in urban drainage (CIRIA, 2006)[33].

6.6.10 It is important that sufficient storage is incorporated within all drainage systems to allow for rain events up to a 1% annual probability (1 in 100) and an allowance for climate change. Storage provided through water re-use methods like rain water harvesting is not usually counted towards the provision of on-site storage for surface water balancing. This is because there may be times where the water is not re-used as hoped (e.g. for watering gardens or flushing toilets) and therefore storage will not be available for each new rain event. Rainwater harvesting is however recognised as very good practice for reducing the use of potable water and is encouraged by the council and its partners.

6.6.11 Table 1 of the Planning Practice Guide[34] for Flood Risk and Coastal Change provides information on recommended peak rainfall intensities for use when taking climate change into account within the design of the development. The city council expects a sensitivity range of 40% to be used for rainfall intensity for climate change when designing all developments.

6.6.12 Appendix B of the Non Statutory Technical Standards[35] sets out the appropriate allowances for urban creep considerations over the lifetime of the proposed development, this is set at between 0 and 10% depending on the density of the housing.

6.6.13 The culverting of watercourses is not generally supported by the city council. Culverting removes floodplain storage from a watercourse and can increase the risk of flooding upstream when bottlenecks or blockages occur. The need for improved green infrastructure corridors and the requirement for water environments to be improved under the Water Framework Directive are two other drivers for ensuring a natural environment around channels, ditches and dykes. Any loss of access to the watercourse can also be a serious problem for the city council and riparian owners who need to maintain the watercourse. Where culverting is required for access purposes the

[33] http://www.ciria.org/Resources/Free_publications/Designing_exceedance_drainage.aspx
[34] https://www.gov.uk/guidance/flood-risk-and-coastal-change
[35] https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards

developer will be required to obtain consent from the necessary flood risk management authority as set out in chapter 8, this is in separation to the planning application process.

6.6.14 The ease of maintenance is an essential part of the design of sustainable drainage system. As well as allowing for access, drainage designers should consider what kind of equipment would be required, e.g. to mow or remove sediment from a drainage system, and how often a certain types of SuDS component might need maintaining. Consideration will also be needed to allow sufficient access to maintain existing drainage and flood risk assets.

6.6.15 The city council is very keen to ensure that SuDS help to create a beneficial site environment. Sections 6.8 and 6.9, page 36 to 38 provide information on biodiversity and health and safety expectations.

6.6.16 It is recognised that some parts of Peterborough have clay-based soils and so infiltration may be not be possible to the same degree as in other areas of the Peterborough, this is not a reason to exclude SuDS. However, there is variation in soil type across Peterborough meaning that in some areas the soil may be more permeable. Infiltration tests will help to confirm the situation onsite.

6.6.17 A permeable area allows rain water to drain into the ground rather than run over a surface. There are certain rules relating to the provision of permeable areas. If an area of proposed hard standing at the front of a dwelling house exceeds five square metres, it will need planning permission unless it is of a permeable construction (made of porous materials) or provision made to direct runoff water from the hard surface to a permeable or porous area or surface within the curtilage of the dwelling (part F of the General Permitted Development Order[36]).

6.6.18 Under Parts 8, 32, 41 and 42 of the 2010 amendments to the General Permitted Development Order, it is possible for warehouses/industrial, schools, offices and retail to implement certain floor areas of hard standing without planning permission. Please refer to the 2010 amendments[37].

[36] http://www.legislation.gov.uk/uksi/2008/2362/pdfs/uksi_20082362_en.pdf
[37] http://www.legislation.gov.uk/uksi/2010/654/contents/made

6.7 Requirements for surface water leaving a site

(a) Drainage strategies must demonstrate adequate consideration of each stage of the Building Regulations **rainwater drainage hierarchy** before moving to the next discharge option.
(b) New surface water connections to the **combined or foul systems** will not be permitted.
(c) If the site is brownfield, options for use of infiltration must still be demonstrated ahead of discharge to **existing surface water sewer connections**.
(d) If the site is **brownfield and in an area of combined sewers,** the council and partners will seek betterment. It is expected through regeneration that surface water discharge will be reduced or removed from the combined system and will be managed in line with the rainwater drainage hierarchy (see Figure 6-2). Alongside source control measures, sites will be expected to consider the full range of SuDS techniques. Since unattenuated discharge to sewers will not normally be permitted, sites finding little potential for many of the SuDS measures will be expected to also consider on-site water re-use and recycling measures before final discharge.
(e) If the site is greenfield, the design of SuDS must take into account **original greenfield drainage** catchments and the rate of runoff must be no greater than the greenfield rate.
(f) If an application site is **adjoining a watercourse**, once infiltration opportunities have been maximised it will be expected that any remaining flows from the development will drain to this watercourse.
(g) Developments wanting to discharge directly or indirectly into **Car Dyke** will need to demonstrate the impacts that any proposed actions will have on the Roman canal and plan mitigating actions.
(h) Where a development will be discharging into an **Internal Drainage Board watercourse or into the River Nene** there are some specific circumstances where the council may allow a reduced level of attenuation prior to discharge to the watercourse. Source control and treatment of the 'first flush' of surface water will however still be required.

6.7.1 The Buildings Regulations 2010 Part H3[38] (2002 edition incorporating 2010 amendments) provides a rainwater discharge hierarchy, shown below, that must be followed. As this demonstrates, discharge of surface water from new developments to a sewer should only be considered as a last resort:

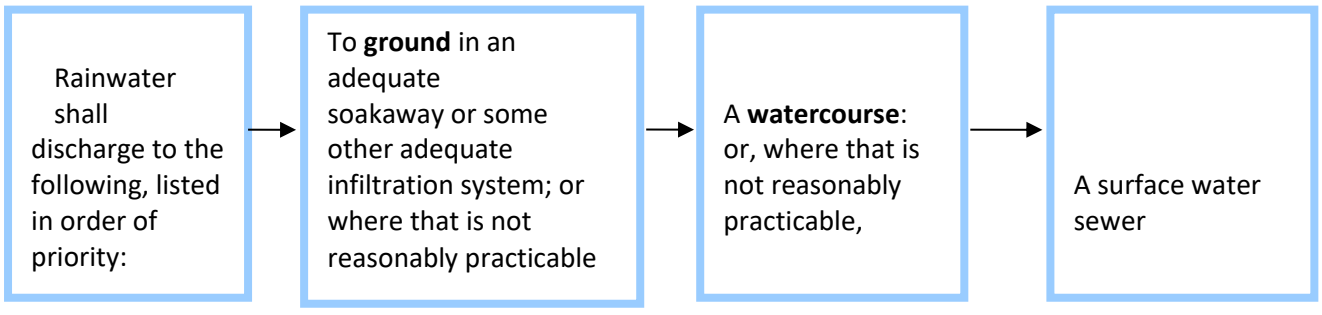


Figure 6 2: Rainwater drainage hierarchy

6.7.2 Paragraph 80 of the NPPF (2012)[39] sets out a similar drainage hierarchy to building regulations;

- Into the ground (infiltration)

[38] http://www.planningportal.gov.uk/buildingregulations/approveddocuments/parth/approved
[39] https://www.gov.uk/guidance/flood-risk-and-coastal-change

- to a surface water body
- to a surface water sewer, highway drain, or another drainage system;
- to a combined sewer

6.7.3 There will be no new surface water connections to the combined or foul systems. Where sewers take rainwater as well as foul, this puts significant pressure on the network in the event of heavy downpours. In an environment where urbanisation has increased the amount of surface runoff entering the sewers, the risk of both foul and surface water flooding is increased as capacity in the system is reduced.

6.7.4 The city council and Anglian Water are seeking opportunities, through regeneration, to reduce and ultimately remove surface water discharge to combined sewers. This measure applies to brownfield redevelopment sites where surface water has historically drained into combined and foul sewers. Removal of surface water would leave the sewers to transport just the foul water from existing and future developments, thus reducing the flood risk presented by overloaded sewers.

6.7.5 Parts of Car Dyke have been designated as a Scheduled Ancient Monument due to the watercourse originating as a Roman canal. Any works proposed for the purposes of discharging water into the channel will need to be planned and undertaken sensitively and in keeping with the watercourse to ensure no deterioration to the nature of the monument. English Heritage and the city council may ask for a buffer between development and the watercourse as well as information about the water quality of the discharge and about any proposed outlet features to be used in or near Car Dyke. Mitigation of any impacts will be sought.

6.7.6 Discharge with reduced attenuation of surface water may be appropriate to the River Nene from riverside sites, although source control for pollution management is still required. For riverside sites, slowing down the discharge of water to the River Nene through the normally required attenuation measures might not always be the preferred approach for wider flood risk management. There is a time lag between heavy rainfall and high water levels in Northampton and the peak water levels being reached in the Nene in Peterborough. For some storm situations it could therefore be better if Peterborough's rainfall and surface water were removed from the system before the high flows arrive from upstream. The city council is willing to consider this as an option for riverside sites subject to the developer undertaking modelling to justify that flood risk from the River Nene will not be increased under certain rainfall conditions if less attenuation is permitted. If developers wish to consider this route they should jointly contact the city council's Sustainable Drainage Team and the Environment Agency for further information and to discuss what modelling work would be required. Reduced attenuation may also be considered if an application site is within an area managed by an Internal Drainage Board and the IDB is in favour of this proposal.

6.8 Water quality, biodiversity and habitat requirements

Water quality, biodiversity and habitat requirements

(a) Opportunities to protect **wildlife habitat** or increase biodiversity on site should be taken ensuring that the wildlife requirements are fully compatible with the flood risk and drainage needs of the site.
(b) **Planting** should assist and be appropriate to the function of the drainage system and preferably use native species that contribute positively to the local Biodiversity Action Plan.
(c) All schemes **must prevent deterioration** of, or preferably enhance, water quality by reducing the risk of diffuse pollution in compliance with chapter 7. Where a water body is vulnerable to a change in ecological status or where biodiversity is particularly susceptible to change, a larger number of treatment stages might be required.
(d) In designing infiltration systems, the depth of the infiltration system must be appropriate for local peak groundwater levels, ensuring that **no direct discharge to groundwater** occurs from the SuDS. This is to avoid a risk of groundwater pollution as well as to ensure that storage capacity is not lost.

6.8.1 The city council recognises that not all types of SuDS provide ecological benefits. However, the applicant is required to show that where practicable, the SuDS scheme will benefit water habitats and biodiversity. The city council therefore expects features such as ponds and wetlands to be planted to enhance biodiversity.

6.8.2 The planting of native species appropriate to the local conditions will be favoured and where appropriate the mix of planted species should aim to create habitats that contribute to the local Biodiversity Action Plan. Information about the Cambridgeshire and Peterborough Biodiversity Action Plan[40] is available from the website of the Cambridge and Peterborough Biodiversity Partnership.

6.8.3 Some common landscape and ecological design requirements may have to be adapted slightly to ensure that the SuDS can function effectively. The city council's drainage and natural environment teams can agree these amendments. It will also be important that the types of planting proposed are considered in line with the design of the SuDS features. For example, the soil moisture profile may be very different at the top of a swale's bank to the bottom and this will need to be taken into consideration to ensure the success of both the plants and the operation of the drainage feature.

6.8.4 Consideration should be given as to whether SuDS within the development site can be designed appropriately to form part of dual amenity open space. SuDS features can provide opportunities for informal, quiet recreation and can also provide improved linkages between existing habitats. Peterborough's Green Infrastructure and Biodiversity SPD, referred to in section 6.9.7, page 39 highlights the importance of green infrastructure in linking green spaces for the benefit of both people and wildlife.

6.8.5 High level biodiversity information is also available in the document Integrating Biodiversity and Development; guidance notes for developers[41]. This document covers a variety of ways to incorporate biodiversity into development.

6.8.6 As discussed in the Peterborough Trees and Woodlands Strategy (2018)[42], Peterborough City Council aims to sustainably maintain and improve the quality of existing tree and woodland cover as well as to find opportunities to expand the extent of woodland. Site design should therefore start with the assumption that existing native trees should be retained and where possible new native

[40] http://www.cpbiodiversity.org.uk/biodiversity-action-plans
[41] https://www.peterborough.gov.uk/upload/PDFs/Planning/OSS/BioChklist%20Notesfordevelopers%20082013.pdf
[42] https://www.peterborough.gov.uk/council/planning-and-development/conservation-trees-and-hedges/tree-management/

trees should be incorporated into the site design. Trees can provide benefits in terms of water quality and flood risk management as discussed in the Environment Agency and Forestry Commission's Woodland for Water (2011) report[43]. The city council's natural environment team can provide advice on tree management.

6.8.7 Chapter 7 provides more detailed guidance on the importance of protecting and enhancing water environments to meet the Water Framework Directive.

6.8.8 The base of an infiltration system should have sufficient clearance above the peak seasonal groundwater levels this ensures that a rise in water levels during particularly wet periods will not cause groundwater to enter the base of infiltration system which would reduce capacity. It should also be noted that a direct discharge of surface water from that infiltration system into groundwater may contravene permitting requirements and environmental legislation.

[43] https://www.forestry.gov.uk/pdf/FRMG004_Woodland4Water.pdf/$file/FRMG004_Woodland4Water.pdf

6.9 Health and safety, access and amenity requirements

Health and safety, access and amenity requirements

(a) All SuDS schemes must be designed to ensure that the health and safety of people and animals is not put at risk. The environment created by SuDS must be a safe one. One of the council's SuDS objectives is to move away from the use of barriers, by schemes being designed to be inherently safe. A **health and safety statement/ risk assessment** must be submitted with all schemes to demonstrate that this principal has been applied;
(b) If an application site adjoins a watercourse, development must be **set back** from it by a distance that allows appropriate access for maintenance or where relevant by the distance dictated in the byelaws of the responsible water management partner.
(c) Schemes should consider how the site and incorporated **green infrastructure** can connect to the Peterborough Green Grid; and
(d) All drainage schemes should have a **positive impact on the landscape,** create good quality spaces and where possible provide amenity value for residents

6.9.1 The Royal Society for the Prevention of Accidents (RoSPA) provides more detailed guidance about safety around inland water sites including SuDS in their leisure safety guide[44]. Further information is also available in chapter 36[45] of the CIRIA SuDS manual.

6.9.2 An example of design that improves safety without the need for barriers is ensuring that the sides of SuDS features such as ponds and swales have very gently sloping sides. If a young children or elderly person can walk in they should be able to walk straight out again. Visibility of and around the feature is also important, not only so that visitors are aware of the features, but also for the purposes of passive or active surveillance.

6.9.3 Signage can be an important accompaniment to larger SuDS features, but must not be used as a replacement for appropriate design. Those potentially at risk may not be able to understand the signs. There is also benefit in signage covering a range of information issues relating to the drainage system so that residents can understand what they are seeing, know what functions and benefits the SuDS are delivering, and recognise safety precautions.

6.9.4 There must be appropriate space between the edge of a watercourse and development to allow for access and the use of equipment to maintain a water body. Even if certain types of maintenance are not envisaged initially consideration must be given to the long term situation. The required distance will vary according to the specific watercourse characteristics and any prescribed information contained within the byelaws of Peterborough's water management partners, see chapter 8. Wherever possible, SuDS features such as ponds and wetlands should be designed so that special machinery is not required to undertake maintenance.

6.9.5 Section 7.7.3, page 47 explains why set back is also important for wildlife, creating increased room for water based habitats and allowing wildlife access between fragmented habitats. Well linked habitat networks allow species to be more resistant to a changing environment and climate. Set back can also be required where it is needed to preserve the nature of a heritage monument such as Car Dyke.

6.9.6 The inclusion of green infrastructure and considered planting in developments is also of significant benefit in improving on-site drainage due to the increased interception and infiltration of water.

[44] https://www.rospa.com/rospaweb/docs/advice-services/leisure-safety/journal/03-spring-2013.pdf
[45] http://www.ciria.org/Memberships/The_SuDs_Manual_C753_Chapters.aspx

6.9.7 Further information about green infrastructure and the natural environment is available from the 'Natural Environment[46]' page of the city council's website. The Peterborough's Green Infrastructure and Biodiversity SPD, can also be downloaded. The aim of the Strategy was to draw up a framework for green space provision throughout Peterborough and its surrounding areas to ensure that the city's growth goes hand in hand with the protection and provision of quality green infrastructure. Residents, visitors and wildlife should have access to a complete network of open space for leisure, access and habitat.

[46] https://www.peterborough.gov.uk/council/planning-and-development/conservation-trees-and-hedges/natural-networks-partnership/

6.10 Adoption and maintenance

Adoption and management

All sites must have made provision for the **properly funded** management and maintenance of the all drainage components for the lifetime of the development

6.10.1 The city council is keen to support developers in finding adoption arrangements for drainage system components and there are a number of opportunities available. Where site discharge would naturally flow into the catchment of an **Internal Drainage Board**, discussions about adoption by the IDB would be appropriate. Anglian Water may also consider adoption of certain systems and developers may wish to enter into discussions on this matter. The **city council** also has the power to adopt sustainable systems as a part of the public open space or highway, with a commuted sum for maintenance. It is recommended that developers who wish to consider these routes for adoption hold early discussions with the necessary organisation about this option so as to avoid designing and building assets which are not of an adoptable standard. Unless adopted by one of the above the responsibility for the future maintenance of drainage systems lies with the developer and hence it is possible that management companies will need to be established.

6.10.2 Should Schedule 3 be commenced the city council will become the approval and principal adoption body for surface water drainage systems. This would provide an increased level of certainty to developers about the intended procedures and pathways for their site drainage once construction has completed.

6.10.3 A key part of the Drainage Strategy will be to detail the long term maintenance requirements of the drainage system along with confirmation of the body responsible for that future maintenance.

6.10.4 Sewers for Adoption (SfA) is a guidance document on the design and construction of sewers and in 2019 it is anticipated that version 8 will be released and may be adopted by Water and Sewerage Companies nationwide, including Anglian Water locally. SfA8 includes guidance on adoptable SuDS, using the best practice for SuDS, laid out in the CIRIA SuDS Manual C753. The council would encourage developers to consider this adoption route but would emphasise the importance of early engagement with Anglian Water to ensure the design of SuDS is of the required standard.

7 Water quality and aquatic environments

7.1 Introduction

7.1.1 This chapter provides guidance to assist implementation of point (d) of policy PP16 -The Landscaping and Biodiversity Implications of Development (see section 12.4.14 for the policy text). Part (d) has been driven by the Water Framework Directive – 2000/60/EC (WFD).

7.1.2 This chapter will help readers to understand some of the additional considerations that need to be thought through when passing step 5 of the flowchart section 1.2.

7.2 Requirements of the Water Framework Directive

7.2.1 An important element of the WFD is the requirement for member states to aim to achieve 'good ecological status' in all surface freshwater bodies by 2015. This objective relates to the water body having biological, chemical and structural characteristics similar to those expected in nearly undisturbed conditions.

7.2.2 The directive also sets out the need for there to be 'no deterioration' in the ecological potential of the water environment. Development proposals affecting the water environment may impact the biological, hydro-morphological, physio-chemical and/or chemical quality elements. 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. New activities and schemes must be assessed to identify if they will:

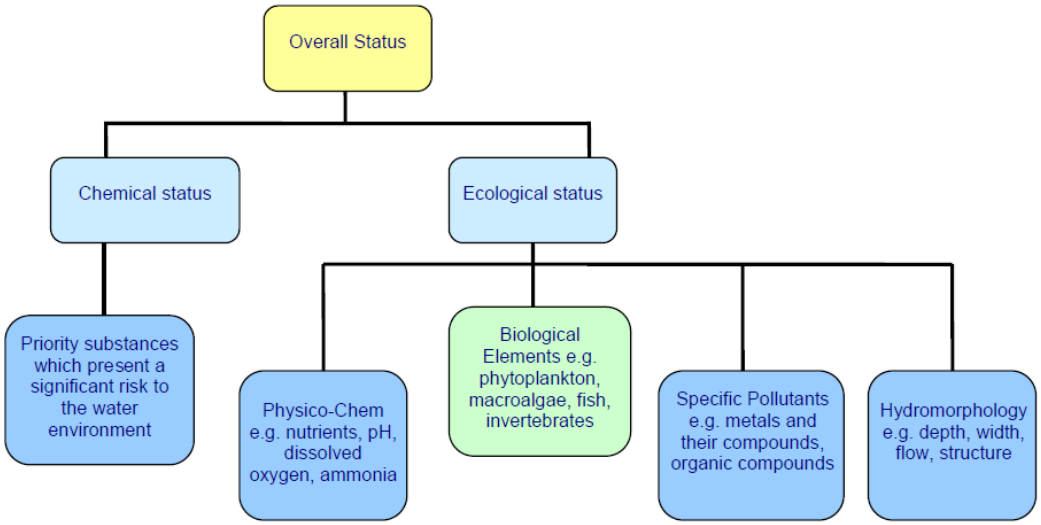
- cause deterioration, or
- lead to failures to achieve ecological objectives.

7.2.3 For surface waters, 'good ecological status' is a statement of overall status, made up of ecological and chemical components. This is illustrated in Figure 7 1 below. A range of elements are measured in each water body, such as priority substances (e.g. lead) and physical structure (hydromorphology). Classification is produced based on a 'one out, all out' principle, so that the poorest individual element result sets the overall status. For groundwater good status has a qualitative component and a chemical component.

7.2.4 The Anglian River Basin Management Plan, produced by the Environment Agency details pressures facing the water environment and actions that need to be taken by all partners in order to meet the requirements of the directive in the Anglian region.

7.2.5 The Water Framework Directive applies to all waters including inland surface waters, groundwater and transitional and coastal waters independent of size and characteristics.

Figure 7-1: Elements making up the WFD status of a water body



7.2.6 Every river has a defined catchment area within which changes can affect the watercourse. However the reporting mechanism used in River Basin Management Plans is based upon a single river line within each catchment. The river line is an over-simplified representation purely for larger scale reporting and provides an average for the catchment. This means that the potential or status of an individual watercourse could in fact be better or worse than indicated by the related water body status. Developers proposing large or industrial developments are strongly encouraged to liaise with the Environment Agency at any early stage in the planning process to gain further local information.

7.2.7 Information about locally reported Peterborough water bodies is provided in table 7-1 below.

7.2.8 Natural rivers with, for example, meandering courses and native vegetation tend to create good habitats for wildlife and may have a higher ecological status than a modified or artificial watercourse. The majority of watercourses in Peterborough are, however, not in their natural state. Modifications such as channel straightening or dredging have taken place over centuries for reasons such as transport, urbanisation, land drainage and flood defence. In most cases in Peterborough the rivers still serve these important purposes and hence channels cannot just be returned to a more natural state. Such watercourses have been designated as heavily modified or artificial water bodies by the WFD and are given the alternative objective of 'good ecological potential'. This is the best ecology possible without compromising the use of the water body for which it has been designated. There are actions that can be taken to help increase the ecological potential of these heavily modified or artificial watercourses, as discussed in section 7.7.6, page 48.

Table 7 1: A summary of the classification of the locally reported water bodies within Peterborough. This should be taken only as an indicator. Further consultation with the Environment Agency is encouraged.

Water body (or group of)	Water body reporting ID	Hydromorphology designation	2009 Ecological Potential	2009 Chemical Status	2015 Predicted Ecological Status / Potential	2015 Predicted Chemical Status	Priority
Welland (western boundary of Peterborough)	GB105031050580	Heavily modified	Poor	Good	Poor	Good	High
Welland (north west boundary of Peterborough)	GB105031050600	Heavily modified	Moderate	Good	Moderate	Good	Medium
Welland (north and east of Peterborough)	GB105031050680	Artificial	Moderate	Good	Moderate	Good	High
Maxey Cut (WFD reference is Welland near Peakirk)	GB105031050590	Heavily modified	Moderate	Assessment not required	Moderate	Assessment not required	Medium
Folly River	GB105031050560	Heavily modified	Moderate	Assessment not required	Moderate	Assessment not required	Medium
Werrington Brook and Marholm Brook	GB105031050540	Heavily modified	Moderate	Assessment not required	Moderate	Assessment not required	Medium
Brook Drain	GB105031050570	Heavily modified	Moderate	Assessment not required	Moderate	Assessment not required	Medium
Southorpe Brook	GB105032050370	Not designated as heavily modified or artificial	Moderate	Assessment not required	Moderate	Assessment not required	Medium

Water body (or group of)	Water body reporting ID	Hydromorphology designation	2009 Ecological Potential	2009 Chemical Status	2015 Predicted Ecological Status / Potential	2015 Predicted Chemical Status	Priority
Wittering Brook	GB105032050360	Not designated as heavily modified or artificial	Good	Assessment not required	Good	Assessment not required	Medium
River Nene (through Peterborough)	GB105032050381	Heavily modified	Moderate	Fail	Moderate	Fail[47]	Medium
Morton's Leam and the Counter Drain	GB105032050382	Artificial	Moderate	Fail	Moderate	Good	High
Kings Dyke (WFD ref: Old River Nene)	GB70510037	Heavily modified	Good	Assessment not required	Good	Assessment not required	Medium
River Nene Old Course (WFD Ref: Middle Level Navigations)	GB70510035	Artificial	Good	Assessment not required	Good	Assessment not required	Medium
Stanground Lode	GB105032050340	Heavily modified	Moderate	Good	Moderate	Good	Medium

[47] It has been determined that it is technically infeasible and disproportionately expensive for this section of the Nene to reach 'good' by 2015. The objective is instead for it to reach 'good' by 2027.

7.2.9 In the event that measures to improve a heavily modified or artificial watercourse cannot easily be taken without affecting the important role that the watercourse plays, the legislation allows that water bodies do not require further assessment on that specific element.

7.2.10 Most development near a river or watercourse will have the potential to impact on the water quality and, in turn, on the biodiversity of the water body.

7.2.11 There are other benefits to Peterborough of improved water quality, other than ecological ones. These include reducing the damage caused to people and property by flood waters and reducing the impacts of pollution on waterlogged archaeology. The latter is a potentially relevant issue in Fen areas.

7.3 Assessment of the impacts

7.3.1 The Environment Agency and the city council have a duty to ensure that WFD requirements are met by new development. They will therefore screen the development, during the planning process, based on three issues in this order of importance:

- Causing harm - Does the development have the potential to cause deterioration in the WFD status of a water body?
- Preventing restoration - Does the development prevent future improvement to the water body and therefore prevent it from reaching good ecological status/potential?
- Taking positive action – Are there opportunities for development to assist with improving the ecological status of water bodies and meeting WFD objectives.

7.3.2 Development which may require a WFD assessment includes, but is not limited to:

- Development within 20 metres of a watercourse where changes are proposed to the channel or bank form or where the long term management of the watercourse would be affected
- Development requiring EIA for reasons linked to the water environment.
- New water infrastructure
- Developments on contaminated land

7.3.3 In the event that a development in Peterborough requires a Water Framework Directive assessment, guidance is provided in appendix C as to what would be expected. The Environment Agency may be able to provide additional guidance. Should future formal national guidance be released in this area then it will supersede the information in appendix C. No WFD assessments have been required or undertaken in Peterborough as of 2012.

7.4 How do people and development influence the WFD status of rivers?

7.4.1 The following development-related factors can influence the WFD status of rivers:

a) Water supply, demand and abstraction
b) Wastewater discharge
c) Site drainage
d) Location of development or works, in relation to water bodies
e) Land contamination
f) Highway provision
g) Minerals and waste planning
h) Tourism, recreation and navigation
i) Community engagement

7.4.2 The city council is keen that local policy supports the implementation of the European Directive and that development in Peterborough does not compromise, but rather aids, achievement of WFD requirements. The following section gives further explanation of how development affects the WFD

status of watercourses so that this can be borne in mind by developers and planners in both planning decisions and future policy.

7.5 Water supply, demand, abstraction and wastewater discharge

7.5.1 If the water supply or wastewater discharge needs of any future development are likely to cause deterioration in WFD status, the city council and developers will need to take this into consideration and manage or determine impacts accordingly. In some cases the city council and its partners may require an appraisal to be carried out to indicate how the works as a whole will affect the WFD status of the watercourse. When the control and monitoring of such water related issues need to be addressed in the planning process the city council takes advice from the Environment Agency, local Internal Drainage Boards and the local water and sewerage provider.

7.5.2 The supply of drinking water to Peterborough involves abstraction from the Nene. When water is removed from a river it can reduce water quality due to reduced dilution of pollutants. Standards are in place between the Environment Agency and Anglian Water to ensure that most of the time water levels within the river are maintained at an appropriate level for fish and other wildlife. However, in drought periods or with increasing demand water companies may need to apply for a permit to increase abstraction, and hence reduce river levels.

7.5.3 New development also leads to an increase in demand for sewerage services and hence increased discharge flows from water recycling centre (WRC). Sewage effluent is collected and directed to the closest WRC. For urban Peterborough this is at the Flag Fen and hence the impact of additional flows is likely to be some distance from the development site. It is important therefore that these are not forgotten as wastewater impacts can still be significant. Further information is provided in the WCS and SFRA.

7.5.4 If Anglian Water reaches a point where it needs to apply for a permit for increased discharge flows from a WRC, it is likely that the water quality limits will be tightened. This will be intended to aid achievement of the water quality objectives of the receiving water body under the WFD. The Counter Drain, into which the treated effluent from Flag Fen WRC is discharged, currently has a chemical status of ‘poor’ and hence is far from reaching ‘good’ by 2015. Where consent limits are not achievable in terms of sustainability or scope for extending the water recycling works, planning issues may arise and strategies for foul drainage and treatment should be investigated. Peterborough’s Core Strategy policy CS12 (Infrastructure) requires that there is sufficient infrastructure capacity to support new development. This may require the phasing of development in line with infrastructure provision, in order to avoid environmental damage / WFD non-compliance.

7.6 Site drainage

7.6.1 Decisions made about how to drain a site need to consider the impacts on the downstream water environment, both in terms of flood risk and water quality. The Water Framework Directive does not allow for any deterioration in the downstream environment as well as in water bodies that are adjacent to or part of the site. An example of when deterioration could occur is if surface runoff, e.g. from construction, resulted in an increase in sediment being carried into the watercourse and then downstream within the catchment.

7.6.2 Where sewers are combined, taking both surface water and foul, heavy rainstorms leading to increases in the surface water flows can result in foul flooding. To reduce the likelihood of this causing damage, combined sewer overflows (CSOs) exist in certain locations. When the capacity of the sewer is reached, spills will result from the CSO into watercourses to reduce the pressure in the system. The connection of surface water and highway drainage to combined sewers therefore increases the risk of flooding and pollution from CSOs and WRC storm discharges. Therefore new surface water connections to the combined sewer system should be avoided where possible and where unavoidable should be restricted to greenfield flow rates. The transfer and treatment of surface water from a CSO or WRC discharge is not normally sustainable.

7.6.3 Increases in flows should also be avoided upstream of CSOs. Where this is not possible, if development will lead to an increase in population of more than ten percent in the wastewater catchment upstream of a CSO, the impact of growth should be assessed using Urban Pollution Manual (UPM) techniques to determine the mitigation required. Developers will be advised by Anglian Water and/or the council if there are CSO(s) near their site. Where the impact on the CSO is expected to be an issue, this should be included in the site's EIA or WFD assessment.

7.6.4 In order to reduce the frequency and duration of spills from CSOs, it is important to ensure that opportunities to divert surface water and highway drainage from combined sewers are fully explored.

7.6.5 As water runs over land it picks up pollutants and transports them ultimately into watercourses. Runoff from roads can contain heavy metals and hydrocarbons and run-off from farmland is more likely to contain nitrates and sediment. The impacts of this diffuse pollution can have serious implications for water quality and the WFD. Improving the quality of discharge from sites is one of the key aims of sustainable drainage systems, as discussed in section 6.8, page 36. By filtering runoff and slowing down flows SuDS can significantly reduce the impacts of pollution through mechanisms such as infiltration, filtration and evapotranspiration. SuDS can also create habitat for wildlife, which may help to improve the ecological potential of nearby water bodies.

7.6.6 Management of surface water flows during construction is very important in order to prevent construction debris entering nearby watercourses.

7.7 Development location

7.7.1 Since the Water Framework Directive applies to all water bodies the location of development within Peterborough is not specifically relevant. However, the development's position within a catchment or its proximity to a watercourse can be relevant.

7.7.2 Location within a catchment will affect how many different watercourses the site drainage could impact on and whether or not the development could be a driver for improvement opportunities for a specific watercourse.

7.7.3 Proximity to a watercourse is relevant where, for example, development or engineering works could affect the ability of a water management partner to access, maintain or improve the water body, or where it could affect the flow in a watercourse. Riverside development must therefore be set back a reasonable distance from the waters edge, allowing a corridor between the two environments. While this corridor is crucial for access for maintenance, it is also the most effective means of ensuring there is potential for habitat and ecological benefits. Appropriate form and landscaping of the riverbanks can then be fulfilled through good design. The distance of 'set back' may vary depending on the size of the watercourse, the type of maintenance that is required and the organisation responsible for maintenance. The distance will therefore be determined on a case by case basis with developers bearing in mind the need for access and green infrastructure.

7.7.4 Special consent is required from Peterborough's water management partners for development that takes place inside or within a certain distance of a watercourse. Chapter 8 explains what consents are needed, under what legislation and from which organisation. As well as the development or engineering works having the potential to affect flood risk, works (such as river straightening, dredging, putting in physical structures and impoundments and hard engineering) also all have the potential to cause deterioration and prevent WFD objectives being met. These works therefore require a level of WFD assessment.

7.7.5 Riverside development is likely to want to make the most of the river to enhance the aesthetics of the location. When landscaping measures are carried out these should be co-ordinated with the Environment Agency and other relevant partners in case methods would also provide ecological benefits or to help facilitate a locally desired partner project. Naturalisation and improvement of river banks and the surrounds of water environments has the most direct and measurable impact on water bodies and their status. Where hard surfaces or bank edges currently exist softening and planting the banks can make a significant contribution to biodiversity; creating and improving habitats for native species. It is recognised that there is significant scope in Peterborough for such improvements to be made and hence part (d) of policy PP16 in the Planning Policies DPD specifically addresses this issue.

7.7.6 Where a watercourse must still serve a function for which it has been modified or was originally created, naturalisation and habitat measures may need to be more subtle or more carefully considered since they must not, for example, increase flood risk. This could be the case in Peterborough with some of the watercourses in fenland areas which are managed by an Internal Drainage Board. Smaller changes such as the installation of fish passes alongside pumping stations or bank-side planting can be particularly valuable to improve the habitat for native species. The Middle Level IDB Biodiversity Partnership has their own IDB Biodiversity Manual[48] explaining the actions taken to manage the waterways in a way that benefits wildlife. This includes methods such as:

- Forming marginal ledges in open channels
- Changing the timing of works to accommodate species
- Having maintenance rotation periods
- Using 'softer' erosion control measures such as sedge plugs and coir roll revetments

[48] https://middlelevel.gov.uk/conservation/idb-biodiversity-manual/

7.7.7 The Environment Agency's online mitigation manual[49] provides examples of methods currently used (where appropriate to individual sites) to bring about river naturalisation and improve the ecological potential of main rivers.

7.8 Highways

7.8.1 There are several ways in which highways can interact negatively with water bodies. Construction waste and discharge points for highway drainage are important as discussed in section 7.6, page 47. Three other examples are also given here:

- Where a bridge crosses a watercourse or a road runs down towards a river, surface water exceedance flows may lead water to run off these surfaces directly into a water body, taking heavy metals and hydrocarbons with it.
- The design of new bridges may require river edges to be strengthened and hardened on both sides potentially cutting off a wildlife corridor.
- Culverting of a watercourse under a carriageway causes a loss of morphological diversity and habitat continuity which may interrupt the migration routes of animals. The newt tunnels installed at Hampton in Peterborough are a very good example of how action has been taken to mitigate such an impact.

7.9 Land contamination

7.9.1 Groundwater beneath development sites can provide base flow to surface waters. Ground conditions on brownfield land potentially affected by contamination should therefore be investigated prior to decisions being made about site layout and design of drainage systems.

7.9.2 If there is potential for land contamination on site then this can have effects on more areas than just drainage and water environments. Policy LP34 in the Local Plan therefore requires that on sites with the potential to be affected by contamination a preliminary assessment should be carried out prior to a planning decision being made. This will identify if additional measures and investigations need be carried out before development should commence. Pre-application advice can be sought from the city council and the Environment Agency to ensure a smoother planning application process.

7.9.3 Planning conditions can usually control pollution during construction, but this are not appropriate for land contamination, which should be addressed in principle prior to development decisions. This is discussed in policy LP34.

7.9.4 Soakaways and other infiltration based sustainable drainage systems (SuDS) should not be constructed within contaminated ground. Non-infiltration based SuDs should be considered as an alternative.

7.9.5 Developers seeking further guidance about land contamination should visit the Gov.UK website[50] and refer to any guidance produced by government or by nationally recognised planning and/or contamination based organisations. The following Environment Agency documents may be of use:

- The risk management framework provided in CLR11: model procedures for management of land contamination; and
- Guiding Principles for Land Contamination for the type of information required in order to assess risks to controlled waters from the site.

7.10 Minerals and waste planning

7.10.1 Developers should address site restoration options for minerals and waste sites at an early stage. The options for restoration can be an important factor in both the viability and suitability of a site for mineral extraction.

[49] http://evidence.environment-agency.gov.uk/fcerm/en/sc060065.aspx
[50] https://www.gov.uk/guidance/land-affected-by-contamination

7.10.2 The restoration of minerals and waste sites to water habitats can:

- offer opportunities to assist with creating areas for flood storage or with meeting water supply objectives. These must be incorporated within restoration schemes where there is a demonstrated need for them.
- provide opportunities for biodiversity improvements
- reduce the risks of pollution and enable natural groundwater flows to be maintained
- offer local amenity benefits

7.10.3 Landfill sites have to have stringent controls in place to ensure contaminants are contained, controlled and treated. Leachate from a landfill site will be controlled separately from surface water to ensure no contamination occurs. Other types of waste sites where there is the potential for surface water contamination need to be controlled through ensuring appropriate sealed drainage systems are in place. Without these measures or in the case of spills significant pollution could result causing a deterioration of water quality and the ecological potential of the watercourse.

7.11 Tourism, recreation and navigation

7.11.1 The use of water bodies for leisure can bring both positive and negative impacts. Through enjoyment visitors can become more aware of how pleasant water environments can be and often watercourses and lakes, for example, might be improved aesthetically to encourage increased visitor interest. Where aesthetics favour natural landscapes and presentation, measures may increase ecological potential. Conversely, trampling, litter and polluting emissions from boats may cause deterioration in the quality of an aquatic environment. Development wishing to make use of water bodies for leisure and recreation will need to consider the impacts of the specific uses. There is a risk that the insertion of structures and physical modifications to the watercourse, for example to facilitate boating, could potentially cause deterioration and therefore be non-compliant with the WFD.

7.12 Community engagement

7.12.1 Waterside development that encourages communities and companies to interact positively with their environment will be encouraged and commended. Informed and interested communities can do a lot to protect water resources that are important to them. This is demonstrated locally by the Peterborough RiverCare groups which have been established locally with help from Anglian Water. Such groups may carry out very beneficial works on a voluntary basis such as undertaking wildlife surveys, removing litter or monitoring non-native invasive species in watercourses. Local people may also be able to help implement some WFD mitigation measures.

8 Consents and permissions

8.1 When is consent required for works affecting watercourses?

8.1.1 If it is proposed to discharge into or undertake construction within the locality of, including over, under and within, a watercourse a specific consent is needed from one of Peterborough's water management partners. This consent is not included within planning permission but may be sought at the same time.

8.1.2 The type of consent required and the distance from the watercourse for which it is needed depends on what area of Peterborough the site is in and the classification of the watercourse.

8.1.3 Consenting requirements may prohibit development, lead to changes in design or layout and hence developers are advised to contact the relevant partners (illustrated in chapter 3 and below) early in the design process to ensure a smooth path through the planning process.

8.1.4 Works that are in, over, under or within 9 metres of the top of the bank of a main river require Flood Defence Consent from the Environment Agency. Where the channel is embanked, consent is required for works 9 metres from the landward toe of the raised embankment.

8.1.5 Ordinary watercourse consent is required for works affecting the flow of an ordinary watercourse, i.e. any ditch, dyke or channel carrying water which is not designated as a main river. This consent will be required from Peterborough City Council unless the site is in an area managed by an Internal Drainage Board where they will manage the consent application.

8.1.6 To support the many provisions of the Land Drainage Act 1991, organisations managing ordinary watercourses are able to have land drainage byelaws setting out clearly the required practises in their area of management. The distance from a watercourse, for which permission needs to be sought for works, varies between organisations. Table 8-1 below sets out these distances for each organisation and indicates where copies of the byelaws are available online.

8.1.7 In general land drainage byelaws will cover issues such as those listed below. However, for a full list of the situations covered by byelaws or advice on how to gain approval please refer to the relevant organisation.

- Control of introduction of water into watercourses
- Control of sluices
- Diversion of stopping up of watercourses
- Obstructions within a certain distance of the watercourse
- Fishing
- Repairs
- Dredging
- Mooring of vessels
- Navigation of vessels

Table 8 1: The different types of consents required and when they are applicable

Watercourse type	Consent required	Byelaw distance from watercourse	Organisation	Related legislation	Where to access the byelaws or relevant information
Main river	Flood defence	Within 9 metres	Environment Agency	Water Resources Act 1991	Contact the local Environment Agency office.
Ordinary watercourse	Land drainage byelaw	Within 20 metres	Middle Level Commissioners	Land Drainage Act 1991	http://www.middlelevel.gov.uk/docs/Byelaws/mlc.pdf
		Within 9 metres	North Level District IDB		http://www.northlevelidb.org/administration/byelaws
		Within 7 metres	Peterborough City Council		http://www.peterborough.gov.uk/pdf/PCCLandDrainageByelaws.pdf
		Within 9 metres	Welland and Deeping IDB		http://www.wellandidb.org.uk/byelaws
		Within 9 metres	Whittlesey and District		Contact http://www.wcidb.org.uk/
	Land drainage ordinary watercourse	Within channel or affecting flow	Peterborough City Council or Internal Drainage Board (IDB) - depends on location	Land Drainage Act 1991 and Flood and Water Management 2010	See http://www.peterborough.gov.uk/water for links to: *Partner organisations* – access contact details for each organisation *Water data* – find out if your site is within an IDB area

9 Implementation and monitoring

9.1 Delivery partners

9.1.1 Those that will help to deliver this SPD and put flood risk and water management policies into action are:

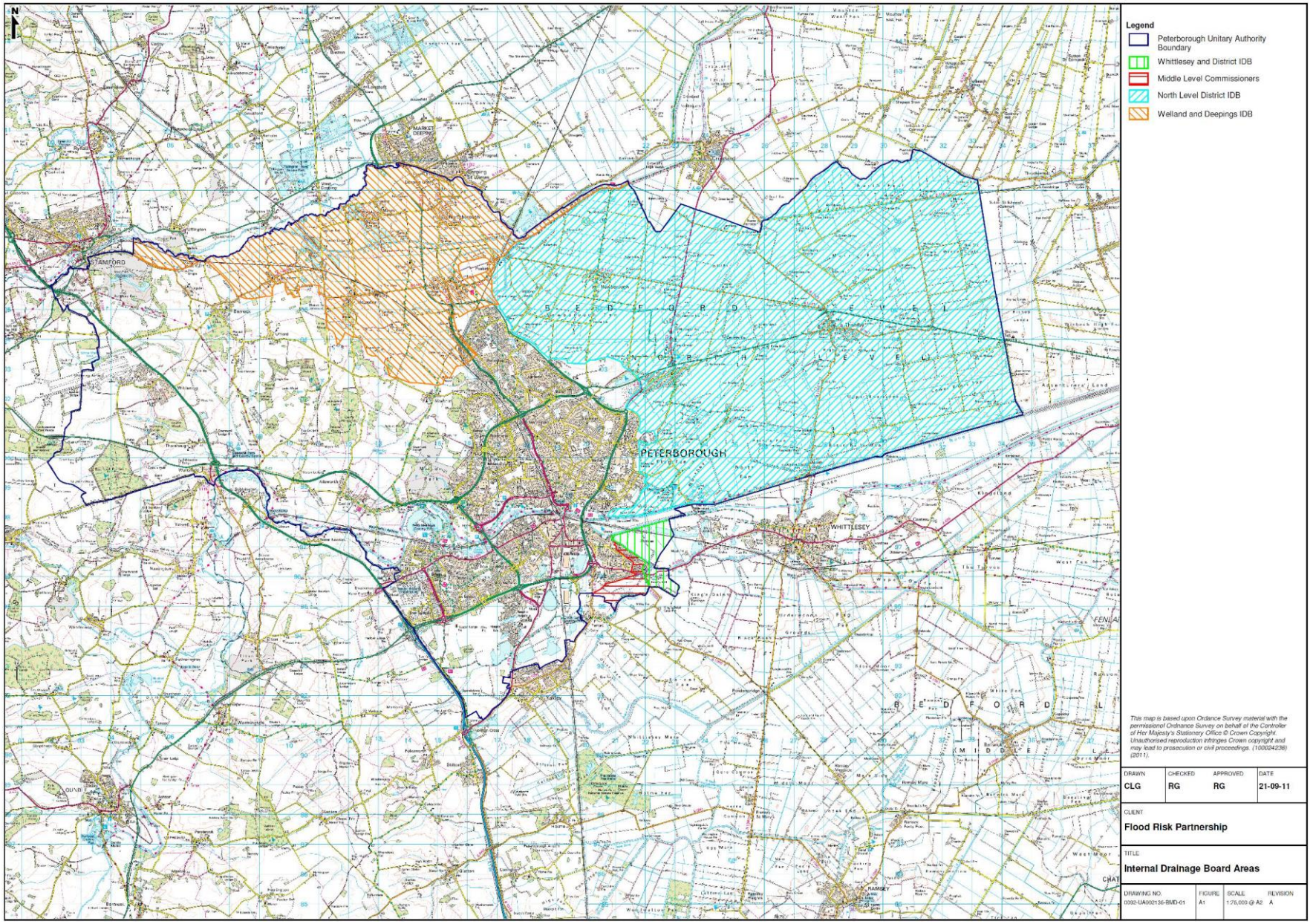
- Peterborough City Council
- Applicants and their agents
- The Environment Agency
- Anglian Water
- North Level District Internal Drainage Board
- Middle Level Commissioners
- Welland and Deeping Internal Drainage Board
- Whittlesey and District Internal Drainage Board

9.1.2 Appropriate indicators and targets have been identified to monitor the effectiveness of current policy, which are set out in Table 9-1 below. An additional indicator has been developed on surface water flows into sewers. The results of annual monitoring will identify which policies are succeeding, and which need revising or replacing because they are not achieving the intended effect.

Table 9 1: Indicators and targets for this supplementary planning document

Indicator	Target
Number of developments containing sustainable drainage systems.	All developments containing sustainable drainage systems to reduce, attenuate and clean water
Number of planning permissions granted contrary to advice from the Environment Agency on WFD and water quality grounds and which adversely affect a water body's potential to achieve statutory WFD targets.	WFD assessments undertaken where detriment is possible and no planning permissions granted contrary to the advice of the Environment Agency.
Number of planning permissions granted contrary to the water management advice of Peterborough's water management partners or officers	No planning permissions granted contrary to the advice of Peterborough's water management partners
Number of new dwellings in flood zones 3b.	No dwellings in 3b.
The number of new dwellings on Greenfield sites in flood risk zones 3a and 3b.	None in 3a and 3b.

Appendix A - Internal Drainage Board areas



Appendix B - Using Sustainable Drainage Systems

SuDS have been discussed throughout the Flood and Water Management SPD and to best help those delivering SuDS, below there is a list of some of the useful resources and best practice guidance currently available, keep an eye on the Peterborough SuDS Website for the latest developments.

Peterborough SuDS Website

The council SuDS website also provides a range of information on delivering SuDS and what is expected in Peterborough, with links to **case studies, technical standards** and lists of **planning requirements** http://www.peterborough-suds.org/

Peterborough Design and Evaluation Guide

The council are intending to release a **Design** and Evaluation guide for the use of SuDS in the new developments, once released this will be hosted on the Peterborough City Council Water Management webpages https://www.peterborough.gov.uk/council/planning-and-development/flood-and-water-management/water-data/

Association of SuDS Authorities (ASA)

Formerly known as the Local Authority SuDS Officer Organisation (LASOO), this organisation has a core of Local Authorities who work in the SuDS industry. It will share best practice and help enable development by providing a platform to discuss delivery and trouble shooting. ASA will have ownership of Non-Statutory Technical guides and a website hosting this information will be available from 2019. www.SuDS-authority.org.uk

Interpave

Interpave make design guides and case studies for **permeable paving** freely available to all, this includes **design and construction** technical specifications which is supported widely across the industry. http://www.paving.org.uk/commercial/permeable.php

CIRIA SUDS manual

This has long been held as the approach for SuDS best practice, including details on water quality and pollutant removal mechanisms. There are sections to set out how to **design the site** and estimate storage needs as well as considerations for the **technical design** of assets. http://www.ciria.org/Resources/Free_publications/SuDS_manual_C753.aspx

UKSuDS

This is a website hosted by HR Wallingford and provides a number of useful tools freely available online, including **calculators and tools** that help to set the design parameters for a site http://www.uksuds.com/

Susdrain

This is an online SuDS community with a wealth of **case studies and resources** for SuDS best practice http://www.susdrain.org/resources/ including advice on assessing **storage and attenuation** needs http://www.susdrain.org/files/resources/fact_sheets/03_14_fact_sheet_attenuation.pdf as well as on creating a **maintenance plan** http://www.susdrain.org/files/resources/SuDS_manual_output/paper_rp992_21_maintenance_plan_checklist.pdf

Non Statutory Technical Standards

These were developed by a multiagency group including working with government to create **a checklist for SuDS** design and achieving the need for SuDS in the planning process. https://www.gov.uk/government/publications/sustainable-drainage-systems-non-statutory-technical-standards . A separate interpretation of these standards by LASOO (Local Authority SuDS Officer Organisation) helps to translate what a Lead Local Flood Authority may expect to see in a new planning application http://www.peterborough-suds.org/wp-content/uploads/2016/09/155639-SUDS-Booklet-A4-LR.pdf.

Climate Change and Urban Creep

Details on **Climate change** allowances can be found in the NPPF https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances

Information on **Urban creep** and what allowances are expected can be found in Appendix B of LASOO guidance http://www.peterborough-suds.org/wp-content/uploads/2016/09/155639-SUDS-Booklet-A4-LR.pdf

Infiltration testing

For standard approaches on **Infiltration testing or soakage** have a look at the BRE365 Soakaway Design https://www.bre.co.uk/page.jsp?id=904 and CIRIA R156 Infiltration Drainage – manual of good practice http://www.ciria.org/ItemDetail?iProductCode=R156&Category=BOOK

Myth Busting

There are a number of misconceptions that surround Sustainable Drainage that seem to have historically prevented SuDS being delivered on new developments. We believe this circulates around a misunderstanding of what the term Sustainable Drainage actually means with some interpretations only seeing SuDS as vegetated features that allow the water to soak into the ground. Whilst these type of features are welcome the designer cannot be this limited in their approach.

National and local policy have an expectation that surface water can be properly managed onsite and that flood risk will not be increased as a result of any development. A sustainable solution for the site drainage would be the most appropriate for managing the volume and quality of water on the site and will incorporate additional benefits such as habitat creation or recreational features where it can.

So before dismissing SuDS out of hand think about what you are trying to achieve, all developments must have a solution for the surface water management that is sustainable for the lifetime of that development, in other words a sustainable drainage system. Below are some of the common barriers to SuDS delivery;

I do not have space for SuDS – There is often an assumption that a site must have a large open water feature such as a pond for storing storm water, this is not the case. A site will need to be designed to manage surface water and provide the necessary attenuation and water treatment functions, this does not have to be vegetated or permanently wet. This volume of water could be managed via a range of smaller components distributed throughout the development.

SuDS cannot be used on clay soils – It is true that certain soil types allow less water to infiltrate into the ground and in this instance infiltration components may not be the most appropriate solution. However, as we have previously discussed, SuDS should look to mimic the natural processes, therefore on a clay site this may mean attenuating and cleaning water as it flows across the surface discharging at a greenfield rate.

I have high water tables so I cannot use SUDS – Similar to clay soils, a high water table may hinder the ability to include infiltration components onsite, however by sending the water underground in a pipe it is likely that a pump will be needed at the end of the pipe to get the water back up to ground level above the water table. This means it is important for the designer to consider keeping the water as close to the surface as possible which could reduce excavation costs and mitigate the need for a pump onsite, in turn avoiding costly installation and long term maintenance.

There are ground contamination issues on site and I cannot use SuDS – As with clay soils or a high ground water table the presence of contamination onsite may act as a constraint to infiltrating water into the ground. In this instance the designer must consider whether the contamination covers the whole site or not and potentially look to drain the water to a portion of the site which is not contaminated. There may be a need to ensure that any drainage components are lined with an impermeable membrane to prevent infiltration in areas of contamination but this does not prevent the use of many SuDS components, it simply changes the technical detail of those features.

No one will adopt the SuDS, they only want pipework – There are perceived barriers to delivering SuDS on site as they have not been widely adopted by drainage authorities. The council have been using SuDS type techniques for a number of years to manage flood risk in Peterborough with some features such as Cuckoos Hollow being in place since the 1970s. The council are willing to consider adopting SuDS features as a part of Public Open Space and also within the adoptable Highway. Our partner organisations, such as Anglian Water, have also previously adopted SuDS features and are open to working with developers on new sites.

Appendix C - Water Framework Directive Assessment Guidance

Introduction

At pre-application stage the city council will make applicants aware of the need to consider impacts on water bodies from the construction of structures in or near channel or from proposed changes to water quality, habitat and/or biodiversity.

If a development site requires Environmental Impact Assessment (EIA), applicants should include the impacts in this assessment, using information obtained from the Anglian River Basin Management Plan or directly from the Agency about the status of potentially affected water bodies.

If a development does not require EIA but has the potential to impact on water bodies then applicants should refer to the Environment Agency. A separate assessment might be required.

Overview of process for assessing impacts on water bodies

If a separate WFD assessment is required the process below for assessing impacts on water bodies, should be followed. The process is derived from European Commission guidance and includes:

- **Preliminary assessment** – including data gathering (water body and proposed development) and identification of impacts on water bodies;
- **Detailed assessment** – including options to avoid impacts on water bodies, mitigation to reduce impacts and opportunities to contribute to betterment.
- **Justification** is required where new modifications led to deterioration of a water body or failure to meet WFD objectives (WFD Article 4.7).

Preliminary assessment

The preliminary assessment of potential impacts on water bodies should follow these stages:

- **development impacts** – how development would impact on water quality elements and thresholds that trigger detailed assessment;
- **cumulative impacts** – how the proposed development together with existing physical modifications might lead to deterioration;
- **sensitive water habitat** – how development would affect water habitat including protected areas;

Where the water body already has a status less than ‘good’ the assessment needs to include information on:

- **the risk of preventing improvement** – whether the proposed development would prevent implementation of any measures in the RBMP;
- **improving water bodies** – other practical opportunities to improve the water body as part of the proposed development.

Detailed assessment

A detailed assessment should have the following stages:

1. **Deterioration assessment** – should consider impacts from development, including physical modifications, on:

    a) water quantity and flow, river continuity and groundwater connectivity;
    b) biological elements (flora and fauna);
    c) recognise where permits, licences or consents that we issue will deal with other impacts including the risk of water pollution.

2. **Ability to achieve good status** – should consider whether the proposed development will prevent implementation of measures in the first RBMPs to achieve good status or good potential as appropriate.

3. **Impacts on other water bodies** – should consider whether or not proposed development would permanently prevent a different water body from the one in which it is located from achieving good status or good potential as appropriate. Consider opportunities to improve status.

4. **Other EC legislation** – the outcome of Detailed Assessment must give the same level of protection as any other EC legislation that applies, to that water body through the designation of protected areas. These include Natura 2000 sites, Bathing Waters, Shellfish Waters, Freshwater Fish Directive reaches and Drinking Water Protected Areas.

Justification

Where the detailed assessment shows that physical modification would lead to unavoidable deterioration then it will only be acceptable if a justification under WFD Article 4.7 can be provided. Such circumstances should be discussed with PCC and the Environment Agency given the limited scope to achieve this under WFD legislation.

Appendix D - Glossary and acronyms
Glossary

Abstraction of water	the process of taking water from any source. Most abstracted water is treated to produce drinking water or used for irrigation.
Amenity	a general term used to describe the tangible and intangible benefits or features associated with a property or location that contribute to its character, comfort, convenience or attractiveness.
Annual flood probability	The estimated probability of a flood of given magnitude occurring or being exceeded in any year. Expressed as, for example, 1-in-100 chance or 1 per cent.
Attenuation	the process of slowing down the rate of flow usually to reduce peak flow downstream.
Biodiversity	all species of life on earth including plants and animals and the ecosystem of which they are all part.
Catchment	an area that serves a river with rainwater, this is every part of the land where the rainfall drains to a single watercourse is in the same catchment
Combined sewers	A sewer which carries foul sewage and surface runoff in the same pipe
Conveyance	movement of water from one location to another
Cross connections	any possible connection between a public surface water sewer and a foul sewer that could cause contamination
Defra	Department for Environment, Food and Rural Affairs
Discharge	Rate of flow of water.
Ecology	The study of environmental systems, particularly the relations of organisms to one another and to their physical surroundings.
Exceedance flow	Excess flow that emerges on the surface once the conveyance/carrying capacity of a drainage system is exceeded.
Exceedance routes	The route that exceedance flows take across the land
First flush	The initial runoff from a site/catchment following the start of a rainfall event. As runoff travels over a catchment it will collect pollutants and the “first flush” portion of the flow may be the most contaminated as a result. This is especially the case for intense storms and in small or more uniform catchments. In larger or more complex catchments pollution wash-off may contaminate runoff throughout a rainfall event.
Flash flood	A significant flood occurring very suddenly as a result of localised intense rainfall
Flood and water management unit	an area of Peterborough identified as having similar flood risk and drainage characteristics
Floodplain	Area of land that borders a watercourse, an estuary or the sea, over which water flows in time of flood, or would flow but for the presence of flood defences where they exist.
Flood storage	The temporary storage of excess runoff or river flow in ponds, basins, reservoirs or on the floodplain during a flood event.
Flood zones	The national flood zones as mapped by the Environment Agency cover all watercourses with a catchment greater than 3 km2 i.e. they cover some ordinary watercourses as well as all main rivers.

Functional floodplain	Land where water has to be stored in times of flood. This includes the land which would flood with an annual probability of 4% (1 in 25), as agreed between Peterborough City Council and the Environment Agency, and water conveyance routes and flood storage areas (sometimes referred to as washlands).
Greenfield land	land which has not been developed before, other than for agriculture or forestry buildings or buildings associated with parks, recreation grounds and allotments.
Green infrastructure	a network of protected sites, nature reserves, green spaces, waterways and greenway linkages (including parks, sports grounds, cemeteries, school grounds, allotments, commons, historic parks and gardens and woodland). It offers opportunities to provide for a number of functions, including recreation and wildlife as well as landscape enhancement.
Green roof	a roof purposely covered in vegetation to retain, attenuate and treat water run-off and to contribute to local biodiversity
Infiltration	the soaking of water into the ground.
Internal Drainage Board	a type of operating authority which is established in areas of special drainage needs in England and Wales with permissive powers to undertake work to manage water levels within drainage districts. Middle Level Commissioners is not technically an Internal Drainage Board although it undertakes many of the same roles.
Local Development Framework	the collective term for the whole package of planning documents which are produced by a local planning authority to provide the planning framework for its area.
Local Resilience Forum	a multi-agency partnership made up of representatives from local public services, including the blue-light emergency services, local authorities, the NHS, the Environment Agency and other partners.
Main rivers	watercourses designated as such on statutory main river maps held by the Environment Agency and Defra and can include any structure or appliance for controlling or regulating the flow of water in or out of a channel. The Environment Agency has permissive powers to carry out maintenance and improvement works on these rivers.
Ordinary watercourse	An Ordinary Watercourse is defined as any watercourse not identified as a main river on maps held by the Environment Agency and Defra.
Peak fluvial flow	the maximum flow rate of water in a river during a particular period
Permeable surface	A surface that is formed of material that is itself water resistance but, by virtue of voids formed through the surface, allows infiltration of water to the sub-base – for example, concrete block paving.
Potable Water	Water that is suitable for drinking
Rapid Inundation Zone	In Peterborough the eastern part of the unitary authority is currently protected by defences along the River Nene. A rapid inundation zone is an area which is at risk of rapid flooding should a flood defence structure be breached or overtopped. The zones at highest risk of rapid inundation are typically located close behind the defences. Please note that the Environment Agency no longer use this term widely but the Core Strategy does make use of this term and hence it is explained here. Hazard and breach mapping are now used to better define the residual risk of a site.

Residual risk	the risk that remains after all risk avoidance, reduction and mitigation measures have been implemented
Runoff	Water flow over the ground surface to the drainage system. This occurs if the ground is impermeable or saturated, or if rainfall is particularly intense.
Source control	The management of rainfall at or close to the place where it lands.
Sustainable drainage systems	a sequence of management practises and control structures often referred to as SuDS, designed to drain water in a more sustainable manner than some conventional techniques. SuDS processes are designed to replicate natural drainage systems which improve water quality and amenity as well. SuDS are typically used to attenuate run-off from sites.
Urban creep	Cumulative impact on towns and cities of gradual increases in impermeable areas.

Appendix E - Application of Sequential and Exception

Sequential Test

1. Area of search	
Location of development	Area of search
(A) City Centre	City Centre
(B) Urban (in City boundary)	Whole city area
(C) Village (that has a defined boundary)	Settlement of the same 'standing' or higher
(D) Rural	Whole rural area incl within settlements

2. Investigation of similar scale sites
Alternative sites can be 20% larger or smaller than the application site's gross site area.

3. How are alternative sites going to be found?
a) Site allocations
b) Land and property being currently marketed by agents
c) Sites rejected during site allocation process (Site Allocations Evidence Report)

4. Are the alternative sites available?
Ownership / willingness to sell are not a matter that can be taken into consideration
Is the site capable of being developed within 5 years (see published 5 year land supply/ apply the used to establish the supply level to any unallocated sites that are identified. If 'NO' the site should still be listed but identified as not being available with the reasons why being stated.

5. Application
If sites are found of a similar size, which are available and at lesser flood risk (based on the Environment Agency's published 'undefended' flood risk maps then the sequential test is failed and the application should be refused. **Only if the test is failed should the exception test be undertaken.**

Exception Test

As per national policy the adopted SPD, both the following criteria must be passed:

Part 1 - The development must be safe in flood terms (typically flood depth vs floor height), not increase flood risk elsewhere, and where possible, will reduce flood risk overall.

AND

Part 2 - The development must provide wider sustainability benefits to the community that outweigh flood risk – i.e. test the development against the objectives in the Community Strategy 2008-21:

[Score system is: 0 = neutral, -1 = or +1 and suggested scores are given below]

The list below identifies all the criteria against which schemes will be assessed. However we have shown those criteria where housing developments will normally score ''0' points.'

- Improves Health - '0' unless the development is care/ support related
- Supports vulnerable people – '0' unless the development is care/ support related
- Improved skills and education - '0'
- Empowers the local community – '0'
- Makes Peterborough safer – '0'
- Builds community cohesion – '0'
- Builds pride in Peterborough – '0'
- Making Peterborough cleaner & Greener – '0' unless significantly exceeds policy compliance in terms of open space/ amenity space
- Conserves natural resources – '0' same as above
- Growing our environmental business sector – '0'

- Increasing use of sustainable transport – ‘0’ unless the proposal will result in above the normal use of sustainable transport
- Creating safe, vibrant City Centre/ sustainable neighbourhood centres – ‘0’ unless the proposal is in these locations
- Increasing economic prosperity – ‘0’ (the fact that people would be involved in building the houses and the occupants may bring trade to local shops does not count)
- Building the sustainable infrastructure of the future – ‘0’ as above
- Creating a better place to live – ‘0’ unless brownfield redevelopment/ deals with an eyesore/ contaminated/ nuisance site

Must score 1+ in order to pass part 2