Surface Water Management:

Interim Guidance for Developers

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Contents

Executive Summary

The aim of this interim guidance is to advise prospective developers and planning applicants of acceptable flood risk management techniques, alongside the Council's expectations of what is required as part of all forms of development across Shropshire. It will be used by Council Officers and Members in considering the appropriateness of planning applications in relation to flood risk, as well as being available for the general public and local amenity societies to use in formulating their responses to planning applications

It is recognised that, through historic drainage practices and climate change, a general increase in flood risk has resulted. The proper consideration of surface water as part of all development, and the use of Sustainable Drainage Systems (SuDS), is key to the successful management of both existing and future flood risk.

In order to be most effective, flood risk must be considered at all stages of the development process. Robust design standards must be adhered to and an allowance for climate change made. Both the volume and routes of exceedance flows, originating from within and outside a development site, must be assessed. Provision for the appropriate maintenance of any drainage systems must also be made and evidence submitted accordingly.

Through the use of, and compliance with, this document, developers and planning applicants will clearly demonstrate that proposals include the appropriate means for the management of surface water and flood risk within proposed development sites. This will also include the correct level of detail is submitted in order for a planning application to be considered valid. Developers are required to submit, alongside their planning application, either:

- a Flood Risk Assessment (using the Strategic Flood Risk Assessment for guidance) and a Surface Water Management Plan (in accordance with Appendix C)
- a Surface Water Management Plan (in accordance with Appendix C)
- a Surface Water Management Statement (in accordance with Appendix D)

1. Introduction

1.1. The aim of this interim guidance is to advise prospective developers and planning applicants of acceptable flood risk management techniques, alongside the Council's expectations of what is required as part of all forms of development across Shropshire. It will be used by Council Officers and Members in considering the appropriateness of planning applications in relation to flood risk, as well as being available for the general public and local amenity societies to use in formulating their responses to planning applications.

1.2. It should be noted that this is a working document, capturing a snapshot in time of the surface water issues that are currently known. Similarly, it reflects on existing legislation, advice and techniques that exist on publication. It is therefore intended that the document will be periodically reviewed to enable new and emerging advice and guidance to be adopted where appropriate.

1.3. All planning applications that have the potential to effect surface water runoff will be judged, in the context of flood risk, against this interim guidance, together with national guidance documents; in particular, Planning Policy Statement 25: Development and Flood Risk. This interim guidance expands on the existing national policy framework, setting out requirements for the consideration of both surface water and watercourse management in the context of emerging evidence on the level and sources of flood risk within Shropshire. It seeks to reduce the risk of flooding arising from new development whilst also providing local enhancements wherever possible, both on and off site, including enhancements to biodiversity and local amenity value.

1.4. This Interim Guidance supports Core Strategy Policy CS18 (Sustainable Water Management) by providing further guidance on how the Council's surface water drainage requirements can be implemented within new developments. It sets out requirements for new development proposals, particularly in light of emerging evidence on surface water flood risk within Shropshire, and provides assistance for planning applications. In time, this interim guidance will be replaced by a Water Management Supplementary Planning Document,

1.5. This document has been drawn up with the intention that as new and emerging advice, guidance, and techniques become available they will be incorporated as part of the best practice approach which is being promoted.

1.6. As the Lead Local Flood Authority for Shropshire, Shropshire Council will, in due course, become the 'SuDS Approving Body' (SAB). This means that all development which may have an impact on surface water drainage will require 'drainage approval' from the SAB. This approval will be in addition to any planning or other consents that may be required for the development. The information within this document will be carried forward to support the SAB role.

2. National Policy Context

2.1. It will help developers, considering the design of sustainable surface water drainage systems and the management of flood risk, if the key findings of the national policy documents following are considered.

Making Space for Water

2.2. 'Making Space for Water' was published in 2005. Building on the Foresight Future Flooding Report, it is the UK Government's response for delivering its strategy for flood risk management. It involves the consideration of all sources of flooding and embedding flood risk management in national and local policies. The aim is to develop a more integrated approach to flood risk management which reduces the threat to people and property and delivers environmental, social and economic benefit, consistent with sustainable development principles.

Future Water

2.3. 'Future Water' was published in 2008 and is the Governments Water Strategy for England. It puts forward policies to encourage a more effective and sustainable management of surface water and flood risk, including the preparation of surface water management plans and promotion of sustainable drainage systems (SuDS)

Planning Policy Statement 25: Development and Flood Risk (PPS25) and associated Practice Guide

2.4. The Government, in PPS25, sets out its policy for the management of surface water drainage and flooding issues in relation to new development. The policy seeks to ensure that appropriate sustainable development is in the right place, taking full account of flood risk. It aims to ensure that flood risk is taken into account (at all stages of the planning process), inappropriate development in areas at risk of flooding is avoided and that development is directed away from areas at high risk.

2.5. The associated Planning Policy Statement 25: Development and Flood Risk Practice Guide provides practical advice on the implementation of the related policy statement and places an onus on Local Planning Authorities to promote sustainable drainage methods.

Planning Policy Statement 1: Delivering Sustainable Development (PPS1)

2.6. Planning Policy Statement 1: Delivering Sustainable Development (PPS1) sets out the Government Objectives for the planning system and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. The December 2007 Supplement to PPS1 Planning and Climate Change, in paragraph 42, confirms that Local Planning Authorities should give priority to the use of Sustainable Drainage Systems (SuDS); they should pay attention to the potential contribution to be gained from water harvesting from impermeable surfaces and encourage layouts that accommodate waste water recycling.

Building Regulations

2.7. Building Regulations exist to ensure the health, safety, welfare and convenience of people in an around buildings. Part H of the Building Regulations specifically covers drainage. In particular, part H3, Rainwater Drainage, strongly recommends a more sustainable approach to surface water management, with a hierarchy that suggests disposal to watercourses and sewers is the last resort.

Flood and Water Management Act 2010

2.8. Leading on from the Pitt Review after the floods of 2007, the Flood and Water Management Act 2010 encourages better protection from flooding, the sustainable management of water, improvement of public services and secure water resources during periods of drought. The Act seeks to reduce flood risk by clarifying who is responsible for management of its sources, encouraging more sustainable forms of drainage in new developments and making it easier to resolve misconnections to sewers. As a result of the Act Shropshire Council is the lead local flood authority in Shropshire. The planning process is one if the key areas through which Shropshire Council will be managing flood risk.

The Natural Environment and Rural Communities Act 2006

2.9. The Natural Environment and Rural Communities Act 2006 requires public bodies to have regard to biodiversity conservation when carrying out their functions. This is commonly referred to as the 'biodiversity duty'. The aim of the biodiversity duty is to raise the profile of biodiversity, such that conservation of biodiversity becomes properly embedded in all relevant policies and decisions made by public authorities. The proper use of SuDS on development sites can deliver additional benefits through the enhancement of biodiversity.

3. Local Policy Context and Evidence

3.1. It may help developers, considering the design of sustainable surface water drainage systems and the management of flood risk, if regard is given to the following Shropshire Council documents.

Local Policy

Shropshire Core Strategy

3.2. The Local Development Framework is a set of documents setting out local policies in relation to the use and development of land in Shropshire over the period to 2026. The Core Strategy Development Plan Document (DPD) was adopted in February 2011 and is the principal document of the Shropshire LDF, setting out the vision for Shropshire and the broad spatial strategy to guide future development and growth. It is a starting point for planning applications which should take the provisions of the strategy into account.

3.3. Core Strategy Policy CS18: Sustainable Water Management, seeks to ensure that new development integrates a set of measures to reduce flood risk, avoids an adverse impact on water quality and quantity and provides opportunities to enhance biodiversity, health and recreation. In terms of managing flood risk, the policy requires development to be in accordance with PPS25 and for proposals to provide evidence that surface water will be adequately managed, particularly in areas of identified surface water flood risk. In time, Policy CS18 will be supported by a Sustainable Water Management Supplementary Planning Document (SPD). This Interim Guidance Document will form the basis of the SPD.

3.4. Core Strategy Policy CS6: Sustainable Design and Development Principles seeks to ensure that all new development is designed to a high quality using sustainable design principles. It requires all development proposals, including changes to existing buildings, to achieve standards set out in the Council's sustainability checklist. This checklist forms part of a Sustainable Design SPD and includes the requirements for surface water management, set out in this Interim Guidance.

Local Evidence

Strategic Flood Risk Assessments (SFRA)

3.5. Level 1 Strategic Flood Risk Assessments were completed in 2007 for the former district authority areas within Shropshire. The Level 1 SFRAs provide strategic flood risk maps which show flooding from all sources including flood zones and areas at risk of flooding from other sources. The assessments also provide an overview of the implications of climate change for flood risk. The SFRAs will help applicants to apply the Sequential Test and prepare site specific Flood Risk Assessments in accordance with the requirements of PPS25.

3.6. A Level 2 Strategic Flood Risk Assessment was undertaken for Shrewsbury town centre (within the river loop) in 2009. This provides more detailed modelling of the River

Severn through Shrewsbury in relation to flood extent, depth and velocity. It considers Shrewsbury's strategic development sites and gives further guidance on development.

Shropshire Water Cycle Study

3.7. The Shropshire Water Cycle Study was completed in the summer of 2010. It seeks to assess the impact of development, at a strategic level, on the water environment and that water services infrastructure either has sufficient capacity or can be provided in a timely manner. In terms of flood risk, the study builds on the evidence within the SFRAs by adding surface water flood risk mapping to identify the vulnerability of different settlements throughout Shropshire to surface water flooding. The study also includes mapping to identify the types of SuDS that may be applicable in different locations.

Shropshire Place Plans

3.8. To ensure the effective implementation of the development strategy, set out within the Local Development Framework, Shropshire Council, in partnership within local infrastructure and service providers and local communities has prepared a suite of 'Place Plans'. These Place Plans detail the infrastructure and investment requirements for Shropshire's settlements and surrounding countryside, based on local needs and community aspirations. The Place Plans provide an indication of what may be required to make a proposed development acceptable in planning terms, in addition to wider community aspirations for an area. As such, they form a basis for decision making on how developments should be designed and any requirement for developer contributions. *Further information on developer contributions is set out in the Developer Contributions SPD and the Community Infrastructure Charging Schedule.*

4. Traditional Approaches to Managing Flood Risk Through Development

4.1. Historic approaches to flood risk management have simply relied on receiving watercourses to transport ever increasing volumes of surface water from the outfalls of below ground drainage systems. Such drainage systems were typically designed to cope with rainfall of relatively low return period, and little consideration was given to what may happen within them, or the receiving watercourses, during extreme rainfall events.

4.2. Developments, and associated infrastructure, have included the creation of impermeable areas that increase the rate of runoff of surface water when compared to the equivalent undeveloped, or greenfield, site. This legacy of increased rates of runoff has directly contributed to an increase in the risk of flooding by some or all of the following:

- an increase in the volume of surface water that enters receiving drainage systems;
- an increase in the speed at which surface water enters receiving drainage systems, and;
- an increase in the likelihood that drainage systems will fail to cope during an extreme rainfall event.

4.3. Historically, developments that have increased the amount of impermeable area and, correspondingly, the speed and volume of runoff, have not faced the full costs and consequences of the development. The effects have typically been felt downstream.

When does flooding occur?

4.4. Drainage pathways can be highly complex and involve the interaction of many different components that may be above or below ground. Following a rainfall event, surface water runoff will flow above ground until:

- it reaches a receiving body such as a pond, watercourse or other low point;
- it enters a below ground drainage system, typically via gullies and roof drains, or;
- it infiltrates into the ground.

4.5. During heavy or extreme rainfall events, flooding can occur when the capacity of one or more elements in the drainage system, including a receiving body, is exceeded. Such exceedance flows then travel overland until a place is reached where they can re-enter a receiving body or below ground drainage system. It is this exceedance flow, and the route that it takes, that can cause damage to property and danger to life.

4.6. Flooding can occur when:

- the capacity of below ground drainage systems is overwhelmed by the rate of flow. New surface water sewers, designed in accordance with Sewers for Adoption, should have sufficient capacity to accept flows that occur during a 1 in 30 year return period, while highway drainage has typically been designed to a lower standard. Excess flows can escape from such systems through any openings, such as gullies or manholes, and then flow on the surface;
- surface water cannot enter the drainage system due to limited capacity of inlets, either by design or through inadequate maintenance;
- drainage systems cannot work effectively because of an inability to discharge effectively. This can be due to high levels in receiving waters and / or blockages but may, in low lying areas where there is no gravity outfall, be caused by limitations in pump capacity, or;
- when the capacity of the receiving body has been exceeded.

Consequences of Flooding

4.7. Flooding can lead to serious property damage and even risk to life in extreme cases.

4.8. The severity of damage caused by flood events depends on what is within the exceedance flow routes and any storage areas (both formal and informal) that are in place. Noticeable damage from surface water flooding typically occurs when buildings or property are within an exceedance flow route.

4.9. The Government's Foresight Future Flooding Report (DTI, April 2004) estimated that 80,000 properties are at risk from surface water flooding, causing an average of £270 million of damage each year. Around 10,000 properties are at specific risk of sewer flooding.

4.10. The cost of flooding arises primarily as a result of physical damage to buildings and infrastructure, but also business interruption, disruption to transport and services, and impacts on human health. The same report predicted that climate change and development pressures could further increase these costs to £1–10 billion by the 2080s.

4.11. Surface water flooding can convey contaminants. Pollutant loads in surface water can be comparable with levels found in combined sewage.

4.12. Additional pollution problems can occur in areas where the drainage system is combined. Combined sewers transport both surface and foul water. Approximately 40% of the drainage systems in England carry combined sewage, a situation which is mirrored within Shropshire. They are often designed to cope with excess rainfall by overflowing into watercourses. Whilst combined sewer overflows (CSOs) do help to protect properties from flooding, they can also increase wet weather pollution loads in the receiving waters through the transfer of combined sewage containing untreated foul effluent.

5. Delivery of Sustainable Water Solutions for Development in Shropshire

The need for the Management of Water

5.1. In the summer of 2007:

- many parts of Shropshire experienced unusually high rainfall;
- drainage systems were in many cases unable to cope with the intensity of the rainfall, and;
- the subsequent flooding caused widespread disruption and damage to dwellings, businesses and highways.

5.2. Climate change is likely to increase the frequency and severity of high intensity rainfall events. Winter rainfall is predicted to increase by 10-30% by 2080 and rainfall intensity could increase by up to 20%. It is therefore essential for new development to, at worst, have a neutral impact on the flooding of other areas. Indeed, wherever possible, development should seek to reduce flood risk elsewhere.

5.3. The effective management of surface water on development sites will also help to manage the risk of fluvial flooding downstream, reducing it wherever possible.

Surface Water Flood Risk Mapping

5.4. Following the 2007 floods, one of the key recommendations of the Pitt Review was that the Environment Agency, supported by Local Authorities and water and sewerage companies, should identify areas at highest risk from surface water flooding.

5.5. The Environment Agency subsequently produced two generations of surface water flood risk mapping. This mapping, along with other datasets, is used to help assess potential flood risk for development sites in Shropshire.

5.6. The Shropshire Water Cycle Study has built on this national data and the existing local data from the SFRAs. It provides detailed mapping of locations at risk of surface water flooding across Shropshire and is an important tool in identifying areas susceptible to a higher risk of flooding.

5.7. Refer to the Design Criteria in Section 7 for instructions on how the Surface Water Flood Risk Mapping should be used.

Surface Water Management Systems

5.8. Surface water flooding often occurs during extreme rainfall events when the capacity of conventional, piped drainage, systems is exceeded. Careful management of water at the surface, close to its source, will often be the most effective solution. SuDS aim to replicate natural drainage from the undeveloped site, for example through the use of soakaways, green roofs, and balancing ponds, to control the flows at source. Such approaches mitigate many of the runoff problems associated with development, because they attenuate peak flows and may reduce both runoff volumes and the impact on water quality.

5.9. Through effective control of runoff at its source, the need to manage flows downstream can be reduced. Managing water at the surface can also benefit water resources through improving water quality.

5.10. SuDS can offer quality of life improvements through additional open space and amenity areas.

5.11. There are three groups of people who form the primary beneficiaries of flood risk reduction through the provision of SuDS:

- owners of properties at risk of flooding;
- non flood plain property owners who unknowingly pay an insurance cross subsidy to flood plain property owners through their building insurance, and;
- tenants who live in the flood plain and do not hold contents insurance.

5.12. SuDS can offer potential capital cost benefits. Construction costs can be significantly reduced compared to conventional drainage systems. Environmental engineering on the surface is generally cheaper than constructing below ground structures and offers opportunities for simpler and more affordable management and maintenance arrangements. For instance, management of SuDS schemes as part of normal landscape care provides additional cost related savings, thus avoiding the need for specialist contractors.

6. The Design Process

General

6.1. Local planning authorities have a responsibility to ensure that a site can be satisfactorily drained prior to granting planning permission. This represents a material consideration when assessing a proposed development through a planning application and will be fundamental when applying for drainage approval once Shropshire Council takes on the SuDS Approving Body role in 2012.

6.2. Measures for water management must be judged primarily on their success in reducing flood risk. However, they can also contribute significant social and environmental gains, by linking with economic growth, environmental performance, social well being and land use changes.

6.3. New development will increase flood risk elsewhere if it:

- causes an increase in the rate or volume of runoff to existing drainage systems;
- introduces new, unmanaged, flow paths, or;
- results in the loss of flood plain.

New development should not increase the rate of run off from a site's undeveloped state and redevelopment should reduce run off rates. Development should result in no net loss of flood plain storage. The topography of a development site should be managed so as not to introduce new flow paths that will increase flood risk.

6.4. Developers are required to submit detailed drainage proposals to the planning authority as part of a planning application. Details should include who will be responsible for the maintenance of each part of the proposal. The appropriate authority's standards should be used in the design of all elements of surface water drainage systems.

6.5. The connection of private drainage pipes into to the highway drainage network is not permitted.

Use of SuDS

6.6. A development site should be drained in the most sustainable manner possible taking account of the circumstances of the site, all sources of flood risk, water resources, amenity provision, the wider environment and durable, accountable long term management.

6.7. A SuDS applicability map has been produced as part of the Water Cycle Study. It should be used, in the first instance, to help plan the types of SuDS that may be suitable for managing surface water from developments. Appendix B includes the SuDS applicability map. It is also available, in greater detail, via Shropshire Council's website.

6.8. SuDS should be implemented for all new developments.

6.9. The developer should clearly identify the proposed ownership, and corresponding

responsibility for maintenance, of all elements of the surface water drainage systems to the planning authority. This will ensure that the proposed ownership responsibilities are suitable and, in particular, that the responsibility for SuDS serving more than one property rests with an organisation that is both durable and accountable.

7. Design Criteria

Level of Detail to be Submitted

7.1. Developments of different scale and location require different levels of submission to demonstrate the appropriate management of flood risk. A hierarchy of requirements is shown below and developers must submit details of their proposals in accordance with these requirements in order for an application to be valid. Further explanation of the submission requirements is illustrated in Figures 7.1 and 7.2.

For development proposals which attract the need for a Flood Risk Assessment (FRA). *FRAs are required as shown in the matrix included below in Figure 7.1.*

- Complete a FRA using Shropshire Council's Strategic Flood Risk Assessment (SFRA) documents for guidance. The SFRAs are available on the Shropshire Council website. The criteria for a FRA are set out in Annex E of Planning Policy Statement 25: Development and Flood risk. Reference should also be made to the Environment Agency West Area (Midlands) Flood Risk Assessment Guidance notes.

- Complete a Surface Water Management Plan; refer to Appendix C, in accordance with the design criteria set out in this document.

For development proposals in areas classified as medium or high surface water flood risk or any major development proposals *(10 or more dwellings or 0.5ha or more for residential development and 0.1ha or more for non-residential development.*

- Complete a Surface Water Management Plan; refer to Appendix C, in accordance with the design criteria set out in this document.

For development proposals in areas classified as low surface water flood risk *Excluding householder applications for works or extensions to dwellings or applications for major developments (10 or more dwellings or 0.5ha or more for residential development and 0.1ha or more for non-residential)*

- Complete a Surface Water Management Statement; refer to Appendix D, in accordance with the design criteria set out in this document.

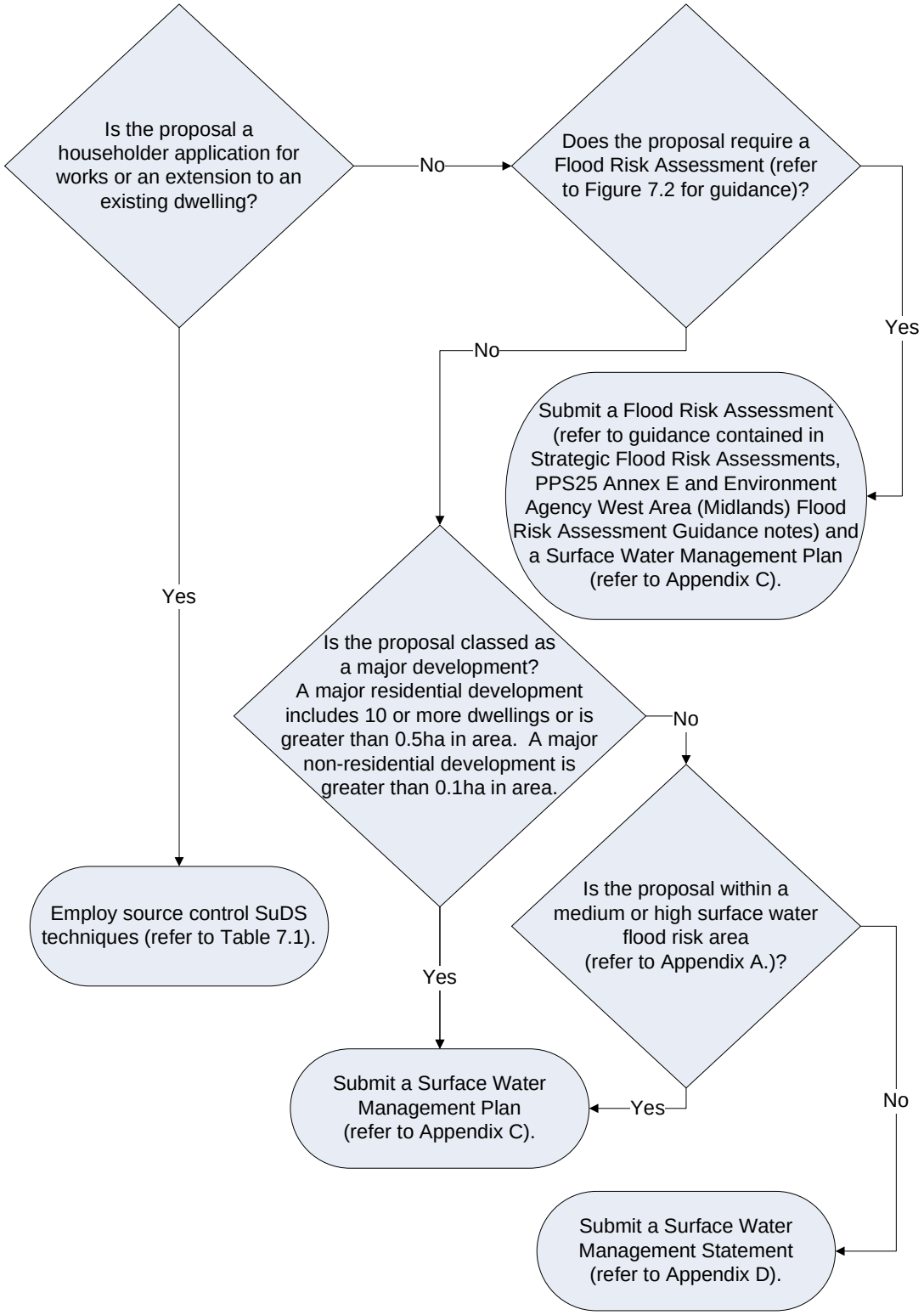


Figure 7.1. Level of detail required to accompany planning applications.

Development Category	Within Flood Zone 3	Within Flood Zone 2	Within Flood Zone 1
Change of use from 'Water Compatible' to 'Less Vulnerable' Development*	**FRA Required**	No FRA Required	No FRA Required
Change of use resulting in 'Highly Vulnerable' or 'More Vulnerable' Development*	**FRA Required**	**FRA Required**	No FRA Required
Operational Development less than 1ha	**FRA Required**	**FRA Required**	No FRA Required
Operational Development of 1ha or greater	**FRA Required**	**FRA Required**	**FRA Required**

Figure 7.2. Requirement for a Flood Risk Assessment

(refer to PPS25 Annex D for further information on development categories and Flood Zones)

Type and Positioning of SuDS

7.2. Mapping has been carried out to identify the types of SuDS that are likely to be more appropriate in different locations in Shropshire. The mapping identifies the locations, at a coarse scale, which may be suitable for infiltration, attenuation or a combination of both. Appendix B includes the SuDS applicability map. It is also available, in greater detail, via Shropshire Council's website.

7.3. SuDS should, wherever possible, be constructed outside of Flood Zones 2 and 3 as indicated on the Environment Agency's Flood Maps.

7.4. Where there is an ordinary watercourse in the vicinity of the development, assessment should be made of the likely 1% (1 in 100 year) flood extent, with an allowance for climate change, and SuDS should be constructed outside of this area.

7.5. A SuDS management train must be used to manage surface water sustainably and to mimic natural catchment processes as closely as possible. As a general rule, surface water should be managed as close to its source as is practicable. Source control, reducing surface water runoff, and recycling should be prioritised for all developments. The SuDS management train has four principle components:

- Prevention - The use of good site design and site housekeeping measures to prevent runoff and pollution (e.g. sweeping to remove surface dust and detritus from car parks), and rainwater harvesting. Prevention policies should generally be included within a development's site management plan;

- Source control - Control of runoff at or very near its source (e.g. soakaways, other infiltration methods, green roofs, pervious pavements);

- Site control - Management of water in a local area or site (e.g. routing water from building roofs and car parks to a large soakaway, infiltration or detention basin), and;

- Regional control - Management of runoff from a site or several sites, typically in balancing ponds or wetland.

7.6. Table 7.1, following, lists many different types of SuDS. Reference should be made to this table, which includes information on their suitability and place within the management train.

Table 7.1 also includes information regarding design standards though it should be noted that, in due course, national standards for the implementation of SuDS will be released. Once in place, the national standards must be adhered to.

General information						Performance					Site suitability	
SuDS technique	Description	Applicable scale	Highly suitable for	Suitable for urban creep / household extensions	Design in accordance with	Peak flow reduction	Volume reduction	WQ treatment	Amenity potential	Ecology potential	Retrofit potential	Contaminated land above vulnerable ground water (with liner)
Green roof	Systems which cover a building's roof with vegetation (laid over a drainage layer)	Source	Large buildings with flat roofs Industrial / commercial areas	Possibly	CIRIA C697 / National Standards	Medium	Medium	Good	Good	Good	Yes	Yes
Soakaway	Square or circular excavations filled withy rubble or lined, and can be used to store and infiltrate runoff	Source / Site	Low-medium density housing Large buildings with land available	Yes	BRE Digest 365 / National Standards	Good	Good	Good	Poor	Poor	Yes	No
Water butt	Offline storage devices used for capturing and storing roof runoff	Source	All scales of development	Yes	-	Low	Low	Low	Poor	Poor	Yes	Yes
Rainwater harvesting	Rainwater from roofs and hard surfaces can be stored and used	Source	Low and high density residential areas Large single-ownership building with land available	Yes	CIRIA C697 / National Standards	High	High	Poor	Poor	Poor	Yes	Yes

General information						Performance					Site suitability	
SuDS technique	Description	Applicable scale	Highly suitable for	Suitable for urban creep / household extensions	Design in accordance with	Peak flow reduction	Volume reduction	WQ treatment	Amenity potential	Ecology potential	Retrofit potential	Contaminated land above vulnerable ground water (with liner)
Filter strip	Wide, sloping areas of grass that treat runoff from adjacent impermeable areas	Source / Site	Low-medium density residential areas Open green space Roads and footpaths with ample space available		CIRIA C697 / National Standards	Poor	Poor	Medium	Medium	Medium	Yes	No
Infiltration trench	Trenches filled with stone designed to convey +/or store runoff (they can infiltrate)	Source (Conveyance)	Hard standing areas Car parks Highway drainage Conveying surface water to other storage		CIRIA C697 / National Standards	Medium	High	High	Low	Low	Yes	No
Filter trench	Trenches filled with stone designed to convey +/or store runoff	Conveyance			CIRIA C697 / National Standards	Medium	Low	High	Low	Low	Yes	Yes

General information						Performance					Site suitability	
SuDS technique	Description	Applicable scale	Highly suitable for	Suitable for urban creep / household extensions	Design in accordance with	Peak flow reduction	Volume reduction	WQ treatment	Amenity potential	Ecology potential	Retrofit potential	Contaminated land above vulnerable ground water (with liner)
Swale	Shallow channels designed to convey runoff and reduce pollutants	Source / Site (Conveyance)	areas		CIRIA C697 / National Standards	Medium	Medium	Good	Medium	Medium	Limited	Yes
Bio-retention	Shallow depression on surface that are under drained and remove pollution and reduce runoff volumes	Source / Site	Large open green space		CIRIA C697 / National Standards	Medium	Medium-High with infiltration	Good	Good	Medium	Yes	Yes
Pervious pavement	Allow rainwater to infiltrate through the surface to an underlying storage area	Source / Site	Residential roads (e.g. estates) Car parks Hard standing areas, e.g. shopping areas	Yes	CIRIA C697 / National Standards	Good	Good	Good	Poor	Poor	Yes	Yes
Geo-cellular / modular system	Modular plastic geocellular systems with a high void ratio that can be used to create a below ground soakaway or storage structure	Source / Site / Regional (Conveyance possible)	SW and highway drainage Low-medium density housing Large buildings with land available		CIRIA C697 / National Standards	Good	Poor - Good with infiltration	Poor	Poor	Poor	Yes	Yes

General information						Performance					Site suitability	
SuDS technique	Description	Applicable scale	Highly suitable for	Suitable for urban creep / household extensions	Design in accordance with	Peak flow reduction	Volume reduction	WQ treatment	Amenity potential	Ecology potential	Retrofit potential	Contaminated land above vulnerable ground water (with liner)
Sand filter	Single or multi-chambered structures to treat surface water runoff through filtration using a sand bed as the primary filter medium.	Site / Regional	SW and highway drainage Low-medium density housing Large buildings with land available		CIRIA C697 / National Standards	Poor	Poor	Good	Poor	Poor	Yes	Yes
Infiltration basin	Depressions designed to store and infiltrate runoff	Site	Large open green space		CIRIA C697 / National Standards	Average	Good	Good	Good	Good	No	No
Detention basin	Dry basins which are designed to store a certain volume of runoff and provide some WQ treatment	Site / Regional	Large open green space		CIRIA C697 / National Standards	Good	Poor	Medium	Good	Medium	Yes	Yes
Pond	Basins with a permanent pool of water for WQ treatment. Provide temporary storage for storm runoff	Site / Regional	Large open green space		CIRIA C697 / National Standards	Good	Poor	Good	Good	Good	Unlikely	Yes

General information						Performance					Site suitability	
SuDS technique	Description	Applicable scale	Highly suitable for	Suitable for urban creep / household extensions	Design in accordance with	Peak flow reduction	Volume reduction	WQ treatment	Amenity potential	Ecology potential	Retrofit potential	Contaminated land above vulnerable ground water (with liner)
Stormwater wetland	Comprise of shallow ponds and marshy areas providing stormwater attenuation and treatment	Site / Regional (Conveyance)	Large open green space		CIRIA C697 / National Standards	Good	Poor	Good	Good	Good	Unlikely	Yes

Table 7.1 Summary of SuDS techniques and their applicability

(based on information derived from CIRIA manuals C609 and C697)

Rates of Discharge

7.7. As a minimum, developments on greenfield sites should limit surface water runoff to existing greenfield runoff rates for all events up to and including the 1% (100 year return period) design event with an allowance for climate change (20% allowance for non-residential developments and 30% allowance for residential developments). In proposing the use of SuDS for greenfield development sites **the ultimate aim should be for mimicry of the pre-developed site's drainage characteristics or, where necessary, to provide a betterment (especially where there are flood risk issues experienced downstream of the site).** A greenfield site is one that has not previously been developed in any way.

7.8. To reduce flood risk downstream, the use of SuDS on brownfield redevelopment sites should reduce the existing rate of surface water runoff by a minimum of 50%. A brownfield site is one that has previously been developed.

Quality of Discharge

7.9. The design of any SuDS should ensure that contaminated surface water is appropriately treated prior to discharge.

Overland Flows

7.10. Exceedance of the capacity of drainage systems should not result in the surface flooding of more vulnerable areas within the development site, or contribute to surface flooding of any area outside of the development site during the 1% (100 year return period) design event with an allowance for climate change (20% allowance for non-residential developments and 30% allowance for residential developments)

7.11. Exceedance flows, originating from both within and outside of the development site, should be directed, via a flood routing exercise, through areas where the risks to both people and property are minimised.

7.12. Where SuDS are installed to cater for an event of lesser magnitude than a 1% design event (1 in 100 year event), the route of exceedance flows, up to the 1% (100 year return period) design event with an allowance for climate change (20% allowance for non-residential developments and 30% allowance for residential developments), should be fully appraised. For example, a developer has two options when considering a soakaway designed to BRE Digest 365, which should cater for a 10% design event (1 in 10 year event):

- undertake an exceedance flow route exercise to ensure that flows in excess of those produced by the 10% design event do not effect people or property, or;
- redesign the soakaway to cater for the 1% (100 year return period) design event with an allowance for climate change (20% allowance for non-residential developments and 30% allowance for residential developments).

Watercourses

7.13. Watercourses passing through or adjacent to a development site should be identified by the developer, as should any existing flood defences. The developer should specify measures as to how a watercourse's function as a means of conveying water and, if appropriate, as an effective exceedance flow route, will be maintained. This will mean that a watercourse is retained as an open feature within a designated corridor, ideally as public open space.

7.14. For those watercourses, such as ordinary watercourses, where no flood mapping currently exists, developers should supply evidence of flood plain extents for the 1% (1 in 100 year) and 0.1% (1 in 1000 year) events. These flood plain extents should be treated as Flood Zones 3 and 2 respectively and the development should be designed in accordance with Planning Policy Statement 25: Development and Flood Risk.

7.15. Culverting of open watercourses will not normally be permitted except where essential to allow highways and / or other infrastructure to cross. In such cases culverts should be designed in accordance with Ciria's Culvert design and operation guide, 2010.

7.16. If a culverted watercourse crosses a development site it should, wherever practicable, be reverted back to open channel. In such a case the natural conditions deemed to have existed prior to the culverting taking place should be re-instated. The open space corridor needed for development in connection with watercourses may have a dual use, for example landscaping, and may then be counted as part of a developments open space provision.

7.17. Measures should be in place to ensure that any future owner of property through which a watercourse passes is aware of their maintenance responsibilities as a riparian owner.

Public Sewers

7.18. There should be a presumption against the connection of SuDS to surface water sewers. As a matter of course, discharge via infiltration should be assumed. Where infiltration is not feasible, surface water should be discharged to a watercourse. Only where it can be clearly demonstrated that discharge via infiltration methods or a watercourse is not achievable will discharge to a sewer be considered as an appropriate solution.

7.19. Infrastructure for new development should ensure that surface water is always drained and managed separately from foul water. Where it is unavoidable, and surface water must be connected to an existing combined sewer, this must be undertaken in such a manner and in such a location so as to facilitate future separation of the surface water from that combined system.

Maintenance

7.20. Appropriate agreements for continuing maintenance of the drainage systems, including any SuDS, should be in place, and demonstrated.

7.21. Where SuDS techniques are used, they should be integrated and managed as part of

the landscape environment. This should occur within both developed, amenity and countryside areas and, where appropriate, Shropshire Council can manage these areas.

7.22. Maintenance of SuDS should consider the likelihood that protected species may be attracted to such areas. The presence of protected species will not usually prevent maintenance work but may alter its timing or method. Opportunities for further enhancing the biodiversity potential of SuDS sites through sympathetic maintenance work should always be sought.

8. Further Design Guidance

BRE Digest 365 – Soakaways. Available from BRE bookshop www.brebookshop.com

Interim Code of Practice for SuDS, 2004. Available from CIRIA bookshop www.ciria.org.uk

C697 The SuDS Manual, 2007. Available from CIRIA bookshop www.ciria.org.uk

Preliminary rainfall runoff management for developments, Defra/Environment Agency R&D Technical Report W5-074/A, July 2007. Available from CIRIA bookshop www.ciria.org.uk

C609 Sustainable Drainage Systems: Hydraulic, structural and water quality advice, 2004. . Available from CIRIA bookshop www.ciria.org.uk

C625 Model Agreements for Sustainable Water Management Systems, 2004. Available from CIRIA bookshop www.ciria.org.uk

C539 Rainwater and greywater use in buildings – best practice guide, 2001. Available from CIRIA bookshop www.ciria.org.uk

C582 Source control using constructed pervious surface: hydraulic, structural and water quality performance issues, – available from CIRIA bookshop www.ciria.org.uk

C635 Designing for exceedance in urban drainage – good practice, 2006. Available from CIRIA bookshop www.ciria.org.uk

Report 156 Infiltration drainage – manual of good practice, 1996. Available from CIRIA bookshop www.ciria.org.uk

C689 Culvert design and operation guide, 2010. Available from CIRIA bookshop www.ciria.org.uk

Harvesting rainwater for domestic uses: an information guide, Environment Agency, 2003. Available from Environment Agency website www.environment-agency.gov.uk

Strategic Flood Risk Assessments. Available from Shropshire Council website www.shropshire.gov.uk

Shropshire Water Cycle Study. Available from Shropshire Council website www.shropshire.gov.uk

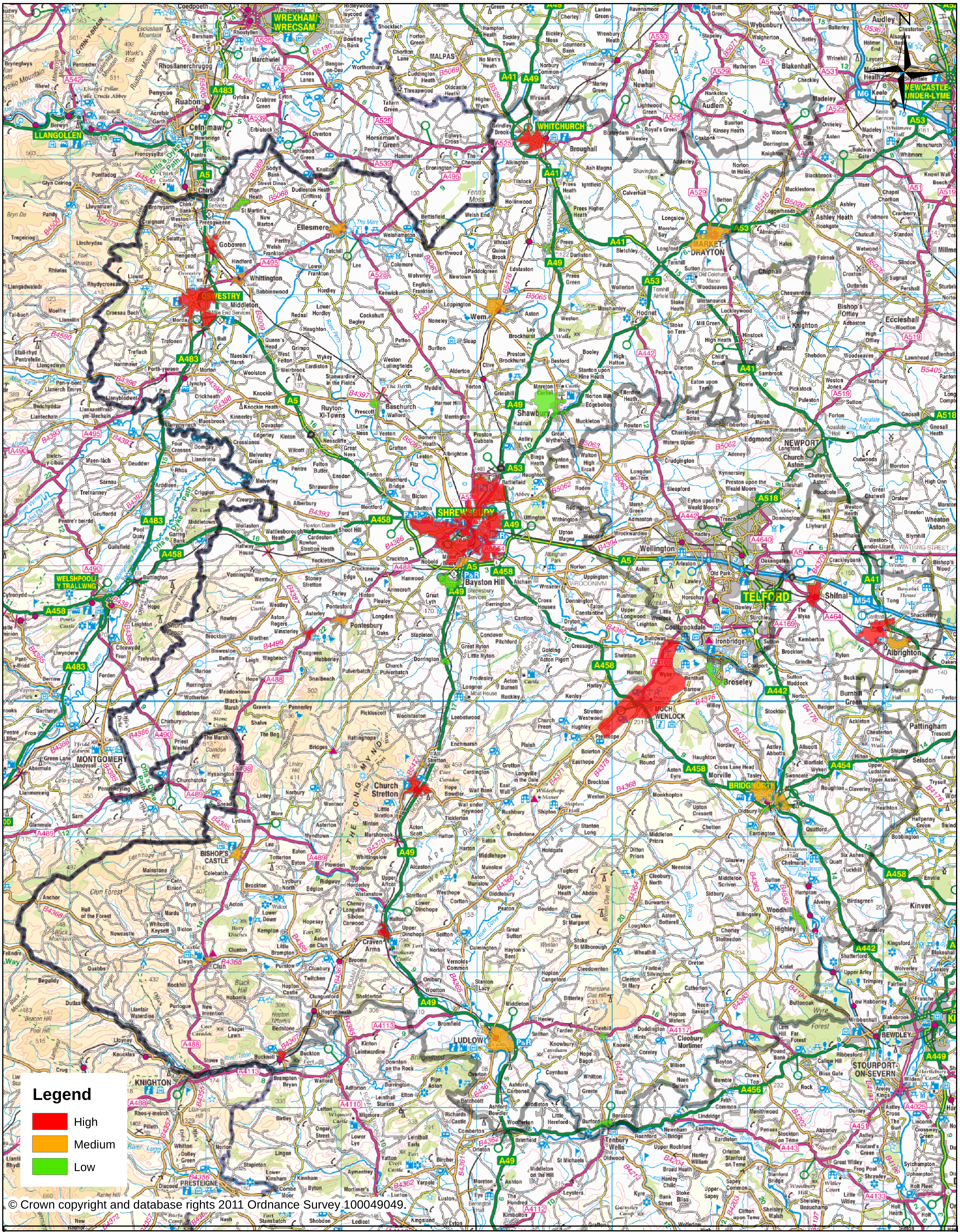
Planning Policy Statement 25: Development and Flood Risk (PPS25), Department for Communities and Local Government, 2010, - available from CLG web site www.communities.gov.uk

Planning Policy Statement 25: Development and Flood Risk – Practice Guide, Department for Communities and Local Government, 2009, - available from CLG web site www.communities.gov.uk

Planning Policy Statement 1: Delivering Sustainable Development (PPS1) Department for Communities and Local Government, 2005, - available from CLG web site www.communities.gov.uk

The Drainage Channel Biodiversity Manual: Integrating Wildlife and Flood Risk Management. Buisson, R.S.K, Wade, P.M., Cathcart, R.L., Hemmings, S.M., Manning, C.J. & Mayer, L. (2008), available from the Water Level Management Alliance website www.wlma.org.uk/uploads/NE121_Drainage_Channel_Biodiversity_Manual.pdf

APPENDIX A – Surface Water Flood Risk Map



Shropshire Council

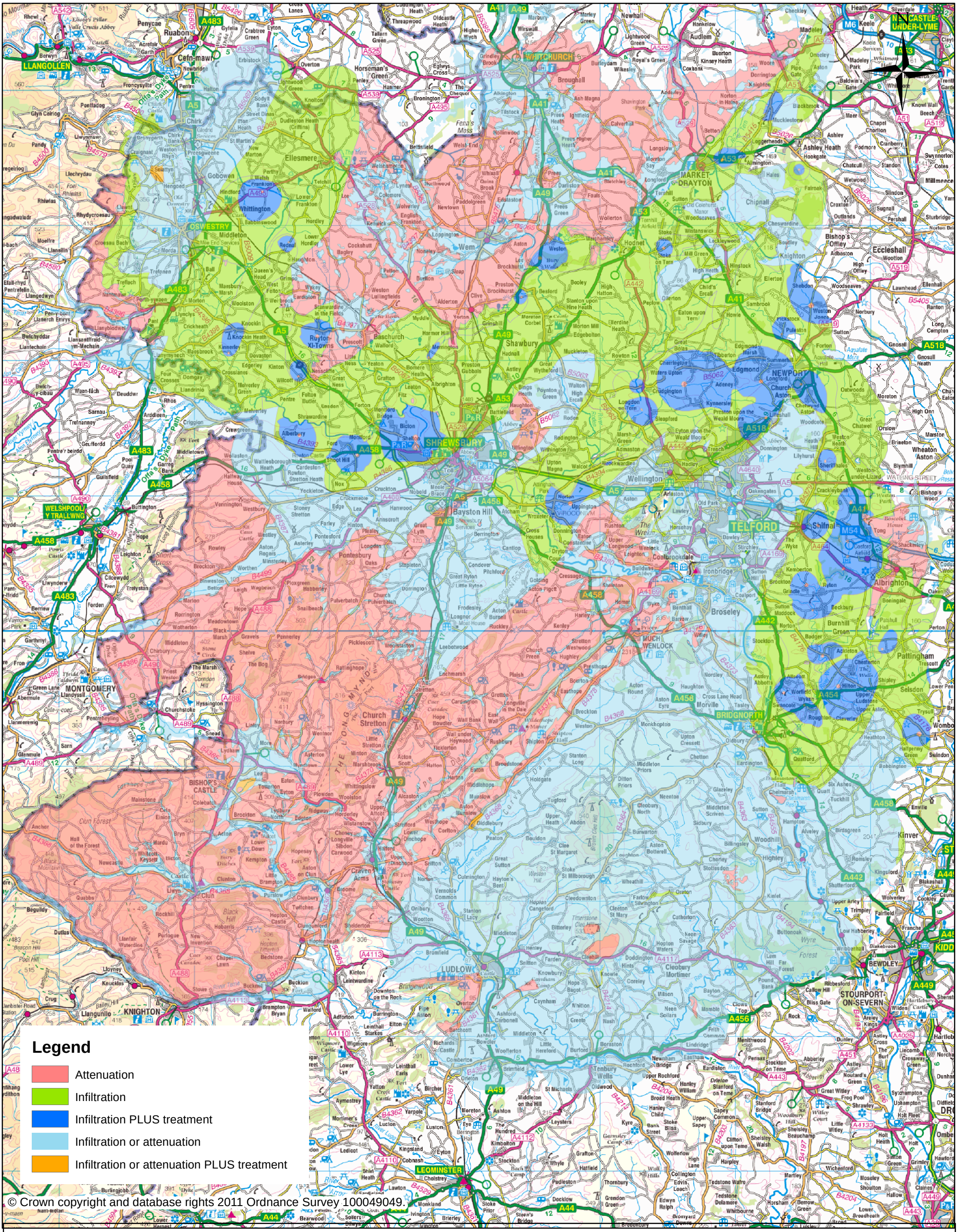
Surface Water Flood Risk Map

Development Services

The Shirehall, Abbey Foregate, Shrewsbury, Shropshire, SY2 6ND

Scale : 1:250,000

APPENDIX B – SuDS Applicability Map



APPENDIX C - Surface Water Management: Interim Guidance for Developers

Note: This document forms an appendix to the Surface Water Management: Interim Guidance for Developers, which can be viewed on Shropshire Council's website. For details of submission requirements, refer to Section 7 of this document.

SURFACE WATER MANAGEMENT PLAN

A Surface Water Management Plan is required to accompany applications for all development within a medium or high risk surface water area and all major development proposals (10 or more dwellings or 0.5 hectares or more for residential development and 1,000m^2 or more for non residential)

1. **Provide evidence of your investigations into the existing sources of flooding on the proposed development site?**

e.g.: consultation with the Environment Agency, Shropshire Council Flood and Water Management Team and relevant water company

2. **Is the development site classed as:**

   Greenfield ☐ **Brownfield** ☐

3. **What is the total area of the development site?**

   ☐ **m^2**

4. **What is the area of hardstanding (impermeable surface) that currently exists on the development site?**

   ☐ **m^2**

5. **What is the area of additional hardstanding will be added to the site as part of the development?**

   ☐ **m^2**

6. **How has the site layout been designed to manage the surface water flood risk?**

e.g.: Habitable parts of the development are located in the areas of the site at lowest risk of flooding and highways act as exceedance flow paths channelling excess water toward an attenuation pond.

7. **What is the means of discharge for surface water from the development site? Justification should be provided if infiltration methods are not being proposed.**

	Infiltration

	Watercourse	
	Provide justification for not proposing to use infiltration methods	

	Sewer	
	Provide justification for not proposing to discharge to a watercourse **(provide further justification, above, for not proposing to use infiltration methods)**	

8. **What Sustainable Drainage Systems (SuDS) will be used on the development site? Your response should include, as a minimum:**
    a. **the type and dimensions of the SuDS that are to be implemented on the development site;**
    b. **design assumptions including details of how they accord with the design criteria contained in the Interim Guidance;**
    c. **calculations showing how the SuDS proposed will be adequate, and;**
    d. **drawings, providing visual aid to the above, including layout, exceedance flow routes (contours) and construction details**

    Additional sheets should be attached, where necessary, and referenced in the table below. Reference should be made to the SuDS Management Train in Section 7

Type of SuDS feature		Design features- in accordance with design criteria
Source Systems		
Site Systems		
Regional Systems		

9. **What consideration has been given to the multifunctional benefits of the chosen SuDS features? Additional sheets should be attached, where necessary, and referenced in the table below.**

Benefit	Please tick whether this benefit will be achieved	Comment on how the benefit will be achieved
Biodiversity		
Recreation		
Water Quality		
Visual amenity		

10. **What are the secure, agreed maintenance processes that have been put in place for the each of the SuDS features described in Question 8?**

e.g.: householder responsibility, management committee, local authority or water company

APPENDIX D - Surface Water Management: Interim Guidance for Developers

Note: This document forms an appendix to the Surface Water Management: Interim Guidance for Developers, which can be viewed on Shropshire Council's website. For details of submission requirements, refer to Section 7 of this document.

SURFACE WATER MANAGEMENT STATEMENT

A Surface Water Management Statement is required to accompany applications for all development within a low risk surface water area *(Excluding householder applications for works or extensions to dwellings)*

1. **Is the development site classed as:**

   Greenfield ☐ **Brownfield** ☐

2. **What is the total area of the development site?** ☐ **m^2**

3. **What is the area of hardstanding (impermeable surface) that currently exists on the development site?**

   ☐ **m^2**

4. **What is the area of additional hardstanding will be added to the site as part of the development?**

   ☐ **m^2**

5. **What is the means of discharge for surface water from the development site? Justification should be provided if infiltration methods are not being proposed.**

	Infiltration

	Watercourse	
	Provide justification for not proposing to use infiltration methods	

	Sewer	
	Provide justification for not proposing to discharge to a watercourse **(provide further justification, above, for not proposing to use infiltration methods)**	

6. **What Sustainable Drainage Systems (SuDS) will be used on the development site and what are the design features (e.g. dimensions, capacity and size of outlets)? Include details of how they accord with the design criteria in the Guidance. Additional sheets can be attached, where necessary, and referenced in the table below.**

Type of SuDS feature		Design features (in accordance with design criteria)
Source Systems		
Site Systems		

7. **What consideration has been given to the multifunctional benefits of the chosen SuDS features?**

Benefit	Please tick whether this benefit will be achieved	Comment on how the benefit will be achieved
Biodiversity		
Recreation		
Water Quality		
Visual amenity		

8. **What are the secure, agreed maintenance processes that have been put in place for each of the proposed SuDS features?**

e.g.: householder responsibility, management committee, local authority or water company