

Strategic Flood Risk Assessment

Level 1

June 2015

List of Contents

Glossary and Abbreviations	5
1 Introduction	6
1.1 Purpose of this report.....	6
1.2 Mid Sussex District.....	7
1.3 The Mid Sussex Local Development Framework	8
2 Flood Risk	11
2.1 What is flood risk?.....	11
2.2 Sources of flood risk.....	11
2.3 Implications of flood risk	13
2.4 The Strategic Flood Risk Assessment and Sequential Approach	13
2.5 Neighbourhood Plans and Neighbourhood Development Orders	16
2.6 Site specific Flood Risk Assessment.....	16
2.7 The impact of climate change on flood risk	19
3 Methodology and findings of the SFRA	22
3.1 Introduction	22
3.2 Coarse Assessment.....	24
3.3 Other steps taken to obtain information on flood risk.....	25
3.4 Have all hazards been sufficiently defined?.....	25
3.5 Overview of flood risk in the district	25
4 Outcomes	27
4.1 Implications for the District Plan 2014 - 2031	27
4.2 Advice on the preparation of flood risk assessments for allocated development sites	28
4.3 Assessment of the implications of climate change for flood risk at allocated development sites	29
4.4 Advice on sustainable drainage techniques for managing surface water run- off at development sites.....	32
4.5 Recommendations about the identification of critical drainage areas and the potential need for surface water management plans	34
4.6 Areas at risk from other sources of flooding	35
4.7 Recommendations for Development Management purposes	36
4.8 Recommendations to inform future policy	37
4.9 Mapping	38
4.10 Flood risk management measures	38
4.11 Future use of the SFRA.....	39

5	Limitations, restrictions and statements of accuracy	40
	Appendix A – Coarse Assessment data sources.....	41
	Appendix B - Flood improvement/alleviation measures undertaken by the District Council.....	63
	Appendix C – Flood Risk Assessment and Sustainable Drainage Systems guidance for specific areas within the District.....	64
	Appendix D – Flood Risk Vulnerability Classification	70

Figures and Tables

	Figure 1 - Map of Mid Sussex District, identifying the main settlements and transport corridors.....	8
	Figure 2 - Climate change implications at land to the east of Burgess Hill at Kings Way.....	30
	Figure 3 - Climate change implications at land to the north and north-west of Burgess Hill.....	32
	Table 1 - Housing Requirement for Mid Sussex 2014-2031.....	10
	Table 2 – Flood risk probabilities	11
	Table 3 - Categories and causes of flooding	11
	Table 4 - Flood Zones	14
	Table 5 – Overview of Mid Sussex flood risk characteristics.....	25

Glossary and Abbreviations

The Agency	The Environment Agency
CFMP	Catchment Flood Management Plan
The District Council	Mid Sussex District Council
DPD	Development Plan Document
FRA	Flood Risk Assessment
FWA's	Flood Warning Areas
GIS	Geographic Information System
LDF	Local Development Framework
LLFA	Lead Local Flood Authority (West Sussex County Council)
LPA	Local Planning Authority
MSDC	Mid Sussex District Council
NPPF	National Planning Policy Framework
OS	Ordnance Survey
PPS	Planning Policy Statement
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SPD	Supplementary Planning Document
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management Plan
WSCC	West Sussex County Council
WSF&RS	West Sussex Fire and Rescue Service

1 Introduction

1.1 Purpose of this report

This report presents the findings of the Strategic Flood Risk Assessment (SFRA) for Mid Sussex, which has been undertaken by Mid Sussex District Council. This SFRA has been prepared in accordance with the National Planning Policy Framework (NPPF) and has followed guidance and advice provided by the Environment Agency, West Sussex County Council, the District Council's Drainage Team and set out in National Planning Practice Guidance (NPPG). This SFRA was initially prepared in 2008 and has been reviewed and updated in 2015.

The aim of planning policy on flood risk is to protect people and property from flooding. The SFRA should therefore enable decision makers to fully understand the flood risk in the area by identifying the areas that are at risk from all forms of flooding, now and in the future, taking account of the impacts that climate change and development will have on flood risk in Mid Sussex. This enables the District Council to inform the scope of the Sustainability Appraisal for consultation, develop policies that seek to reduce and manage flood risk and identify where development can be located in areas with a low probability of flooding. The SFRA will inform other work including site-specific flood risk assessments and neighbourhood planning.

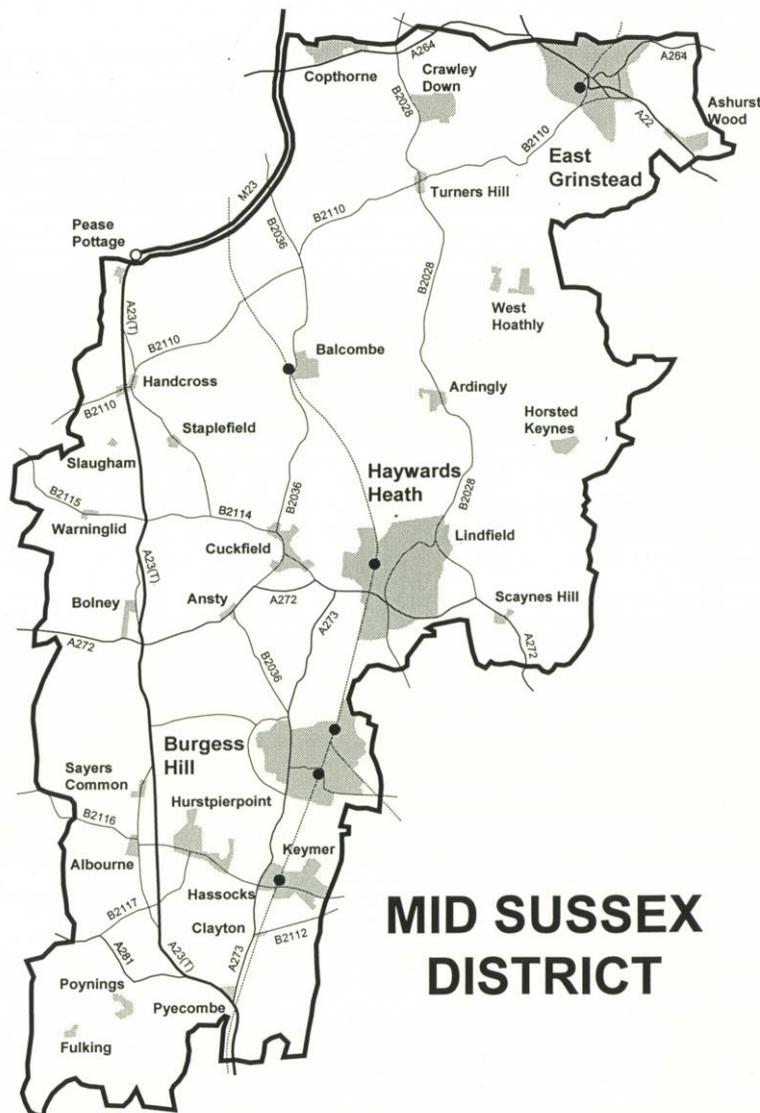
This SFRA forms part of the evidence used in the development of the Mid Sussex District Plan 2014 – 2031 which will provide a framework, vision and delivery strategy for development in the District and has informed the Sequential Test and Sustainability Appraisals (incorporating the Strategic Environmental Assessment (SEA)). A draft of the 2008 SFRA was also used as part of the evidence base in the production of the Small Scale Housing Allocations Development Plan Document. The District Council's SFRA will continue to be updated and used in the development of other Local Development Documents, which the District Council will prepare, Neighbourhood Plans, for assistance in the determination of planning applications and for emergency planning purposes.

1.2 Mid Sussex District

Mid Sussex District is located between Crawley and Brighton, in the County of West Sussex. The District covers an area of almost 130 square miles and has three main towns; Burgess Hill, Haywards Heath and East Grinstead. The remainder of the District is largely rural in character with 25 villages and many small hamlets. Some of these villages are considered to act as a local service centre for surrounding rural areas, in that they contain a range of community services and facilities, and are therefore significant in size with a resident population of over 3000. These larger villages and three main towns have generally been the locations for new development, predominantly housing, over the past twenty years.

As well as areas at risk from flooding, the District has many other environmental constraints. Over 60% of the District is covered by two protected landscape designations, the High Weald AONB to the north (49%) and the South Downs National Park to the south (11.2%). There are also numerous Sites of Special Scientific Interest (SSSI), Sites of Nature Conservation Importance (SNCI) and Local Nature Reserves (LNR's) scattered throughout Mid Sussex and ancient woodland covers 15.9% of the District's area. The Ashdown Forest, although outside of the District boundary, presents a further constraint as the 7km Zone of Influence incorporates a large portion of the north and east of the District. The Forest is both a Special Protection Area and Special Area of Conservation under EU regulations. An assessment of primary and secondary constraints in the District has been undertaken through the Capacity of Mid Sussex District to Accommodate Development Study (June 2014).

Figure 1 - Map of Mid Sussex District, identifying the main settlements and transport corridors



The District does not have any areas of coastline, but does contain parts of catchments of four main rivers; the River Ouse, the River Adur, the River Medway and the River Mole.

1.3 The Mid Sussex Local Development Framework

Mid Sussex District Council are currently in the process of the producing a Local Development Framework (LDF), which will replace the current Mid Sussex District Council Local Plan, which was adopted in May 2004. The District Council has produced the Mid Sussex District Plan 2014 - 2031 in preparation for submission to

Government in 2015. The Environment Agency and other bodies have been consulted on the contents of the District Plan throughout its preparation. The District Plan seeks to achieve sustainable development in Mid Sussex in accordance with the National Planning Policy Framework. Flood risk management can contribute towards sustainable development by tackling climate change, using techniques that enhance the natural environment and adopting strategies which don't prevent future generations from meeting their own needs and effectively managing their own flood risk. Flood risk management can also enhance and protect the built, cultural heritage, biodiversity, rural and natural environments by preventing loss and damage to habitats and heritage assets, reducing pollution, protecting infrastructure and transport links and contribute to income generation and economic growth.

Towns and Parishes within the District are producing their own Neighbourhood Plans, 20 in total, setting the vision for their areas over the next 20 years and the level of development they consider to be necessary and appropriate to help fund improvements and meet local needs. Many of the Neighbourhood Plans also seek to allocate sites for development to meet those needs.

The SFRA has been used help inform the content of the District Plan, particularly with regards to the identification of strategic options for new development in the district. The SFRA, which will be continually updated and will remain a 'live document', will also be used in the determination of planning applications, including proposals for windfall developments. Other Planning documents which the District Council or Town and Parish Councils produce will utilise the SFRA including; the Gypsy and Traveller Sites Development Plan Document (DPD), Neighbourhood Plans and, if necessary, a Site Allocations DPD.

In undertaking the SFRA for Mid Sussex it is important to understand the development pressures that are faced by the District over the coming years, particularly in terms of new housing. Table 1 on the following page, which is taken from Policy DP5 of the District Plan 2014 - 2031 sets out the District Council's current proposals for meeting the required housing figure of 11,050 new homes in the District up until 2031.

Table 1 - Housing Requirement for Mid Sussex 2014-2031

District Plan requirement 2014 - 2031	11,050
Completions 2014/15 (part year)	630
Total Housing Commitments	5,405
Strategic Development to the north and northwest of Burgess Hill (DP9)	3,500
Elsewhere in the District, as allocated through Neighbourhood Plans or other appropriate planning documents	1,515

In formulating the content of the above policy approach locations/options have been considered and appraised in order to determine the most appropriate strategy for meeting housing demand, including the ability of the District to meet some or all of the unmet needs of neighbouring authorities and the impacts of doing so in sustainability terms. Realistic options have been subject to the Sequential Test, as defined in section 2.4 of this report, and Sustainability Appraisal. The Sequential Test report for the District Plan can be viewed online at: <http://www.midsussex.gov.uk/8933.htm>

2 Flood Risk

It is not technically, economically or environmentally feasible to prevent flooding altogether, but the impacts of flooding can be avoided and reduced through appropriate flood risk management.

2.1 What is flood risk?

Flood risk can be defined as a combination of the probability of a particular flood event occurring and the impact that event would have. The probability of a particular flood event is usually expressed as the probability of that flood event occurring in any year, which in turn can be expressed as a percentage, Table 2 below demonstrates this.

Table 2 – Flood risk probabilities

Annual flood probability as percentage likelihood	Basis of expression
1%	1 in 100 chance of being equalled or exceeded in any year
0.1%	1 in 1000 chance of being equalled or exceeded in any year

2.2 Sources of flood risk

Flooding can occur from a variety of sources and can happen naturally, when specific environmental factors or combinations of factors occur, or can be a result of human intervention with natural processes, such as altering a river channel. Table 3, below, provides an overview of the different flooding categories and their causes.

Table 3 - Categories and causes of flooding

Category	Cause
Fluvial flooding	When the amount of water in a watercourse exceeds the flow capacity of the channel of that watercourse*. The excess water spills onto the floodplain associated with that watercourse. Fluvial flooding can also be caused where the channel of a watercourse

	becomes blocked; this usually occurs where culverts and bridges become blocked by debris, or where constrictions in the river channel cause flood water to backup.
Coastal and tidal flooding	High tides, storm surges and wave action, often in combination. Areas affected by such forms of flooding are generally low-lying land by the sea and tidal estuaries.
Surface water (pluvial) flooding	Surface water flooding results from excess overland flow and ponding. This can be caused by intense short duration storms when the water does not have time to soak into the ground or at times when the ground is already saturated and water cannot soak in at all. Within the built environment surface water will tend to collect more easily because the water cannot infiltrate or drain into the ground like it would do naturally. Poorly maintained drainage systems and blockages can increase the likelihood of surface water flooding and in urban areas this can include pollutants (particularly sewage).
Groundwater flooding	When water levels in the ground rise above surface elevations or floods subsurface infrastructure. Low lying areas that are underlain by aquifers are particularly susceptible to this form of flooding, especially during the winter months.
Flooding from sewers	The overloading or blockage of surface water sewers or combined sewers**. Urban areas are particularly at risk from this form of flooding when sewers can become overwhelmed by heavy rainfall.
Flooding from reservoirs, canals and other artificial sources	Flooding from reservoirs and canals can occur as a result of that facility being overwhelmed with water or as a result of dam or bank failure. Other causes of flooding under this category include where current pumping systems fail or cease to be used resulting in groundwater levels rising. This is particularly the case where there are current or derelict minerals workings.

* the term watercourse includes rivers, streams, ditches and other natural passages through which water flows.

** combined sewers are those sewers that contain both surface and waste water (sewage).

2.3 Implications of flood risk

Developments that are designed without regard to flood risk may endanger lives, damage property, cause significant disruption to the economy and the wider community, damage the environment, be difficult to insure and require additional expense for remedial works. With this in mind, such developments would be unsustainable and would therefore not be in accordance with paragraph 100 of the National Planning Policy Framework (NPPF).

The implication of flooding to properties has been recently demonstrated locally and nationally in flood events in early 2014, where properties were flooded across Sussex, including in parts of Copthorne and Hassocks.

Appropriate flood risk management can achieve wide-ranging benefits including the enhancement and protection of infrastructure, transport links, the built, rural and natural environments as well as achieving economic growth and regeneration, habitat enhancement and reduce pollution

2.4 The Strategic Flood Risk Assessment and Sequential Approach

The basis for all decision making in flood risk is to first understand the risk and then identify responses to that risk so that it is effectively managed. The SFRA provides information that should be supplemented, where necessary, with more detailed information. Paragraph 100 of the NPPF provides the national policy background concerning the need for an SFRA to be undertaken by Local Planning Authorities to inform the preparation of Local Plans. Local Plans should also apply a “sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change”.

The aim of the Sequential Test is to steer new development to the areas that are at the lowest probability of flooding. For fluvial flood risk these areas are classed as Flood Zone 1 but the sequential test should recognise the possible risk of flooding from all sources. The fluvial flood zones are identified in Table 4 below (source: ID: 7, National Planning Practice Guidance (NPPG) – Table 1). As stated in paragraph 101 of the NPPF, “Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a

lower probability of flooding”. This applies in the determination of planning applications and in the production of Local Plans and Neighbourhood Plans.

Table 4 - Flood Zones

Note: these flood zones refer to the probability of river and sea flooding ignoring the presence of flood defences.

<p>Flood Zone 1 (Low probability) – comprises of land having a less than 1 in 1000 annual probability of river or sea flooding.</p>	<p>Appropriate uses All uses of land are appropriate in this zone.</p>	<p>Policy aims Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of new development, and in particularly the appropriate application of sustainable drainage systems (i.e. reduce surface water run-off from new development).</p>
<p>Flood Zone 2 (Medium probability) – comprises of land having between a 1 in 100 and 1 in 1000 annual probability of river flooding or between a 1 in 200 and 1 in 1000 annual probability of sea flooding.</p>	<p>Appropriate uses All uses are considered appropriate but highly vulnerable uses of land would require an exception test to demonstrate that flood risk will be managed satisfactorily. This includes Police, Ambulance and Fire Stations, emergency dispersal points, basement dwellings, caravans and mobile homes intended for permanent residential use.</p>	<p>Policy aims Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area and beyond through the layout and form of new development, and in particularly the appropriate application of sustainable drainage systems (i.e. reduce surface water run-off from new development).</p>
<p>Flood Zone 3a (High probability) – comprises of land having a 1 in 100 or greater annual probability of river flooding or a 1 in 200 or greater annual probability of sea flooding.</p>	<p>Appropriate uses Water compatible uses (i.e. water base recreation) and less vulnerable uses of land (generally buildings used for non-residential uses, such as shops, offices and agricultural buildings) as well as essential infrastructure and more vulnerable uses (including residential) if an exception test can show that flood risk to people and property will be managed satisfactorily.</p>	<p>Policy aims Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area, through the layout and form of the development (including application of SuDS), and relocate existing development to land with a lower probability of flooding. Opportunities should also be sought to create space for flooding to occur by restoring functional floodplains and flood flow pathways and by identifying, allocating and safeguarding open space for flood storage.</p>

Flood zone 3b (The functional floodplain) – land where water has to flow or be stored in times of flood. The annual probability of flooding would be 1 in 20 or greater.	Appropriate uses Only water-compatible uses (i.e. water based recreation) and essential infrastructure that has to be there.	Policy aims Developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area, through the layout and form of the development (including application of SuDS), and relocate existing development to land with a lower probability of flooding.
---	--	---

It should be noted that flooding from surface water, groundwater, sewers, reservoirs, canals and other artificial sources is not classified into these flood zones. The information that the District Council has collected on flood risk from such sources will be considered on a case-by-case basis to determine the severity of risk and whether or not the cause of flooding could be resolved or overcome through new development. In particular all major development of at least 10 dwellings or more and major commercial development must ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate.

Where it is not possible to allocate new development in areas of lowest risk due to a lack of reasonable sites being available in such locations, then local authorities should consider the allocation of development in sites that are classified as Flood Zone 2. Consideration will need to be given to what uses are appropriate in such areas (see table 4 above). Where suitable sites at lower risk of flooding are not available then the Exception Test will be required in accordance with paragraph 102 of the NPPF. The Exception Test is a method to demonstrate and help ensure that flood risk to people and property will be managed satisfactorily, while allowing necessary development to go ahead. 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; and
- a site-specific flood risk assessment must demonstrate that 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.

Where no reasonable available sites can be found in Flood Zones 1 and 2, then only in such an instance can the local authority consider development in Flood Zone 3. Where the proposed use is considered not to be appropriate then the Exception Test, as identified in the previous paragraph, will need to be applied.

2.5 Neighbourhood Plans and Neighbourhood Development Orders

Parish and Town Councils involved in neighbourhood planning should (PPG ID: 7-061-20140306):

- seek to ensure neighbourhood plans and neighbourhood development/community right to build orders are informed by an appropriate assessment of flood risk;
- ensure policies steer development to areas of lower flood risk as far as possible;
- ensure that any development in an area at risk of flooding would be safe, for its lifetime taking account of climate change impacts;
- be able to demonstrate how flood risk to and from the plan area/development site(s) will be managed, so that flood risk will not be increased overall, and that opportunities to reduce flood risk, for example, through the use of sustainable drainage systems, are included in the plan/order.

2.6 Site specific Flood Risk Assessment

Site-specific flood risk assessment would generally be undertaken at the planning application stage to ensure that flood risk is considered in the determination of planning permission. Flood Risk Assessments should be undertaken under the supervision of an experienced flood risk management specialist (who would normally be expected to have achieved chartered status with a relevant professional body such as the Institution of Civil Engineers (ICE) or the Chartered Institution of Water and Environmental Management (CIWEM)).

Site-specific flood risk assessments are required for any site greater than 1 hectare in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3; proposals in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class (see Appendix E) may be subject to other sources of flooding. Major development - developments of 10 dwellings or more; or equivalent non-residential or mixed development (as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010) are required

to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate.

Where developers seek to provide new development, similar principles need to be applied as the ones set out for development at a strategic level. These principles concern locating development in the areas of lowest flood risk and only developing in areas of higher risk (i.e. Flood Zones 2 and 3) where no reasonable available sites can be found in lower risk areas. In such instances the Exception Test may need to be applied.

The objectives of a site-specific flood risk assessment are to establish:

- whether a proposed development is likely to be affected by current or future flooding from any source;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate;
- the evidence for the local planning authority to apply (if necessary, see below) the Sequential Test, and;
- whether the development will be safe and pass the Exception Test, if applicable.

Developers and applicants need to consider flood risk to and from the development site and where sites are affected by above ground water features (these may be outside of the site itself - see Appendix A, section (b)), site-specific flood risk assessments should also demonstrate that they will not be at risk of flooding from these.

Within the site, the most vulnerable development must be located in areas of lowest flood risk unless there are overriding reasons to prefer a different location. Development must be appropriately flood resilient and resistant, including safe access and escape routes where required, it must be demonstrated that any residual risk can be safely managed, including by emergency planning, and proposals must give priority to the use of sustainable drainage systems (SuDS). Sustainable drainage systems should always be provided as part of major development proposals unless demonstrated to be inappropriate. South East England authorities have prepared guidance for sustainable drainage titled '*Water.People.Places. A guide for*

*master planning sustainable drainage into developments*¹ that should be used at the earliest stages of the planning and design process for all types of residential, commercial and industrial development. In order to determine the level of flood risk for an individual site it is the responsibility of the developer to prepare a Flood Risk Assessment (FRA). Applicants for planning permission (or prior approval in the case of certain permitted development rights) should also refer to the Environment Agency's guidance² on flood risk when preparing a site-specific flood risk assessment.

The FRA should include:

- a location plan showing geographical features, street names and identifies the catchment, watercourses or other bodies of water in the vicinity;
- a plan of the site showing the: (i) existing site; (ii) development proposals; and (iii) any structures which may influence the local flood flow overland and/or in any watercourses present on site;
- site levels – both existing and proposed;
- information about the surface water disposal measures already in place and their state of maintenance;
- an assessment of the volume of surface water run-off likely to be generated from the proposed development;
- allowance in design for how the increased frequency and intensity of rainfall that is predicted as a result of climate change will affect the proposal;
- information about other potential sources of flooding, if any, that may affect the site e.g. streams, surface water run-off, sewers, groundwater, reservoirs, canals and other artificial sources or any combination of these; including details on how these sources of flooding will be managed safely within the development proposal;
- proposals for surface water management that aim to not increase, and where practicable reduce the rate of runoff from the site;
- confirmation as to whether Environment Agency consent is needed for any aspect of the work, and whether this has been applied for or not;
- information about how any residual risks are to be managed over the lifetime of the development.

¹ www.midsussex.gov.uk/media/Water_People_Places.pdf

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

For individual developments on sites allocated in development plans (which are accompanied by a Sequential Test) applicants need not apply the Sequential Test. Applications for minor works and changes of use (except for any proposal involving a change of use to a caravan, camping or chalet site, or to a mobile home or park home site) should not be subject to the Sequential or Exception Tests but should still meet the requirements for site-specific flood risk assessments. This is in accordance with paragraphs 103 and 104 of the NPPF and the FRA should build upon the findings of the SFRA.

2.7 The impact of climate change on flood risk

The water environment is particularly vulnerable to the effects of climate change. Climate change hazards include brief events, such as severe storms, and longer term trends. It is accepted that one impact will be more frequent, short duration, but high intensity rainfall events as well as more frequent long-duration rainfall events. As identified in Table 3, causes of flooding can include physical, biological and human processes. Interactions between these multiple processes, which are already complex, are changing over time as a consequence of climate change and it is therefore necessary to adopt a proactive flood risk strategy to mitigate and adapt to the predicted impacts of climate change and allow for uncertainties. Preventive action brings clear economic, environmental and social benefits by anticipating potential impacts and minimising threats to human health, ecosystems, the economy and infrastructure.

This SFRA uses climate change allowances set out in PPS25. PPS25 recommended that a 10% increase in peak river flow for the period up until 2025 is given for considering the impact of climate change on fluvial flood risk. For the period after 2025 and until 2115 a 20% increase in peak river flows is given. The Environment Agency issued guidance to support the NPPF in September 2013³ that stated that these remained the recommended climate change allowances for use in flood risk assessments, plans and determining planning applications.

The baseline river flow is that used for the Environment Agency's Flood Map. The Agency's flood zones can provide a rough indication of areas where climate change

³ [Climate change allowances for planners](#), Environment Agency (2013)

may have the most lateral effect (i.e. extent of the flood risk area), by comparing Zones 2 and 3 to see how rare, more extreme flows affect the floodplain extents. However increased flood levels will also be associated with more severe events and following consultation with the Agency the SFRA has identified the potential impacts of more severe flood events resulting in a 20% increase in peak river flows. In terms of what these impacts would be the following has been agreed between the District Council (including the Land Drainage Engineer) and the Environment Agency:

- With an allowance for climate change, areas covered by Flood Zone 2 become areas of Flood Zone 3a.
- With an allowance for climate change, areas covered by Flood Zone 3a become areas of Flood Zone 3b (functional floodplain).
- A 20 metre horizontal buffer strip is to be applied to the outer edge of the existing areas of Flood Zone 2. As an allowance for climate change, this 20 metre buffer strip will be considered as an area of Flood Zone 2.
- A 20 metre horizontal buffer strip is to be applied to the outer edge of areas that have been identified as having historically flooded (this includes flooding from overland flow as well as groundwater flooding).

With climate change predicted to bring about an increase in rainfall intensity, there is the likelihood that there will be increases in surface water run-off and therefore drainage schemes will need to be designed taking climate change into account. The Environment Agency recommends a 5% increase in rainfall intensities by 2025, a 10% increase between 2025 and 2055, a 20% increase between 2055 and 2085 and a 30% between 2085 and 2115.

There are many methods available to reduce the impact of runoff from development throughout Mid Sussex and the '*Water.People.Places.*' document provides a guide. A case study showing the potential impact of climate change has been developed below for flow attenuation in the form of ponds.

For example, an attenuation pond intercepting a catchment area of 4 hectares (runoff rate of 0.8) designed to attenuate the flow for a 1 in 25 year return period storm of 1 hour duration from an average peak runoff rate of 350 l/s down to a Greenfield runoff rate of 20 l/s, would need to have a capacity of 1,200 m³. A 20% increase in rainfall (predicted between 2055 and 2085) would require the 1,200 m³ capacity of the pond

to be increased by at least 20% to 1,440 m³ to be able to maintain the same level of protection against flooding.

This example illustrates how important it will be for climate change allowances to be built into the design of drainage systems throughout the district. In most instances the Council will seek such drainage systems to be designed with a 30% increased allowance for the impact of climate change.

3 Methodology and findings of the SFRA

3.1 Introduction

The approach to producing this SFRA has been guided by national policy and guidance, West Sussex Local Flood Risk Management Strategy (2013 – 2018) and advice obtained from the Environment Agency, which has included the Environment Agency guidance document entitled “Strategic Flood Risk Assessments - Guidance to support the National Planning Policy Framework”. This guidance note explains that there are two levels of assessment to reflect the likely risk of flooding and development pressures in the local planning authority area.

All Local Plans should be supported by a Level 1 SFRA that informs plan preparation and enables the Local Planning Authority undertake the Sequential Test. In areas like Mid Sussex where land outside flood risk areas can appropriately accommodate all necessary development (i.e. where flooding isn't a major issue or where development pressures are low) this may be the only SFRA carried out. The sequential test for the Mid Sussex District Plan 2014 – 2031 concludes that the proposals in the Plan direct development of vulnerable uses to areas of low flood risk.

The key outputs of a Level 1 SFRA are:

- Maps showing the local planning authority area, main rivers, ordinary watercourses and flood zones, including the functional floodplain if appropriate, as well as all previously allocated development sites (or sites to be considered in the future);
- An assessment of the implications of climate change for flood risk at allocated development sites over an appropriate time period;
- Areas at risk from other sources of flooding, such as surface water or reservoirs;
- Flood risk management measures, including location and standard of infrastructure and the coverage of flood warning systems;
- Locations where additional development may significantly increase flood risk elsewhere through the impact on existing sources of flooding, or by the generation of increased surface water run-off;
- Recommendations about the identification of critical drainage areas and the potential need for surface water management plans;

- Advice on the preparation of flood risk assessments for allocated and other development sites; and
- Advice on the likely suitability of sustainable drainage techniques for managing surface water runoff at key development sites

The Level 2 SFRA should be undertaken in areas where land outside flood risk areas cannot appropriately accommodate all the necessary development. A Level 2 SFRA should build on the source information comprised within a Level 1 Assessment and also contain:

- An appraisal of the current condition of flood defence infrastructure and of likely future flood management policy with regard to its maintenance and upgrade;
- An appraisal of the probability and consequences of overtopping or failure of flood risk management infrastructure, including an appropriate allowance for climate change;
- Definition and mapping of the functional floodplain in locations where this is required;
- Maps showing the distribution of flood risk across all flood zones from all sources of flooding taking climate change into account;
- Advice on appropriate policies for sites that could satisfy the first part of the Exception Test (sustainability benefits to the community that outweigh flood risk), and on the requirements that would be necessary for a site-specific flood risk assessment in support of a planning application in order to pass the second part of the Exception Test;
- Advice on the preparation of site-specific flood risk assessments for sites of varying risk across the flood zones, including information about the use of sustainable drainage techniques; and
- Meaningful recommendations to inform policy, development management and technical issues.

It was not necessary to undertake a Level 2 Assessment at this time although some elements of the Level 2 Assessment have been addressed where appropriate to do so.

3.2 Coarse Assessment

The first stage of the SFRA was to undertake the 'Coarse Assessment'. This assessment entailed obtaining sufficient information on flood risk in the district to enable the Sequential Test to be undertaken for the Core Strategy and any other LDD's that the District Council will be preparing. Information that was gathered included the following:

- The Local Planning Authority boundary
- Location of main rivers
- Location of all other watercourses
- Locations of flood defences
- Areas with flood warnings
- Land that is classified as Flood Zone 2 or 3 (fluvial and tidal)
- Land that has been subject to flooding from overland flow, groundwater and sewers.
- Land at risk of flooding from reservoirs, canals and other artificial sources.
- Areas with flood management strategies.
- Areas of groundwater vulnerability.
- Areas of surface water flood risk.
- Locations and details of historical flood incidents.
- Geology within the district.
- Topographical data within the district.
- Environmental problems and/or strategies that are sensitive to flood management activities.
- Information from the District Council's Emergency Planning function.
- Reports in the local press (Mid Sussex Times and East Grinstead Courier) of flooding incidents and events.

The findings and methodology for collecting this information/data is detailed in Appendix A – Coarse Assessment data sources. This includes the sources for the information/data, difficulties in collecting it and any uncertainties/gaps in knowledge. All information/data has been plotted on the District Council's GIS using the most up to date version of Ordnance Survey's (OS) Landline Basemap as a guide while digitising. This is the same basemap used when viewing the SFRA layers on the

District Council's GIS. Where individual properties have been highlighted, OS AddressPoint was used in order to determine the location.

3.3 Other steps taken to obtain information on flood risk

The District Council has sought to make the SFRA as comprehensive as possible but in some cases it has not been possible to acquire all the information that would otherwise have been included. Steps were taken to obtain the following data:

- Requests for updated flood incident data and modelling from Southern Water and Thames Water were made but no additional information was received.
- Several Parish and Town Councils did not respond to the District Council's requests for information on historic flood incidents.

However, as the SFRA is a live document any subsequent information or data that becomes available will be added.

3.4 Have all hazards been sufficiently defined?

The District Council consider that they have identified all flood risk hazards as far as practically possible. It is accepted that as the SFRA is a 'living document' there will be further flood risk hazards identified over time, which will be added to the information/data that has already been identified in this SFRA and the mapping that accompanies this SFRA will be kept up-to-date. Any subsequent flood risk hazards will therefore be taken into consideration in undertaking the Sequential Test for future Local Development Documents.

3.5 Overview of flood risk in the district

The following table summarises aspects of this data and thereby provides an overview of the district's flood risk characteristics.

Table 5 – Overview of Mid Sussex flood risk characteristics

No	Question	Area (km ²)	% of Area
1	Size of District	334.029	N/A
2	Area in Zone 3 (High flood risk)	7.78	2.233 % of Total Area
3	Area in Zone 2 (Moderate flood risk)	9.72	2.91 % of Total Area
4	Existing development in Zone 3	0.215	2.763 % of Zone 3
5	Existing development in Zone 2	0.356	3.768 % of Zone 2
6	Area of Zone 3 that is defended	0.011	0.141 % of Zone 3

7	Total Developed Area	32.306	9.672 % of Total Area
8	Required new development*	3.683	1.103 % of Total Area
9	Likely Development in Zones 3 and 2	0	0.000 % of Zones 3 and 2
10	Area affected by drainage problems	1.108	0.332 % of Total Area
11	Area affected by groundwater flooding	0.164	0.049 % of Total Area
12	Area affected by overland flows	0.427	0.128 % of Total Area
13	Area affected by surface water flood risk (1 in 30 year)	7.25	2.17 % of Total Area
14	Area affected by surface water flood risk (1 in 100 year)	12.22	3.658 % of Total Area
15	Area affected by surface water flood risk (1 in 1000 year)	33.502	10.03 % of Total Area

* Takes the required housing delivery of approximately 11,050 new homes over the period until 2031 and assumes this housing will be built at an average of 30 dwellings per hectare. It should be recognised that a considerable amount of this development will be on previously developed land. In addition, no allowance is given for new employment developments or any other uses.

4 Outcomes

4.1 Implications for the District Plan 2014 - 2031

This SFRA has been prepared with the production of the District Plan in mind and is therefore considered to be fit for purpose to inform the content of this document. Its findings are also a relevant consideration in the production of other Development Plan Documents and Neighbourhood Plans.

The information detailed in the previous section and Appendix A – Coarse Assessment data sources has enabled the District Council to undertake the Sequential Test for the District Plan 2014 - 2031. This Sequential Test is detailed in a separate report but concludes that the proposals in the District Plan do not involve the development of vulnerable uses in Flood Zones 2 and 3 and there is no requirement for an Exception Test to be undertaken.

The information gathered in this SFRA, when read alongside the '*Water. People. Places.*' sustainable drainage guide, will be used to ensure that site specific flood risk assessments for development allocations within the District Plan identify the most appropriate form of SuDS (i.e. utilising the geological information gathered for the SFRA and the planning and design guidance within *Water. People. Places.*) as well as applying a more detailed Sequential Test for the location of different development types within the development areas. In addition, the Gatwick Sub Region Water Cycle Study makes a number of policy recommendations relating to the management of surface water (see section (q) of Appendix A for details).

The SFRA has demonstrated that due to the nature of Mid Sussex, in terms of it being at the source of the four river catchments that cover the district, the level of risk of fluvial flooding is comparatively low when compared to neighbouring authorities. However, what has been identified is the need for careful planning to ensure against increased risks of flooding downstream (i.e. on the watercourses that pass into neighbouring authorities). An example of this is on the tributaries of the River Mole where existing flooding problems in Crawley could be exacerbated by inappropriate drainage schemes for development within this catchment and within Mid Sussex District. Similarly, where opportunities arise for the storage of water within these areas this can help reduce the risk of flooding to downstream areas. Land at Clay's Lake and Worth Farm identified for flood alleviation schemes should be safeguarded

from development for this reason. Neighbourhood Plans may address locally specific flood risk issues and where sites are allocated for housing and employment uses a separate Sequential Test shall be undertaken for each Neighbourhood Plan.

4.2 Advice on the preparation of flood risk assessments for allocated development sites

Advice on the preparation of flood risk assessments for allocated development sites is defined as a key output of a Level 1 SFRA within the National Planning Practice Guidance. Similar principles apply for all development and further advice on site-specific flood risk assessments can be found in Section 2.6.

The strategic allocation to the east of Burgess Hill at Kings Way contains no areas of current or future fluvial flood risk as defined within this SFRA but the development will still need to take into account the movement of water, its interaction with development proposals and integrate sustainable drainage solutions into the master planning for the development. Some areas of surface water flood risk are indicated based on modelling, these are near to the existing watercourses (ditches and channels) running through the lowest parts of the site and using the sequential test these areas should be avoided. Existing watercourse channels, ponds and flow routes should be preserved and improved. The site is indicated as being at a low level of groundwater flood risk potential due to clay geology.

The strategic allocation to the north and north-west of Burgess Hill (District Plan policy DP9) contains areas identified as being at current and future (see Section 4.3) risk within Flood Zones 2 and 3. Development in these areas should be avoided using the sequential test. Modelling indicates areas of surface water flood risk; these are near to the existing watercourses running through the lowest parts of the site. West Sussex County Council have identified historic records of isolated surface water flooding nearby around Bridge Hall Farm that should be investigated further as part of any Flood Risk Assessment.

Proposals will need to consider flood risk management and the potential for the development to increase the risk of flooding downstream. Masterplanning of the development should be undertaken in order to direct vulnerable types of development away from areas of current and future flood risk including the watercourses running through the site (tributaries of the River Adur) and climate

change buffer zone. Consideration of flood risk issues must include areas at future risk from climate change as required by Policy 4 of the River Adur Catchment Flood Management Plan (December 2009) and identified in mapping for the SFRA (see sections 2.7 and 4.3 for further details).

Both sites have been subject to a high-level assessment in the Gatwick Sub Region Water Cycle Study and are considered to have low potential for infiltration, however site specific infiltration tests should be undertaken to determine if local variations in soil conditions will be suitable for infiltration SuDS.

4.3 Assessment of the implications of climate change for flood risk at allocated development sites

It is necessary to assess the potential impact of climate change on fluvial flood risk for strategic allocations within the District Plan and this is a key output of a Level 1 SFRA. The approach applied for this SFRA is as recommended by the Environment Agency and detailed within section 2.7 of this document.

As previously mentioned the strategic allocation to the east of Burgess Hill at Kings Way is wholly located within Flood Zone 1. The site and its relationship with areas of current and future fluvial flood risk are shown at Figure 2.

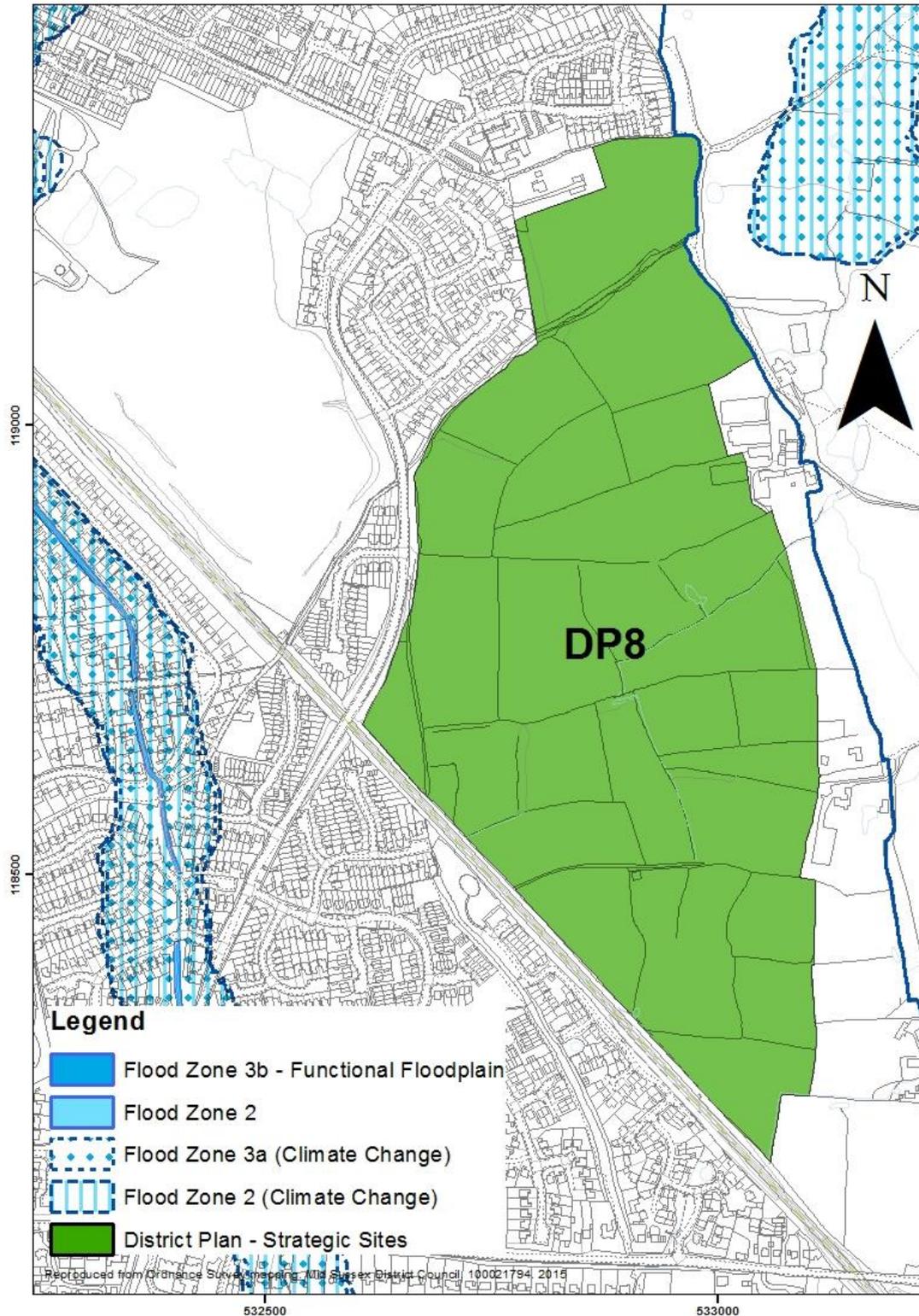


Figure 2 - Climate change implications at DP8 Land to the east of Burgess Hill at Kings Way

The strategic allocation to the north and north-west of Burgess Hill (District Plan policy DP9) is a 218 hectare site with some existing areas within Flood Zone 2 and 3 particularly around the watercourses in the north-west of the site. The map at Figure

3 also shows that there are some areas of future fluvial flood risk as a result of climate change to the south and east of the allocated area.

Development proposals will need to take areas of current and future flood risk into account, take a sequential approach to flood risk and ensure that risks can be managed through suitable adaptation measures in accordance with guidance in Appendix C – Flood Risk Assessment and Sustainable Drainage Systems guidance for specific areas within the District and ‘Water. People. Places’⁴. Proposals must also ensure development is safe throughout its lifetime and must not increase the risk of flooding elsewhere. Due to the geology of the Burgess Hill area, poor permeability is likely to limit the effectiveness of SuDS that promote infiltration; however some infiltration may still be achieved. SuDS should, therefore, primarily be designed to provide the required attenuation and treatment above ground or near the surface.

There are a range of SuDS that could be appropriate in these circumstances (if designed correctly) and possible options are identified within the ‘Water. People. Places.’ guide. It is likely a number of these methods could be utilised across the site. Other approaches such as the retention and expansion of woodland areas (see the Woodland Trust’s “Stemming the Flow” guidance⁵) could be used to increase resilience to future flood risk and support other policy objectives such as the delivery of Burgess Hill Green Circle routes.

⁴ http://www.eastsussex.gov.uk/NR/rdonlyres/C849823F-F843-470A-A6E6-44D6F2310691/0/SE7sudsmasterplanning_low_res_reduced.pdf

⁵ <http://www.woodlandtrust.org.uk/mediafile/100188521/lga-flood-report.pdf>

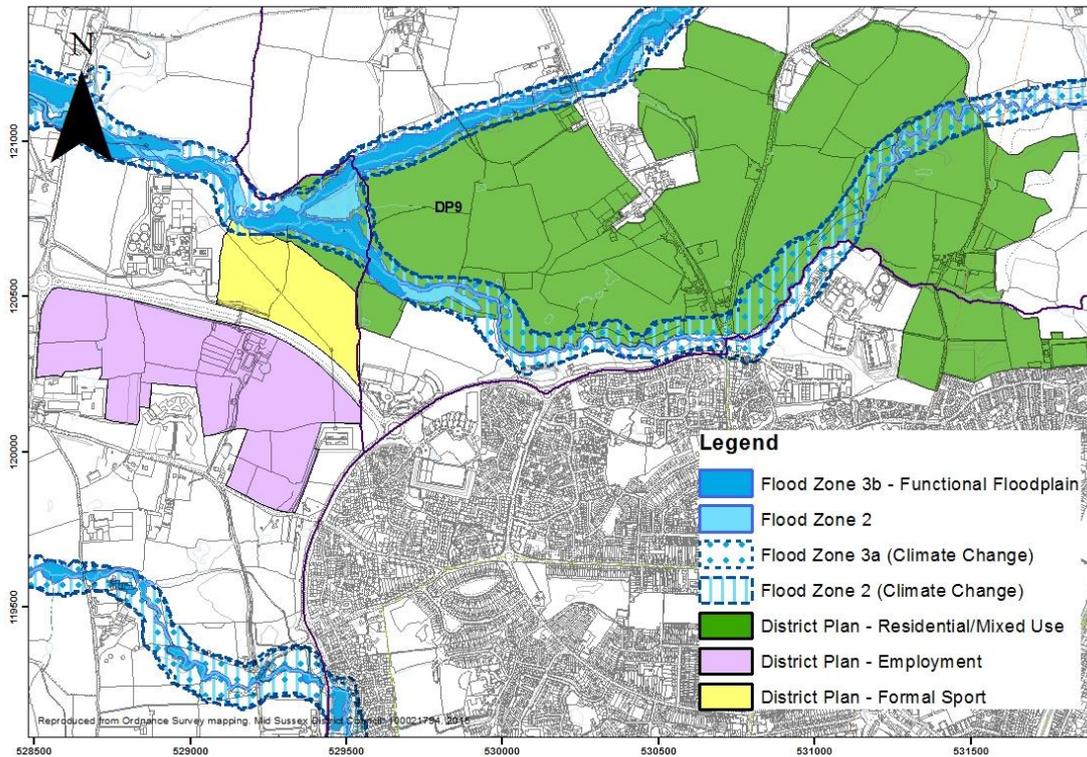


Figure 3 - Climate change implications at DP9 Land to the north and north-west of Burgess Hill

4.4 Advice on sustainable drainage techniques for managing surface water run-off at development sites

Sustainable drainage systems are designed to control surface water runoff close to where it falls and mimic natural drainage as closely as possible. They provide opportunities to:

- Reduce the causes and impacts of flooding;
- Remove pollutants from urban runoff at source;
- Combine water management with green space with benefits for amenity, recreation and wildlife.

The aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable:

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

Surface water flood mapping (see section (n) of Appendix A for further details) identifies the countryside areas around Hickstead, Staplefield, Twineham and Twineham Green as being at high risk of flooding from this source.

New development should only be considered appropriate in areas at risk of flooding if priority has been given to the use of sustainable drainage systems. Following the Ministerial Statement on sustainable drainage systems on 18th December 2014, now reflected in Planning Practice Guidance, all developments of 10 dwellings or more and other major developments are required to ensure that sustainable drainage systems are put in place for the management of run-off, unless demonstrated to be inappropriate. However, well-designed SuDS should cost no more, and usually less, than conventional piped drainage systems and given the lower maintenance costs, pollution removal and amenity benefits of most SuDS it is advised that all developments should seek to implement sustainable drainage solutions.

Early consideration of sustainable drainage systems can ensure cost-effective delivery, make the most of the potential benefits SuDS can offer and consequently maximise the desirability and value of a development. Development sites should ensure SuDS are interconnected and provide a treatment train through which water is slowed down or stored and slowly released. This passes the runoff through a variety of features offering several stages of treatment which results in improved water quality for the water returning to the river networks. Infiltration techniques are generally the preferred SuDS method because they provide source control close to the location of run-off generation, however, there are areas within the district where infiltration may not be appropriate such as where the impermeable nature of ground conditions (for example, areas underlain by Weald Clay) minimise their effectiveness. Treatment and management close to source can also avoid the need for significant excavations and major engineer works. The emerging District Plan 2014 – 2031 Policy DP41 Flood Risk and Drainage incorporates the preferred hierarchy for managing surface water drainage in developments.

Drainage elements require periodic inspection and maintenance, especially features designed to intercept silt or oil. Wherever possible these functions should be provided within an above ground SuDS system, where access can readily be achieved and the need for maintenance is easily apparent. The Ministerial Statement requires local planning authorities to consult the Lead Local Flood Authority (West Sussex County Council) on planning applications for surface water management,

ensure that the proposed minimum standards of operation are appropriate and that there are clear arrangements in place for ongoing maintenance over the lifetime of the development. The sustainable drainage system/s should be designed to ensure that maintenance and operation requirements are economically proportionate.

SuDS should reflect the character of the local area; the predominantly rural nature of the District suggests that SuDS with soft edges and natural features will usually be most appropriate. The *Capacity of Mid Sussex to Accommodate Development Study* identifies primary and secondary constraints across the district that may affect the suitability of some SuDS, in particular environmental designations and the high quality landscape that affect large areas of Mid Sussex. Where possible, and particularly where additional benefits could be achieved by doing so, SuDS should be designed to include plants⁶, trees and other vegetation to store water and provide filtration as well as improving and complementing the ecology and amenity of the area.

Appendix C provides specific guidance taking into account location and geology in certain areas of the district that should be used to inform site-specific Flood Risk Assessments and the design of SuDS.

4.5 Recommendations about the identification of critical drainage areas and the potential need for surface water management plans

The Environment Agency has not notified us of any critical drainage problems within the district.

Three potential locations for the development of Surface Water Management Plans (SWMPs) have been identified. The first is identified in the River Adur Catchment Flood Management Plan and the Gatwick Sub-Region Water Cycle Study which recommend the development of a SWMP for Burgess Hill (see sections (l) and (q) of Appendix A for more information). The River Ouse Catchment Flood Management Plan and Gatwick Sub-Region Water Cycle Study also identify network capacity at Haywards Heath as a potential constraint and recommend that a SWMP is considered to determine where drainage improvements can be delivered. West

⁶ Planting should not impair the drainage function

Sussex County Council plan to undertake a Surface Water Management Plan for Hassocks in 2015/16 with a Grant-in-Aid for £425,000 between 2016 and 2019.

The approach and level of analysis within a SWMP should be proportionate to the risk and complexity of the area concerned. Technical Guidance⁷ is available from the Department for Environment, Food and Rural Affairs but is primarily intended to be used for areas of high flood risk.

4.6 Areas at risk from other sources of flooding

Generally Mid Sussex is an area of low flood risk however there are areas affected by specific issues and careful management is necessary to ensure flood risk is not increased now or in the future. Analysis undertaken for the West Sussex Local Flood Risk Management Strategy identifies 'wet spots' where a limited number of properties are considered to be at risk. These are Burgess Hill, East Grinstead, Haywards Heath/Lindfield and Sayers Common (mostly surface water flood risk) and Cophorne and Hassocks (both surface water and fluvial flood risk). There are no areas identified at risk from coastal and tidal flooding. Locations where mapping identifies large areas considered to be at high risk of surface water flooding are rural locations south of Staplefield and around Hickstead, Twineham and Twineham Green.

Reservoir flooding is extremely unlikely to happen but the Environment Agency has produced mapping⁸ to indicate the worst case scenario in the event that a reservoir was to fail. This mapping indicates that a limited area around existing watercourses to the south of Ardingly reservoir (countryside areas to the north of Haywards Heath/Lindfield/Cuckfield) and in the immediate vicinity around Weir Wood reservoir (countryside areas to the south of East Grinstead/Ashurst Wood) could be affected, but it is unlikely that any actual flood would be this large.

The majority of the district is considered to have medium potential for groundwater flooding however a small area within the South Downs National Park is considered to have high potential for flooding from this source.

⁷ www.gov.uk/government/publications/surface-water-management-plan-technical-guidance

⁸ <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=reservoir>

4.7 Recommendations for Development Management purposes

SFRA mapping can be used as a constraint layer when analysing planning applications, deciding which organisations need to be consulted and when a Flood Risk Assessment (FRA) needs to be undertaken by an applicant. There are a number of specific flood risk considerations identified that may need to be addressed:

- mapping identifies locations within the district that currently experience problems with drainage and will enable the case officer to consult with the District Council's Drainage Team and/or the Lead Local Flood Authority and/or the Environment Agency on planning applications that will be relevant to them;
- the coarse assessment (Appendix A) identifies watercourses and recommends that a twenty metre precautionary buffer zone is applied. Applications for development within these buffer zones will need to demonstrate that they will not be at risk from flooding from these watercourses;
- all areas covered by Flood Zone 3 are to be treated as areas of Flood Zone 3b unless evidence can be provided to demonstrate otherwise. In particular the Environment Agency have advised that land that would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year should be identified as functional floodplain;
- it will be essential that the recommendations and guidance concerning climate change impact, as summarised in section 2.7 of this report, are followed with regards to designing drainage schemes and determining what areas will likely be at risk from flooding, and what the level of risk will be, as a result of climate change. The SFRA has highlighted the importance of climate change allowances being built into the design of drainage systems throughout the district. Proposals should ensure drainage systems are designed with a 30% increased allowance to protect against the impacts of climate change.

Further information about undertaking a site-specific flood risk assessment (FRA) can be found in section 2.6 of this document. It is expected that any such assessment would draw upon the information and data gathered for this SFRA.

It will be essential for applicants to carefully consider the land take implications of sustainable drainage systems at the earliest opportunity. The *'Water. People. Places'*

guide details the range of SuDS available for use and the type of conditions that best suit their implementation. It is recommended that this guidance is closely followed when considering the implementation of SuDS. Appendix C – Flood Risk Assessment and Sustainable Drainage Systems guidance for specific areas within the District of this SFRA provides further information on particular issues that need to be considered in specific areas of the district.

The District Council's Planning Policy Division can supply SFRA mapping information to applicants on request (planningpolicy@midsussex.gov.uk).

4.8 Recommendations to inform future policy

The SFRA has identified a number of areas that would improve flood risk management in Mid Sussex and reduce the risk of flooding both in the district and in neighbouring areas. This document will inform future policy decisions, including for Neighbourhood Plans.

Specifically, additional storage of water on the floodplain, particularly in rural parts of the Low Weald and High Weald AONB, has the potential to significantly reduce flood risk to downstream areas by restoring rivers and floodplains to a naturally functioning state and contributing to biodiversity improvements. Preservation and restoration of natural landscape features (such as forests, floodplains and wetlands) are important components of rural land management, providing floodwater retention and groundwater recharge. This approach has already reduced flood risk in Crawley and Horley as part of the Upper Mole Flood Alleviation Scheme. Woodland schemes could increase water retention alongside other benefits such as improved wildlife and habitat connectivity and the expansion of green infrastructure networks. If an area is intended to flood then this should be safeguarded from development and identified as functional floodplain even though it might not flood very often.

Actions that will maintain and improve river flows in urban areas are encouraged. In particular, the River Ouse Catchment Flood Management Plan identifies the long-term protection and re-creation of the Scrase Bridge Stream and West Common Stream at Lindfield.

4.9 Mapping

Mapping produced to accompany this SFRA shows administrative boundaries, main rivers, ordinary watercourses, flood zones (including the functional floodplain where appropriate) and allocated development sites, as well as other information collected as part of the coarse assessment (see Section 3.2 and Appendix A – Coarse Assessment data sources). In order to ensure up-to-date and relevant mapping this will be updated with new data releases and flood incidents as and when these become available. Therefore, a distinct set of maps will not be available to accompany the SFRA, except those contained within this document, but mapping will be freely available from the District Council on request.

The Flood Map for Planning (from Rivers and Sea)⁹ and Risk of Flooding from Surface Water map¹⁰ produced by the Environment Agency are also available as online resources.

4.10 Flood risk management measures

A variety of flood risk management measures have been undertaken by landowners, developers, local authorities and other groups across the district and it would not be possible to provide a comprehensive list but some of the measures implemented by the District Council are shown in Appendix B - Flood improvement/alleviation measures undertaken by the District Council. Two flood alleviation schemes in north-west Mid Sussex have been implemented as part of the River Mole Flood Risk Strategy (see section (I) of Appendix A for details).

Worth Parish Council have received Operation Watershed funding and are working with both West Sussex County Council and Mid Sussex District Council to deliver a new trash screen at The Green, along with earth movements to create a water detention area in the vicinity of the new screen. These improvements aim to reduce flood risk in the village. The Parish Council have also applied for a grant to set up an emergency flood plan with local volunteers.

⁹ <http://apps.environment-agency.gov.uk/wiyby/37837.aspx>

¹⁰ <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=ufmfsw>

Environment Agency flood warning areas¹¹ cover properties in the immediate vicinity of tributaries of the River Adur (particularly around Albourne, Bolney, Hurstpierpoint & Sayers Common and Twineham parishes), small parts of the countryside around the River Ouse (in Ardingly and Lindfield Rural parishes) and around Scrase Stream in Lindfield. Mapping showing these areas is available as an online resource. The Council's Emergency Plan and Severe Weather Plan, as well as the West Sussex Multi-Agency Flood Plan could be applied during a flood incident. The West Sussex Multi-Agency Flood Plan sets out when a response should be triggered.

4.11 Future use of the SFRA

As mentioned throughout this report this SFRA is a 'live document' in that information and data can be constantly added to that which has already been collated and mapped. This information and data can then be used in applying the Sequential Test and determining policy requirements in subsequent DPD's and SPD's that the District Council produce.

¹¹ <http://apps.environment-agency.gov.uk/wiyby/37835.aspx>

5 Limitations, restrictions and statements of accuracy

In some instances, historical flooding information and/or data that has been supplied to the District Council has not identified the cause of the flooding or when it took place. In these cases it has been decided to either leave these gaps in information or, through consultation with the District Council's Drainage Team, determine what the missing information/data is likely to be. It is accepted in the latter case there will be some instances where there may be slight inaccuracies in the information reported.

Whilst the District Council are confident that the data supplied by external sources is accurate, we are not responsible for any inaccuracies involved, whether relate to background details (date of flooding, type of flooding, etc.) or with the area/address identified. The Environment Agency highlighted that indicative floodplain information is out of date and information on historic flood events is of variable quality and accuracy and so this data should be read with those considerations in mind.

Section 3.3 of this report identifies information and data sources that the District Council attempted to obtain for the purposes of this SFRA but were not forthcoming. In light of this it is considered that the SFRA is not entirely comprehensive. However, every reasonable attempt has been and will continue to be made to obtain information on flood risk affecting the district.

In the production of this SFRA there has been a reliance on external sources to keep the District Council informed with regards to data/information updates. To ensure that the SFRA remains an up-to-date 'living document' there will be a need to ensure that these arrangements are maintained and the District Council updates GIS data as required.

The District Council will attempt to stay well informed and plot new flood events when they occur in order to maintain an up-to-date dataset. To ensure consistency, every attempt will be made to follow the same principles in capturing new data as those used when plotting data captured in writing this version of the SFRA.

Appendix A – Coarse Assessment data sources

a) Local Planning Authority boundary

Included on the District Council's GIS is an accurate boundary of the district, as well as boundaries for all parishes and district wards. This information can be overlaid onto the OS basemap, together with the all the other SFRA layers.

b) Location of main rivers and all other watercourses

Prior to undertaking this SFRA the District Council had already obtained the GIS layer identifying the main river centrelines that are within the district. The District Council contacted the Environment Agency with a view to obtaining the most up-to-date information on fluvial flood risk, including the main river centrelines for its 2008 SFRA. This information has been incorporated into the SFRA mapping on the District Council's GIS. Updates to this information (supplied to the District Council by the Environment Agency) have and will be incorporated/amended within the SFRA mapping.

In terms of other watercourses the OS basemap layer on the District Council's GIS has been used to identify all other above ground water features within the district by isolating the "0059 – Standard Water Features" OS feature style on the Landline dataset, and formatting it in blue. This includes streams, ditches and drainage channels large enough to be picked up by the surveying techniques. This information has been incorporated into the SFRA mapping on the District Council's GIS. A twenty-metre precautionary buffer zone should be applied for planning purposes (as agreed in consultation with the Environment Agency). Any applications for development within these zones will have to demonstrate that they will not be at risk from flooding from these watercourses. By having such a buffer will ensure that any areas that may be at risk from flooding, from these minor watercourses, as a result of climate change will be identified in site-specific Flood Risk Assessments.

c) Locations of flood defences

Significant river flood defences are identified in the West Sussex Strategic Flood Risk Assessment (2010) but none of these are currently located within Mid Sussex District. The Environment Agency have previously supplied the District Council with

mapping that identifies the location of flood defences built since 2001 to protect against river floods with a 1% (1 in 100) probability of happening each year, together with some, but not all, older defences and defences which protect against smaller floods. These defences will be incorporated into the SFRA mapping as and when new information is available from the Environment Agency. Also identified on this mapping are the areas that benefit from the presence of these defences (i.e. the areas that would flood under a 1 in 100 year flood event if the defences were not there). This information has also been supplied by the Environment Agency and they are looking to continue adding to this information.

Mid Sussex District Council is a Land Drainage Authority and has permissive powers in respect of ordinary watercourses. The District Council hold records of flood defence measures that have been implemented to help reduce localised flooding problems. These measures have generally been balancing ponds/attenuation ponds but include culverts and trash screens. Many of these features are included within the SFRA mapping, however there are some flood improvement/alleviation measures that have not been mapped and these are identified in Appendix B - Flood improvement/alleviation measures undertaken by the District Council. Further information on areas affected by these flood defence measures can be obtained from the District Council's Drainage Team.

d) Areas with flood warnings

Environment Agency Flood Warning and Alert Area mapping¹² is available online and shows the areas where alerts and warnings are available to residents, the current flood status of these areas and provides a record of previously issued flood warnings/alerts. This includes properties in the immediate vicinity of tributaries of the River Adur (particularly around Albourne, Bolney, Hurstpierpoint & Sayers Common and Twineham parishes), the River Ouse (in countryside around Ardingly and Lindfield Rural parish) and around Scrase Stream in Lindfield. GIS layers that cover those areas have been incorporated into the SFRA mapping on the District Council's GIS.

¹² <http://apps.environment-agency.gov.uk/wiyby/37835.aspx>

e) Coastal and tidal flooding

Mid Sussex does not border any stretches of coastline and is therefore not at risk from coastal flooding. The watercourses within Mid Sussex are all influenced by the tide up until a certain distance inland. The stretches of these watercourses where they are tidally influenced are outside of the district (i.e. the River Adur is influenced by the tide up until Chates Weir and Mockbridge, both locations are near to Henfield and lie within Horsham district). As a result of these findings there are no areas identified at risk from coastal and tidal flooding on the SFRA mapping on the District Council's GIS.

f) Fluvial flooding

In terms of information/data on fluvial flooding the Environment Agency has been the main provider. The Southern (Solent and South Downs) Area office is the main point of contact for Mid Sussex and they were able to supply information and data for the whole Area which covers the Adur, Ouse, Mole and Medway catchments. Information and data that they have provided and which has been included on the SFRA mapping on the District Council's GIS is as follows:

- Main River locations within Mid Sussex boundary.
- Indicative floodplains – Fluvial, within Mid Sussex boundary.
- Historic flood events within Mid Sussex boundary.
- Flood Map for Planning (Zones 2 and 3) within Mid Sussex boundary.
- Flood Map for Surface Water (1 in 30yr, 1 in 100yr and 1 in 1000yr).

In supplying this data the Agency highlighted any limitations, restrictions or statements of accuracy concerning the datasets. They stated that the indicative floodplain information is out of date and no longer used by the Agency and that the information on historic flood events is of variable quality and accuracy. An allowance for climate change was not included within the Flood Zone mapping supplied by the Agency. Section 2.7 of this report details how such an allowance has been built into this mapping.

With regards to areas covered by Flood Zone 3, the PPG sub-divides this zone into Zone 3a (High Probability) and 3b (The Functional Floodplain). It is stated that Level

2 SFRA's should identify the areas covered by Flood Zone 3b. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. However, land which would naturally flood with an annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood (such as a flood attenuation scheme) in an extreme (0.1% annual probability) flood, should provide a starting point for consideration to identify the functional floodplain. There are also areas of high surface water flood risk (1 in 30 annual probability) that should be considered as the functional floodplain, particularly in locations where there is nowhere else for the water to drain to. Due to this information not being available for most of the district, and the District Council not having the resource to map these areas it has been decided to take the precautionary approach and to assume that all areas covered by Flood Zone 3 are to be treated as areas of Flood Zone 3b (the exception being the area of the district within the Upper Mole catchment, see below) unless up to date evidence demonstrates otherwise.

Areas which would naturally flood, but which are prevented from doing so by existing defences, infrastructure and/or solid buildings, will not normally be identified as functional floodplain. If an area is intended to flood, e.g. an upstream flood storage area designed to protect communities further downstream, then this should be safeguarded from development and identified as functional floodplain, even though it might not flood very often.

In terms of fluvial flooding information and data for the Upper Mole catchment, the District Council received data sets from the Agency. Included within these data sets were the following:

- Flood extents from a detailed modelling study carried out on the Upper River Mole catchment in 2000. Flood extents produced include the 1 in 5, 1 in 20 and 1 in 100 year flood events. The Agency stated that the 1 in 20 year flood event outline can be used in the SFRA to identify areas of functional floodplain (Flood Zone 3b). An allowance for climate change was not included in this study. Section 2.7 of this report details how such an allowance for climate change has been built into this Flood Zone mapping.
- Main River Map showing extents of Main River and Non-Main River in the north-west area of Mid Sussex District.

The above two data sets have been included on the SFRA mapping.

In addition to the above mentioned datasets the District Council already had the following datasets, concerning fluvial flooding, included on GIS:

- Areas benefiting from defences (supplied by the Agency)
- Location of flood defences (supplied by the Agency)
- Location of flood storage areas (supplied by the Agency)
- Historic flood map (supplied by the Agency). This mapping shows the combined extents of known flooding from rivers and groundwater.
- Main river centrelines (supplied by the Agency).

This mapping will be updated when the Agency provide any new information.

In addition to the information provided by the Environment Agency, the District Council also collected information on fluvial flooding from other individuals and organisations. This information was predominantly received from either the District Council's own Drainage Team and Town and Parish Councils (the methodology and reasoning for collecting this information from these organisations is identified in section (i) of this appendix). Historical fluvial flood events that were identified generally resulted from flooding of ordinary watercourses; the Environment Agency's Flood Zone Mapping primarily shows flooding from Main Rivers, not ordinary watercourses with a catchment of less than 3km. Where individuals/organisations identified such events they were asked to provide information on the date(s) of the flooding incidents, the cause, the area affected and whether any flood alleviation measures have been put in place. This information has been included within the SFRA mapping.

g) Surface water flooding incidents (also see section (n))

A large amount of information and data has been supplied by the Land Drainage section, particularly records on properties that had experienced flooding as a result of major flood events in December 1993, October/November 2000 and December 2013 – February 2014. Where a flooding incident had been recorded and its cause had been identified as overland flow, the property/area affected was identified and captured on the SFRA GIS layer. When only a road name was supplied, the full extent of the road was captured using the road centreline. If any alleviation works had been undertaken to help prevent this flooding from happening in the future, or to

reduce the risk, this was documented on the mapping in the background data held for each incident.

In addition to information received from the Land Drainage section, the District Council also contacted all the Town and Parish Council's within the District, the Emergency Services and the County Council Highways and Transport Department to obtain records of historical flooding they may hold.

Risk of Flooding from Surface Water mapping identifies approximate areas at risk of flooding (see section (n) of this appendix). The County Council Highways and Transport Department also provided a list of 14 locations within the district that experience persistent flooding problems. These locations were all on public highways and the cause of the flooding was identified as the inability of rainfall to enter the drainage system and thereby cause overland flow. In some cases a whole highway was identified but the District Council has attempted to identify specific location(s) of where flooding occurred wherever possible.

The District Council contacted the West Sussex Fire and Rescue Service (WSF&RS) to obtain any records they may hold of flooding to properties. It was considered that they might hold such records as in instances where they would have been contacted to pump out properties or rescue inhabitants of buildings that are flooding. Unfortunately only limited information was available but the District Council has included all of these incidents within the SFRA mapping. WSF&RS were unable to identify the sources of these flooding incidents. As these incidents were all a considerable distance from any watercourses the District Council considered that the flooding would not have been caused by over-topping of watercourses (fluvial flooding). Also, as all the flooding incidents were during the summer months it was presumed that the flooding would not have been caused from raised groundwater levels. Therefore, the District Council stated that the source of these flooding incidents was either from overland flow or flooding from sewers.

h) Groundwater flooding incidents (also see section (m))

As identified in table 3 of this report, groundwater flooding is seen as a characteristic of low-lying areas that are underlain by aquifers. Large parts of the district are underlain by aquifers, particularly the chalk aquifers in the southern part of the district and the sandstone aquifers in the High Weald area of the district. Parts of the district

where these aquifers lie are also low-lying. This includes part of the southern area of the district, particularly Hassocks, Hurstpierpoint and Sayers Common.

The District Council sought to obtain data on where flooding from high groundwater levels had occurred from Town and Parish Council's, the Environment Agency and the District Council's own Drainage Team. Only a limited number of historical flood records, where the cause had been documented as groundwater flooding, were obtained. It is possible that some of the records of flooding, where the cause was recorded as overland flow, may have been in part caused by water levels in the ground rising above surface elevations however it has not been possible to determine if this is the case with any certainty. Areas where the cause of flooding is known to be groundwater have been included within the SFRA mapping.

The West Sussex Strategic Flood Risk Assessment (2010), produced by Capita Symonds on behalf of West Sussex County Council, identified a single groundwater flooding event at Cuckfield.

i) Flooding from sewers

Data collected from Southern Water and Thames Water

Southern Water provides wastewater treatment services across the majority of the district, with Thames Water providing the same service for the north-western part of the district (Cophthorne and Pease Pottage area). The District Council originally contacted these two utility companies on the 6th October 2006 requesting information on any flooding incidents they hold records for and then again in March 2015 requesting updated information. The type of information requested included dates and locations of flooding incidents, the frequency of these incidents and the causes. The District Council first met with officers from Southern Water on the 26th October 2006 to discuss the SFRA process and how Southern Water could assist with this. Further to this meeting, Southern Water provided historic data on flooding problems up to January 2007 as well as providing predictions of flood volumes using available models (these models would be based on the piped network and would predict where water would flood from the system in a 1 in 100 year storm event). Following consultation with the Environment Agency it was decided that using the historical data would be the best form of data to use for the SFRA (the Agency considered that the time and costs associated with detailed modelling would not add sufficient benefit

to the SFRA). Following a request for updated flood incident data, Southern Water provided up to date on 22nd May 2015. The Council attempted but was not able to obtain similar records from Thames Water.

The data provided showed flooding incidents that had occurred within the district over the last 18 years. Included within this information was the date of the flooding incident, the locality (street, settlement, post code, grid reference), the type of sewer where flooding occurred from and whether the flooding affected properties internally, within their curtilage or on the highway (the information provided was in the form of an excel spreadsheet).

This information should be used to identify an issue that would need resolving before further development could proceed in that location, rather than identifying a location where further development would not be allowed. Examples of how this information could be used include; identifying policy requirements for the allocation of sites; setting a Development Management policy for certain areas of the district; and making the District Council, applicants and developers aware of these issues at the start of the planning application process. However, current data does not identify any issues at the locations within the strategic allocations of the District Plan 2014 – 2031. Whilst a number of incidents have been identified across the district there are currently no specific locations where a bespoke policy should be applied but planning applications at locations affected by or adjacent to recorded historical incidents should demonstrate whether issues have been or can be resolved.

In identifying this information on the SFRA mapping it has been found that each record only identifies one particular property, due to the grid reference provided, but in some cases more than one property has been affected. On the District Council's GIS there is a Public Sewer layer identifying the location of sewers under the jurisdiction of Southern Water Services Ltd. This GIS layer specifies whether the sewer is a surface water sewer, a foul sewer or a combined sewer. Where Southern Water have identified a historical flooding incident on a certain street the data on the District Council's SFRA GIS layer has been captured using the line of the sewer on the Public Sewer layer as a guide. For flooding incidents where the sewer has been identified as 'foul/combined' the current operational 'foul' sewer along this street has been used. For flooding incidents from 'surface water' sewers the 'surface water' sewer has been used. In certain instances a historical sewer flooding record has been identified on a street that is shown not to have a sewer running along it. In

such instances the data on the SFRA layer has been captured using the road centreline for the full extent of the street.

It is recognised that some of these historical flooding problems from sewers have been resolved, however where this has happened it has not been identified by Southern Water. Therefore, taking the precautionary approach, all records have been identified on the SFRA mapping with the caveat that further consultation will be required with Southern Water on any development proposals that will impact on the sewers/areas identified, on the SFRA mapping, to establish the extent of the issue and what needs to be done to resolve it, or whether it has already been resolved.

Data collected from town and parish councils and district councillors

All town and parish councils within the district were written to between the 7th November and 10th December 2014. These organisations/individuals were requested to supply information on historical flooding incidents in their local area, preferably identifying the source/cause of flooding, when the incidents occurred and if any alleviation scheme had been put in place to resolve the flooding problem. They were also asked to review any existing historical flood incident records for their area, including those identified during a previous consultation by the District Council in 2006, and identify where issues had been resolved. In writing to the town and parish councils a map was enclosed to enable areas/properties that have flooded in the past to be identified. Maps were sent out at a variety of scales, anything between 1:8000 and 1:26000 depending on the size of the Parish. Therefore, when being captured onto the District Council's SFRA GIS layer, areas highlighted as having historical flood events are interpretations of the data supplied, although every effort has been made to ensure they are of high accuracy. The reason for contacting the town and parish councils was that it was considered these individuals/organisations would have a good knowledge of their local area, which would include information on past flood events.

In total there are 24 town and parish councils within Mid Sussex, all of which were written to. In response, the District Council received information on previously unidentified historical flood incidents in Ardingly, Balcombe, Hassocks, Lindfield Rural and West Hoathly.

Not all town and parish councils responded to the request for flood event/risk information and therefore the SFRA is perhaps not as extensive as it could be. However, a lack of response may indicate a lack of historic flooding incidents in those towns and parishes. It was possible to supplement this information with historic flood incident data received by West Sussex County Council in January and February 2011 as part of their Local Drainage Asset Survey and other flood incident data shared by local groups. This data identified incidents in Bolney, Burgess Hill, Cuckfield, Fulking, Horsted Keynes, Poynings, Turners Hill, Twineham and West Hoathly. In addition, consultation with the District Council's Drainage Team, who keep records of historic flood events, should ensure that most historical flooding problems have been documented in this SFRA.

Much of the information received from town and parish council's was also obtained from the District Council's Drainage Team. In some instances the town and parish council's had not identified the cause of past flooding incidents. In many instances the information/data gathered by the District Council from other individuals and organisations enabled a cause to be established. Where the cause was identified as blocked or inadequate sewers the areas/properties affected, including the actual sewers, were included within the SFRA mapping.

j) Flooding from reservoirs, canals and other artificial sources

There are no canals within the district and the one major reservoir is at Ardingly. The reservoir is owned and run by South East Water. Reservoirs in the UK have an extremely good safety record with no incidents resulting in the loss of life since 1925 and are carefully maintained to prevent flooding. Reservoir flooding is therefore extremely unlikely to happen but the Environment Agency has produced mapping¹³ to indicate the worst case scenario in the event that a reservoir was to fail. This mapping indicates that a limited area around existing watercourses to the south of Ardingly reservoir (countryside areas to the north of Haywards Heath/Lindfield/Cuckfield) and in the immediate vicinity around Weir Wood reservoir (countryside areas to the south of East Grinstead/Ashurst Wood) could be affected, but it is unlikely that any actual flood would be this large.

¹³ <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=reservoir>

A generic off-site plan for reservoirs has been prepared by Sussex Resilience Forum to ensure a swift and effective response to any reservoir emergency involving reservoirs for which specific off-site plans have not been established. It sets out the co-ordination and control arrangements at each level of response across all agencies.

The District Council are aware of only one significant scheme where water has been pumped from one area to another within the district. This was at the Keymer Brick & Tile Works site in Burgess Hill; however the site has currently ceased operations and is allocated for residential development. Typically rainwater gravitates to the lowest point of the pit area and to prevent flooding of the site the water was pumped into the River Adur via a series of settlement ponds. This discharge into the Adur was licensed by the Environment Agency. The site is underlain by Weald Clay which is classified as a non-aquifer and is unable to transmit appreciable volumes of water into the ground. This information has been included within the SFRA mapping and will need to be considered if any development is to occur on this site.

k) Flooding from outside the District boundary and from inside out

Due to the nature of Mid Sussex, the district experiences only minor flood risk problems from areas outside of its administrative boundary. This is due to the source of the watercourses such as the Ouse, Adur, Medway and Upper Mole being within, or just outside of the district. Hence, Mid Sussex does not experience downstream problems from these watercourses as a result of activities in a neighbouring authority. The downside of this is that what happens in Mid Sussex can impact on flood risk in neighbouring authorities. This would generally occur where development in Mid Sussex would result in an increase in surface water being discharged into a watercourse, which would be likely to impact negatively on flood risk downstream, particularly in urban areas such as Crawley. As identified in section (q) of this appendix, schemes are being implemented within Mid Sussex to reduce the risk of flooding in Crawley, Horley and at Gatwick Airport as part of the Upper Mole Flood Alleviation Scheme. It is important that proposed new development in the district as well as the Council's Local Development Framework fully consider cross-boundary flood risk implications.

I) Areas with flood management strategies

West Sussex Local Flood Risk Management Strategy

West Sussex County Council as Lead Local Flood Authority are required to set out how it will deliver local flood risk management under the Flood and Water Management Act. West Sussex County Council have prepared a Local Flood Risk Management Strategy covering the county to meet their duties as a Lead Local Flood Authority. The analysis undertaken in this strategy identifies 53 ‘wet spots’ in West Sussex with six identified in Mid Sussex at the following locations:

- Burgess Hill
- Copthorne
- East Grinstead
- Hassocks
- Haywards Heath/Lindfield
- Sayers Common

The majority of properties identified are in areas of surface water flood risk, however there a number of properties at risk of river flood risk in Copthorne and Hassocks. The most significant clusters of properties are located in the urban centres, particularly Haywards Heath and Burgess Hill. Purely surface water flooding is known to exist in East Grinstead and on a smaller scale in Sayers Common. Properties are largely at risk from surface water flooding in Hassocks. No wet spots within Mid Sussex are identified as ‘priority’ wet spots by the County Council.

Wet Spot	Surface Water Flood Risk (no. of properties)	River and Sea Flood Risk (no. of properties)	Combined Flood Risk (properties within surface & river/sea water risk areas)	Total (no. of properties)
Burgess Hill	2,500	1	0	2,501
Copthorne	75	130	75	280
East Grinstead	2,200	0	0	2,200
Hassocks	525	105	55	685

Haywards Heath & Lindfield	2,200	0	100	2,300
Sayers Common	50	0	0	50

The Strategy identifies that Burgess Hill was previously known to have experienced regular sewer flooding.

Catchments

The Environment Agency has defined catchments where inter-connected water bodies converge to a single point and the resulting Catchment Flood Management Plans are used to manage water issues in an integrated way across authorities. The south of the District (up to the southern boundary of Haywards Heath) is covered by the River Adur Catchment Flood Management Plan (CFMP) (December 2009). The north of the district is split between three catchment areas; the villages of Copthorne, Pease Pottage and the surrounding countryside fall within the Thames Region CFMP area along with Crawley and Gatwick Airport. East Grinstead and the surrounding villages fall within the Medway CFMP area and Haywards Heath and villages to the north-east and west are within the Ouse CFMP (December 2009) area.

River Adur Catchment Flood Management Plan

The River Adur Catchment Flood Management Plan (December 2009) aims to deliver sustainable long term flood risk management for the catchment area by identifying flood risk management policies to assist decision making. The main sources of flood risk in the Adur catchment area are from both localised river flooding and surface water flooding, including flooding in urban areas due to under capacity of, or blockages in, the drainage network. There have been several serious flood events in the catchment area over the last century caused by surface water run-off from the South Downs. The Plan is intended to inform local authority spatial planning activities, as well as informing project and investment plans for the Environment Agency, utility companies, transport planners, businesses and land owners/managers whilst assisting the public.

The Burgess Hill and Hassocks area is identified within the CFMP as being an 'area of low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate

change' (CFMP Policy 4). The Plan also predicts that the number of properties in Burgess Hill and Hassocks at risk will increase from 13 to 250 by 2100. The proposed actions for Burgess Hill and Hassocks include strengthening development management advice, increasing the use of SuDS through local development framework policies, and developing a Surface Water Management Plan for Burgess Hill.

Rural areas to the south and west of the Burgess Hill/Hassocks area (Upper Adur and South Downs - East) are identified as 'areas of low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits'. The proposed actions for the Upper Adur include investigating opportunities where additional storage of water on the floodplain could reduce flood risk to downstream areas, restore rivers and floodplains to a naturally functioning state, and contribute to meeting biodiversity action plan targets.

River Ouse Catchment Flood Management Plan

The Plan predicts that the number of properties in Haywards Heath at risk in a 1% annual probability river flood is 27 and this figure is predicted to rise to 50 by 2100. The Haywards Heath area is identified as an area of 'low, moderate or high flood risk where we are already managing the flood risk effectively but where we may need to take further actions to keep pace with climate change'. The CFMP identifies the potential for localised flooding from the Scrase Bridge Stream and West Common Stream as a result of surface water overwhelming urban drainage systems. It is recommended that policies are developed to work towards long-term protection and re-creation of the Scrase Bridge Stream and West Common Stream and that a Surface Water Management Plan is developed for Haywards Heath.

Twenty four properties in the High Weald and Middle Ouse area are considered to be at risk of impacts in a 1% annual probability river flood event but this is not expected to increase by 2100. This includes areas outside Mid Sussex in Wealden district. The area is identified as an area of 'low to moderate flood risk where we will take action with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits'. An increase in flood storage in this area could reduce flood risk to properties in Uckfield and Lewes into the future. The use of agri-

environment and woodland schemes to increase water retention in the catchment should be considered.

A small area around Scaynes Hill is located within the Ouse Low Weald area which is an area of low flood risk that is not expected to increase in the future due to climate change.

River Medway Catchment Flood Management Plan

The area of Mid Sussex within the River Medway catchment area is entirely within the Upper Catchment sub-area and is identified as an area 'where the risks are currently appropriately managed and where the risk of flooding is not expected to increase significantly in the future'. Development within the town of East Grinstead should follow national policy, the Strategic Flood Risk Assessment and the Local Flood Risk Management Strategy produced by West Sussex County Council in order to manage flood risk and the speed of surface water run-off.

River Thames Catchment Flood Management Plan

The area of Mid Sussex within the River Thames catchment area is entirely within the Upper Mole sub-area and is identified as an area of 'low to moderate flood risk where actions to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits are recommended'. The approach to flood risk management in these places uses the natural protection already provided by the river channel and the open spaces in the floodplain. The proposed actions include ensuring that recommendations in Strategic Flood Risk Assessments and Local Development Framework policies create the potential to reduce flood risk through adaptation of places at risk, managing run-off and retaining open spaces in the floodplain.

The main aim of the River Mole Flood Risk Strategy is to reduce the level of flood risk on parts of the Upper Mole catchment, which could have knock-on effects downstream. Records show that severe flooding incidents have taken place within the Upper Mole catchment in 1947, 1968, 1980, 1990, 1993, 1994, 2000, 2002, 2013 and 2014. The flood events in 2000 caused a significant number of properties to suffer from flood damage at Fetcham, Dorking, Maidenbower, Furnace Green and Ifield Green. Although all of these areas are outside of Mid Sussex, some of the

measures proposed to reduce the flood risk in these areas will impact upon the district.

The Environment Agency, in partnership with the Upper Mole Strategy Working Group¹⁴, identified two flood alleviation schemes within Mid Sussex, which will be used to store and attenuate flow into the downstream watercourses, thereby reducing the risk of flooding during heavy rainfall/storm events. It is essential that such areas are safeguarded from development so that the implementation of these flood alleviation measures is not compromised. The scheme at Worth Farm has now been implemented and the scheme at Clay's Lake is at an advanced stage at the time of writing. It is anticipated that these works will be completed ahead of the adoption of the Mid Sussex District Plan 2014 – 2031. This land should be safeguarded from development in accordance with District Plan Policy DP41 Flood Risk and Drainage.

m) Areas of Groundwater Vulnerability

To assist in identifying areas that are at risk from groundwater flooding and to also assist in the preparation of SuDS guidance for particular areas/sites in the district information regarding areas that have vulnerability to groundwater flooding have been included on the SFRA mapping. This mapping has, therefore, identified the locations and extents of the major and minor aquifers within the district. The data for this GIS layer was received from the Environment Agency prior to this SFRA being undertaken. Information on spring lines was also obtained from the Council's Drainage Team and this has enabled areas at risk of groundwater flooding to be identified.

The majority of the district is considered to have medium potential for groundwater flooding. A small area of the district, the southernmost part within the National Park, is considered to have high potential and the settlements of Burgess Hill, Hassocks, Hurstpierpoint, Albourne and Sayers Common, as well as countryside areas to the west are considered to be in an area of low potential for groundwater flooding.

¹⁴ This group consists of Local Authorities within the strategy area, which includes Mid Sussex District Council, as well as other key stakeholders such as BAA Gatwick and Thames Water.

n) Areas of surface water flood risk

West Sussex Local Flood Risk Management Strategy identifies surface water flooding as causing “the most regular impact to communities across West Sussex”. The PPG (ID: 7-013-20140306) states that SFRA’s should identify areas at risk from surface water flooding taking account of the surface water flood risk map and other available evidence such as local flood risk management strategies.

The Environment Agency’s Risk of Flooding from Surface Water mapping¹⁵ shows the approximate areas at risk of flooding based on ground levels and drainage. Locations at high risk of surface water flooding (annual probability greater than 1 in 30) are particularly notable south of Staplefield and around Hickstead, Twineham and Twineham Green.

Catchment Flood Management Plans (see section (l) of this appendix for details) have identified the main urban areas of Burgess Hill, East Grinstead and Haywards Heath as having the potential for surface water flood risk. Historical flood events have also occurred in the Low Weald caused by surface water run-off from the South Downs, particularly at times of high groundwater levels.

o) Geology within the district

In order to identify the most appropriate SuDS strategy for different sites and areas within Mid Sussex it is important to understand what the ground conditions are for these different sites and areas. Ground conditions are likely to dictate whether or not an infiltration drainage method, such as permeable paving or soakaways, would be suitable or not. This information was obtained from the British Geological Society, who provided GIS layers for the whole of the district, including areas of artificial ground, bedrock classification, linear features, areas of mass movement and superficial (surface) ground conditions.

¹⁵ <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=ufmfsw>

p) Topographical data within the district.

To help understand how sites and areas currently drain it was important to gain detailed topographical information, as far as possible, for the district. The Environment Agency were able to supply LiDAR tiles, which provided contour data for a number of the areas within the district, particularly in and around Haywards Heath and Burgess Hill.

It is considered that this information will be of use to those preparing detailed site specific FRA's.

q) Environmental problems and/or strategies that are sensitive to flood management activities

Gatwick Sub Region Water Cycle Study

The Gatwick Sub Region Water Cycle Study (January 2011) provides strategic level advice on water infrastructure and environmental capacity in order to develop an integrated approach to management of the water environment. Flood risk management is a key part of this work and the assessment of environmental constraints within the study finds that the assessed levels of development¹⁶ can be accommodated within areas at low risk of fluvial flooding. The study does however contain a number of relevant recommendations that should inform the preparation of development plan documents. The study makes specific Local Plan policy recommendations including:

- a preferred hierarchy of managing surface water drainage from any development through first infiltration measures, secondly attenuation and discharge to watercourses, and if these cannot be met, through discharge to surface water sewers only;
- all developments to incorporate SuDS to control surface water run-off; and
- a policy is adopted to ensure redeveloped brownfield sites disconnect any surface water drainage from the foul network.

¹⁶ Due to the timing of the study the assessment reviewed the potential impact of growth based on housing figures within the now revoked South East Plan.

Infiltration techniques are generally the preferred SuDS method because they provide source control close to the location of run-off generation. These recommendations have been incorporated into District Plan policy DP41 Flood Risk and Drainage.

The Study also identifies that potential constraints to development exist relating to the capacity of the sewerage network as well as the capacity of the wastewater treatment works, especially in Burgess Hill and Haywards Heath. Sewerage providers consider Surface Water Management Plans (SWMPs) a valuable tool in alleviating network capacity issues, by addressing surface water management and reducing storm overflows into the combined sewer system. The Study recommends that SWMPs are considered for Burgess Hill and Haywards Heath to determine where improvements in drainage can be delivered.

Catchment Flood Management Plans

Catchment Flood Management Plans (CFMPs) are a strategic planning tool through which the Environment Agency will seek to work with other key decision-makers within a river catchment to identify and agree policies for sustainable flood risk management. As previously mentioned there are four catchments within Mid Sussex; the Adur, Ouse, Medway and Mole.

A significant amount of information on flood risk is identified within these CFMP's, including within the Scoping Reports. They identify estimated depths of flooding when a 1 in 100 year flood event takes place and also estimate costs for the flood damage that would occur under such an event. Much of this information is of relevance to the SFRA and will be used when applying the Sequential Test for the allocation of land for development, as well as for the formulation of policies (further information can be found in section (I) of this appendix).

Upper Mole Flood Alleviation Scheme

The Upper Mole Flood Alleviation Scheme is a series of schemes that, once complete, will reduce the risk of flooding for at least 1,038 properties in the Crawley and Horley areas as well as Gatwick Airport. Two of these schemes are located within Mid Sussex District. Already constructed works include a new flood detention

reservoir adjacent to the M23 motorway at Worth Farm, and the construction of a larger replacement dam at Clay's Lake is currently underway. A Construction Management Plan was submitted to Mid Sussex District Council in 2014 detailing the scheduling of works at Clay's Lake to provide the new flood defence by the end of 2015. Worth Farm lies to the east of the M23 near Junction 10A and close to the motorway. This consists of a new embankment dam about 6.5 metres above the surrounding ground, broadly parallel with the motorway. For most of the year, the area can still be used for farming but when flows of water increase, the existing brook will start to pond up behind the dam and will create a reservoir. This reservoir will have a restricted outlet meaning that it will empty at a steady rate as water levels in the brook fall. Clays Lake is an existing dam that is being upgraded. When water flows are high the amount of water stored in the reservoir will increase before returning to normal as water levels in the river fall. This allows the release of water at a steady rate which should reduce the risk of flooding downstream in Crawley.

r) Information from the District Council's Emergency Planning function

The District Council's Emergency & Outdoor Service Manager confirmed that the Council's Emergency Plan and Severe Weather Plan could both be applied to a flooding incident. The Council is also working with partners across West Sussex to develop Part 2 Multi-Agency Flood Plans for areas at risk of flooding and these complement the Sussex Resilience Forum's adopted Part 1 Multi-Agency Flood Plan.

The West Sussex Multi-Agency Flood Plan sets out when a response should be triggered and was activated and used during flooding in June 2012. If a response is activated, adverse weather arrangements are supported by the Sussex Emergency Response and Recovery Document and Multi-Agency Strategic Co-ordinating Group Guidance. The multi-agency response will either be an Adverse Weather Teleconference (chaired by the Environment Agency), an Adverse Weather Office (chaired by the Police), or, to set up a Strategic Co-ordinating Group (chaired by the Police).

With regard to rescue procedures the detailed plans for each urban centre contain the processes involved to evacuate, and also include shelter arrangements. Procedures and the response to flooding can vary depending on the type of flood event, the area and the time of year. Membership of the recovery group will vary depending on the event, but will usually include all risk management authorities of

which Mid Sussex District Council is one. A Recovery Co-ordinating Group led by West Sussex County Council will manage the recovery process.

The District Council will not be impacted by any Shoreline Management Plans as the District has no coastline. There are, however, likely to be other plans and strategies that will influence the SFRA and when these documents are identified they will be included within the SFRA.

s) Searching for reports in the local press (Mid Sussex Times and East Grinstead Courier of flooding incidents and events

A number of flood incidents were identified:

Date	Location	Settlement	Details
31 st January 2004	Hanlye Lane	Cuckfield	West Sussex Fire and Rescue Service had to pump water out of the basement of a house
31 st January 2004	Ardingly Road	Lindfield	Several houses flooded
1 st February 2004	Delta House, Bridge Road Industrial Estate	Haywards Heath	Two foot of floodwater due to blocked culverts
8 th November 2008	Keymer Road	Hassocks	Three shops flooded due to blocked drains
4 th August 2010	Elite Garage, opposite Railway Station	Haywards Heath	Forecourt and workshop flooded (surface water)
17 th January 2014	Balcombe Railway Tunnel	Balcombe	Delays of 1hrs 40mins for train services
17 th January 2014	A23 northbound (between A272 and M23) and southbound (between A264 and A272)		Carriageway flooded, A23 closed between those junctions
14 th February 2014	Parklands Road	Hassocks	Garden flooding due to surge of water in Herring Stream during

			heavy rainfall. Culvert under Downs View Road not large enough to handle very heavy rainfall.
28 th July 2014	Collingwood Road	East Grinstead	One house and garage flooded

Information provided in the local press about these events is often incomplete or limited and it is usually not known if the problems have been resolved. A precautionary approach makes further consideration necessary (through a site-specific flood risk assessment) for any development proposals that will impact on the areas identified. It will be important to establish the likely cause and whether any action needs to be taken to resolve the risk wherever possible. These incidents have been included on the SFRA mapping.

Appendix B - Flood improvement/alleviation measures undertaken by the District Council

Dolphin Balancing Pond, Haywards Heath – Construction of a balancing pond.

Balancing Pond, Lincoln Wood, Haywards Heath – Raising of the banks of the existing pond.

Penland Road, Haywards Heath – Construction of a balancing pond, clearing and regrading stream and raising existing banks.

Concorde House, Balcombe Road, Haywards Heath – Clearing of rubbish from banks of the stream.

Builders Centre, Bridge Road, Haywards Heath – Construction of a permanent sandbag barrier.

Drummond Close, Haywards Heath – Bank construction works and landscaping.

By Sunte, Lindfield – Raising banks of the stream.

Meadow Lane, Burgess Hill – De-silting stream

Chanctonbury Road, Burgess Hill – Improvements to outlet

Herring Stream, Hassocks – Stream and bank clearance and de-silting of culvert.

Gleave Close Balancing Pond, East Grinstead – Construction of a balancing pond and improvements to retain more water.

The Street, Bolney – Construction of large relief culvert.

Sydney Road, Haywards Heath – Construction of relief culvert.

Janes Lane, Burgess Hill – Improvements to culvert entrance and placement of new screen.

Pyecombe – Improvements to drainage ditch.

Greenways, Haywards Heath – Construction of relief culvert.

Penland Road, Haywards Heath – Construction of relief culvert.

Oakhurst, Sayers Common – Construction of relief culvert.

Longhurst, Burgess Hill – Relining of foul sewer and improvement works.

Sandy Vale, Haywards Heath – Construction of relief culvert.

Norton House Car Park, Tower Close, East Grinstead – construction of a storm water attenuation tank with restricted outlet.

Copthorne Common Road – installation of a new trash screen.

Hickmans Lane Recreation Ground – Construction of a balancing pond

For further information on these flood improvement/alleviation measures please contact the District Council's Drainage Team.

Appendix C – Flood Risk Assessment and Sustainable Drainage Systems guidance for specific areas within the District

This Appendix provides guidance on FRAs and SuDS that should be used when submitting/considering a planning application for development. The document ‘Water. People. Places.’ should also be used as it provides excellent guidance for choosing SuDS. These guidance notes have been prepared in partnership with the District Council’s Drainage Team. It is suggested that pre-application consultation is undertaken between the developer and the District Council/Environment Agency/WSCC prior to submitting a planning application for development where flood risk may be an issue.

Settlement/Area	FRA guidance	SuDS guidance
Pyecombe, Poynings & Fulking - the Downland villages.	Surface water run-off from the Downs needs to be considered as do any springs/spring lines that can be found in this locality.	In most instances in this locality, infiltration systems (permeable paving, soakaways, etc.) should be able to be implemented effectively. Care needs to be taken to avoid pollution to the aquifers in the area.
Hassocks (inc. Keymer)	Flood Zones 2 and/or 3 (fluvial flood risk from the Herring Stream) would need to be considered if applications are within these areas (a FRA would need to accompany any application for development in such areas). Proposals in and around Damian Way, Church Mead, Newlands Close, Pattendens Nursery, Adastra Avenue, Queens Drive and The Quadrant would need to consider historical fluvial flood events and the current risk of flooding from all sources (areas are not covered by Flood Zones). A number of minor drainage ditches/streams pass through and around the settlement - the risk of flooding from these ditches/streams will need to be considered in any FRA for a development proposal in their vicinity.	On the southern periphery of the settlement and the land immediately to the south, ground conditions (mudstone) will mean that infiltration systems are unlikely to be suitable and therefore attenuation systems, such as balancing ponds, should be considered as the preferred SuDS. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. This also applies on land to the north of the settlement, where the geology is generally Weald Clay with poorly drained soils. Within the majority of the settlement itself, ground conditions are slightly more permeable (sandstone) and should allow for infiltration systems or a combined infiltration/attenuation system. Land in this location overlies a major aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.
Hurstpierpoint and Albourne	Due to the impermeable nature of the ground in this area surface water drainage needs to be carefully considered. A number of minor drainage ditches/streams are present on the northern, western and eastern sides of Hurstpierpoint - the risk of flooding from these ditches/streams will need to be considered in any FRA for a development proposal in their vicinity. Springs/spring lines that are present on an east-west line through both settlements will need to be considered.	For the majority of Albourne together with the southern half of Hurstpierpoint (and land to the south of the village) the ground conditions mainly consist of sandy clays overlying Weald Clay. Minimal soakage potential is present in this area (as can be demonstrated by the number of ponds in the area) and therefore attenuation systems, such as balancing ponds, are going to be the most appropriate form of SuDS in this area. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. Land in this location overlies a major aquifer and therefore high groundwater vulnerability will need

Settlement/Area	FRA guidance	SuDS guidance
		to be addressed in any SuDS design. Much of the northern part of Hurstpierpoint and land to the north of the village is underlain by Weald Clay and therefore the same issues concerning the use of SuDS apply to this area as they do for the area to the south.
Sayers Common and Hickstead area (inc. Bolney Grange)	Numerous records of historical flooding exist in and around Sayers Common predominantly due to poor surface water drainage systems - this issue will need to be carefully considered in any FRA in this locality. A significant area of Flood Zone 2 and 3 (fluvial flood risk from the River Adur) runs through the Hickstead area and to the immediate north of Bolney Grange - this will need to be considered for any applications within this area (a FRA will need to accompany any planning application for development in such areas).	The majority of this area is underlain by Weald Clay (the only exceptions are around the tributaries of the River Adur where clay, silts, sands and gravels overlie the Weald Clay). The scope to utilise infiltration systems will be minimal and therefore attenuation systems will be the most appropriate form of SuDS. Evidence of the impermeable nature of the ground conditions in this area can be seen by the numerous ponds in the locality. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse.
Burgess Hill	Tributaries of the River Adur lie immediately to the north of the built up area boundary of the town, to the west and south west of the town and also through the eastern part of the town. There are significant areas of fluvial Flood Zone 2 and 3 associated with these watercourses - this will need to be considered for any applications within this area (a FRA would need to accompany any application for development in and adjacent to such areas, which will need to consider the implications of climate change). The Worlds End area of Burgess Hill (north east part of the town) suffers from localised flooding problems resulting from overland flow and surcharging sewers during periods of heavy rainfall. Any FRA in this locality will need to consider these issues and demonstrate that this problem will not be exacerbated, and where possible reduced or resolved. Further information on this issue can be gained from the District Council's Drainage Team. Throughout the town surface water drainage will need to be carefully considered for any development work and as part of any FRA, if undertaken.	The majority of this area is underlain by Weald Clay (the only exceptions are around the tributaries of the River Adur where clay, silts, sands and gravels overlie the Weald Clay). The scope to utilise infiltration systems will be minimal and therefore attenuation systems will be the most appropriate form of SuDS in and around the town. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse.

Settlement/Area	FRA guidance	SuDS guidance
Bolney	The area around The Street, Bolney, has historically suffered from flooding resulting from overland flow. Works have taken place to alleviate this problem; however any further development in this locality will need to consider whether the alleviation works are able to cater for any increase in surface water flow. This should be demonstrated in any FRA for development in this location.	The geology of the land in and around Bolney generally consists of sandstone and siltstone with poor to moderately drained soils. The exception to this is an area of land that stretches westwards from Bachelor's Field where the ground conditions consist of Weald Clay. Bearing in mind these ground conditions, for large developments particularly (that will generate significant amounts of surface water run-off) attenuation systems will be the most appropriate form of SuDS in this locality. There may be scope to implement infiltration systems in combination with an attenuation system, particularly for smaller developments. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be considered in any SuDS design
Ansty and Cuckfield	No specific flood risk issues in and around Ansty. For Cuckfield, the area around Broad Street (east of Warden Park School) has suffered from a couple of minor floods as a result of overland flow from the school site. Development in this locality should bear this in mind.	For Ansty the ground conditions consist of sandstone and siltstone with moderately drained soils on gentle slopes. Combined infiltration and attenuation facilities are likely to be the most appropriate form of SuDS in this locality. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design In Cuckfield the majority of the area in and around the village is underlain by Upper Grinstead Clay, hence the scope to utilise infiltration systems, such as soakaways, will be minimal.
Haywards Heath (inc. Lindfield and Scaynes Hill)	A number of watercourses pass through the northern part of Haywards Heath and Lindfield, including the Scrase Stream and Northlands Wood Stream (sections of both are classified as Main River). There are significant areas of Flood Zone 2 and 3 associated with both of these watercourses. Any application for development within these areas will need to be accompanied by a FRA, which will need to address the issue of fluvial flood risk (inc. considering the implications of climate change). Within Haywards Heath there are a number of minor watercourses around Penland Road, Burrell Road and Bridgers Mill that have areas of flood risk associated with them and they have been known to overtop causing flooding of property and roads. Any application for development in these areas will need to consider this issue in a FRA. There are a number of other minor watercourses and ditches in and around Haywards Heath and Lindfield so any proposed development within their immediate vicinity should undertake a FRA to ensure that the proposal will not be at an unacceptable risk of flooding. Any development on the eastern side of the town (west of Cuckfield) will need to consider the impact on the attenuation facilities/ flood alleviation measures installed in this area to reduce flood risk downstream (see Appendix B -	The general geology in this area is sandstone and siltstone with moderately drained soils. With this in mind infiltration systems are only likely to be appropriate to a certain extent, particularly on large-scale developments. Hence it is recommended that combined infiltration and attenuation systems will be the most appropriate form of SuDS in most instances. Such a system has been implemented for the Bolnore Village development. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.

Settlement/Area	FRA guidance	SuDS guidance
	Flood improvement/alleviation measures undertaken by the District Council). For Scaynes Hill, overland flow (run off from the side of the hills) needs to be considered for the area around the Millennium Village Centre.	
Horsted Keynes	No specific flood risk issues in and around Horsted Keynes that need to be considered in addition to current FRA guidance.	The general geology in this area is sandstone and siltstone with moderately drained soils. With this in mind infiltration systems are only likely to be appropriate to a certain extent, particularly on large-scale developments. Hence it is recommended that combined infiltration and attenuation systems will be the most appropriate form of SuDS in most instances. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.
Settlement/Area	FRA guidance	SuDS guidance
Balcombe	An area of land either side of the Haywards Heath Road (particularly to the north around the Old Rectory / Braky Wood) has experienced flooding in the past as a result of an inadequate drainage system. Any proposed development in this locality will need to demonstrate how this problem will not be exacerbated and where possible rectified within the FRA. No other specific flood risk issues in and around Balcombe that need to be considered in addition to current FRA guidance.	Much of the area in and around Balcombe is underlain with Upper Grinstead Clay (although there are areas of Ardingly Sandstone and Lower Tunbridge Wells Sand Formation) with poorly drained soils. Minimal soakage potential is present in this area (as can be demonstrated by the number of ponds and ditches in the area) and therefore attenuation systems, such as balancing ponds, are going to be the most appropriate form of SuDS in this area. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse.
Ardingly	No specific flood risk issues in and around Ardingly that need to be considered in addition to current FRA guidance.	In the western part of the village the ground conditions consist of clay overlain with poorly drained soils. With this in mind attenuation systems, such as balancing ponds, are going to be the most appropriate form of SuDS in this area. In the remainder of the village and land to its east the geology is mostly mudstone and sandstone and therefore the same guidance applies in this area with regards to SuDS. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse.
West Hoathly and Sharpthorne	The area around The Hollow, which runs between West Hoathly and Sharpthorne has suffered from persistent flooding problems as a result of overland flow. Further north from here overland flow has been known to cause flooding to the rear of Sussex Cottages (Sharpthorne). Any application for development in these areas will need to consider the risk of flooding posed by surface water run-off in a FRA.	The majority of this area is underlain by Wadhurst and Lower Grinstead Clay. The scope to utilise infiltration systems will be minimal and therefore attenuation systems will be the most appropriate form of SuDS. Evidence of the impermeable nature of the ground conditions in this area can be seen by the numerous ponds in the locality. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse.

Settlement/Area	FRA guidance	SuDS guidance
East Grinstead (inc. Ashurst Wood)	East Grinstead has few areas at risk from flooding. The main exception to this is the area around Dunning's Mill where there is an area of fluvial Flood Zone 2 and 3 as well as a number of historical flood records associated with the watercourse that runs through this locality. Any proposed development in this part of the town should be accompanied by a FRA that considers this issue. Another area of historical fluvial flooding can be found to the north of East Court, including Lynton Park Avenue. Although no flood zones are designated in this locality any proposed development should consider the flood risk presented by the watercourse(s) in this area. Surface water drainage will need to be carefully considered as part of any FRA undertaken.	For Ashurst Wood and the eastern part of East Grinstead the geology consists of sandstone, siltstone and mudstone (Grinstead Clay) with poorly drained soils. The scope to utilise infiltration systems will be minimal and therefore attenuation systems will be the most appropriate form of SuDS. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. For the western part of East Grinstead (and land to the west) the geology and soils should allow for infiltration SuDS to a certain extent, probably in combination with an attenuation system, particularly for larger developments. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.
Crawley Down and Turners Hill	For land to the north and south of Turners Hill flood risk from surface water run-off will need to be considered. This is due to the topography of the area. Otherwise, there are no specific flood risk issues in and around Turners Hill that need to be considered in addition to current FRA guidance. For Crawley Down, the area around the junction of Old Station Close, Station Road and Grange Road is known to have flooded in the past as a result of surface water drainage problems in the area. Any development within this locality will need to demonstrate through a FRA that this surface water drainage problem will not be exacerbated and where possible alleviated.	With regards to Turners Hill, the majority of the area is underlain by sandstone with moderately well drained soils. This should provide scope to utilise infiltration systems as an appropriate form of SuDS, although in some cases this may have to be combined with attenuation systems (particularly for developments to the south of the village centre and for large-scale developments). The geology in and around Crawley Down is sandstone with siltstone with poor to moderately drained soils. With this in mind attenuation systems are going to be the most appropriate form of SuDS. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. In both locations the land overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.
Settlement/Area	FRA guidance	SuDS guidance
Copthorne and land east of Crawley (within Mid Sussex)	Fluvial flood risk is the main flood risk issue in this locality. Within Copthorne and to the west of the village are significant areas of Flood Zone 2 and 3 that are associated with a number of tributaries within the River Mole catchment. Any proposed development within these areas will need to be accompanied by a FRA. These aforementioned flood zone areas and other areas at risk from all forms of flooding are also to the south of the village. Development in this location will need to ensure that it does not compromise the ability to implement the River Mole Flood Alleviation Strategy. Proposals for development in the north west of Copthorne Common (outside Flood Zone 2 and 3, but has historically flooded) will need to be accompanied by a FRA, which will need to address fluvial and pluvial flood risk.	Due to the risk of flooding in areas downstream (i.e. parts of Crawley and Horley, including Gatwick Airport) care needs to be taken to avoid exacerbating downstream flood risk and therefore any discharge of surface waters into watercourses in the area needs to be carefully controlled. Bearing this in mind and the fact that the soils in the area are generally poor to moderately drained (as demonstrated by the number of ponds and surface water ditches in the area) in most instances attenuation type SuDS will need to be implemented. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.

Settlement/Area	FRA guidance	SuDS guidance
Pease Pottage, Handcross and Warninglid (south of Crawley)	No specific flood risk issues in and immediately around these three settlements that need to be considered in addition to current FRA guidance. Development to the south of Crawley will need to ensure that it does not compromise the ability to implement the River Mole Flood Alleviation Strategy.	The geology of all 3 of these settlements, and their surrounding areas, is sandstone and mudstone with poorly drained soils. Evidence of the impermeable nature of the ground conditions in this area can be seen by the numerous ponds in the locality. The most appropriate form of SuDS will be attenuation systems. Permeable paving and other such systems can, however, be utilised so they act as source control and storage prior to a restricted discharge to a watercourse. Land in this location overlies a minor aquifer and therefore high groundwater vulnerability will need to be addressed in any SuDS design.

Appendix D – Flood Risk Vulnerability Classification

(according to “the Planning Practice Guidance on Flood Risk and Coastal Change”)

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly Vulnerable

- Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use³.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “Essential Infrastructure”).

More Vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children’s homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan.*

Less Vulnerable

- Police, ambulance and fire stations which are *not* required to be operational during flooding.
- Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do *not* need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water-Compatible Development

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan.*