

**SHROPSHIRE SITE ALLOCATIONS AND MANAGEMENT OF DEVELOPMENT
(SAMDev) DPD**

(SFRA Update)

**Flood Risk Sequential and Exception Test Assessment of Proposed
Development Sites**

July 2014

Development and Flood Risk- Update to SFRA

1.0 Introduction

- 1.1 This document considers the extent to which potential development sites within the Site Allocations and Management of Development (SAMDev) DPD are at risk of flooding.
- 1.2 It summarises the information which has helped to inform the site assessment process for proposed site allocations within the SAMDev Plan.
- 1.3 It also provides an update to the initial site assessment work, taking into account the most up to date information on flood risk from both fluvial and pluvial sources.
- 1.4 It is important that this document is read in conjunction with the Council's Adopted Core Strategy, as this provides the context for the development strategy set out within the SAMDev Plan and has thereby influenced the potential development choices within Shropshire.

2.0 National Policy

- 2.1 National planning policy requires local planning authorities to assess the sustainability and deliverability of potential development sites.
- 2.2 In undertaking these site assessments, the following national policy guidance sets out the main areas of consideration in relation to flood risk:

National Planning Policy Framework (NPPF)

- 2.3 The National Planning Policy Framework (NPPF) was published on 27th March 2012 to replace the previous documentation, as part of reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. The NPPF sets out Government's planning policies for England and how these are expected to be applied. Advice and guidance in relation to flood risk was initially detailed in a companion document – the 'Technical Guidance to the National Planning Policy Framework.' In March 2014, the NPPF Technical Guidance was replaced by new planning practice guidance.
- 2.4 The NPPF requires Local Plans to take account of climate change over the longer term, including factors such as flood risk. New development should be planned to avoid increased vulnerability to the range of impacts arising from climate change.
- 2.4 Paragraph 100 of NPPF states that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk. Where development is necessary, development should be safe and avoid increasing flood risk elsewhere. As such, Local Plans should 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 by:

- applying the Sequential Test;
- if necessary, applying the Exception Test;
- safeguarding land from development that is required for current and future flood management;
- using opportunities offered by new development to reduce the causes and impacts of flooding; and
- where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long term, seeking opportunities to facilitate the relocation of development, including housing, to more sustainable locations.

2.5 The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. 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. The Strategic Flood Risk Assessment will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding.

2.6 If following application of the Sequential Test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the Exception Test can be applied if appropriate. For the Exception Test to be passed:

- it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared; 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.

2.7 Both elements of the test will have to be passed for development to be allocated or permitted.

3.0 Local Evidence Base

3.1 The NPPF provides the strategic framework for considering proposals at a local level. To ensure that flood risk has been considered appropriately within the Local Plan, a number of documents have been produced which form the Local Evidence Base. These are considered in more detail in the following sections.

Strategic Flood Risk Assessment

3.2 A Strategic Flood Risk Assessment (SFRA) forms a key element of the local evidence base in order to assess the risk of flooding to an area from all sources, both now and in the future, taking into account the impacts of climate change, and to assess the impact that land use will have on flood risk.

3.3 A Level 1 SFRA for the Districts and Boroughs of Shropshire as well as Shropshire Council and Telford and Wrekin Council was completed in September 2007. This was updated in June 2012 following the replacement of the Districts and Boroughs with a Unitary Authority. A more detailed Level 2 SFRA for Shrewsbury town centre was also completed in August 2009. These assessments were used to inform the adopted Core Strategy and particularly the Policy approach set out within Policy CS18 Sustainable Water Management.

3.4 With regard to managing flood risk, Policy CS18 requires new development to:

'Integrate measures for sustainable water management to reduce flood risk, avoid an adverse impact on water quality and quantity within Shropshire, including groundwater resources and provide opportunities to enhance biodiversity, health and recreation, by ensuring that:

- *Planning applications and allocations in the Site Allocations and Management of Development (SAMDev), are in accordance with the tests contained in PPS25 and have regard to the SFRAS for Shropshire;*
- *New development is designed to be safe, taking into account the lifetime of the development, and the need to adapt to climate change. Proposals should have regard to the design guidance provided in the SFRAs for Shropshire*
- *All developments within local surface water drainage areas as identified by the Water Cycle Study and any major development proposals, demonstrate that surface water will be managed in a sustainable and coordinated way. Proposals will either be supported by a Surface Water Management Statement or Plan, depending on the scale of development;*
- *All developments, including changes to existing buildings, include appropriate sustainable drainage systems (SuDS) to manage surface water. All developments should aim to achieve a reduction in the existing runoff rate but must not result in an increase in runoff;*
- *New development improves drainage by opening up existing culverts where appropriate.*

Updated evidence for the SAMDev Plan

3.5 Whilst the SFRAs provide a useful basis to support implementation of Policy CS18, it is recognised that evidence on flood risk is constantly being refined and updated as more detailed modelling work is undertaken.

3.6 In accordance with the NPPF and Core Strategy Policy CS18, an updated assessment has therefore been undertaken for all potential development options, as a basis for applying the sequential and exception test and to inform the allocation of development sites within the SAMDev Plan. The results of the updated assessments are presented in Annex A and Annex B.

3.7 Due to the importance and potential impact of flood risk within Shropshire, this updated assessment of flood risk has formed an integral part of the site

assessment process, as outlined within section 4, rather than a standalone update to the earlier SFRAs. This has also ensured that the assessment of flood risk has informed the Sustainability Appraisal of the Local Plan, in accordance with the guidance in the NPPG, making certain that flood risk is fully taken into account when considering allocation options and in the preparation of plan policies.

- 3.8 This document draws together the work undertaken through the site assessment process and applies the Sequential Test on the potential development sites considered during the preparation of the SAMDev Plan. As such it provides an update to the SFRAs.
- 3.9 Where appropriate, this document also applies the Exception Test to those sites identified as being at some risk of flooding but taken forward as a site allocation. It is important to note that whilst flood risk is an important consideration within the site assessment process, it forms just one element of the overall site sustainability. As such, judgements have been made in line with other, sometimes competing priorities, in accordance with the national planning policy guidance and the local policy context provided by the adopted Core Strategy. In making these judgements, a balanced approach to Shropshire's development strategy has been sought.
- 3.10 Whilst this document provides updated evidence on flood risk, it is important to note that, Shropshire Council is seeking to apply an integrated approach to water management, as set out within Core Strategy Policy CS18. By applying measures which manage water in an integrated way, Shropshire Council aims to reduce public risk and maximise benefits. Consequently, the following pieces of evidence base have also been prepared and should be read alongside this document:
- **Shropshire Water Cycle Study- Outline Study completed June 2010.** *Assesses the impact of proposed development on the water environment, including whether the necessary water infrastructure can be provided in a timely manner to support growth. Updated Water Cycle Study July 2014 as an addendum to the original study, to take account of the SAMDev Plan.*
 - **Clun Nutrient Management Plan-** *To identify the sources of nutrients and sediments and the reductions which could be achieved by different combinations of measures to reduce the phosphorous, nitrogen and sediment levels in the River Clun Special Area of Conservation (SAC) February 2014*
 - **Shropshire Local Flood Risk Management Strategy-** *currently out to public consultation, the Strategy sets out how local flood risk is to be managed across the county, including local flood risk associated with new development.*
 - **SuDS Handbook** - *currently being prepared in partnership with Staffordshire County Council and due for completion in time for implementation of Schedule 3 of the Flood and Water Management Act 2010. Provides specific guidance and details the approach to the use of*

SuDS which should be incorporated as part of any new development in Shropshire.

4.0 Shropshire's Development Strategy- Core Strategy Context

4.1 Prior to undertaking the sequential test of sites for the SAMDev Plan, it is important to understand the development context that provides the framework for considering site allocations. The adopted Core Strategy (March 2011) identifies the following quantum of development that Shropshire Council needs to plan for from 2006-2026:

- around 27,500 new homes, and;
- around 290 hectares of employment land

4.2 Whilst Core Strategy Policy CS1 sets the amount and spatial distribution of development, the SAMDev Plan seeks to apply the strategic Core Strategy policies in determining the scale and location of development in specific areas, including allocating land for development in individual settlements. As the plan period runs from 2006, it is important that completions and commitments since that date are factored into the decision making process, in order to avoid over provision. The Housing Delivery Technical Background Paper (July 2014) provides further information on the development context within the Core Strategy and the progress that has been made to date, which provides a basis for the SAMDev Plan.

5.0 Methodology- A risk based approach

- 5.1 As outlined in paragraph 3.7, flood risk has been an important consideration throughout the preparation of the SAMDev Plan. An assessment of flood risk has therefore been embedded within the site assessment process.
- 5.2 This section outlines the approach taken in undertaking the sequential test of the potential development sites within Shropshire that are being considered as part of the SAMDev Plan. Further information on the SAMDev Plan preparation is provided within the Technical Background Paper March 2014.

Sequential Test

Site Assessment of Housing and Employment Sites

- 5.3 The site assessment process has been undertaken in three key stages and is designed to incorporate the requirements of the Sustainability Appraisal (SA):

Stage 1: This eliminates sites which have serious constraints. Sites are evaluated against a set of criteria and sites with serious constraints are not taken forward to Stage 2.

Stage 2a: Assesses the sustainability of sites using a set of criteria derived from the SA objectives which were used for the policies in the Core Strategy and SAMDev.

Stage 2b: Presents general information about each site, assesses planning considerations, incorporates comments from consultees and (with reference to the Stage 2a assessment) recommends whether the site should be a preferred option or not.

- 5.4 In accordance with the sequential approach, there has been an iterative approach to assessing flood risk with flooding from both fluvial and pluvial sources being a criterion which has been assessed at each stage of the site assessment process, as follows:

From a flood risk perspective, Stage 1 involved identifying sites with a significant area within flood zone 3, such that the remainder of the site is considered to be undevelopable, were knocked out and not carried forward to a stage 2 assessment. In making this judgement, consideration was given to whether sites could be accessed safely. The remaining sites were then scored according to probability of flood risk. Sites in Zone 1 scored positively, zone 2 neutral and zone 3 negatively. The sites were then assessed in detail in terms of flood risk including identifying risk of flooding from a watercourse, surface water flooding, groundwater flooding in addition to suitability for SuDS. In addition, the Environment Agency commented on all 2b assessments at Preferred Options stage and the comments were incorporated within relevant 2b assessment forms to assist in informing any conclusions drawn on site suitability.

5.5 Whilst flood risk has been assessed throughout the site selection process, a significant update in the Flood Zone Map data and Surface Water Flooding Data was made available after the Revised Preferred Options Consultation. The initial screening phases of the assessment also identified a number of sites where an 'ordinary watercourse' or 'main river' ran within or adjacent to the site, but these watercourses had not been subject to the Environment Agency's broad scale Flood Zone 2 or 3 type modelling. As such, a number of sites were showing up as being located within the lower risk Flood Zone 1, but in reality, may be at risk from fluvial flooding. A further assessment (Stage 3) was therefore deemed necessary in order to ensure those sites where unmodelled watercourses were identified had been taken into consideration. This process is detailed below:

Stage 3 – Site Assessment Process & Update to Level 1 SFRA data for unmodelled watercourses:

Following the Stage 1 and 2 assessments, a total of 151 sites were identified as potential allocations within the SAMDev Plan. Of these, 127 were identified as being located fully in Flood Zone 1, and, 24 as being partially located within Flood Zone 2 or 3.

Initial Review Stage:

An initial review of all of these sites taken forward from the first stage of the assessments was then undertaken to determine whether any un-modelled 'ordinary watercourses' or 'main rivers' were located within or adjacent to the site, which may present a risk of fluvial flooding that is not shown within the Environment Agency's existing Flood Map for Planning. This part of the assessment was undertaken using the latest available Flood Map for Planning dated December 2013. Further information available in terms of recent modelling undertaken as part of Flood Risk Assessments (FRAs) was also taken into consideration as part of the initial review process, as this had a bearing on whether any further modelling was required as part of this site assessment process as some FRAs had already been undertaken for the sites. Based on this assessment, 18 sites were deemed as requiring further assessment and modelling.

Update to Level 1 SFRA data for Unmodelled Watercourses:

In total, 18 sites were identified as requiring further assessment. In these instances, further hydraulic modelling was undertaken using ISIS 2D software to determine whether a risk of flooding presented a constraint to development of the site. The NPPF requires Local Plans to take account of climate change over the longer term. As such, each of the hydraulic models was run for the 1 in 100 year plus 30% uplift for climate change scenario. Flood extent, depth and velocity outputs were subsequently provided for each of the modelled areas and used in the site assessment process. The Technical Note in Annex C details the hydraulic modelling process.

Update to Site Assessment:

Using the updated modelling data for the unmodelled watercourse, a full review of flood risk from all sources was undertaken for each site as outlined below.

- The risk of fluvial flooding to each site was assessed utilising the most up-to-date Flood Map for Planning provided by the Environment Agency and the updated modelling produced as part of the Level 1 SFRA update for the unmodelled watercourses (as outlined in Section 5.5). As required in the NPPF, the risk of flooding due to climate change was assessed for each site. Where available, modelled climate change flood outlines were used. However, where no modelled climate change flood outlines exist, the current fluvial Flood Zone 2 was considered an estimate of the future fluvial flood zone 3 due to climate change. Similarly, Flood Zone 3a was considered an estimate of the future fluvial Flood Zone 3b due to climate change. This approach was agreed with the Environment Agency.
- The risk of surface water flooding to each site was assessed using the updated flood map for surface water (uFMfSW) provided by the Environment Agency. The risk presented by climate change was also assessed for each site. As with the fluvial flood zone maps, the approach was taken whereby the current surface water Flood Zone 2 was considered an estimate of the future surface water Flood Zone 3 due to climate change; and, the current surface water Flood Zone 3a was considered an estimate of the future surface water Flood Zone 3b due to climate change. This approach was agreed with the Environment Agency.
- Historic flood data and flood risk from other sources were reviewed utilising existing information collected as part of the Level 1 and Level 2 SFRAs along with any additional information which had been collected following the completion of these two studies. It should be noted that for areas where historic flood outlines are not available, this does not mean that a flood event has never occurred; further the historic flood outlines provided by the Environment Agency are not definitive and may not capture the definitive extents of all historic flooding.
- An assessment of residual risk (e.g. defence breach, canal overtopping, culvert blockage etc.) to each site was undertaken using information contained within the existing Level 1 and Level 2 SFRAs.
- Using proposed dwelling numbers and any additional climate change and surface water information, a calculation was undertaken to determine whether the proposed development is achievable. This took the form of a simple calculation which calculated the combined flood risk area (Flood Zones 2 and 3, additional modelled climate change flood extents for unmodelled watercourses, surface water risk areas and historic flood risk areas) within each site and subtracted from the overall site area. The number of properties that could then be accommodated in the remaining Flood Zone 1 area was calculated based on an assumed housing density of 40 properties per hectare.

- For each site, a suitability assessment was made. Sites where the development could be accommodated within the available Flood Zone 1 were coloured green, sites where a constraint had been identified and the development could not be accommodated were coloured orange. In some instances, the assessment indicated that the development could not be accommodated, but this was a result of the identified site boundary and not due to a flood risk constraint. In these cases it is likely that adjustments to the site boundary or proposed numbers of dwellings could be made. These sites have been coloured yellow. This colour coding has been applied to Tables 2 & 3, and Annex B.
- Based on the findings of the assessment, the suitability of each site to be taken forward for development was discussed and appropriate planning policy recommendations put forward.

5.6 The updated assessment of all potential development sites assessed as part of the SAMDev Plan is contained in Annex B, with a summary of the findings of the assessment and the planning policy recommendations presented in Section 6.0 below.

Site Assessment of Waste and Mineral sites

5.7 In terms of waste sites, the SAMDev Plan does not propose the allocation of any landfill sites. Instead, the Plan focuses on waste processing facilities which are considered to be similar in use to those covered by B2 and B8 use classes. Given that waste is one of a number of uses to which employment land can be put, the assessment of waste sites was incorporated as an integral part of the employment site assessment, as outlined above. Waste uses are likely to require waste management licensing, including appropriate consideration of impacts on the water environment, before they can become operational.

5.8 A separate three stage assessment has been undertaken specifically for sand and gravel sites. However, the methodology adopted was consistent with that undertaken for the housing and employment sites, as outlined above.

6.0 Site Allocations and Management of Development DPD- Allocated sites

- 6.1 The sites contained within the SAMDev Plan as allocations were selected following a balanced judgement made as part of the site selection process. The following sections detail the findings of the site assessment process. Table 1 below presents a summary of the findings. Note that the following sections should be read in conjunction with the full site assessment spreadsheets included within Annex B.

Table 1: Summary of Site Assessments

	No. of Sites
Sites located fully in Flood Zone 1	47
Sites located partially within Fluvial Flood Zone 2 or 3 or affected by another source of flooding where the proposed level of development can be accommodated	80
Sites located partially within Fluvial Flood Zone 2 or 3 or affected by another source of flooding where the proposed level of development cannot be accommodated within the current site boundary	24

- 6.2 Whilst it is evident that the development guidelines cannot be accommodated within the current site boundary for some of the proposed site allocations, it is important to note that in the majority of cases this is only considered to be marginal. In addition, whilst the assessment includes a development guideline for each site, this should not be seen as a development target but merely indicative and will be subject to refinement through the Development Management process, as sites come forward through individual planning applications. Further flexibility has also been built into the SAMDev Plan through Policy MD3 (Managing Housing Development) which provides a mechanism for additional provision over and above the housing guidelines. Furthermore, it is important to note that this assessment only takes account of the proposed allocations, whilst a proportion of Shropshire's development strategy will be delivered through windfall development, reflecting the rural nature of the county. It is therefore considered that flood risk does not present a constraint to the deliverability of the housing numbers contained within Shropshire's development strategy. Further more detailed information is contained within the Housing Delivery Technical Background Paper (July 2014).
- 6.3 Full details of the site assessment is provided in Annex B. Table 2 below presents a summary of the findings for sites where constraints to development have been identified. Where a flood risk constraint has been identified there may be options to adjust the site boundary of the proposed level/type of development. Equally a site specific Flood Risk Assessment may refine the understanding of flood risk on site.

- 6.4 Whilst the assessment includes a development guideline for each site, it should be noted that this is merely indicative and will be subject to refinement through the Development Management process, as sites come forward through individual planning applications.

Table 2: Sites with flood risk constraints

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification & Recommendations
Bishops Castle Area									
CLUN002 Land at Turnpike Meadow	1.46	0.10	1.38	58	Residential	60	-	NO - See comments	A minor risk of surface water flooding has been identified within the site, however these are isolated occurrences. The assessment has shown that the proposed development cannot be fully accommodated outside of the identified risk areas, however, this is only marginal and there is potential to move the eastern boundary of the site as all land to the east is in the same ownership. All uses appropriate within Flood Zone 1. Follow requirements for development within Flood Zone 1.
Bridgnorth									
W039 Land at Old Worcester Road	1.40	0.15	1.25	50	Employment-recycling and environmental industries	0	1.5	NO - See comments	The uFMfSW has identified some surface water flow paths within the site with Old Worcester Road to the south of the site also shown to be a risk from surface water flooding. The assessment has shown that the proposed development area cannot be accommodated outside of the identified risk area, however this is only marginal. It is recommended that the identified surface water risk areas are kept free from development and appropriate surface water management measures are adopted for the site. All uses appropriate within the identified Flood Zone 1. Follow requirements for development within Flood Zone 1.
Craven Arms									
CRAV003 & CRAV009 Land between Watling Street and Brook Road	7.94	3.35	4.59	184	Residential	235	-	NO	CRAV009 is significantly affected by both fluvial and surface water flooding, and is not considered suitable for development. This has also been highlighted in an FRA undertaken by JNM Engineering in May 2014 which concluded that the area to the south of Craven Arms Business Park within Site CRAV009 falls within Flood Zone 3 and should therefore not be developed as it acts as attenuation for the surrounding ditch network. In addition, residual risk from culvert blockage under the railway has also been identified. CRAV009 may be set aside for a balancing pond, with the 35 dwellings for this site transferred to CRAV003. Fluvial and surface water flood risk areas have been identified within CRAV003, however these are largely confined to the area immediately adjacent to the watercourses, and the majority of site CRAV003 is shown to be located within Flood Zone 1. It is recommended that the identified flood risk areas within CRAV003 are kept as open space, and development is directed towards the low risk Flood Zone 1. The assessment has indicated that the proposed development cannot be accommodated within the available Flood Zone 1, with the additional properties relocated from CRAV009. However there is flexibility in the proposed dwelling numbers and the site promoter has acknowledged that CRAV009 is not suitable for development. Residential development is classified as 'More Vulnerable'. Housing development is therefore not permitted within FZ3b and the Exception Test will be required should any development be proposed within Flood Zone 3a. It is recommended that detailed modelling is undertaken to confirm the extent of fluvial flooding within the site and the residual risk from the downstream culvert at CRAV009. It must also be ensured that the site can be made safe without increasing flood risk elsewhere. In particular, it must be ensured that safe access to the development can be achieved during the 1 in 100 year climate change event.

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification & Recommendations
LS2005_00002 North of Long Lane	3.44	0.08	3.36	134	Employment	-	3.5	NO - see comments	The additional modelling has not shown a fluvial risk to the site from the 'ordinary watercourse' however this is culverted in places and it is recommended that a site specific FRA is undertaken to confirm the location of the culvert within the site. Development above and adjacent to the culvert should be avoided. A risk of surface water flooding has been identified along the road to the south of the site. It must be ensured that safe access and egress to any development is achievable for the 1 in 100 year climate change event. Follow requirements for development in Flood Zone 1. The assessment has indicated that the proposed development cannot be accommodated within the available Flood Zone 1, however this is only marginal and unlikely to impact upon the developability of the site provided minor adjustments to the site boundary can be undertaken.
Ellesmere									
ELR075 Land off Grange Road	3.02	0.31	2.71	108	Employment-B2 use	-	3	NO - See comments	A minor risk of surface water flooding has been identified within the north eastern part of the site. This is an isolated occurrence and therefore, it should be possible to mitigate the risk of surface water flooding through the use of appropriate SuDS techniques. The assessment has indicated that the proposed development cannot be fully accommodated outside of the identified risk areas, however this is only marginal and opportunities to extend the site boundary may be possible. Employment development is classified as 'Less Vulnerable' and therefore is permitted within Flood Zones 2 and 3a; however it is not permitted within Flood Zone 3b.
Market Drayton									
ELR023/ELR024 Sych Farm (Phase 2)	16.43	2.27	14.16	566	Employment	-	16.4	NO - See comments	The additional modelling has shown that there is a risk of fluvial flooding from the unnamed 'Ordinary' watercourse during the 1 in 100 year climate change event, affecting southern parts of the site. Further isolated pockets of surface water risk can be seen in the northern part of the site. The assessment has indicated that the proposed development cannot be accommodated within the available Flood Zone 1. The proposed development is to serve a full range of Class B employment uses including the development of recycling and environmental industries. Such development is classified as 'Less Vulnerable' and is permitted within Flood Zones 1, 2 and 3a. Should this site be taken forward for development, it should be developed sequentially, with development directed towards the lower risk Flood Zone 1. Opportunities exist to extend the site boundary to the north or south given the land is in the same ownership. A site specific FRA should investigate the residual risk from the Shropshire and Union Canal located along the northern boundary of the site. For any development proposed adjacent to the canal, the relevant body should be consulted and it is recommended that a minimum 8m wide undeveloped buffer strip is incorporated as part of any development to enable future access to the canal for maintenance purposes.

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification & Recommendations
Oswestry									
OSW029 Former Oswestry Leisure Centre	0.99	0.07	0.92	37	Residential	40	-	NO -see comments	The additional modelling has not identified a risk of fluvial flooding from the unnamed 'Ordinary' watercourse; however there are areas of surface water flood risk within the site. The assessment has indicated that the proposed development cannot be accommodated outside of the identified risk areas, however, this is only marginal and adjustment of the site boundary or the proposed number of dwellings would address this. Development should be directed towards the identified Flood Zone 1 areas within the site. Provided development is directed towards the available Flood Zone 1, all uses are appropriate. Development subject to further assessment of potential flood risk and biodiversity impacts and design measures to address the relationship between the site and the adjacent college buildings.
OSW033 Alexandra Road Depot	0.85	0.04	0.81	33	Residential	35	-	NO - See Comments	A minor risk of surface water flooding has been identified within the site. The assessment has indicated that the proposed development cannot be accommodated outside of the identified risk area, however this is marginal and there may be opportunities to adjust the site boundary or the proposed allocation within the site. A watercourse is shown to be culverted beneath the site. The exact location of this culvert should be confirmed at the planning stage (through a FRA) and development should be avoided above or within the immediate vicinity of the culvert.
Oswestry Sustainable Urban Extension	24.25	1.85	22.40	896	Mixed use-residential and commercial	900	-	NO - See comments	A minor risk of surface water flooding has been identified within the site. In general the surface water risk areas are small, isolated occurrences; however, a more significant area of surface water flood risk is identified within the north eastern part of the site. It is recommended that the identified risk areas are kept as open space and development is directed towards the low risk Flood Zone 1. The assessment has indicated that the proposed development cannot be accommodated within the available Flood Zone 1, however this is marginal (4 dwellings). Opportunities to adjust the site boundary or the proposed number of dwellings should be investigated.
ELR042 Land north of Whittington Road	1.85	0.10	1.75	70	Employment	-	2	NO - See comments	A minor risk of surface water flooding has been identified within the site. The assessment has indicated that the proposed development cannot be accommodated outside of the identified risk area, however this is marginal and there may be opportunities to adjust the site boundary or the proposed allocation within the site.
ELR072 Land at Mile End East	22.82	4.15	18.67	747	Employment	-	23	NO - See comments	A significant risk of surface water flood risk has been identified within the northern and south western parts of the site. It is recommended that the identified surface water risk areas are kept as open space. However, the assessment has shown that the proposed development cannot be accommodated outside of the identified risk area. Opportunities to adjust the site boundary or the proposed allocation within the site should therefore be investigated.

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification & Recommendations
Shifnal									
SHIF004a Land south of Aston Road	4.66	2.04	2.62	105	Residential	115	-	NO - See Comments	The Environment Agency's Flood Map for Planning does not show a risk of fluvial flooding to the site from Wesley Brook. Significant parts of the site shown to be affected by the uFMfSW within the central and eastern part of the site, and based on high level assumptions within the SFRA there may be difficulties in accommodating the indicative allocation. however this is only marginal. The uFMfSW shows a significant flow route for surface water through the culvert beneath the railway which may present a residual risk. However, the site was granted permission on 24 th March 2014 for 115 units (ref 13/03055/FUL). An FRA and drainage strategy was completed and submitted with the application in November 2013. This concluded that development of the site is possible subject to careful consideration of surface water and foul drainage. The FRA includes a surface water drainage strategy. A number of planning conditions have been included on the planning permission in relation to drainage. It is also recommended that routine maintenance schedules are implemented to ensure the culvert is kept clear from blockage. The identified flood risk areas should be kept as open space and development directed towards the available Flood Zone 1. All uses appropriate in Flood Zone 1. Follow requirements for development in Flood Zone 1.
SHIF004b Land between Lawton Road and Stanton Road	3.08	0.86	2.23	89	Residential	100	-	NO - See Comments	The Environment Agency's Flood Map for Planning does not show a risk of fluvial flooding to the site from Wesley Brook. A recent FRA completed by Mewies Engineering Consultants Ltd (December 2013) concluded that there is no risk of flooding to the site from the ditch. Site located predominantly in FZ1 however the eastern extent of the site is shown to be at risk from surface water flooding. The calculation has shown that the proposed development cannot be accommodated within the available FZ1, however this is marginal. There is a culverted watercourse to the south of the site which may present a residual risk from culvert blockage. It is recommended that appropriate surface water management strategies are developed to ensure surface water flood risk is not increased within the site. It is also recommended that routine maintenance schedules are implemented to ensure the culvert is kept clear from blockage. It should be noted that there is an outline application currently being considered for 100 dwellings and a 60 bed care home in SHIF004b and SHIF004c, which is pending consideration. An FRA has been submitted as part of the application and includes a drainage strategy for this combined site.
SHIF004c Land between Lawton Road and Lamledge	2.07	0.51	1.57	63	Employment	-	2	NO - See Comments	Site located predominantly in FZ1 however the western extent of the site is shown to be at risk from surface water flooding. The calculation has shown that the proposed development cannot be accommodated within the available FZ1, however this is marginal. There is a culverted watercourse to the south of the site which may present a residual risk from culvert blockage. The uFMfSW suggest this. It is recommended that routine maintenance schedules are implemented to ensure the culvert is kept clear from blockage. It should be noted that there is an outline application currently being considered for 100 dwellings and a 60 bed care home in SHIF004b and SHIF004c, which is pending consideration. An FRA has been submitted as part of the application and includes a drainage strategy for this combined site.

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification & Recommendations
Shrewsbury									
SHREW198 Land at Ditherington Flaxmill	1.45	0.05	1.40	112* (at 80 homes per hectare as this will be a high density brownfield site)	Residential	120	-	NO - See Comments	A small part of the site shown to be at risk from surface water flooding. The assessment has indicated that the proposed development cannot be accommodated within the available Flood Zone 1, however this is marginal assuming a density of 80 homes per hectare, which is the likely density for this site. An FRA for the site was completed in October 2009 (Planning Application Ref. 10/03237/OUT) which confirms the site is in Flood Zone 1. All uses appropriate within Flood Zone 1. Follow requirements for development in Flood Zone 1.
ELR007 Land east of Battlefield Road	2.13	0.26	1.87	75	Employment	-	2	NO - See Comments	A small part of the eastern extent of the site shown to be at risk from surface water flooding. The assessment has shown that the proposed development cannot be accommodated outside of the identified risk areas, however this is only marginal. It is recommended that the exact location of the Battlefield Brook culvert is confirmed at the planning stage to ensure development is not proposed above or within the vicinity of the culvert. Should the culvert be located within or adjacent to the site, it is recommended that a development easement is applied to the culvert. The exact distance should be negotiated with the Lead Local Flood Authority. Provided development is directed towards the available Flood Zone 1, all uses are appropriate. Follow requirements for development within Flood Zone 1.
ELR035 Part of Shrewsbury West Extension	10.73	0.27	10.46	418	Employment	-	11	NO - See comments	The additional modelling has not shown a risk of fluvial flood risk to the site from the 'ordinary watercourse', however, there are isolated pockets of surface water flood risk within other parts of the site. The assessment has shown that the proposed development cannot be accommodated outside of the identified risk areas, however this is only marginal and it should be possible to adjust the site boundary to accommodate the additional area. Provided development is directed towards the available Flood Zone 1, all uses are appropriate. Follow requirements for development within Flood Zone 1.
ELR067SHREW Part of Shrewsbury West Extension	4.15	0.08	4.06	163	Employment	-	9.0-12.0	NO - See comments	A small part of the site is shown to be at risk from surface water flooding however these are isolated occurrences. The assessment has shown that the proposed development cannot be accommodated within the available Flood Zone 1, however the allocation forms part of the wider Shrewsbury West SUE. It may be possible to migrate some of the development to the area to the north of the proposed link road, however, the preference is for the employment development to be allocated within the identified site as this forms an extension to the existing Oxon Business Park.

Sustainability Appraisal- balancing flood risk with other planning objectives

- 6.5 The site assessment process assesses sites against the sustainability objectives of the Local Plan and as such enables a judgement to be made of the wider sustainability benefits that could outweigh the flood risk of a site. This forms the first part of the Exception Test.
- 6.6 Table B.3 of Annex B identifies allocations within Flood Zones 2 or 3 and summarises the wider sustainability benefits that have been considered as part of the site selection process, thereby providing evidence to demonstrate that this part of the Exception Test has been passed. For the sites identified as being within Fluvial Flood Zones 2 or 3, the assessment showed that for 21 of the sites, the development could be accommodated outside of the identified risk area and as such, provided that the sites are developed sequentially, with development directed towards the low risk Flood Zone 1, flood risk does not present a constraint to the development of the site.
- 6.7 Four sites were however identified where the proposed development numbers could not be fully accommodated outside of the identified flood risk areas. These were: CSTR018, ELR078, ELR006 and ELR031. Table 3 below presents a summary of the findings of the site assessments for the four sites where the assessment showed a significant constraint to development from flood risk. Table 3 below should be read in conjunction with the full site assessment tables contained in Annex B.
- 6.8 The tables in Annex B also set out the measures that need to be put in place to ensure development on these allocated sites will be safe, thereby providing addressing the second part of the Exception Test. This has been used to inform both the development guidelines within the SAMDev Plan and will form the basis discussions with developers as part of site masterplanning or the development management process.

Table 3: Site Allocations within Flood Zones 2 and 3 where significant flood risk constraints have been identified

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification	Wider Sustainability Benefits & Management of Risk
Church Stretton										
CSTR018 (ELR052) School playing fields	2.19	1.07	1.12	45	Residential	50	-	NO - See Comments	X - 'Less Vulnerable' development is permitted within FZ2	The proposed development is for relocation of existing playing fields and provisions of enhanced facilities for sporting and recreational use to be used by the adjacent school and wider community. The assessment has indicated that the proposed housing numbers cannot be accommodated within the available Flood Zone 1, however this is only marginal (5 dwellings) and may be addressed by adjusting the site boundary or the proposed number of dwellings. Further, the NPPF states that residential development is permitted within Flood Zone 2. Infiltration or attenuation may be appropriate depending on site characteristics. If using infiltration, consideration should be given to groundwater protection.
ELR078 Springbank Farm	1.27	0.57	0.70	28	Employment - B1	-	1.27	NO - See Comments	X - 'Less Vulnerable' development is permitted within FZ2 & FZ3a. However no development permitted in FZ3b.	Site forms part of larger employment site which was rejected at Preferred Options following lack of local support. However, part of site was proposed as an alternative development option by the Town Council, following Revised Preferred Options. The site assessment for this smaller site concludes that development is not a realistic option given the limited developable area outside the identified flood risk areas. However, following agreement by Cabinet and Full Council the site was included within the Final Plan to reflect the strong local support for this alternative employment option. Less vulnerable development is permitted within Flood Zones 2 and 3a. However, 31.77% of the site is within Flood Zone 3b where development is not permitted. Development subject to design and layout satisfactorily addressing drainage and flood risk issues.
Shrewsbury										
ELR006 Land west of Battlefield Road	3.31	1.28	2.03	81	Employment	-	3	NO - See Comments	X - Less Vulnerable development is permitted in FZ2 and 3a. 4.54% of the site is located in fZ3b where development is not permitted.	Approximately 38% of the site is shown to lie within Flood Zone 2. The assessment has indicated that not all of the development can be located within the available Flood Zone 1. The site adjacent to existing major employment use and is considered to be the most sustainable location, particularly for employment development given proximity to Sundorne Retail Park, Battlefield Enterprise Park/Lancaster Road Business Park. Development is to be focused on southern part of site adjoining ABP premises, subject to a new access off Battlefield Road and flood risk mitigation in relation to the Battlefield Brook. The northern part of the site (SHREW095) is allocated for 100 dwellings. Site subject to detailed design and masterplanning and to be developed sequentially focusing development on lower risk areas away from Flood Zone 3b.

Site Reference	Site Area (ha)	Combined Flood Risk Area (ha)	Available FZ1 (ha)	No. Properties that can be accommodated in FZ1	Proposed Land Use	Proposed Property No.	Proposed Land area developed (ha)	Can development be accommodated within the available FZ1?	Vulnerability Classification	Wider Sustainability Benefits & Management of Risk
Wem										
ELR031 Land adjacent to Shawbury Road	4.00	1.165	2.84	113.4	Employment	-	4	NO - See Comments	X - Less Vulnerable development is permitted in FZ1	This site is proposed for employment development. The site is in an accessible location which provides employment opportunities within the town whilst avoiding exacerbating the cross town congestion and traffic related issues, particularly to the east of the town around the railway line crossing. The additional modelling shows a significant area of flood risk to the south of Hough Lane, affecting approximately 29% of the site. With climate change taken into consideration, the development cannot be accommodated within the available Flood Zone 1. Safe access and egress to the site is only likely to be achieved from the south western corner of the site adjacent to the railway line. Employment development is classified as 'Less Vulnerable' within the NPPF guidance and is permitted within Flood Zone 2 and 3a. However, given the extent of flooding shown by the additional modelling, it is recommended that the identified flood risk areas are kept as open space, and development is directed to the low risk parts of the site in Flood Zone 1, to the north of Hough Lane. Opportunities to adjust the site boundary to incorporate the available Flood Zone 1 to the north of Hough Land not currently considered should be investigated.

7.0 Flooding from other sources

- 7.1 The NPPF and supporting NPPG make clear that Local Planning Authorities should apply a sequential approach to site selection so that development, as far as reasonably possible is located where flooding, from all sources, is lowest. The site assessments have therefore included a review of flood risk from watercourses, groundwater and surface water. As outlined in Section 5, a significant update to the Surface Water Flooding Data was made available after the Revised Preferred Options Consultation. The revised site assessment has taken this update into account and the site assessment tables provided in Annex B provides an update to this earlier site assessment work.
- 7.2 Good drainage practices for new developments protects properties within the development and provides opportunities to reduce existing surface water flood risk downstream or to create capacity in the drainage system by reducing existing runoff. To assist in the effective management of surface water, Annex B therefore includes an assessment of SuDS applicability, identifying the most appropriate sustainable drainage technique for each proposed development site, taking into account the geology and proximity to Source Protection Zones. In accordance with Core Strategy Policy CS18 (Sustainable Water Management) and SAMDev Policy MD2 (Sustainable Design), new development is required to incorporate sustainable drainage techniques as an integral part of design. This is aimed at assisting with flood risk management whilst also providing the opportunity to contribute towards wider benefits including improved water quality. Further local guidance on the use of SuDS will be set out in the SuDS Handbook, which new development will need to comply with alongside the new National SuDS Standards, in order to demonstrate compliance with the policy requirements of Policy MD2 (Sustainable Design).

8.0 Conclusions & Recommendations

- 8.1 The assessment of sites within Section 6 of this report and within Annex B, identifies that the majority of allocations contained within the SAMDev Plan are located within Flood Zone 1.
- 8.2 The assessment has identified the available Flood Zone 1 within each site, taking into account the impacts of climate change. This has shown that based on a theoretical housing density of 40 dwellings per hectare, the following estimated capacity is available outside of the 1 in 100 year climate change scenario:
- 26,669 dwellings
 - 667 hectares

The figures shown above are not the proposed number of dwellings, but the numbers that could be accommodated within the available Flood Zone 1. The development guidelines for each site indicated a total estimated requirement for 9078 dwellings and 185 ha of employment land. Further detailed information about Shropshire's overall housing supply including SAMDev sites is available in the Council's Strategic Housing Land Availability Assessment (SHLAA). This document also details the important role that windfall sites play as part of the Shropshire's land supply.

- 8.3 Based upon the assessment, it is clear that there is sufficient land outside of the 1 in 100 year climate change scenario to accommodate the proposed development guidelines outlined within the SAMDev Plan. In some instances, potential flood risk issues have been identified which will require further assessment as part of a site specific FRA or more detailed modelling at the planning stage. However, given the flexibility demonstrated within the plan and outlined in Section 6, this does not present a constraint to the developability of the proposed housing numbers.
- 8.4 There are a few sites which are considered suitable for allocation but which include some element of land within flood zone 2 or 3. In undertaking the sequential test (see Annex's A and B) the Council has tested the options available in lower flood risk areas. However, as summarised in the tables in Section 6.0, above, it is considered that there are wider sustainability benefits which outweigh the level of flood risk. In making this judgement, the Council has needed to achieve a balance between competing planning policies and ensure compliance with the adopted Core Strategy. Some sites, such as the southern Sustainable Urban Extension are already subjected to adopted planning policy within the Core Strategy, or have recently been granted planning permission and therefore continued designation is considered to be appropriate in the SAMDev Plan.
- 8.5 For sites where there is more concern about flood risk, the settlement policies within the SAMDev Plan do set out specific requirements for the sites which will ensure that flood risk is considered from the outset through appropriate management criteria. In the majority of cases, the sites can be developed

sequentially therefore steering development to the lowest risk areas. Development proposals will also need to demonstrate conformity with policy CS18 (Sustainable Water Management) in the adopted Core Strategy which requires developments to integrate measures for sustainable water management to reduce flood risk. In accordance with NPPF, all sites within Flood Zones 2 and 3 will require a detailed Flood Risk Assessment. This policy includes a requirement for new development to be designed to be safe, taking into account the lifetime of the development and the need to adapt to climate change.

Guidance on the use of Flood Zone maps

- 8.6 Table 1 of the NPPF Technical Guidance details the definition of Flood Zones within a planning context. The site assessment process undertaken as part of this study have utilised the best available fluvial flood zone data. This has included:
- The Environment Agency's latest Flood Map for Planning
 - The Shropshire Level 1 SFRA Flood Zone maps
 - Modelled flood outlines produced as part of the Shrewsbury Level 2 SFRA
 - Modelled outlines for the 'ordinary watercourses' identified as part of this assessment which were not included within the Environment Agency's Flood Map for Planning.
 - Modelled flood outlines produced as part of recent FRAs
- 8.7 The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) are published and updated quarterly in their website. Appendix A of the Shropshire Level 1 SFRA Update (March 2012) provides further information on the Environment Agency Flood Zones and how they are produced.
- 8.8 When assessing flood risk to a site, the various flood map outputs all provide useful information upon which informed decisions on the location and layout of future development. The additional modelling undertaken as part of this study has enabled fluvial flood risk areas to be identified for some of the 'ordinary watercourses' within or adjacent to the proposed sites, thus enabling an informed decision to be made as to the fluvial flood risk to a site.
- 8.9 Whilst the modelling approach adopted is considered appropriate at the strategic site assessment level, further more detailed modelling of 'ordinary watercourses' will be required as part of a site-specific FRA at the planning stage where a risk of fluvial flooding to the site has been identified. This will need to confirm the flood extent for Flood Zones 2, 3a and 3b. The FRA will also need to demonstrate that the site can be made 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.
- 8.10 Similarly, all sites identified as being located within Flood Zones 2 and 3 will require a detailed Flood Risk Assessment in accordance with NPPF.

Consultation with the Environment Agency is strongly recommended at the earliest opportunity within the FRA process.