FLOOD RISK AND SEQUENTIAL TEST FOR SITE ALLOCATIONS

BACKGROUND PAPER
DECEMBER 2023

Crawley Local Plan

Crawley Borough Council

Contents

1. INTRODUCTION

1.1 This Background Paper was originally prepared following completion of the Crawley Borough and Upper Mole Catchment Level 1 Strategic Flood Risk Assessment (SFRA) (September 2020)[1]. It has been revised following updates to the SFRA (November 2023), which take account of updated Environment Agency (EA) fluvial climate change allowances (May 2022) and updated flood zone definitions set out in the revised Planning Practice Guidance (PPG): Flood Risk and Coastal Change (August 2022).

1.2 CBC has worked with the EA to agree the specific updates required to ensure the revised SFRA 2023 is in conformity with updated national policy. The EA has advised that whilst the SFRA 2020 remains fit for purpose, a re-running of the model to determine the 3.3% Annual Exceedance Probability (AEP) extents would offer an outline for the suggested functional floodplain as set out in the August 2022 PPG update. Through the course of updating the SFRA, it was found that the hydrology associated with the Upper Mole flood model was outdated, meaning that new hydrology and a re-run of all other events may be required. Through discussion with the EA, it has been agreed that a full re-run of the model would not be proportionate. As an alternative, the EA has agreed with an approach whereby the 2% AEP outputs are used to derive Flood Zone 3b (1 in 50yr), providing a more precautionary approach to identifying the functional floodplain than is required by national policy.

1.3 In this regard, the EA advised that it would not insist that a significant amount of work should be carried out by the council to determine the 3.3% AEP extent if a suitable alternative that safeguarded areas at the greatest risk to flooding was available. It agreed that the modelled 2% AEP event would also offer an extent that would be the same as, or in most areas, greater than a modelled 3.3% AEP extent. Therefore, use of the modelled 2% AEP extent has been applied through the SFRA 2023 as setting out a conservative approach to determining the functional floodplain for the Crawley's administrative area, representing a reasonable alternative in the absence of a modelled 3.3% AEP event.

1.4 The Background Paper draws upon the overarching assessment of flood risk identified by the SFRA 2023 to apply the sequential test and, if required, the exception test for housing allocations proposed in the Local Plan that may, in part, be subject to flood risk.

2. POLICY CONTEXT

2.1 As set out by the National Planning Policy Framework (NPPF) and accompanying PPG, inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk of flooding from all sources, including future risk as a result of climate change. To achieve this, a sequential test should be applied to steer development to areas with the lowest risk of flooding, and development sites should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.

2.2 If it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be

[1] Crawley Borough and Upper Mole Catchment Level 1 Strategic Flood Risk Assessment (September 2020) JBA https://crawley.gov.uk/sites/default/files/2020-09/Strategic%20Flood%20Risk%20Assessment.pdf

applied. For this to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh the flood risk, and 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.

2.3 This Background Paper undertakes a high level assessment where sites fall partly within Flood Zone 2 (medium probability), Flood Zone 3a (high probability) or Flood Zone 3b (functional floodplain). It is based on information available at the current time, and further work may need to be undertaken by the developer to demonstrate proposed development is acceptable in flood risk terms. This includes ensuring the most up to date policy, guidance and information on flood risk and climate change is used to inform the design of any development.

3. METHODOLOGY

3.1 To inform the identification of housing allocations in the Local Plan, the Strategic Housing Land Availability Assessment (SHLAA) has been prepared. The SHLAA is a technical study that assesses the potential of sites and broad locations to accommodate housing development, having regard to their suitability, availability and achievability, and the likely timeframe for development. The SHLAA does not determine whether a site should be progressed through the Local Plan process as a housing allocation, nor does it automatically mean that planning permission is certain. Rather, it carries out an assessment of sites that might be suitable for housing development, having regard to whether and when they might be developed.

3.2 The SHLAA assigns sites to specific categories. Those sites identified for allocation within the Local Plan fall within Category C (Local Plan Key Housing Allocations Deliverable Years 1-5), Category D (Local Plan Key Housing Allocations Deliverable Years 6-10), and Category E (Local Plan Key Town Centre Opportunity Sites). Other categories identify sites with planning permission that are being progressed, smaller sites that are not of a sufficient number of units to allocate, and broad locations for housing. SHLAA Category I (Suitable but Undeliverable) and Category J (Sites which are Unsuitable) identify sites which are not being taken forward as allocations through the Local Plan. The SHLAA therefore represents a robust appraisal of the sites in Crawley Borough that have been assessed, and where appropriate taken forward, as housing allocations in the Local Plan.

3.3 A Sustainability Appraisal[2] has been prepared to assess the potential impact of site allocations against nine sustainability objectives. This includes Objective 2, Adapt to Climate Change, which seeks to reduce the negative consequences of changes in the climate on people and the environment. Specifically in relation to flood risk, it identifies the need to locate site proposals away from areas that are high risk flooding zones (including in the future) and incorporate appropriate drainage, mitigation and resilience measures as part of development.

3.4 In all, 23 sites are identified within the Local Plan for allocation as housing or mixed-use with housing. These sites have been subject to flood risk screening through the Strategic Flood Risk Assessment (November 2023), which assesses the proportion of each site that is subject to flood risk from fluvial, surface water, and ground water sources. For fluvial and surface water flood risk, allowances have also been made for climate change.

[2] Crawley Sustainability Appraisal/Strategic Environmental Assessment (May 2023) CBC

3.5 Sites where significant and irreconcilable flood risk issues have been identified in the SHLAA and Sustainability Appraisal have not been taken forward for the purposes of the Local Plan. However, where there are sites that are only in part affected by flood risk, their allocation, if carefully planned, would help to meet Crawley's housing needs and deliver a range of positive sustainability outcomes.

3.6 The housing and mixed-use site allocations proposed in the Local Plan have been screened through the SFRA, which identifies 20 of the allocation sites as being located entirely within Flood Zone 1 (including climate change allowance). Therefore, these satisfy the requirements of the sequential test. Additionally, land at Broadfield Kennels southwest of the A264, identified as a reserve Gypsy and Traveller site, is situated entirely within Flood Zone 1, and no further assessment is required.

3.7 The remaining sites are identified as being at some risk of fluvial flooding as smalls parts of the site fall within Flood Zones 2 or 3. One of these sites, Forge Wood, a neighbourhood allocation that benefits from outline planning permission and an approved Master Plan, is currently being built out. Matters of flood risk for this site are addressed through the master planning and planning application process. Two sites, Land adjacent to Desmond Anderson, and Land east of Balcombe Road/Street Hill, have previously been allocated in the adopted 2015 Local Plan, and continue to be identified for residential development, with the latter to be supported by additional site enhancements. For completeness, these sites are subject to application of the sequential test.

3.8 The 2021 update to the NPPF requires that the sequential test considers the risk of flooding from all sources, as opposed to just fluvial and tidal flood risks, though there is no national guidance detailing how the sequential test should be applied for non-fluvial and tidal flood risk sources. The 2023 SFRA advises that for surface water flooding, the 1 in 1000 surface water flood extent should be used to define the areas at highest risk, with development directed to lower risk areas. The SFRA recognises that the surface water flood maps are conceptually different to the fluvial flood extents, as they are more 'dendritic' (i.e. along defined flow corridors) rather than the 'blanket' extents associated with fluvial flooding. Due to the nature of surface water flooding, it is not anticipated that the Sequential Test for surface water would normally require the consideration of alternative sites at lower risk, as in practical terms it is unlikely to be a primary factor that demonstrates that the principle of development could not be supported.

3.9 In Crawley, it is not considered that consideration of surface water materially impacts any of the proposed site allocations as other sources of flood risk were already considered through the original SFRA prepared in 2020 and no new information has been made available that would change the existing understanding of surface water flood risk. For allocation sites where over 30% of the site is at a higher risk (1 in 1000) of surface water flooding, these have already been considered sequentially in fluvial flood risk terms (Land adjacent Desmond Anderson) or have outline planning permission (Crawley Station and Car Parks; Zurich House) that has considered surface water flood risk through a site-specific Flood Risk Assessment. The Crawley College site is subject to areas of higher surface water flood risk, though this is more greatly concentrated in the southern part of the site, whereas any redevelopment for residential use would be anticipated at the north of the site which is less subject to surface water flood risk.

4. SEQUENTIAL TEST SITE PROFILES

4.1 For each of the allocations listed above, a Sequential Test Site Profile has been prepared to allow further analysis in terms of:

a. **If the proposed allocation can be alternatively located on a site wholly within Flood Zone 1**. The Sustainability Appraisal and SHLAA have been used in the assessment of whether any reasonable alternative sites are available that are at less risk of flooding. The defined area of search in looking for alternative sites is the Crawley Borough administrative boundary.

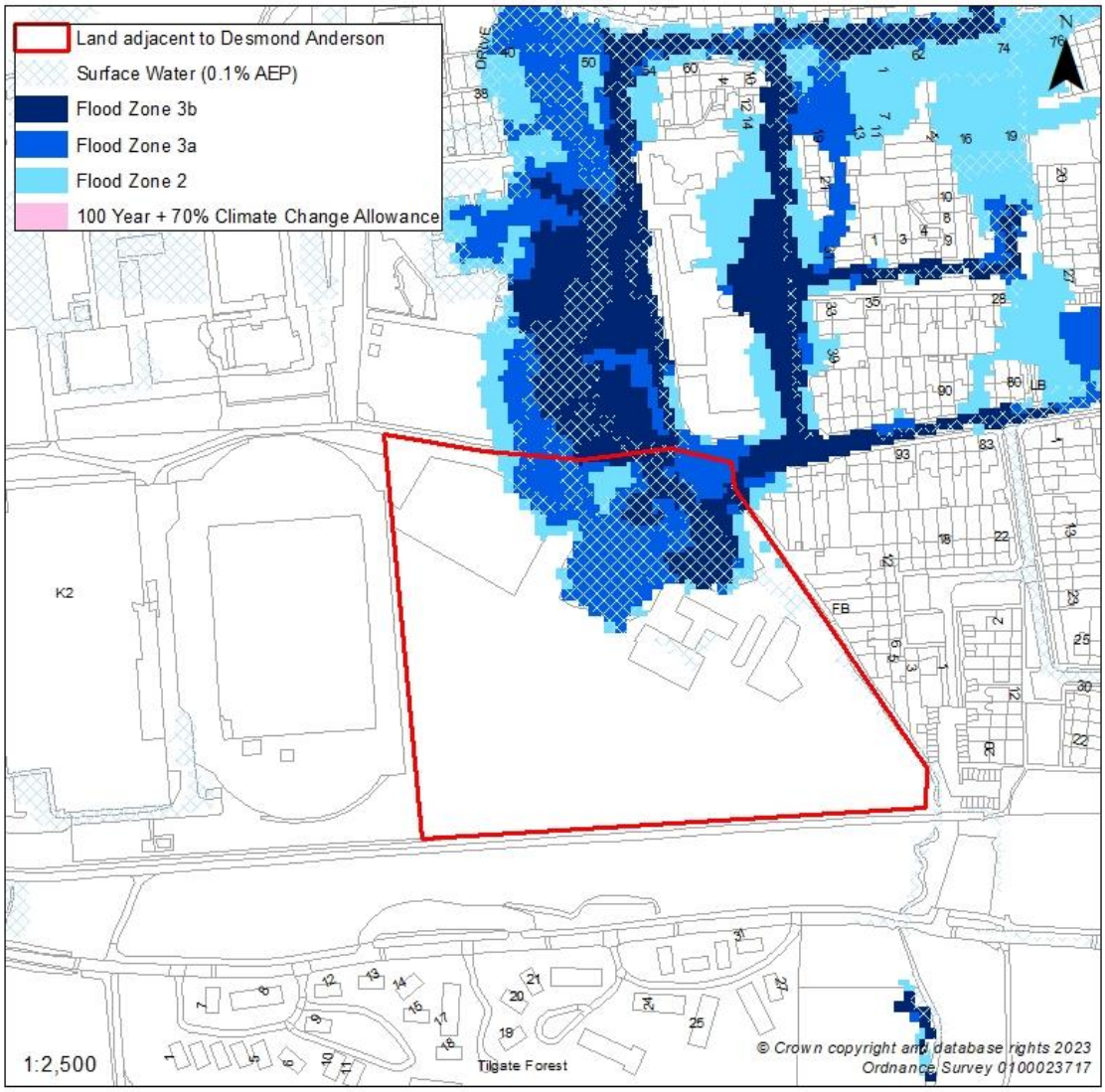
b. **If 'more vulnerable' development can be directed to parts of the site where flood risk is lower for both occupiers and premises.** The extent of the different flood zone areas is identified in the SFRA, based on a precautionary approach whereby the 2% AEP outputs are used to derive Flood Zone 3b (1 in 50yr) using the Environment Agency Upper River Mole (2020) flood model. Consideration of the suitability of the site to accommodate specific development types is based on the flood risk vulnerability classification set out in the *Planning Practice Guidance: Flood Risk and Coastal Change*, and more detailed site guidance has been provided by the Environment Agency.

c. **Implications of climate change.** The SFRA uses the Upper River Mole (2020) Flood Modeller / TUFLOW model climate change outputs, which reflect the 2019 peak river flow allowances for the Thames River Basin. The model was run for the 1% Annual Exceedance Probability[3] (AEP) plus 25%, 35% and 70% increases in peak flows, and the site assessment provides an overview of the percentage of each site affected by a peak flow increase of up to 70%. The 2023 recognises that the updated peak river flow allowances of 12%, 20% and 40% respectively are lower than the previous allowances used in the 2020 SFRA, and the original 2020 climate change allowance is therefore considered sufficiently precautionary. For surface water flooding, peak rainfall intensities for the 1% AEP event have been uplifted by 20% and 40% to assess the impact of climate change on surface water flood risk in the SFRA study area.

d. **If application of the exception test is required.** If it is not possible for development to be located in areas of lower flood risk, the exception test must be satisfied. This requires demonstration that (i) the development would provide wider sustainability benefits to the community that outweigh the flood risk, and (ii) that it 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. If the development will ultimately lie outside of Flood Zones 2 or 3 e.g. within Flood Zone 1, then the exception test will not need to be carried out.

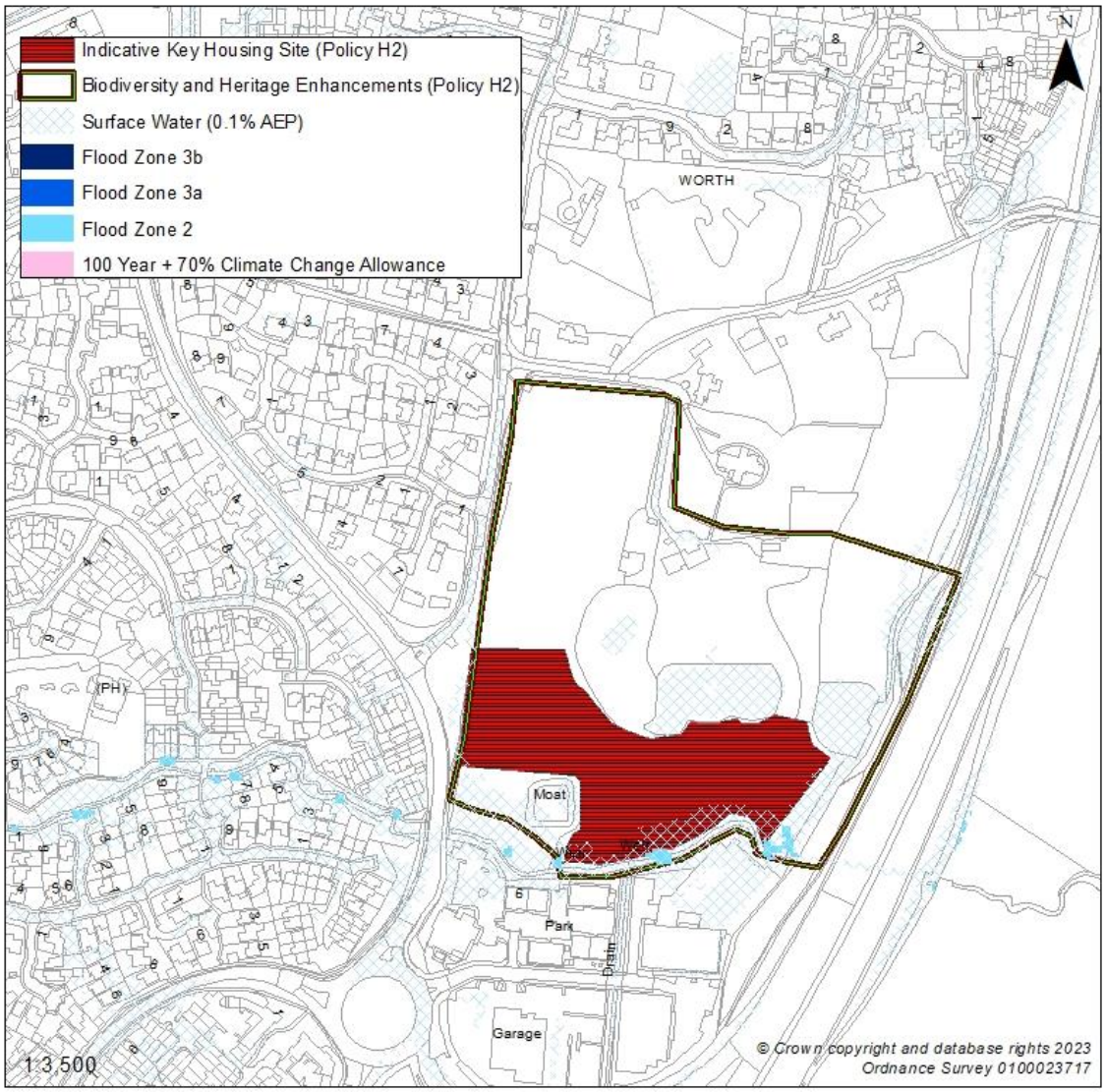
[3] Annual Exceedance Probability is the chance of an event with a particular magnitude occurring in each and every year.

LAND ADJACENT TO DESMOND ANDERSON, TILGATE



Existing Use	Surplus educational land
Proposed Use	Key Housing Site (205 dwellings)
Flood Zone Analysis	SFRA 2020: FZ1 (78%), FZ2 (3%), FZ3a (15%), FZ3b (3%). SFRA 2023: FZ1 (78%), FZ2 (3%), FZ3a (15%), FZ3b (4%). Crawley is a highly constrained borough in terms of its available land supply for housing, and it is vital that potential sites are appropriately assessed. Through the SHLAA and SA, it is recognised that a number of sites are at significant risk of flooding and are not therefore appropriate for housing. The Land at Desmond Anderson is significantly within Flood Zone 1 and although parts of the site are at a higher risk of flooding, it is possible to apply a sequential approach within the site to ensure that more vulnerable development is directed away from these areas of greater risk. The majority of the site is shown as being Flood Zone 1, with small areas of Flood Zone 3(b) and 2. It is broadly at a low risk of fluvial flooding, though the north east of the site falls within Flood Zones 2 and 3a. The eastern site boundary falls

	within Flood Zone 3b. Allowance for climate change does not significantly appear to increase the extent of flooding on site. As the site is considered to be situated mainly within Flood Zone 1, there is still the opportunity to use the sequential approach to development on site and locate all built development outside of the area at risk to flooding. Flood Zone 3 passes across the centre of the site which means any potential occupiers of property in the southern part of the site could have restricted access under flood conditions. The layout should follow a sequential approach, placing more vulnerable forms of development such as housing, in the area of least flood risk. No residential development should take place within the area of the site currently shown to be within Flood Zone 3. The Environment Agency has confirmed that it does not object to the principle of residential development in this location, though would expect a detailed site-specific Flood Risk Assessment, which uses the most up to date information, to be submitted as part of any development application. As such, a detailed Flood Risk Assessment (FRA) must be submitted in support of any planning application at this site. The FRA must demonstrate that development avoids the areas of the sites that are at greatest flood risk, and that the development can be made safe against flooding without increasing the flood risk elsewhere, including in the design measures that will reduce flood risk. The FRA should also ensure that the correct climate change allowances will be used to inform the site's finished floor levels along with any resilience measures. The FRA should also take account of surface water runoff to confirm that both peak flow and volumes have not increased. Sustainable Drainage Systems (SuDS) should be incorporated into design and site layout at the early stages of planning with sufficient space made available when considering density of development. The FRA should include a drainage strategy which informs the layout and demonstrates runoff from the site is restricted to less than the current rate of discharge, using sustainable drainage systems. Reinstating a length of approximately 150 metres of culvert to open watercourse would assist with options for sustainable drainage, along with enhanced landscaping, public amenity and biodiversity. This would also help meet the objectives of the Water Framework Directive.
Other Flood Risk	The SFRA 2023 identifies that around 3% of the site is subject to risk of surface water flooding at the 1 in 100 year event, increasing to 6% with climate change allowance of +40% added. For the less frequent 1 in 1000 year event, 15% is affected by flood risk from surface water. The SFRA finds the site to be at a 0% risk of flood from ground water sources.
Conclusion	The SFRA screening confirms that the site is significantly within Flood Zone 1, with the SHLAA and SA processes finding no sequentially preferable alternative sites that are not already identified for allocation. The majority of the site is not at risk of fluvial flooding, and through careful design and layout, residential development can be achieved by ensuring that more vulnerable development is directed away from the areas of the site that are at greatest risk of flooding. No residential development should take place within Flood Zone 3. Parts of the site are at risk of surface water flooding, and SuDS and appropriate mitigation will be required as part of development. The site is an existing housing allocation retained from the 2015 Local Plan, and subject to the considerations above, remains appropriate for allocation.

LAND EAST OF BALCOMBE ROAD/STREET HILL, POUND HILL	
	
Existing Use	Greenfield
Proposed Use	Housing (15 dwellings), Biodiversity and Heritage
Flood Zone Analysis	SFRA 2020: FZ1 (98%), FZ2 (1%), FZ3a (0%), FZ3b (1%). SFRA 2023: FZ1 (98%), FZ2 (<1%), FZ3a (1%), FZ3b (<1%). Crawley is a highly constrained borough in terms of its available land supply for housing, and it is vital that potential sites are appropriately assessed. Through the SHLAA and SA, it is recognised that a number of sites are at significant risk of flooding and are not therefore appropriate for housing. Land East of Balcombe Road/Street Hill is significantly within Flood Zone 1 and although small parts of the site are at a higher risk of flooding, it is possible to apply a sequential approach within the site to ensure that more vulnerable development is directed away from these areas of greater risk.

	The majority of land identified for housing development is situated within Flood Zone 1, with only a small area of the site affected by Flood Zones 2 and 3. The area at greatest risk of flooding has reduced in extent as a result of the Upper Mole Flood Alleviation Scheme, and the Environment Agency advise that as the site is a beneficiary of the scheme which reduces flood constraint, a developer contribution would be expected towards the future life of Worth Farm reservoir to ensure its functionality associated with the development's lifetime. There is a bridge and culvert located on the south-east of the site (Balcombe Road). The EA advise that it would want to see this surveyed along with a future inspection for the lifetime of the development as blockage of either of these structures could cause serious on-site flooding. Any works within 8m of the main river will not be permitted to take place without prior consent from the Environment Agency, and a Flood Risk Activity Permit will be required. However, it is understood that no works need to be located within this distance. A detailed Flood Risk Assessment (FRA) must be submitted in support of any planning application at this site. The FRA must demonstrate that development avoids the areas of the site that are at greatest flood risk, and that the development can be made safe against flooding without increasing the flood risk elsewhere, including in the design measures that will reduce flood risk. The FRA should also ensure that the correct climate change allowances will be used to inform the site's finished floor levels along with any resilience measures. The FRA should also take account of surface water runoff to confirm that both peak flow and volumes have not increased.
Other Flood Risk	The SFRA 2023 identifies that around 6% of the site is subject to risk of surface water flooding at the 1 in 100 year event, increasing to 7% with climate change allowance of +40% added. For the less frequent 1 in 1000 year event, 11% is affected by flood risk from surface water. The SFRA finds the site to be at a 0% risk of flood from ground water sources.
Conclusion	The SFRA screening confirms that the site is significantly within Flood Zone 1, with the SHLAA and SA processes finding no sequentially preferable alternative sites that are not already identified for allocation. The majority of the site is not at risk of fluvial flooding, and through careful design and layout, residential development can be achieved by ensuring that more vulnerable development is directed away from the areas of the site that are at greatest risk of flooding. No residential development should take place within Flood Zone 3. Parts of the site are at risk of surface water flooding, appropriate mitigation, including SuDS, will be required as part of development. The site is an existing housing allocation retained from the 2015 Local Plan, and subject to the considerations above, the remains appropriate for allocation.

5. ENVIRONMENT AGENCY FEEDBACK

5.1 The Environment Agency has provided site specific feedback for each site which has been incorporated into the table above. It has also advised that for these two proposed residential development sites, there are large areas which are classified as Flood Zone 1, though the sites do have parts which do fall within Flood Zone 2 and 3. Considering the percentages of these sites which do sit within Flood Zone 1, development should follow a sequential approach within the site to ensure that more vulnerable development is directed away from those areas which are at greater risk. This approach does appear to be feasible for these sites, so should be followed. It welcomed this approach being contained within the Background Paper and considered the conclusions of the Background Paper to be reasonable.

6. CONCLUSION

6.1 Utilising the methodology recommended by the NPPF, this report has assessed the sites proposed for allocation in the Crawley Local Plan against their vulnerability to flooding.

6.2 The SHLAA and SA have provided an early scoping process through which the suitability of sites in flood risk terms has been assessed. As per the NPPF sequential test, sites where significant and irreconcilable flood risk issues were identified have not been taken forward for the purposes of the Local Plan.

6.3 The housing and mixed-use allocations identified within the Local Plan have been subject to further assessment through the SFRA screening assessment. This work identifies that 20 of the proposed allocations, and also the Gypsy and Traveller site at Broadfield Kennels southwest of the A264, are located entirely within Flood Zone 1. As such, these allocations satisfy the requirements of the sequential test.

6.4 Only three sites out of the 23 proposed allocations in the Local Plan contain land that is within Flood Zone 2 and/or 3a and 3b. The Forge Wood neighbourhood allocation has planning permission and continues to be built out, with the remaining residential land parcels outside of flood risk areas. Through the planning application and master plan process, the more vulnerable development typologies have been directed away from the areas of the site that are at greatest flood risk, meeting sequential test requirements. The remaining two sites have been subject to more detailed analysis in terms of whether any reasonable alternative sites were available that have not already been allocated that would still meet the objectives of the Local Plan, and having regard to the level of flood risk within the site itself.

6.5 The site profiles demonstrate that each of the site allocations will support Crawley in meeting its supply-led housing needs, and that having assessed a range of sites through the SHLAA and SA process, no other suitable alternatives are available which are not already allocated. The site profiles show that only part of each of the sites is at risk of fluvial flooding, with sufficient area remaining for proposed housing to be feasibly located within the significant parts of each site that fall within Flood Zone 1.

6.6 Each site was found to be at some risk of surface water flooding occurring as a result of rainfall with less than a 1 in 1,000 (0.1% AEP, very low probability) chance in any given year, representing a cautious approach. The proportion of each site affected by surface water at this probability is 15% at Desmond Anderson, and 11% at Land East of Balcombe Road/Street Hill. For surface water flooding occurring as a result of rainfall with a greater than 1 in 30

chance in any given year (3.3% AEP, high probability), the affected proportion of each site is smaller, at 2%, 1% and 4% respectively. No sites were found to be at risk of groundwater flooding. Since these risks can be managed through site layout and the use of other mitigation measures, surface water and groundwater risks have not been included as part of the Sequential Test process. In this respect, policy criteria are included within the Local Plan to manage surface and groundwater flood risk at these sites.

6.7 The allocation sites that have passed the Sequential Test will still need to respond to and effectively mitigate any risk of flooding on the site, including as a result of climate change. The SFRA has undertaken additional analysis to assess the future flood risk of climate change impacts. This work has identified a theoretical extent of the area at risk of flooding over the lifetime of the development. For fluvial flood risk, a peak flow increase of up to 70% is used. The updated allowances (peak flow increase of up to 40%) are lower than the previous allowances used in the 2020 SFRA. As a result, use of the previous allowances is suitably conservative in setting out an approach to flood risk for allocations. For surface water flooding, peak rainfall intensities for the 1% AEP event have been uplifted by 20% and 40% to assess the impact of climate change on surface water flood risk in the SFRA study area. This finds that, even allowing for a 40% uplift on the 1% AEP event, the proportion of each site affected is still significantly less than that of the 0.1% (1 in 1,000 year) AEP.

6.8 This additional analysis has shown that, taking climate change into account, and the amount of development proposed, sufficient land within the sites remains outside of Flood Zone 3 to show that each allocation can be taken forward. Should ‘more vulnerable’ development be proposed to take place in areas of the sites that are of a higher risk of flooding, as part of a planning application, the developer will be required to demonstrate that the Exception Test is satisfied.