Level 1 Strategic Flood Risk Assessment for Greater Manchester – Bolton MBC Sites Assessment

Final Report

February 2019

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Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

This document has been prepared as a Final Report for Greater Manchester Combined Authority and Bolton Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the clients for the purposes for which it was originally commissioned and prepared.

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Acknowledgements

JBA would like to thank all Greater Manchester Combined Authority, Bolton Council, Environment Agency and United Utilities staff for their time and commitment to providing data and discussing the issues identified during the course of this study.

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1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Bolton Metropolitan Borough Council (Bolton MBC).

The information and guidance provided in this summary report (also supported by the main SFRA report, SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Bolton MBC in Appendix B) can be used by GMCA and Bolton MBC to inform the Greater Manchester Spatial Framework (GMSF) and Bolton Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Bolton MBC alone, 533 potential sites have been provided, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Industry and warehousing	Less vulnerable	3
Land Supply 2018	Residential	More vulnerable	367
	Offices	Less vulnerable	8
	Industry and warehousing	Less vulnerable	26
Call for Sites 2018	Residential	More Vulnerable	93
	Residential / Offices	More Vulnerable	1
	Residential / Industry and Warehousing	More Vulnerable	2
	Residential / Offices / Industry and Warehousing	More Vulnerable	2
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	4
	Residential / Offices / Other use	More Vulnerable	1
	Residential / Other use	More Vulnerable	7
	Industry and warehousing	Less Vulnerable	5
	Offices / Industry and warehousing	Less Vulnerable	2
	Unknown	N/A	12

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All site assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively. **Error! Reference source not found.** shows the number of sites within each fluvial flood zone and **Error! Reference source not found.** shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Industry and warehousing	0	0	0	0
Land Supply 2018	Residential	336	7	9	15
	Offices	5	0	1	2
	Industry and warehousing	22	0	3	1
Call for Sites 2018	Residential	80	0	1	12
	Residential / Offices	1	0	0	0
	Residential / Industry and Warehousing	0	0	1	1
	Residential / Offices / Industry and Warehousing	2	0	0	0
	Residential / Offices / Industry and Warehousing / Other use	3	0	0	1
	Residential / Offices / Other use	1	0	0	0
	Residential / Other use	4	0	0	3
	Industry and warehousing	4	0	0	0
	Offices / Industry and warehousing	2	0	0	0
	Unknown	12	0	0	0
Total		**472**	**7**	**15**	**36**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Industry and warehousing	0	0	3
Land Supply 2018	Residential	96	46	69
	Offices	1	1	2
	Industry and warehousing	8	5	8
Call for Sites 2018	Residential	13	7	57
	Residential / Offices	1	0	0
	Residential / Industry and Warehousing	0	0	2
	Residential / Offices / Industry and Warehousing	0	0	2
	Residential / Offices / Industry and Warehousing / Other use	0	0	3
	Residential / Offices / Other use	0	0	1
	Residential / Other use	0	0	4
	Industry and warehousing	0	0	5
	Offices / Industry and warehousing	0	0	2
	Unknown	4	1	6
Total		**123**	**50**	**164**

*No part of site within medium or high risk zone

**No part of site within high risk zone

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Industry and warehousing	0	0	1	2	0
Land Supply 2018	Residential	2	9	37	194	125
	Offices	0	0	3	4	1
	Industry and warehousing	0	0	4	17	5
Call for Sites 2018	Residential	0	1	24	65	3
	Residential / Offices	0	0	0	1	0
	Residential / Industry and Warehousing	0	0	2	0	0
	Residential / Offices / Industry and Warehousing	0	0	2	0	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	1	3	0
	Residential / Offices / Other use	0	0	0	1	0
	Residential / Other use	2	0	1	4	0
	Industry and warehousing	0	0	1	4	0
	Offices / Industry and warehousing	0	0	0	2	0
	Unknown	0	0	1	10	1
Total		**4**	**10**	**77**	**307**	**135**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's must up-to-date allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?

- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA.

Strategic Recommendation A applies to four of the 533 sites overall, due to their location within Flood Zone 3b (see

Table 1-5).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	1462887055493	Residential / Other use	1.14	20.75
Call for Sites 2018	1488292102284	Residential / Other use	0.30	93.43
Land Supply 2018	1041-BOL	Residential	0.87	24.48
Land Supply 2018	744-BOL	Residential	1.23	10.50

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to 10 potential development sites shown in

Table 1-6.

Table 1-6 Sites where the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	145398496 9388	Residential	1.43	23.54*
Land Supply 2018	1040-BOL	Residential	0.44	39.04*
Land Supply 2018	1148-BOL	Residential	1.64	57.85
Land Supply 2018	1189-BOL	Residential	0.50	23.11
Land Supply 2018	1237-BOL	Residential	0.30	29.36*
Land Supply 2018	1289-BOL	Residential	1.48	28.80
Land Supply 2018	1601-BOL	Residential	0.41	29.02*
Land Supply 2018	HLA-122	Residential	0.08	100.00
Land Supply 2018	HLA-421	Residential	0.13	100.00
Land Supply 2018	HLA-480	Residential	0.09	27.18
*Also partially within Flood Zone 3b				

Based on the size of the sites and the percentage of area at risk, it is unlikely that any of these sites would pass the second part of the Exception Test. In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than

10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 77 potential sites to which Strategic Recommendation C apples. 26 sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 26 sites three are categorised as less vulnerable.

There are 31 sites located partially within Flood Zone 3a, six of which are also partially within Flood Zone 3b. Of these 31 sites, 27 are categorised as being more vulnerable and will therefore be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

53 of the 77 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood zone that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be allocated due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.

- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 307 potential sites overall. 297 of these sites are 100% within Flood Zone 1 though are at some level of surface water risk.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 135 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Bolton, 88 out of the 553 sites are located within 100m of watercourses which have been modelled for climate change. 49 of these 88 sites are not considered to be at additional risk from climate change. However, it is recommended that all 88 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

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	Mixed use / Gypsy and traveller	Highly Vulnerable	1
	Residential / Gypsy and traveller	Highly Vulnerable	1
	Offices / Industry and warehousing	Less vulnerable	1
	Other use	N/A	2
	Mixed use	More Vulnerable	17
	Unknown	N/A	14
*Two of these sites overlap into Rochdale			

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This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively.

Table 1-2 shows the number of sites within each fluvial flood zone and

Table 1-3 shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	2	0	0	1
	Mixed use	1	0	0	2
Land Supply 2018	Residential	159	10	8	6
	Offices	10	0	0	1
	Industry and warehousing	9	0	0	1
Call for Sites 2018	Residential	86	1	4	9
	Industry and warehousing	3	0	0	3
	Mixed use / Gypsy and traveller	1	0	0	0
	Residential / Gypsy and traveller	1	0	0	0
	Offices / Industry and warehousing	1	0	0	0
	Other use	1	0	0	1
	Mixed use	9	0	1	7
	Unknown	12	0	0	2
Total		**295**	**11**	**13**	**33**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	3
	Mixed use	0	0	3
Land Supply 2018	Residential	20	20	61
	Offices	5	3	3
	Industry and warehousing	5	2	3
Call for Sites 2018	Residential	11	7	76
	Industry and warehousing	0	0	6
	Mixed use / Gypsy and traveller	0	0	1
	Residential / Gypsy and traveller	0	0	1
	Offices / Industry and warehousing	0	0	1
	Other use	0	0	1
	Mixed use	0	0	17
	Unknown	0	0	14
Total		**41**	**32**	**190**
*No part of site within medium or high risk zone **No part of site within high risk zone				

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraph's 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Residential	0	0	1	2	0
	Mixed use	0	0	2	1	0
Land Supply 2018	Residential	3	5	26	71	78
	Offices	0	0	1	8	2
	Industry and warehousing	0	0	2	5	3
Call for Sites 2018	Residential	3	1	16	78	2
	Industry and warehousing	1	0	2	3	0
	Mixed use / Gypsy and traveller	0	0	0	1	0
	Residential / Gypsy and traveller	0	0	0	1	0
	Offices / Industry and warehousing	0	0	0	1	0
	Other use	0	0	2	0	0
	Mixed use	0	0	9	8	0
	Unknown	0	0	3	0	0
Total		**7**	**6**	**64**	**190**	**85**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding.

Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.

- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA.

Strategic Recommendation A applies to seven of the 352 sites overall, due to their location within Flood Zone 3b (see

Table 1-5).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	299	Industry and warehousing	2.71	20.23
Call for Sites 2018	433	Residential	4.00	28.11
Call for Sites 2018	717	Residential	15.42	35.45
Call for Sites 2018	1327	Residential	3.57	12.34
Land Supply 2018	HL/2146/00	Residential	19.72	22.69
Land Supply 2018	HL/2338/00	Residential	6.21	36.65
Land Supply 2018	HL/2675/00	Residential	0.08	40.00

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to six potential development sites shown in Table 1-6.

Table 1-6 Sites where application of the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	512	Residential	4.89	18.24*
Land Supply 2018	HL/2441/00	Residential	5.15	19.12*
Land Supply 2018	HL/2519/00	Residential	2.23	56.63
Land Supply 2018	HL/2648/00	Residential	0.45	96.45*
Land Supply 2018	HL/2880/00	Residential	0.61	22.41
Land Supply 2018	HL/2907/00	Residential	0.12	83.45
*Also partially within Flood Zone 3b				

Based on the size of the sites and the percentage of area at risk, it is unlikely that any of these sites would pass the second part of the Exception Test. The two larger sites may have enough space to accommodate the risk areas on-site through amenity open space whilst still have considerable areas of land that could be developed.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the

site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 64 potential sites to which Strategic Recommendation C apples. 23 sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 23 sites four are categorised as less vulnerable.

There are 29 sites located partially within Flood Zone 3a, 19 of which are also partially within Flood Zone 3b. Of these 29 sites, 23 are categorised as being more vulnerable and will therefore be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

34 of the 64 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 190 potential sites overall. 183 of these sites are 100% within Flood Zone 1 with 179 at some level of surface water risk. The other four sites are at very low risk from surface water, according to the RoFSW, though are greater than 1 ha in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 85 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Bury, 64 out of the 352 sites are located within 100m to watercourses which have been modelled for climate change. 44 of these 64 sites are not considered to be at additional risk from climate change. However, it is recommended that all 64 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Manchester CC Sites Assessment

Final Report

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www.jbaconsulting.com

Greater Manchester Combined Authority

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Manchester City Council (Manchester CC).

The information and guidance provided in this summary report (also supported by the main SFRA report, SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Manchester CC in Appendix B) can be used by GMCA and Manchester CC to inform the Greater Manchester Spatial Framework (GMSF) and Manchester CC's Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Manchester CC, 673 potential sites have been provided overall, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	1
	Mixed use	More vulnerable	1
	Industry and warehousing	Less vulnerable	1
Land Supply 2018	Residential	More vulnerable	533
	Offices	Less vulnerable	68
	Industry and warehousing	Less vulnerable	17
Call for Sites 2018	Residential	More Vulnerable	29
	Residential / Offices	More Vulnerable	3
	Residential / Industry and Warehousing	More Vulnerable	1
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	2
	Residential / Offices / Other use	More Vulnerable	3
	Residential / Other use	More Vulnerable	3
	Industry and warehousing	Less Vulnerable	2
	Industry and warehousing / Other use	Less Vulnerable	2
	Offices	Less Vulnerable	1
	Other use	N/A	4
	Unknown	N/A	2

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively. **Error! Reference source not found.** shows the number of sites within each fluvial flood zone and **Error! Reference source not found.** shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	1	0	0	0
	Mixed use	0	0	0	1
	Industry and warehousing	1	0	0	0
Land Supply 2018	Residential	472	28	9	24
	Offices	49	8	3	8
	Industry and warehousing	13	2	1	1
Call for Sites 2018	Residential	19	3	1	6
	Residential / Offices	1	0	0	2
	Residential / Industry and Warehousing	0	0	1	0
	Residential / Offices / Industry and Warehousing / Other use	1	0	0	1
	Residential / Offices / Other use	0	1	1	1
	Residential / Other use	2	1	0	0
	Industry and warehousing	2	0	0	0
	Industry and warehousing / Other use	2	0	0	0
	Offices		0	0	1
	Other use	1	0	0	3
	Unknown	2	0	0	0
Total		**566**	**43**	**16**	**48**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	1	0
	Mixed use	0	0	1
	Industry and warehousing	0	0	1
Land Supply 2018	Residential	116	71	75
	Offices	18	12	25
	Industry and warehousing	7	4	6
Call for Sites 2018	Residential	0	1	2
	Residential / Offices	0	0	1
	Residential / Industry and Warehousing	0	0	1
	Residential / Offices / Industry and Warehousing / Other use	0	0	0
	Residential / Offices / Other use	0	0	0
	Residential / Other use	0	0	0
	Industry and warehousing	0	0	1
	Industry and warehousing / Other use	0	0	0
	Offices	0	0	1
	Other use	0	0	0
	Unknown	0	0	1
Total		**137**	**89**	**115**

*No part of site within medium or high risk zone

**No part of site within high risk zone

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Residential	0	0	0	1	0
	Mixed use	0	0	1	0	0
	Industry and warehousing	0	0	0	1	0
Land Supply 2018	Residential	3	9	40	223	258
	Offices	0	0	9	47	12
	Industry and warehousing	0	0	4	11	2
Call for Sites 2018	Residential	1	2	4	15	7
	Residential / Offices	0	0	2	0	1
	Residential / Industry and Warehousing	0	0	1	0	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	1	0	1
	Residential / Offices / Other use	0	0	2	1	0
	Residential / Other use	0	0	0	1	2
	Industry and warehousing	0	0	0	2	0
	Industry and warehousing / Other use	0	0	0	2	0
	Offices	0	0	1	0	0
	Other use	1	0	2	1	0
	Unknown	0	0	0	2	0
Total		**5**	**11**	**67**	**307**	**283**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?

- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to five of the 673 sites overall, due to their location within Flood Zone 3b (see **Error! Reference source not found.**).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	1453806086284	Residential	3.51	26.24
Call for Sites 2018	1454684390963	Other use	1.57	74.47
Land Supply 2018	113669/FO/2016	Residential	0.04	10.15
Land Supply 2018	Brad_Cap_141	Residential	19.72	14.16
Land Supply 2018	CC_Cap_904	Residential	1.02	26.32

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to 11 potential development sites shown in

Table 1-6.

Table 1-6 Sites where the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1450888073111	Residential	0.56	99.05*
Call for Sites 2018	1455557453618	Residential	3.78	80.03*
Land Supply 2018	110893/FO/2015/S2	Residential	0.30	100.00
Land Supply 2018	114848 / 110554 / 100039	Residential	2.68	20.35*
Land Supply 2018	116719/FO/2017	Residential	0.20	17.06
Land Supply 2018	117054/FO/2017	Residential	0.11	80.39*
Land Supply 2018	CC_Cap_007	Residential	11.22	10.01*
Land Supply 2018	CDN/17/0737 / 111182	Residential	0.72	82.30
Land Supply 2018	High_Cap_700	Residential	8.03	24.65*
Land Supply 2018	Hulm_Cap_002	Residential	0.08	100.00
Land Supply 2018	Old_Cap_001	Residential	0.22	76.69
*Also partially within Flood Zone 3b				

Based on the size of the areas of these sites and the percentage of area at risk, it is unlikely that the majority of these sites would pass the second part of the Exception Test. Site CC_Cap_007 is the most likely to pass the test, based on area only.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the

site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 67 potential sites to which Strategic Recommendation C apples. 37 sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 37 sites 25 are categorised as more vulnerable.

There are 32 sites located partially within Flood Zone 3a, 25 of which are also partially within Flood Zone 3b. Of these 32 sites, 23 are categorised as being more vulnerable and will therefore be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

24 of the 67 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 307 potential sites overall. 245 of these sites are 100% within Flood Zone 1 though are at some level of surface water risk.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 283 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Manchester, 25 out of the 673 sites are located within 100m of watercourses which have been modelled for climate change. 15 of these 25 sites are not considered to be at additional risk from climate change. However, it is recommended that all 25 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Oldham BC Sites Assessment

Final Report

February 2019

www.jbaconsulting.com

Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Oldham Borough Council (Oldham BC).

The information and guidance provided in this summary report (also supported by the main SFRA report, SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Bury BC in Appendix B) can be used by GMCA and Oldham BC to inform the Greater Manchester Spatial Framework (GMSF) and the Oldham Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Oldham BC, 612 potential sites have been provided overall, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	12
	Mixed use	More vulnerable	5*
Land Supply 2018	Residential	More vulnerable	386
	Offices	Less vulnerable	28
	Industry and warehousing	Less vulnerable	32
Call for Sites 2018	Residential	More Vulnerable	122
	Residential / Industry and Warehousing	More Vulnerable	7
	Residential / Industry and Warehousing / Other use	More Vulnerable	2
	Residential / Offices / Industry and Warehousing	More Vulnerable	1
	Residential / Other use	More Vulnerable	4
	Industry and warehousing	Less Vulnerable	2
	Industry and warehousing / Other use	Less Vulnerable	4
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	4
	Other use	N/A	1
	Unknown	N/A	2
*Two of these sites overlap into Rochdale			

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively.

Table 1-2 shows the number of sites within each fluvial flood zone and

Table 1-3 shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	10	0	0	2
	Mixed use	1	0	0	4
Land Supply 2018	Residential	359	8	5	14
	Offices	23	0	0	5
	Industry and warehousing	27	0	0	5
Call for Sites 2018	Residential	88	6	4	24
	Residential / Industry and Warehousing	1	0	0	6
	Residential / Industry and Warehousing / Other use	1	0	0	1
	Residential / Offices / Industry and Warehousing	1	0	0	0
	Residential / Other use	3	0	0	1
	Industry and warehousing	0	0	0	2
	Industry and warehousing / Other use	4	0	0	0
	Residential / Offices / Industry and Warehousing / Other use	2	0	1	1
	Other use	0	0	0	1
	Unknown	2	0	0	0
Total		**522**	**14**	**10**	**66**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	11
	Mixed use	0	0	5
Land Supply 2018	Residential	91	51	96
	Offices	4	7	15
	Industry and warehousing	5	4	19
Call for Sites 2018	Residential	17	10	80
	Residential / Industry and Warehousing	0	0	7
	Residential / Industry and Warehousing / Other use	0	0	2
	Residential / Offices / Industry and Warehousing	0	0	1
	Residential / Other use	0	0	4
	Industry and warehousing	0	0	2
	Industry and warehousing / Other use	0	0	4
	Residential / Offices / Industry and Warehousing / Other use	0	0	4
	Other use	0	0	1
	Unknown	0	1	1
Total		**117**	**73**	**252**
*No part of site within medium or high risk zone **No part of site within high risk zone				

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GM Allocations 2019	Residential	0	1	2	9	0
	Mixed use	0	1	3	1	0
Land Supply 2018	Residential	1	4	40	193	148
	Offices	0	0	11	15	2
	Industry and warehousing	0	0	11	17	4
Call for Sites 2018	Residential	1	7	32	71	11
	Residential / Industry and Warehousing	0	1	5	1	0
	Residential / Industry and Warehousing / Other use	0	0	1	1	0
	Residential / Offices / Industry and Warehousing	0	0	0	1	0
	Residential / Other use	0	0	2	2	0
	Industry and warehousing	0	0	2	0	0
	Industry and warehousing / Other use	0	0	0	4	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	2	2	0
	Other use	0	0	0	0	0
	Unknown	0	0	1	1	0
Total		**2**	**14**	**112**	**318**	**165**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?

- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to only two of the 612 sites overall, due to their location within Flood Zone 3b (see Table 1-5).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	1527	Residential	3.36	11.11
Land Supply 2018	HLA3324	Residential	0.02	25.28

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to 14 potential development sites shown in .

Table 1-6.

Table 1-6 Sites where application of the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1518	Residential	0.88	78.30
Call for Sites 2018	1658	Residential	11.54	20.25*
Call for Sites 2018	1691	Residential / Industry and warehousing	6.60	16.68*
Call for Sites 2018	405	Residential	0.19	67.57*
Call for Sites 2018	435	Residential	0.18	46.00
Call for Sites 2018	487	Residential	0.58	29.38*
Call for Sites 2018	508	Residential	1.64	40.55*
Call for Sites 2018	528	Residential	1.01	47.44*
GMSF allocation 2019	GM Allocation 15a	Mixed use	6.60	16.73*
GMSF allocation 2019	GM Allocation 18	Residential	32.27	10.14*
Land Supply 2018	HLA2091(1)	Residential	0.01	100.00
Land Supply 2018	HLA2091(2)	Residential	0.57	23.71*
Land Supply 2018	HLA3458	Residential	0.17	14.45*
Land Supply 2018	SHA1723	Residential	0.17	96.61
*Also partially within Flood Zone 3b				

Based on the size of the areas of these sites and the percentage of area at risk, it is unlikely that the majority of these sites would pass the second part of the Exception Test. The two GMSF allocation sites are the most likely given the large size of the sites. For the mixed use allocation, if Flood Zone 3a cannot be avoided then the developer should ensure less vulnerable elements of the development are directed here and more vulnerable elements are directed to Flood Zone 1 or 2 areas.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 112 potential sites to which Strategic Recommendation C apples. 53 sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 53 sites 41 are categorised as more vulnerable.

There are 46 sites located partially within Flood Zone 3a, 40 of which are also partially within Flood Zone 3b. Of these 32 sites, 23 are categorised as being more vulnerable and will therefore be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

67 of the 112 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the

Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 318 potential sites overall. 313 of these sites are 100% within Flood Zone 1 with 308 at some level of surface water risk. The other five are at very low risk from surface water, according to the RoFSW, though are greater than 1 ha in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 165 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Oldham, 70 out of the 612 sites are located within 100m of watercourses which have been modelled for climate change. 25 of these 70 sites are not considered to be at additional risk from climate change. However, it is recommended that all 70 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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+44(0)1756 799919
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Rochdale BC Sites Assessment

Final Report

February 2019

www.jbaconsulting.com

Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Rochdale Borough Council (Rochdale BC).

The information and guidance provided in this summary report (also supported by the main SFRA report, SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Rochdale BC in Appendix B) can be used by GMCA and Rochdale BC to inform the Greater Manchester Spatial Framework (GMSF) and Rochdale Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Rochdale BC, 589 potential sites have been provided overall, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	7
	Mixed use	More vulnerable	6*
Land Supply 2018	Residential	More vulnerable	283
	Offices	Less vulnerable	6
	Industry and warehousing	Less vulnerable	30
Call for Sites 2018	Residential	More Vulnerable	84
	Residential / Industry and Warehousing	More Vulnerable	14
	Residential / Industry and Warehousing / Other use	More Vulnerable	3
	Residential / Offices / Industry and Warehousing	More Vulnerable	8
	Residential / Other use	More Vulnerable	6
	Industry and warehousing	Less Vulnerable	8
	Industry and warehousing / Other use	Less Vulnerable	1
	Residential / Offices	More Vulnerable	2
	Offices	Less vulnerable	1
	Offices / Industry and warehousing	Less vulnerable	1
	Other use	N/A	5
	Unknown	N/A	3
*Two of these sites overlap into Oldham and two into Bury			

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively.

Table 1-2 shows the number of sites within each fluvial flood zone and

Table 1-3 shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	3	0	0	4
	Mixed use	3	0	0	3
Land Supply 2018	Residential	283	4	6	35
	Offices	4	1	0	1
	Industry and warehousing	22	0	1	7
Call for Sites 2018	Residential	53	1	2	28
	Residential / Industry and Warehousing	9	0	0	5
	Residential / Industry and Warehousing / Other use	2	0	0	1
	Residential / Offices / Industry and Warehousing	8	0	0	0
	Residential / Other use	5	0	0	1
	Industry and warehousing	28	0	1	9
	Industry and warehousing / Other use	1	0	0	0
	Residential / Offices	2	0	0	0
	Offices	1	0	0	0
	Offices / Industry and warehousing	0	0	1	0
	Other use	3	0	0	2
	Unknown	2	0	0	1
Total		**429**	**6**	**11**	**97**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	7
	Mixed use	0	0	6
Land Supply 2018	Residential	49	33	96
	Offices	1	0	1
	Industry and warehousing	2	10	15
Call for Sites 2018	Residential	0	0	79
	Residential / Industry and Warehousing	0	0	14
	Residential / Industry and Warehousing / Other use	0	0	3
	Residential / Offices / Industry and Warehousing	0	0	8
	Residential / Other use	0	0	6
	Industry and warehousing	0	0	8
	Industry and warehousing / Other use	0	0	1
	Residential / Offices	0	0	2
	Offices	0	0	1
	Offices / Industry and warehousing	0	0	1
	Other use	0	0	5
	Unknown	0	0	3
Total		**52**	**43**	**256**

*No part of site within medium or high risk zone

**No part of site within high risk zone

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based

on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GM Allocations 2019	Residential	1	1	2	3	0
	Mixed use	0	0	3	3	0
Land Supply 2018	Residential	4	18	37	119	105
	Offices	0	0	1	2	3
	Industry and warehousing	3	0	5	20	2
Call for Sites 2018	Residential	10	4	22	44	4
	Residential / Industry and Warehousing	1	0	6	7	0
	Residential / Industry and Warehousing / Other use	0	0	1	2	0
	Residential / Offices / Industry and Warehousing	0	0	0	8	0
	Residential / Other use	0	0	2	4	0
	Industry and warehousing	0	0	2	6	0
	Industry and warehousing / Other use	0	0	0	1	0
	Residential / Offices	0	0	0	2	0
	Offices	0	0	0	1	0
	Offices / Industry and warehousing	0	0	1	0	0
	Other use	0	0	3	2	0
	Unknown	0	0	1	2	0
Total		**19**	**23**	**86**	**226**	**114**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?

- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to 19 of the 468 sites overall, due to their location within Flood Zone 3b (see

Table 1-5).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	1060	Residential	21.22	28.61
Call for Sites 2018	1297	Residential	6.23	10.66
Call for Sites 2018	1484	Residential	0.88	25.12
Call for Sites 2018	1661	Residential	16.42	10.68
Call for Sites 2018	339	Residential / Industry / warehousing	18.35	10.73
Call for Sites 2018	715	Residential	0.44	30.13
Call for Sites 2018	896	Residential	6.14	23.65
Call for Sites 2018	898	Residential	4.04	14.92
Call for Sites 2018	899	Residential	9.72	17.01
Call for Sites 2018	900	Residential	3.04	15.11
Call for Sites 2018	902	Residential	6.46	54.67
GMSF allocation 2019	GM Allocation 28	Residential	14.05	11.13
Land Supply 2018	EMP06	Industry and Warehousing	0.93	14.34
Land Supply 2018	EMP11	Industry and Warehousing	2.99	36.84
Land Supply 2018	EMP33	Industry and Warehousing	0.41	39.28
Land Supply 2018	SH 0807	Residential	7.68	18.43
Land Supply 2018	SH 0893	Residential	1.58	11.84
Land Supply 2018	SH 1962	Residential	0.45	26.61
Land Supply 2018	SH 2216	Residential	0.05	15.78

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to 23 potential development sites shown in

Table 1-6

Table 1-6 Sites where application of the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1662	Residential	7.26	10.34*
Call for Sites 2018	206	Residential	21.24	18.86*
Call for Sites 2018	862	Residential	7.25	10.24*
Call for Sites 2018	897	Residential	4.67	21.29*
GMSF allocation 2019	GM Allocation 25	Residential	16.81	17.99*
Land Supply 2018	SH 0594	Residential	0.85	11.86*
Land Supply 2018	SH 0610	Residential	0.86	13.19*
Land Supply 2018	SH 0622	Residential	3.28	16.28*
Land Supply 2018	SH 0665	Residential	1.33	16.37*
Land Supply 2018	SH 0745	Residential	0.38	12.09*
Land Supply 2018	SH 1020	Residential	0.10	99.76*
Land Supply 2018	SH 1469	Residential	1.68	74.30
Land Supply 2018	SH 1759	Residential	0.58	19.86*
Land Supply 2018	SH 1775	Residential	5.31	16.76*
Land Supply 2018	SH 1778	Residential	0.92	47.10*
Land Supply 2018	SH 2066	Residential	0.25	95.52*
Land Supply 2018	SH 2173	Residential	0.01	100.00
Land Supply 2018	SH 2184	Residential	0.07	58.67
Land Supply 2018	SH 2205	Residential	0.53	82.32*
Land Supply 2018	SH 2227	Residential	7.50	10.04*
Land Supply 2018	SH 2275	Residential	0.02	82.92
Land Supply 2018	SH 2286	Residential	0.04	10.49*
Land Supply 2018	SH 2330	Residential	0.93	60.70*
*Also partially within Flood Zone 3b				

The majority of the smaller sites would be unlikely to pass the Exception Test, given the lack of space to either accommodate the risk onsite or to redraw the site boundaries. Several of the larger sites may be large enough to include the risk areas for amenity space, free of development.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid

having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 86 potential sites to which Strategic Recommendation C apples. 52 sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 52 sites 42 are categorised as more vulnerable.

There are 40 sites located partially within Flood Zone 3a, 35 of which are also partially within Flood Zone 3b. Of these 40 sites, 32 are categorised as being more vulnerable and will therefore be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

49 of the 86 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 226 potential sites overall. 219 of these sites are 100% within Flood Zone 1 with 218 at some level of surface water risk. The other one is at very low risk from surface water, according to the RoFSW, though is greater than one hectare in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 114 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Rochdale, 72 out of the 468 sites are located within 100m of watercourses which have been modelled for climate change. 38 of these 72 sites are not considered to be at additional risk from climate change. However, it is recommended that all 72 sites are reviewed against modelled climate change outputs

at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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+44(0)1756 799919
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Salford CC Sites Assessment

Final Report

February 2019

www.jbaconsulting.com

Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

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Acknowledgements

JBA would like to thank all Greater Manchester Combined Authority, Salford City Council, Environment Agency and United Utilities staff for their time and commitment to providing data and discussing the issues identified during the course of this study.

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Salford City Council (Salford CC).

The information and guidance provided in this report (also supported by the SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Salford CC in Appendix B) can be used by GMCA and Salford CC to inform the Greater Manchester Spatial Framework (GMSF) and Salford Local Plan and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Salford CC alone, 360 potential sites have been provided overall, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section **Error! Reference source not found.**.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	3
	Industry and warehousing	Less vulnerable	1
Land Supply 2018	Residential	More vulnerable	274
	Offices	Less vulnerable	11
	Industry and warehousing	Less vulnerable	17
Call for Sites 2018	Residential	More Vulnerable	33
	Residential / Industry and Warehousing	More Vulnerable	1
	Residential / Offices / Other use	More Vulnerable	3
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	6
	Residential / Other use	More Vulnerable	6
	Industry and warehousing	Less Vulnerable	2
	Residential / Offices	More Vulnerable	1
	Other use	N/A	2

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively. **Error! Reference source not found.** shows the number of sites within each fluvial flood zone and **Error! Reference source not found.** shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	2	0	0	1
	Industry and warehousing	0	1	0	0
Land Supply 2018	Residential	209	30	17	18
	Offices	2	9	0	0
	Industry and warehousing	11	2	1	3
Call for Sites 2018	Residential	15	2	3	13
	Residential / Industry and Warehousing	1	0	0	0
	Residential / Offices / Other use	0	2	0	1
	Residential / Offices / Industry and Warehousing / Other use	2	1	1	2
	Residential / Other use	3	1	1	1
	Industry and warehousing	2	0	0	0
	Residential / Offices	0	1	0	0
	Other use	0	0	1	1
Total		**247**	**49**	**24**	**40**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	3
	Industry and warehousing	0	0	1
Land Supply 2018	Residential	79	41	58
	Offices	5	3	3
	Industry and warehousing	6	4	7
Call for Sites 2018	Residential	4	2	27
	Residential / Industry and Warehousing	0	0	0
	Residential / Offices / Other use	0	1	2
	Residential / Offices / Industry and Warehousing / Other use	1	3	2
	Residential / Other use	1	0	5
	Industry and warehousing	0	0	2
	Residential / Offices	1	0	0
	Other use	0	0	2
Total		**97**	**54**	**109**
*No part of site within medium or high risk zone **No part of site within high risk zone				

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test. Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Residential	1	0	0	2	0
	Industry and warehousing	0	0	0	1	0
Land Supply 2018	Residential	0	17	32	134	91
	Offices	0	0	1	10	0
	Industry and warehousing	0	0	3	12	2
Call for Sites 2018	Residential	1	1	14	17	0
	Residential / Industry and Warehousing	0	0	0	0	1
	Residential / Offices / Other use	0	0	1	2	0
	Residential / Offices / Industry and Warehousing / Other use	0	2	1	3	0
	Residential / Other use	0	1	1	4	0
	Industry and warehousing	0	0	0	2	0
	Residential / Offices	0	0	0	1	0
	Other use	0	0	1	1	0
Total		**2**	**21**	**54**	**189**	**94**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water

flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.

- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories (see

-) that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to two sites of the 360 sites overall, due to their location within Flood Zone 3b (see **Error! Reference source not found.**).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for sites 2018	1453372590791	Residential	26.72	18.15
GMSF allocation 2019	GM Allocation 31	Residential	29.03	16.70

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of

some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3b.

Strategic Recommendation B applies to 23 potential development sites shown in **Error! Not a valid bookmark self-reference.**.

Table 1-6 Sites where the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for sites 2018	1452448586799	Residential / Offices / Industry and warehousing / Other Use	0.53	42.98
Call for sites 2018	1452529195862	Residential / Offices / Industry and warehousing / Other Use	0.12	67.50
Call for sites 2018	1452854008520	Residential / Other Use	32.23	14.60
Call for sites 2018	ELR5	Residential	97.72	5.82
Land Supply 2018	S/BEL/002	Residential	0.07	10.74
Land Supply 2018	S/BRO/004	Residential	0.48	100.00
Land Supply 2018	S/BRO/018	Residential	1.91	94.33
Land Supply 2018	S/BRO/029	Residential	0.96	76.37
Land Supply 2018	S/BRO/032	Residential	0.28	100.00
Land Supply 2018	S/BRO/043	Residential	0.42	99.72
Land Supply 2018	S/BRO/053	Residential	7.63	70.24
Land Supply 2018	S/BRO/062	Residential	0.01	90.94
Land Supply 2018	S/BRO/067	Residential	0.36	100.00
Land Supply 2018	S/BRO/087	Residential	0.15	100.00
Land Supply 2018	S/CAD/060	Residential	0.69	97.01
Land Supply 2018	S/KER/018	Residential	4.66	97.90
Land Supply 2018	S/ORD/087	Residential	1.29	14.53

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Land Supply 2018	S/ORD/087e	Residential	0.12	45.65
Land Supply 2018	S/ORD/128	Residential	1.48	16.06
Land Supply 2018	S/WOR/063	Residential	0.05	37.92
Land Supply 2018	S/WSO/046	Residential	0.09	100.00
*Also partially within Flood Zone 3b				

The majority of the smaller sites would be unlikely to pass the Exception Test, given the lack of space to either accommodate the risk onsite or to redraw the site boundaries. Several of the larger sites may be large enough to include the risk areas for amenity space, free of development.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 54 potential sites to which Strategic Recommendation C apples. 27 sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 27 sites 23 are categorised as more vulnerable.

There are 34 sites located partially within Flood Zone 3a, 24 of which are also partially within Flood Zone 3b. Of these 34 sites, 30 are categorised as being more vulnerable and will therefore be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

17 of the 54 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be allocated due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.

- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 189 potential sites overall. 141 of these sites are 100% within Flood Zone 1, each of which is at some level of surface water risk.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 94 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Salford, 86 out of the 360 sites are located within 100m of watercourses which have been modelled for climate change. 31 of these 86 sites are not considered to be at additional risk from climate change. However, it is recommended that all 86 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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Registered Office
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Broughton Hall
SKIPTON
North Yorkshire
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United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Stockport MBC Sites Assessment

Final Report

February 2019

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Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by	Mike Williamson BSc MSc EADA FRGS CGeog Chartered Senior Analyst
Reviewed by	Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA Associate Director

Purpose

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Stockport Metropolitan Borough Council (Stockport MBC).

The information and guidance provided in this report (also supported by the SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Stockport MBC in Appendix B) can be used by GMCA and Stockport MBC to inform the Greater Manchester Spatial Framework (GMSF) and Stockport Local Plan and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Stockport MBC alone, 718 potential sites have been provided, including the proposed uses listed in Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	7
	Industry and warehousing	Less vulnerable	1
Land Supply 2018	Residential	More vulnerable	361
	Offices	Less vulnerable	16
	Industry and warehousing	Less vulnerable	34
Call for Sites 2018	Residential	More Vulnerable	252
	Residential / Gypsy and Traveller / Industry and warehousing	Highly vulnerable	1
	Residential / Gypsy and Traveller / Offices / Industry and warehousing	Highly vulnerable	1
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	Highly vulnerable	1
	Residential / Offices	More Vulnerable	3
	Residential / Industry and Warehousing	More Vulnerable	1
	Residential / Offices / Industry and Warehousing	More Vulnerable	2
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	3
	Residential / Offices / Other use	More Vulnerable	2
	Residential / Other use	More Vulnerable	17
	Industry and warehousing	Less Vulnerable	4
	Offices / Industry and warehousing	Less Vulnerable	4
	Offices	Less Vulnerable	1
	Industry and warehousing / Other use	Less Vulnerable	1
	Other use	N/A	6

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively.

Table 1-2 shows the number of sites within each fluvial flood zone and Table 1-3 shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	5	0	0	2
	Industry and warehousing	1	0	0	0
Land Supply 2018	Residential	340	5	2	14
	Offices	15	0	1	0
	Industry and warehousing	30	1	1	2
Call for Sites 2018	Residential	211	4	3	34
	Residential / Gypsy and Traveller / Industry and warehousing	1	0	0	0
	Residential / Gypsy and Traveller / Offices / Industry and warehousing	0	0	0	1
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	0	1
	Residential / Offices	3	0	0	0
	Residential / Industry and Warehousing	1	0	0	0
	Residential / Offices / Industry and Warehousing	2	0	0	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	0	3
	Residential / Offices / Other use	1	0	0	1
	Residential / Other use	16	0	1	0
	Industry and warehousing	3	0	0	1
	Offices / Industry and warehousing	1	1	0	2
	Offices	0	1	0	0
	Industry and warehousing / Other use	1	0	0	0
	Other use	4	0	1	1
Total		**635**	**12**	**9**	**62**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	7
	Industry and warehousing	0	0	1
Land Supply 2018	Residential	103	45	51
	Offices	10	5	1
	Industry and warehousing	24	3	7
Call for Sites 2018	Residential	45	31	149
	Residential / Gypsy and Traveller / Industry and warehousing	0	0	0
	Residential / Gypsy and Traveller / Offices / Industry and warehousing	1	0	0
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	1
	Residential / Offices	1	1	1
	Residential / Industry and Warehousing	1	0	0
	Residential / Offices / Industry and Warehousing	0	1	1
	Residential / Offices / Industry and Warehousing / Other use	0	0	3
	Residential / Offices / Other use	0	0	2
	Residential / Other use	2	2	12
	Industry and warehousing	0	0	4
	Offices / Industry and warehousing	0	0	3
	Offices	0	0	1
	Industry and warehousing / Other use	0	0	1
	Other use	0	1	5
Total		**187**	**89**	**250**

*No part of site within medium or high risk zone

**No part of site within high risk zone

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Residential	0	0	2	5	0
	Industry and warehousing	0	0	0	1	0
Land Supply 2018	Residential	2	5	29	164	161
	Offices	0	0	0	13	3
	Industry and warehousing	0	0	2	20	12
Call for Sites 2018	Residential	5	3	41	178	25
	Residential / Gypsy and Traveller / Industry and warehousing	0	0	0	0	1
	Residential / Gypsy and Traveller / Offices / Industry and warehousing	0	0	1	0	0
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	1	0	0	0	0
	Residential / Offices	0	0	0	3	0
	Residential / Industry and Warehousing	0	0	0	1	0
	Residential / Offices / Industry and Warehousing	0	0	1	1	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	3	0	0
	Residential / Offices / Other use	0	0	1	1	0
	Residential / Other use	0	0	2	14	1
	Industry and warehousing	0	0	1	3	0
	Offices / Industry and warehousing	0	0	3	1	0
	Offices	0	0	0	1	0
	Industry and warehousing / Other use	0	0	0	1	0
	Other use	0	0	0	4	0
Total		**8**	**8**	**86**	**411**	**203**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b, or 10% or greater of highly vulnerable development is within Flood Zone 3a. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b or for highly vulnerable development that fall within Flood Zone 3a. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to eight of the 718 sites, seven of which are due to being partially within Flood Zone 3b (see **Error! Reference source not found.**). The other one is due to its classification as highly vulnerable and its location within Flood Zone 3a. Highly vulnerable development is not permitted within Flood Zone 3a.

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b / 3a

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	144984873 8575	Residential	1.12	11.19
Call for Sites 2018	145469039 0478	Residential / Gypsy and traveller / Offices / Industry and warehousing / Other use	13.28	7.70*
Call for Sites 2018	145555745 3618	Residential	3.78	72.78
Call for Sites 2018	145561511 1196	Residential	3.42	62.41
Call for Sites 2018	145589275 2109	Residential	0.26	13.98
Call for Sites 2018	147265706 5525	Residential	4.66	17.40
Land Supply 2018	STO1730	Residential	0.04	12.72
Land Supply 2018	STO1807	Residential	0.09	44.74
*highly vulnerable use with 61% in FZ3a				

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to eight potential development sites shown in Table 1-6.

Table 1-6 Sites where the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1455738858216	Residential	11.23	11.30*
Call for Sites 2018	1462269780756	Residential	0.20	15.08*
Call for Sites 2018	1483611804638	Residential	16.58	11.29*
Land Supply 2018	SKH17067	Residential	3.33	22.89*
Land Supply 2018	SKH17142	Residential	2.78	25.98*
Land Supply 2018	STO1574	Residential	0.31	20.18
Land Supply 2018	STO1591	Residential	0.08	29.43
Land Supply 2018	STO1811	Residential	1.12	28.59*
*Also partially within Flood Zone 3b				

Site Refs '1455738858216' and '1483611804638' may be able to pass the second part of the Exception Test, given their large footprint areas available to either incorporate the risk into amenity open space or to redraw the boundaries without impacting too much on housing yields. In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A

Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 86 potential sites to which Strategic Recommendation C apples. 47 of these sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 47 sites, one is categorised as highly vulnerable and 41 are classed as more vulnerable.

There are 37 sites located partially within Flood Zone 3a, 33 of which are also partially within Flood Zone 3b. Of these 37 sites, one (Ref 1459248794142) is categorised as being highly vulnerable and is therefore not permitted within Flood Zone 3a. This site is also partially within Flood Zone 2 and will therefore be subject to the Exception Test if the risk area cannot be avoided. The highly vulnerable element, gypsy and traveller, will must be directed to Flood Zone 1.

31 of the 37 sites in Flood Zone 3a are more vulnerable and therefore would be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

37 of the 86 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for

maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 411 potential sites overall. 401 of these sites are 100% within Flood Zone 1 with 399 at some level of surface water risk. The other two are at very low risk from surface water, according to the RoFSW, though are greater than 1 ha in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 203 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Stockport, 58 out of the 708 sites are located within 100m of watercourses which have been modelled for climate change. 50 of these 58 sites are not considered to be at additional risk from climate change. However, it is recommended that all 58 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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Registered Office
South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
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Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

This document has been prepared as a Final Report for Greater Manchester Combined Authority and Tameside Council. JBA Consulting accepts no responsibility or liability for any use that is made of this document other than by the clients for the purposes for which it was originally commissioned and prepared.

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Acknowledgements

JBA would like to thank all Greater Manchester Combined Authority, Tameside Council, Environment Agency and United Utilities staff for their time and commitment to providing data and discussing the issues identified during the course of this study.

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Tameside Borough Council.

The information and guidance provided in this summary report (also supported by the main SFRA report, SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Tameside BC in Appendix B) can be used by GMCA and Tameside BC to inform the Greater Manchester Spatial Framework (GMSF) and Tameside Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Tameside BC, 373 potential sites have been provided overall, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	3
	Industry and warehousing	Less vulnerable	1
Land Supply 2018	Residential	More vulnerable	229
	Offices	Less vulnerable	7
	Industry and warehousing	Less vulnerable	18
Call for Sites 2018	Residential	More Vulnerable	97
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	Highly vulnerable	1
	Residential / Offices	More Vulnerable	2
	Residential / Industry and Warehousing	More Vulnerable	3
	Residential / Offices / Industry and Warehousing	More Vulnerable	4
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	2
	Residential / Other use	More Vulnerable	2
	Industry and warehousing	Less Vulnerable	1
	Other use	N/A	2
	Unknown	N/A	1

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively.

Table 1-2 shows the number of sites within each fluvial flood zone and

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	3	0	0	0
	Industry and warehousing	1	0	0	0
Land Supply 2018	Residential	203	1	9	16
	Offices	7	0	0	0
	Industry and warehousing	13	0	1	4
Call for Sites 2018	Residential	84	0	0	13
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	0	1
	Residential / Offices	2	0	0	0
	Residential / Industry and Warehousing	3	0	0	0
	Residential / Offices / Industry and Warehousing	2	0	0	2
	Residential / Offices / Industry and Warehousing / Other use	0	0	0	1
	Residential / Other use	2	0	0	0
	Industry and warehousing	1	0	0	0
	Other use	1	0	0	1
	Unknown	1	0	0	0
Total		**323**	**1**	**10**	**38**

^Sites with 100% area within Flood Zone 1
*No part of site within Flood Zones 3a or 3b
**No part of site within Flood Zone 3b

Table 1-3 shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within...			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	3	0	0	0
	Industry and warehousing	1	0	0	0
Land Supply 2018	Residential	203	1	9	16
	Offices	7	0	0	0
	Industry and warehousing	13	0	1	4
Call for Sites 2018	Residential	84	0	0	13
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	0	1
	Residential / Offices	2	0	0	0
	Residential / Industry and Warehousing	3	0	0	0
	Residential / Offices / Industry and Warehousing	2	0	0	2
	Residential / Offices / Industry and Warehousing / Other use	0	0	0	1
	Residential / Other use	2	0	0	0
	Industry and warehousing	1	0	0	0
	Other use	1	0	0	1
	Unknown	1	0	0	0
Total		**323**	**1**	**10**	**38**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	3
	Industry and warehousing	0	0	1
Land Supply 2018	Residential	70	31	47
	Offices	3	3	1
	Industry and warehousing	4	4	8
Call for Sites 2018	Residential	14	9	68
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	1
	Residential / Offices	0	1	1
	Residential / Industry and Warehousing	0	0	3
	Residential / Offices / Industry and Warehousing	0	1	3
	Residential / Offices / Industry and Warehousing / Other use	0	1	1
	Residential / Other use	0	0	1
	Industry and warehousing	0	0	1
	Other use	0	0	2
	Unknown	0	0	1
Total		**91**	**50**	**142**
*No part of site within medium or high risk zone **No part of site within high risk zone				

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test. Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Residential	0	0	1	2	0
	Industry and warehousing	0	0	0	1	0
Land Supply 2018	Residential	2	7	25	116	79
	Offices	0	0	1	6	0
	Industry and warehousing	1	0	3	12	2
Call for Sites 2018	Residential	3	1	18	71	4
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	1	0	0	0	0
	Residential / Offices	0	0	0	2	0
	Residential / Industry and Warehousing	0	0	1	2	0
	Residential / Offices / Industry and Warehousing	0	0	2	2	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	0	2	0
	Residential / Other use	0	0	0	1	1
	Industry and warehousing	0	0	0	1	0
	Other use	0	0	0	1	0
	Unknown	0	0	1	0	0
Total		**7**	**8**	**52**	**219**	**86**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event

outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.

- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b, or 10% or greater of highly vulnerable development is within Flood Zone 3a. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b or for highly vulnerable development that fall within Flood Zone 3a. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to seven of the 373 sites, six of which are due to being partially within Flood Zone 3b (see The other one is due to its classification as highly vulnerable and its location within Flood Zone 3a. Highly vulnerable development is not permitted within Flood Zone 3a.

Table 1-5). The other one is due to its classification as highly vulnerable and its location within Flood Zone 3a. Highly vulnerable development is not permitted within Flood Zone 3a.

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	255	Residential	1.97	10.91
Call for Sites 2018	267	Residential	3.25	11.84
Call for Sites 2018	701	Residential	12.96	15.52
Call for Sites 2018	850	Residential / Gypsy and traveller / Offices / Industry and warehousing / Other use	13.28	5.52*
Land Supply 2018	E-HYDGOD-001	Industry and Warehousing	0.30	63.87
Land Supply 2018	H-HYDGOD-022	Residential	1.43	14.16
Land Supply 2018	H-HYDNEW-007	Residential	2.77	13.84
**highly vulnerable use with 63% in FZ3a				

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to eight potential development sites Table 1-6.

Table 1-6 Sites where application of the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1052	Residential	5.44	26.22
Land Supply 2018	H-DUKSTB-002	Residential	0.40	16.92
Land Supply 2018	H-HYDGOD-039	Residential	0.09	100.00
Land Supply 2018	H-HYDNEW-003	Residential	5.69	26.60
Land Supply 2018	H-MOSSLE-022	Residential	0.23	11.01
Land Supply 2018	H-MOSSLE-131	Residential	1.08	37.66
Land Supply 2018	H-MOSSLE-132	Residential	1.07	10.26
Land Supply 2018	H-WATERL-050	Residential	1.23	24.27
*Also partially within Flood Zone 3b				

It appears unlikely that any of these sites would pass the second part of the Exception Test, given the small footprint areas available to either incorporate the risk into amenity open space or to redraw the boundaries without impacting too much on housing yields. In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether by removing the site from Flood Zone 3a.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.

- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 52 potential sites to which Strategic Recommendation C apples. 25 of these sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 25 sites, 22 are classed as more vulnerable.

There are 17 sites located partially within Flood Zone 3a, 12 of which are also partially within Flood Zone 3b. 14 of the 17 sites are more vulnerable and should therefore be directed away from Flood Zone 3a. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

27 of the 52 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 219 potential sites overall. 217 of these sites are 100% within Flood Zone 1 with 213 at some level of surface water risk. The other four are at very low risk from surface water, according to the RoFSW, though are greater than one hectare in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 86 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Tameside, 19 out of the 373 sites are located within 100m of watercourses which have been modelled for climate change. 9 of these 19 sites are not considered to be at additional risk from climate change. However, it is recommended that all 19 sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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South Barn
Broughton Hall
SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Trafford BC Sites Assessment

Final Report

February 2019

www.jbaconsulting.com

Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

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Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

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- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Trafford BC, 419 potential sites have been provided overall, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 1.4.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Mixed use	More vulnerable	2
Land Supply 2018	Residential	More vulnerable	265
	Offices	Less vulnerable	37
	Industry and warehousing	Less vulnerable	42
Call for Sites 2018	Residential	More Vulnerable	44
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	Highly vulnerable	1
	Residential / Gypsy and Traveller / Other use	Highly vulnerable	1
	Residential / Gypsy and Traveller / Offices / Other use	Highly vulnerable	2
	Residential / Offices	More Vulnerable	2
	Residential / Industry and Warehousing	More Vulnerable	2
	Residential / Offices / Industry and Warehousing / Other use	More Vulnerable	5
	Residential / Offices / Other use	More Vulnerable	2
	Residential / Other use	More Vulnerable	2
	Industry and warehousing	Less Vulnerable	1
	Offices / Industry and warehousing	Less Vulnerable	2
	Offices	Less Vulnerable	1
	Offices / Industry and warehousing / Other use	Less Vulnerable	2
	Offices / Other use	Less vulnerable	2
	Other use	N/A	3
	Unknown	N/A	1

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map

for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively.

Table 1-2 shows the number of sites within each fluvial flood zone and Table 1-3 shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within…			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Mixed use	0	0	0	2
Land Supply 2018	Residential	304	17	3	20
	Offices	31	5	0	1
	Industry and warehousing	35	7	1	2
Call for Sites 2018	Residential	23	5	0	16
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	0	1
	Residential / Gypsy and Traveller / Other use	1	0	0	0
	Residential / Gypsy and Traveller / Offices / Other use	2	0	0	0
	Residential / Offices	0	0	0	2
	Residential / Industry and Warehousing	0	0	0	2
	Residential / Offices / Industry and Warehousing / Other use	3	0	0	2
	Residential / Offices / Other use	0	0	1	1
	Residential / Other use	2	0	0	0
	Industry and warehousing	0	1	0	0
	Offices / Industry and warehousing	1	0	1	0
	Offices	0	0	0	1
	Offices / Industry and warehousing / Other use	0	0	0	2
	Offices / Other use	1	0	0	1
	Other use	1	2	0	0
	Unknown	1	0	0	0
Total		**405**	**37**	**6**	**53**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Mixed use	0	0	2
Land Supply 2018	Residential	101	37	32
	Offices	24	9	4
	Industry and warehousing	13	14	9
Call for Sites 2018	Residential	4	4	33
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	1
	Residential / Gypsy and Traveller / Other use	0	1	0
	Residential / Gypsy and Traveller / Offices / Other use	0	0	2
	Residential / Offices	0	0	2
	Residential / Industry and Warehousing	0	0	2
	Residential / Offices / Industry and Warehousing / Other use	0	0	5
	Residential / Offices / Other use	0	0	2
	Residential / Other use	0	1	1
	Industry and warehousing	0	0	1
	Offices / Industry and warehousing	0	0	2
	Offices	0	0	1
	Offices / Industry and warehousing / Other use	0	1	1
	Offices / Other use	0	0	2
	Other use	0	0	3
	Unknown	0	0	1
Total		**142**	**67**	**106**

*No part of site within medium or high risk zone

**No part of site within high risk zone

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on

Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Mixed use	0	0	2	0	0
Land Supply 2018	Residential	1	4	19	147	94
	Offices	0	0	2	29	6
	Industry and warehousing	0	0	2	35	5
Call for Sites 2018	Residential	6	1	10	25	2
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	1	0	0	0
	Residential / Gypsy and Traveller / Other use	0	0	0	1	0
	Residential / Gypsy and Traveller / Offices / Other use	0	0	0	2	0
	Residential / Offices	0	0	2	0	0
	Residential / Industry and Warehousing	0	0	2	0	0
	Residential / Offices / Industry and Warehousing / Other use	0	0	2	3	0
	Residential / Offices / Other use	0	0	2	0	0
	Residential / Other use	0	0	0	2	0
	Industry and warehousing	0	0	0	1	0
	Offices / Industry and warehousing	0	0	0	2	0
	Offices	0	0	1	0	0
	Offices / Industry and warehousing / Other use	0	0	1	0	0
	Offices / Other use	0	0	1	1	0
	Other use	0	0	0	3	0
	Unknown	0	0	0	1	0
Total		**7**	**6**	**46**	**252**	**107**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation, which may include detailed surface water modelling, would therefore be required, particularly for any site flagged as being at significant surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b, or 10% or greater of highly vulnerable development is within Flood Zone 3a. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b or for highly vulnerable development that fall within Flood Zone 3a. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to seven of the 419 sites due to being partially within Flood Zone 3b (see

Table 1-5).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	1361	Residential	6.60	19.49
Call for Sites 2018	1765	Residential	23.16	16.60
Call for Sites 2018	410	Residential	9.08	13.14
Call for Sites 2018	414	Residential	12.38	16.62
Call for Sites 2018	817	Residential	12.25	15.59
Call for Sites 2018	820	Residential	8.96	12.93
Land Supply 2018	1894-01	Residential	29.80	15.07

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test and highly vulnerable sites are not permitted in this zone.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to six potential development sites, five of which are proposed for residential use only and one of which is mixed use inclusive of gypsy and traveller use which is classed as highly vulnerable (see **Error! Not a valid bookmark self-reference.**).

Table 1-6 Sites where application of the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1702	Residential / Gypsy and traveller / Offices / Industry and warehousing / Other use	36.97	7.85*^
Call for Sites 2018	501	Residential	4.55	18.91*
Land Supply 2018	1594	Residential	1.73	22.96*
Land Supply 2018	1610	Residential	18.95	11.71*
Land Supply 2018	2457	Residential	0.13	73.83
Land Supply 2018	2503	Residential	0.06	12.19
*Also partially within Flood Zone 3b ^Highly vulnerable site with 38% area within Flood Zone 2 therefore Exception Test required				

Each of these sites must be subject to and must pass the Exception Test. The two more vulnerable residential only sites have more than 10% of their areas within Flood Zone 3a and the mixed site with gypsy and traveller use has 38% of its area within Flood Zone 2 which, as the site is classed as highly vulnerable means the site must pass the Exception Test.

The gypsy and traveller element of the site is not permitted in Flood Zone 3a and no development is permitted in Flood Zone 3b. Including the area with Flood Zone 2, this accounts for around half of the total site meaning the gypsy and traveller element is limited to one half of the site. The residential element should also be directed away from Flood Zone 3.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 46 potential sites to which Strategic Recommendation C apples. 38 of these sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 38 sites, one is categorised as highly vulnerable and 32 are classed as more vulnerable.

There are 29 sites located partially within Flood Zone 3a, 28 of which are also partially within Flood Zone 3b. 24 of the 29 sites in Flood Zone 3a are more vulnerable and therefore would be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

12 of the 46 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This easement buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.

  Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 252 potential sites overall. 225 of these sites are 100% within Flood Zone 1 with 224 at some level of surface water risk. The remaining site is at very low risk from surface water, according to the RoFSW, though is greater than 1 ha in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 107 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Trafford, six out of the 419 sites are located within 100m of watercourses which have been modelled for climate change. Four of these six sites are not considered to be at additional risk from climate change. However, it is recommended that all six sites are reviewed against modelled climate change outputs at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
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Level 1 Strategic Flood Risk Assessment for Greater Manchester – Wigan MBC Sites Assessment

Final Report

February 2019

www.jbaconsulting.com

Greater Manchester Combined Authority

GMCA GREATER MANCHESTER COMBINED AUTHORITY

JBA Project Manager

Mike Williamson
Mersey Bank House
Second Floor
Barbauld Street
Warrington
WA1 1WA
United Kingdom

Contract

This report describes work commissioned by David Hodcroft, on behalf of Greater Manchester Combined Authority Planning and Housing Team, by a letter dated 14 June 2017. The lead representative for the contract was David Hodcroft. Mike Williamson of JBA Consulting carried out this work.

Prepared by ..... Mike Williamson BSc MSc EADA FRGS CGeog

Chartered Senior Analyst

Reviewed by ..... Rachel Brisley BA (Hons) Dip TRP MCD MBA AMBA

Associate Director

Purpose

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Acknowledgements

JBA would like to thank all Greater Manchester Combined Authority, Wigan Council, Environment Agency and United Utilities staff for their time and commitment to providing data and discussing the issues identified during the course of this study.

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1 Development and Flood Risk

1.1 Introduction

This document provides a strategic assessment of the suitability, relative to flood risk, of the potential development sites provided by Greater Manchester Combined Authority (GMCA) specific to Wigan Metropolitan Borough Council (Wigan MBC).

The information and guidance provided in this report (also supported by the SFRA Maps in Appendix A and the Development Site Assessment spreadsheet for Wigan MBC in Appendix B) can be used by GMCA and Wigan MBC to inform the Greater Manchester Spatial Framework (GMSF) and Wigan Local Plan, and provide the basis from which to apply the Sequential Approach in the development allocation and development management process.

1.2 Sites assessment

GMCA provided several GIS datasets containing the following sites information:

- GMSF allocations (2019). These sites are the proposed allocations included within the Revised Draft GMSF drafted in January 2019. These sites are currently in Green Belt and are proposed to be removed from Green Belt and allocated for development in the GMSF. They are the sites that are needed to meet the shortfall in housing and employment land needs up to 2037.
- Baseline Land Supply (2018) housing, industry and warehousing and office land supply, which show the potential supply of new housing and employment land across Greater Manchester (GM) from 2018 to 31 March 2037.
- GMSF Call for Site Submissions (2018). These sites are currently in Green Belt though developers and landowners have suggested they should be taken out of Green Belt and allocated for development through the GMSF. The majority of these sites are not proposed for allocation in the GMSF.

For Wigan MBC alone, 556 potential sites have been provided, including the proposed uses listed in

Table 1-1. This table also shows the associated vulnerability of each proposed use that is used to help assign the strategic site recommendations discussed in Section 0.

Table 1-1 Proposed site uses and flood risk vulnerability

Site category	Proposed site use	Flood risk vulnerability (Table 2 of FRCC-PPG)	Number of sites
GMSF Allocations 2019	Residential	More vulnerable	2
	Mixed use	More vulnerable	2
	Industry and warehousing	Less vulnerable	1
Land Supply 2018	Residential	More vulnerable	376
	Offices	Less vulnerable	9
	Industry and warehousing	Less vulnerable	35
Call for Sites 2018	Residential	More Vulnerable	95
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	Highly vulnerable	1
	Residential / Other use	More vulnerable	5
	Residential / Industry and Warehousing	More Vulnerable	3
	Residential / Offices / Industry and Warehousing	More Vulnerable	14
	Residential / Offices / Industry and warehousing / Other use	More Vulnerable	3
	Residential / Offices / Other use	More Vulnerable	2
	Industry and warehousing	Less Vulnerable	5
	Offices / Industry and warehousing	Less Vulnerable	1
	Unknown	N/A	2

In order to inform the Sequential Approach to the allocation of development through the GMSF, this review entails a high-level GIS screening exercise overlaying the potential development sites against Flood Zones 1, 2, 3a and 3b and calculating the area of each site at risk. Flood Zones 1, 2 and 3a are sourced from the EA's Flood Map for Planning (Rivers and Sea) and Flood Zone 3b (functional floodplain) has been updated through this SFRA. Surface water risk to potential sites is assessed by way of the EA's Risk of Flooding from Surface Water (RoFSW) flood zones, namely the high risk 1 in 30 AEP zone; the medium risk 1 in 100 AEP zone; and the low risk 1 in 1000 AEP zone.

All sites assessment results are presented in the Development Site Assessment spreadsheet in Appendix B.

1.3 Screening of potential development sites

This section summarises the results included in the Development Site Assessment spreadsheet (Appendix B), produced from the GIS screening exercise. The LPA should use the spreadsheet to identify which sites should be avoided during the Sequential Test. If this is not the case, or where wider strategic objectives require development in areas already at risk of flooding, then the LPA should consider the compatibility of vulnerability classifications and Flood Zones (refer to FRCC-PPG) and whether or not the Exception Test will be required before finalising sites. The decision-making process on site suitability should be transparent and information from this SFRA should be used to justify decisions to allocate land in areas at high risk of flooding.

The Appendix B spreadsheet provides a breakdown of each site and the area (in hectares) and percentage coverage of each fluvial flood zone and each surface water flood zone. Fluvial Flood Zones 3b, 3a, 2 and 1 are considered in isolation. Any area of a site within the higher risk Flood Zone 3b that is also within Flood Zone 3a is excluded from Flood Zone 3a and any area within Flood Zone 3a is excluded from Flood Zone 2. This allows for the sequential assessment of risk at each site by addressing those sites at higher risk first. For the surface water flood zones, results are presented cumulatively. **Error! Reference source not found.** shows the number of sites within each fluvial flood zone and **Error! Reference source not found.** shows the number of sites within each surface water flood zone.

Table 1-2: Number of potential development sites at risk from fluvial flooding

Site category	Proposed site use	Number of sites within…			
		Flood Zone 1^	Flood Zone 2*	Flood Zone 3a**	Flood Zone 3b
GMSF Allocations 2019	Residential	0	0	0	2
	Mixed use	1	0	1	0
	Industry and warehousing	0	0	0	1
Land Supply 2018	Residential	329	12	10	25
	Offices	3	2	4	0
	Industry and warehousing	27	2	5	1
Call for Sites 2018	Residential	69	3	3	20
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	0	1
	Residential / Other use	1	1	2	1
	Residential / Industry and Warehousing	2	0	1	0
	Residential / Offices / Industry and Warehousing	12	0	0	2
	Residential / Offices / Industry and warehousing / Other use	2	0	0	1
	Residential / Offices / Other use	0	0	0	2
	Industry and warehousing	4	0	0	1
	Offices / Industry and warehousing	1	0	0	0
	Unknown	0	1	0	1
Total		**451**	**21**	**26**	**58**

^Sites with 100% area within Flood Zone 1

*No part of site within Flood Zones 3a or 3b

**No part of site within Flood Zone 3b

Table 1-3: Number of potential development sites at risk from surface water flooding

Site category	Proposed site use	Number of sites within…		
		Low Risk (1 in 1000)*	Medium Risk (1 in 100)**	High Risk (1 in 30)
GMSF Allocations 2019	Residential	0	0	2
	Mixed use	0	0	2
	Industry and warehousing	0	0	1
Land Supply 2018	Residential	70	45	100
	Offices	0	3	5
	Industry and warehousing	7	3	23
Call for Sites 2018	Residential	3	2	85
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	0	0	1
	Residential / Other use	0	0	5
	Residential / Industry and Warehousing	0	0	3
	Residential / Offices / Industry and Warehousing	0	0	14
	Residential / Offices / Industry and warehousing / Other use	0	0	3
	Residential / Offices / Other use	0	0	2
	Industry and warehousing	0	0	5
	Offices / Industry and warehousing	0	0	1
	Unknown	0	0	2
Total		**80**	**53**	**254**

*No part of site within medium or high risk zone

**No part of site within high risk zone

The spreadsheet also includes high level broad-brush strategic recommendations on the viability of development for each site. Development viability is assessed, based on Tables 1, 2 and 3 of the flood risk and flood zone tables[1] of the FRCC-PPG (Paragraphs 065 - 067). The strategic recommendations are intended to assist the LPA in carrying out the Sequential Test. Table 1-4**Error! Reference source not found.** shows the number of sites each strategic recommendation applies to.

1 https://www.gov.uk/guidance/flood-risk-and-coastal-change#flood-zone-and-flood-risk-tables

Strategic recommendations:

- Strategic Recommendation A - consider withdrawal if development cannot take place outside of Flood Zone 3b;
- Strategic Recommendation B - Exception Test required if site passes Sequential Test;
- Strategic Recommendation C - consider site layout and design around the identified flood risk if site passes Sequential Test, as part of a detailed FRA or drainage strategy;
- Strategic Recommendation D - site-specific FRA required; and
- Strategic Recommendation E - site permitted on flood risk grounds due to little perceived risk, subject to consultation with the LPA / LLFA.

Table 1-4 Strategic recommendations

Site category	Proposed site use	Strategic Recommendation				
		A	B	C	D	E
GMSF Allocations 2019	Residential	0	0	2	0	0
	Mixed use	0	0	1	1	0
	Industry and warehousing	0	0	1	0	0
Land Supply 2018	Residential	5	13	47	157	154
	Offices	0	0	1	7	1
	Industry and warehousing	0	0	2	32	1
Call for Sites 2018	Residential	7	2	21	61	4
	Residential / Gypsy and Traveller / Offices / Industry and warehousing / Other use	1	0	0	0	0
	Residential / Other use	0	0	3	2	0
	Residential / Industry and Warehousing	0	0	1	2	0
	Residential / Offices / Industry and Warehousing	0	0	4	10	0
	Residential / Offices / Industry and warehousing / Other use	0	0	1	2	0
	Residential / Offices / Other use	1	0	1	0	0
	Industry and warehousing	0	0	1	4	0
	Offices / Industry and warehousing	0	0	0	1	0
	Unknown	1	0	0	1	0
Total		**15**	**15**	**86**	**280**	**160**

It is important to note that this Level 1 SFRA does not assess each individual site in detail. Each individual site will require further investigation, as local circumstances may dictate the outcome of the strategic recommendation. The strategic recommendation may therefore change upon further investigation.

Such local circumstances may include the following:

- Flood depths and hazards will differ locally to each at risk site therefore modelled depth, hazard and velocity data should be assessed for the relevant flood event outlines, including climate change (using the EA's February 2016 allowances), as part of a site-specific FRA or Level 2 SFRA.
- Current surface water drainage infrastructure and applicability of SuDS techniques are likely to differ at each site considered to be at risk from surface water flooding. Further investigation would therefore be required for any site at surface water flood risk.
- It may be possible at some sites to develop around the flood risk. Planners are best placed to make this judgement i.e. will the site still be deliverable if part of it needs to be retained to make space for flood water?
- Surrounding infrastructure may influence scope for layout redesign/removal of site footprints from risk.
- Safe access and egress must exit at all times during a flood event for emergency response and evacuation
- Current land use. A number of sites included in the assessment are likely to be brownfield, thus the existing development structure should be taken into account as further development in excess of the current footprint may lead to increased flood risk.
- If sites have planning permission but construction has not started, the SFRA will only be able to influence the design of the development e.g. finished floor levels. New, more extensive flood extents (from new models) cannot be used to reject development where planning permission has already been granted.
- Existing planning permissions may exist on some sites where the EA may have already passed comment and/or agreed to appropriate remedial works concerning flood risk. Previous flood risk investigations/FRAs may already have been carried out at some sites.
- Cumulative effects. New development may result in increased risk to other potential or existing sites. This should be assessed through a Level 2 SFRA or drainage strategy, whichever may be applicable.

1.4 Strategic Recommendations

The following strategic recommendations provide only a guide, based on the fluvial and surface water flood risk information made available for this Level 1 SFRA. Information regarding local, site specific information is beyond the scope of this Level 1 SFRA. It is the LPA's responsibility to carry out sequential testing of each site using the information provided in this SFRA and more specifically using their local, site specific knowledge and advice from the EA and LLFA. The strategic recommendations should be read alongside the Development Site Assessment spreadsheet in Appendix B, which assists the LPA in carrying out the Sequential Test for each site.

1.4.1 Strategic Recommendation A – Consider withdrawal if development cannot take place outside of Flood Zone 3b

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation A applies to any site where the following criteria is true:

- 10% or greater of the site area is within Flood Zone 3b. The FRCC-PPG flood risk vulnerability classification states that only water-compatible uses and essential infrastructure should be permitted in Flood Zone 3b, though any essential infrastructure must pass the Exception Test and water-compatible uses must be designed and constructed to remain operational and safe for users in times of flood; must result in no net loss of floodplain storage; and not impede water flows and not increase flood risk elsewhere. Development should not be permitted for sites within the highly, more or less vulnerable categories that fall within Flood Zone 3b. If the developer is able to avoid 3b however, then part of the site could still be delivered.

The 10% threshold is not included within any policy, it is merely considered that it may prove difficult for developers to deliver a site where 10% or more of the site area is considered as undevelopable, based on the NPPF. This 10% threshold does not account for local circumstances therefore it may be possible to deliver some of the sites, particularly in larger sites, included with Strategic Recommendation A upon more detailed investigation through a Level 2 SFRA or drainage strategy.

Strategic Recommendation A applies to 15 of the 556 sites overall, due to their location within Flood Zone 3b (see **Error! Reference source not found.**).

Table 1-5 Sites to consider withdrawing if development cannot take place outside of Flood Zone 3b

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3b
Call for Sites 2018	1452245740905	Residential	0.58	32.27
Call for Sites 2018	1452855368329	Residential	40.69	17.64
Call for Sites 2018	1454692805770	Residential / Gypsy and traveller / Offices / Industry and warehousing / Other use	4.96	55.51
Call for Sites 2018	1455191117501	Unknown	6.01	10.28
Call for Sites 2018	1466429889749	Residential	4.77	65.66
Call for Sites 2018	1470227906721	Residential	4.08	65.80
Call for Sites 2018	1472736186952	Residential / Offices / Other use	9.01	10.45
Call for Sites 2018	1474039520517	Residential	12.60	30.57
Call for Sites 2018	1474384461167	Residential	9.91	14.81
Call for Sites 2018	1474980917288	Residential	3.52	24.82
Land Supply 2018	A/15/80530/FULL	Residential	0.25	55.60
Land Supply 2018	SHLAA0001A	Residential	15.70	18.36
Land Supply 2018	SHLAA0051	Residential	1.23	27.42
Land Supply 2018	SHLAA0346	Residential	0.35	13.20
Land Supply 2018	SHLAA0431	Residential	7.22	10.45

The LPA should refer to the SFRA maps in Appendix A to ascertain whether it may be possible to accommodate the risk onsite or whether site boundaries can be redrawn to remove 3b from the site before deciding whether to take these sites forward. The areas of functional floodplain must either be removed from the site footprint or be incorporated into site design by leaving these areas free of development. Such areas

could provide amenity greenspace for site users. A detailed site design together with a detailed FRA would have to show each site would be safe for its lifetime, which is 100 years for residential.

1.4.2 Strategic Recommendation B – Exception Test

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation B applies to sites where it is likely the Exception Test would be required, assuming the Sequential Test has been passed in the first instance. This does not include any recommendation on the likelihood of a site passing the Exception Test. A more in-depth investigation such as a Level 2 SFRA would be required to assess this. The developer / LPA should always attempt to avoid the risk area where possible.

Strategic Recommendation B applies to sites where the following criteria is true:

- 10% or greater of any more vulnerable site that is within Flood Zone 3a, unless already included in Strategic Recommendation A. Less vulnerable uses of land do not require the Exception Test.

NOTE: All development proposals in Flood Zone 3a must be accompanied by a flood risk assessment.

The 10% threshold is not included within any policy; it is merely considered that it would be very difficult for developers to avoid Flood Zone 3a when 10% or more of the site area is within it. This 10% threshold does not account for local circumstances therefore it may be possible to avoid Flood Zone 3a altogether for some of the sites included with Strategic Recommendation B. It may also be possible to deliver part of some of the larger sites, dependent upon further investigation, where a significant area is not within the FZ3a.

Strategic Recommendation B applies to 15 potential development sites, each of which is proposed for residential use (see

Table 1-6).

Table 1-6 Sites where the Exception Test would be required

Site category	Site ref	Proposed use	Site area (ha)	% within Flood Zone 3a
Call for Sites 2018	1452865101012	Residential	13.09	53.75
Call for Sites 2018	1488298070259	Residential	3.21	12.56*
Land Supply 2018	A/16/82925/FULL	Residential	0.04	100.00
Land Supply 2018	A/16/83339/FULL	Residential	0.01	100.00
Land Supply 2018	A/17/84367/FULL	Residential	0.03	100.00
Land Supply 2018	SHLAA0023	Residential	1.59	18.84*
Land Supply 2018	SHLAA0131	Residential	5.70	89.38
Land Supply 2018	SHLAA0205	Residential	6.30	13.03*
Land Supply 2018	SHLAA0240	Residential	3.17	12.44*
Land Supply 2018	SHLAA0325	Residential	0.62	61.39
Land Supply 2018	SHLAA0360	Residential	10.80	29.87*
Land Supply 2018	SHLAA0374	Residential	0.21	93.91*
Land Supply 2018	SHLAA0401	Residential	0.04	100.00
Land Supply 2018	SHLAA0405	Residential	0.44	47.70*
Land Supply 2018	SHLAA0446	Residential	0.02	17.08
*Also partially within Flood Zone 3b				

Each of these sites must be subject to and must pass the Exception Test. Judging by the considerable area that are at flood risk, it is unlikely that any of these sites would pass the Exception Test.

In order to pass both parts of the Exception Test, the LPA or developer must prove that development of the site will provide wider sustainability benefits to the community that outweigh flood risk, and that the development will be safe for its lifetime, without increasing flood risk elsewhere and where possible reducing flood risk overall. To avoid having to apply the Exception Test, the developer / LPA should attempt to avoid the risk area altogether.

1.4.3 Strategic Recommendation C – consider site layout and design as part of detailed FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a Flood Zone.

This recommends that, due to only a small proportion of a site being at fluvial risk, it may be possible that a detailed review of site layout and / or design around the flood risk, as part of a detailed FRA at the development planning stage, may enable development to proceed. Or it may be possible to incorporate suitable SuDS into the site layout to mitigate risk on-site, following a detailed FRA or drainage strategy. A Level 2 SFRA or detailed site-specific FRA would be required to help inform on site layout and design.

Strategic Recommendation C applies to sites where the following criteria is true:

- <10% of the area of any site type is within Flood Zone 3b.
- <10% of any more vulnerable site is within Flood Zone 3a.
- 10% or greater of any site type is within the medium risk surface water flood zone

The 10% threshold is not included within any policy, it is merely considered that it may be possible for developers to avoid Flood Zone 3b and Flood Zone 3a when less than 10% of the site area is at risk. In terms of surface water risk, sites with greater than 10% within the 1 in 100 AEP event outline (medium risk) are likely to have to pay greater attention to incorporating the surface water into the site layout and design. This 10% threshold does not account for local circumstances.

Paragraph 050 of the FRCC-PPG states:

"Local authorities and developers should seek opportunities to reduce the overall level of flood risk in the area and beyond. This can be achieved, for instance, through the layout and form of development, including green infrastructure and the appropriate application of sustainable drainage systems, through safeguarding land for flood risk management, or where appropriate, through designing off-site works required to protect and support development in ways that benefit the area more generally."

Overall there are 86 potential sites to which Strategic Recommendation C apples. 36 of these sites**Error! Reference source not found.** are partially within Flood Zone 3b (see Appendix B). The areas within Flood Zone 3b must not be developed and must be left as open space or the site boundaries adjusted to remove the 3b area from the site footprint. Of these 36 sites, 33 are categorised as highly vulnerable.

There are 37 sites located partially within Flood Zone 3a, 27 of which are also partially within Flood Zone 3b. 33 of the 37 sites in Flood Zone 3a are more vulnerable and therefore would be subject to the Exception Test if the site boundaries cannot be adjusted to remove the Flood Zone 3a areas. Also, for the less vulnerable sites, where possible, Flood Zone 3a areas should also be left to flood naturally.

45 of the 86 sites are potentially at significant risk from surface water.

Where Strategic Recommendation C applies to a potential site, the developer should consider the site layout with a view to removing the site footprint from the flood extent that is obstructing development. If this is not possible then the alternative would be to investigate the incorporation of on-site storage of water into the site design. Depending on local circumstances, if it is not possible to adjust the site boundary to remove the site footprint to a lower risk zone then this part of the development should not be permitted (for any site in Flood Zone 3b), or the Exception Test should be undertaken and passed as part of a site-specific FRA for the more vulnerable sites within Flood Zone 3a.

Any site layout and design within 8 m of any flood defence structure or culvert on a main river is likely to be a regulated flood risk activity under Schedule 25 of the Environmental Permitting (England and Wales) Regulations 2016. Site layout and design will have to take this into consideration for development proposals. This 8 m buffer is recommended by the EA to allow ease of access to watercourses for maintenance works. Any site redesign, where Flood Zones 3b and 3a, are included within the site footprint, should allow water to flow naturally or be stored in times of flood through application of suitable SuDS.

1.4.4 Strategic Recommendation D – development could be allocated subject to FRA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

This recommends that development could be permitted due to low flood risk perceived from the EA flood maps, assuming a site-specific FRA shows the site can be safe and it is demonstrated that the site is sequentially preferable. A site within Flood Zone 2 could still be rejected if the conclusions of the FRA decide development is unsafe or inappropriate.

Strategic Recommendation D applies to sites where the following criteria is true:

- Any site within Flood Zone 2 that does not have any part of its footprint within Flood Zone 3a or 3b, with the exception of a highly vulnerable development which would be subject to, and have to pass, the Exception Test.
- Less vulnerable and water compatible sites within Flood Zone 3a. No part of the site can be within Flood Zone 3b.
- Any site 100% within Flood Zone 1 where surface water flood risk is apparent but not considered significant.
- Any site 100% within Flood Zone 1 that is greater than or equal to 1 hectare in area.

Recommendation D applies to 280 potential sites overall. 259 of these sites are 100% within Flood Zone 1 with 255 of these 259 sites at some level of surface water risk. Four sites are at very low risk from surface water, according to the RoFSW, though are greater than 1 ha in area and therefore must be subject to a FRA.

1.4.5 Strategic Recommendation E – development could be allocated on flood risk grounds subject to consultation with the LPA / LLFA

This strategic recommendation DOES NOT take account of local circumstances, only that part of a site area falls within a flood zone.

Strategic Recommendation E applies to any site with its area 100% within Flood Zone 1, not within any surface water flood zone and less than 1 hectare in size.

This recommends that development should be allocated on flood risk grounds, based on the evidence provided within this SFRA. Further investigation may be required by the developer and an FRA would be required to assess further or new information that may not have been included within this SFRA. Recommendation E applies to 160 sites.

1.5 Climate change

As discussed in the main SFRA report, the potential development sites have been screened against fluvially modelled climate change outputs (using the EA's 2016 allowances), where available. For Trafford, 83 out of the 556 sites are located within 100m of watercourses which have been modelled for climate change. 43 of these 83 sites are not considered to be at additional risk from climate change. However, it is recommended that all 83 sites are reviewed against modelled climate change outputs

at the FRA stage, using the latest EA allowances at the time. See Appendix B for these sites.

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SKIPTON
North Yorkshire
BD23 3AE
United Kingdom

+44(0)1756 799919
info@jbaconsulting.com
www.jbaconsulting.com
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