

Gloucester City Council SFRA Level 2 Data Review

Gloucester City Council

19 January 2017



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1. Introduction

As part of Gloucester City Council's (GCC) Strategic Assessment of Land Availability (SALA), there is a requirement to update the local Strategic Flood Risk Assessment (SFRA) for the city of Gloucester.

The aims of commissioning the SFRA are:

- To develop an appropriate SFRA evidence base, to assess current flood risk and existing flood risk management infrastructure and to consider new potential development sites.
- To assess future flood risk.
- To assess the impact of flooding on the area and off-site, and to assess how impacts can be managed and mitigated.
- To provide guidance on the potential for spatial redevelopment of the area in ways that minimise flood risks, reflecting any reductions in that risk that are considered achievable and sustainable.

1.1. Project Brief

In December 2007 Gloucestershire County Council, in partnership with its Local Authorities, produced a Level 1 SFRA. The purpose of the SFRA is to assess and map all forms of flood risk from groundwater, surface water, sewer, river and tidal sources, taking into account future climate change predictions. This allows the Councils to locate future development primarily in low flood risk areas, using a sequential approach. A level 2 SFRA was undertaken in 2011, for some parts of the Gloucester district.

The SFRA now needs updating to take into account the new data available, policy changes, new potential development sites, and to extend the Level 2 SFRA to all areas.

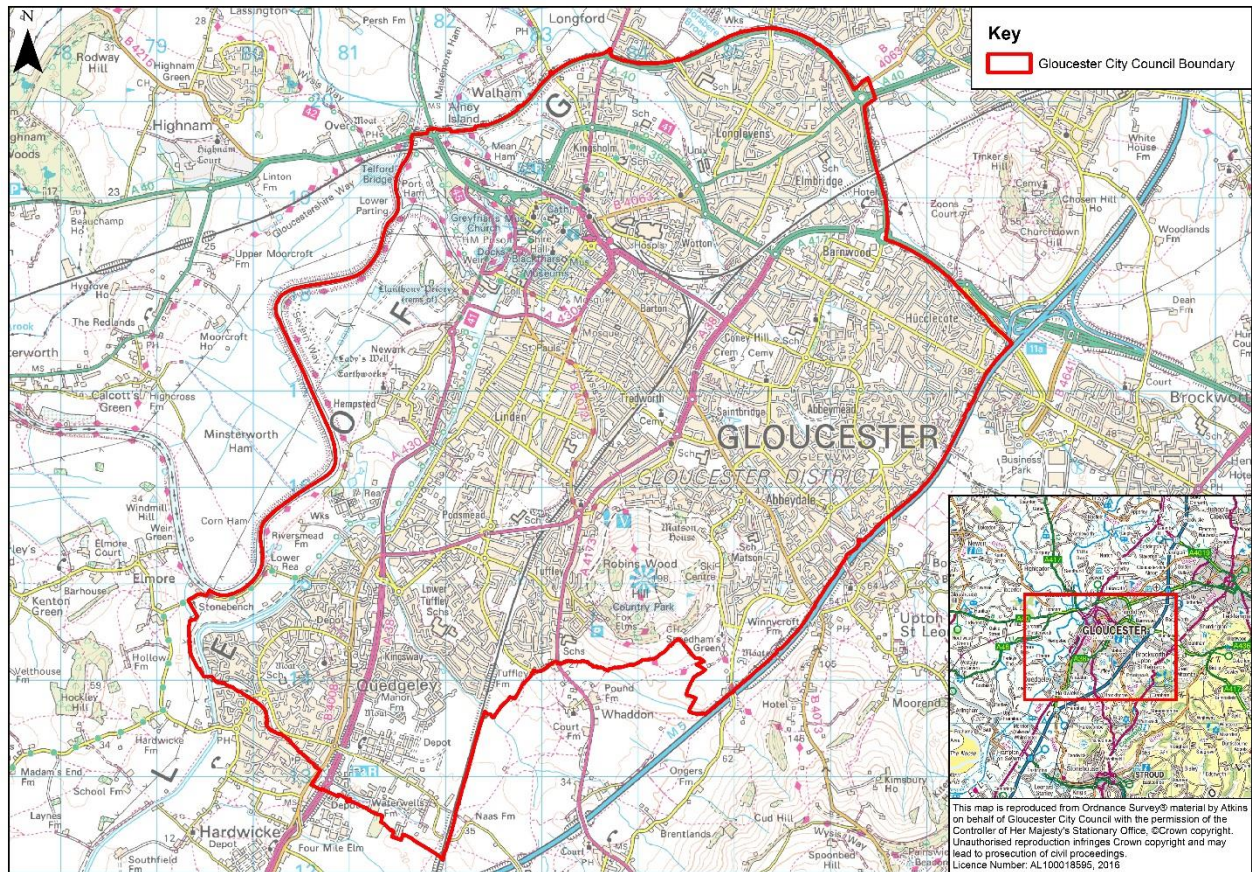
The update to the SFRA is split into two stages. Stage 1 comprises a review of data and reports pertinent to the SFRA update, as detailed in this report. The Stage 1 work also includes the production of a site specific flood risk sheet for each SALA development site. Stage 2 consists of the update to the SFRA, the scope of which is laid out in Section 6.

1.2. The Study Area

The city of Gloucester is situated in the south west of England close to the Welsh border. Gloucester is drained by the River Severn. The River Severn has a number of flood defences at certain critical locations within the Gloucester District. However, these are not considered to provide full protection. Furthermore, during high flows its tributaries can back up causing elevated water levels, and associated flooding.

The topography of the city is relatively flat and low lying, resulting in a susceptibility to flooding. The figure below illustrates the study area.

Figure 1-1 Study Area



The city of Gloucester and surrounding areas have periodically been subject to flooding events. Notably 2007 saw large parts of the city inundated with over 1,100 properties estimated to have flooded. The risk of flooding in Gloucester is from fluvial, tidally influenced fluvial, surface water and groundwater.

Parts of the Gloucester catchment have undergone investment in flood defence and management since the 2007 storms.

2. SALA Development Sites

GCC initially identified 117 potential sites for development within the city of Gloucester. From these sites 22 are being brought forward for consideration for potential development. The site GIS outlines provided have been digitised and the watercourse catchment within which each site falls has been identified.

The SALA (January 2015) states that the National Planning Policy Framework (NPPF) makes it clear that where there are no reasonably available sites in Flood Zone 1, local authorities may consider development in Flood Zone 2. Sites in Flood Zone 2 have therefore been considered suitable for some development in this assessment subject to a detailed Flood Risk Assessment on the appropriateness, scale and nature of the development.

Sites have generally been assessed as unsuitable if they fall entirely within Flood Zones 3a and 3b (SFRA Level 2 2010 and 2013). A site's capacity for development is adjusted where part of the site falls within Flood Zone 3a or 3b. Consideration has also been given to whether a site includes a watercourse, culverted watercourse or a planned scheme to mitigate flood risk. It should be noted that with the updated climate change guidance released in February 2016, the available development area may be reduced. This will be discussed in detail in Section 3.

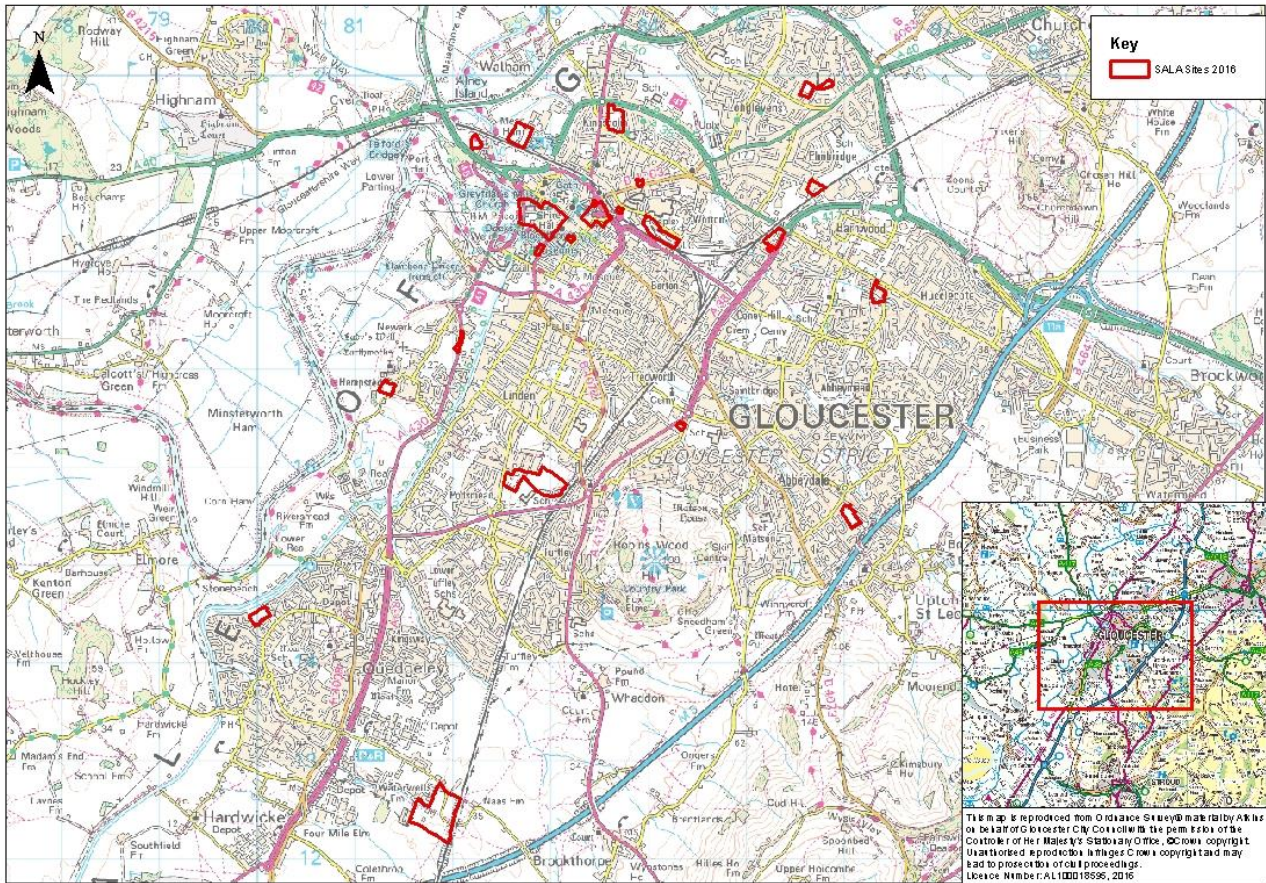
The 22 sites considered as part of this assessment are listed below in Table 2-1, and the location shown in Figure 2-1.

Table 2-1 SALA Development Sites

Reference	Name	Catchment	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3 (%)
SA01	Land at The Wheatridge	River Twyver	100	0	0
SA02	Manor Gardens, Barnwood	Wotton Brook	85	15	9
SA03	Gloucester Mail Centre	Wotton Brook	100	0	0
SA04	Helipebs, Sisson Road	Horsbere Brook	100	0	0
SA06	Civil Service Sports Club	River Twyver	2.5	97.5	0
SA07	67-69 London Road	River Twyver	100	0	0
SA08	Wessex House	River Twyver	100	0	0
SA09	Railway Corridor Great Western Sidings	River Twyver	100	0	0
SA10	Land at Leven Close and Paygrove Lane	Horsbere Brook	89.5	10.5	4.9
SA11	Land adjacent St Aldates	Sud Brook	100	0	0
SA12	Blackbridge Sports Hub	River Severn	100	0	0
SA13	Land east of Waterwells Business Park	Dimore Brook	100	0	0
SA14	Land at Clearwater Drive	River Severn	100	0	0
SA15	Kings Quarter	River Twyver	72	28	11
SA16	Greater Blackfriars	River Severn	63.5	36.5	21
SA17	Southgate Moorings and Car Park	River Severn	100	0	0
SA18	104 Northgate Street	River Severn	67	33	0
SA19	Land adjacent to Eastgate Shopping Centre	River Severn	100	0	0
SA20	Rear of former cattle market	River Twyver	0	100	9
SA21	Former Town Ham Allotments	River Severn	0	100	2

Reference	Name	Catchment	Flood Zone 1 (%)	Flood Zone 2 (%)	Flood Zone 3 (%)
SA22	Secunda Way Industrial Estate	Gloucester and Sharpness Canal	81	19	1
SA23	Land at Rea lane, Hempsted	River Severn	100	0	0

Figure 2-1 SALA Site Locations



3. Climate Change Guidance

The NPPF sets out how the planning system should help minimise vulnerability and provide resilience to the impacts of climate change. NPPF and supporting planning practice guidance on Flood Risk and Coastal Change explain when and how Flood Risk Assessments should be used. This includes demonstrating how flood risk will be managed now and over a development’s lifetime, taking climate change into account. Local planning authorities refer to this when preparing local plans and considering planning applications.

As of 19th February 2016 the government updated the climate change guidance which is to be considered during the planning process. This supersedes the climate change guidance within the Planning Practice Guidance, where typically a 20% allowance for uplift on river flows was given. This change will need to be reflected in the updated SFRA. Further details can be found here:

<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

The updated percentage allowances for climate change required for consideration in development are dependent on the following factors:

- Regional/catchment location within the UK.
- Development type, in line with the planning practice guidance on Flood Risk and Coastal Change. For example essential infrastructure such as highways or power stations, highly vulnerable such as Emergency services infrastructure, more vulnerable such as residential developments, less vulnerable such as commercial buildings or water compatible such as ports and marinas.
- Flood Zone of development, as shown on the Environment Agency Flood Zone maps or Strategic Flood Risk Assessment.
- Lifetime of development; allowances are provided up to 2115 and therefore the anticipated lifetime of the development will in part determine the allowance required.

The table below contains the range of climate change allowances for the Severn River Basin district, which may need to be considered.

Table 3-1 Climate change allowances for the Severn River Basin

Allowance category	Total potential change anticipated for the ‘2020s’ (2015 to 2039)	Total potential change anticipated for the ‘2050s’ (2040 to 2069)	Total potential change anticipated for the ‘2080s’ (2070 to 2115)
Upper End	25	40	70
Higher Central	15	25	35
Central	10	20	25

The Environment Agency will base its planning advice to Local Planning Authorities on this updated guidance except for the following situations, where the previous guidance can still be used.

- A development plan already submitted for examination e.g. Development Consent Order process.
- A valid planning application already submitted to the local planning authority.

Where a project is already at the stages above it is not anticipated that the revised climate change allowances will need to be accounted for within the Flood Risk Assessment. However, where a project is at the pre-planning stage, then the updated allowances will need to be considered within reporting.

The Environment Agency has confirmed that the new climate change rules should be considered for the update of the SFRA.

4. Data Availability

An extensive list of data was requested to inform the study. The full list can be found in Appendix A. The data was requested from GCC, Gloucestershire County Council and the Environment Agency. All data obtained has been reviewed and key datasets are discussed in the following sections:

- Surface Water Management Plan modelling (SWMP) data (including models if available).
- Risk of flooding from rivers and sea – Detailed.
- Risk of pluvial flooding.
- Risk of groundwater flooding.
- Hydraulic modelling.
- Flood zones.

4.1. Surface Water Management Plans

The Surface Water Management Plans (SWMPs) were produced in 2013/2014 by Gloucestershire County Council acting as Lead Local Flood Authority with the most up to date data available at that time.

Table 4-1 SWMPs in the study area

Name	Date	Description
North Gloucester Surface Water Management Plan	2014	Overview of the management strategy of surface water in the north of Gloucester; encompassing Horsbere Brook, Wotton Brook, Normans Brook and includes the urban area of north Gloucester, Churchdown, Innsworth, Longford and Twigworth.
Central Gloucester Surface Water Management Plan	2014	Overview of the management strategy of surface water in central Gloucester; encompassing Sud Brook, River Twyver, Matson Brook and Linden Brook.
South Gloucester Surface Water Management Plan	2014	Overview of the management strategy of surface water in the south of Gloucester; encompassing Black Ditch, Daniel's Brook, Dimore Brook, Shorn Brook and Whaddon Brook.

The 2014 SWMPs are based upon the stage 1 SWMP work. This found that flooding mechanisms in Gloucester are highly complex, with significant interactions between fluvial and surface water systems.

The modelling included in the 2014 SWMP listed above developed a Level 2 ICM model. This consisted of the existing modelling from the First Edition SWMP, watercourses and culverts; thus producing a single integrated model (divided into three sub study boundaries: North, Central and South). This model allows all flooding mechanisms to be simulated in an integrated way. It should be noted that this model includes the Horsbere Brook flood storage area and the Daniels Brook flood alleviation scheme.

Gloucestershire County Council were asked to comment on the dataset and provided the following opinion:

- The SWMPs were produced in 2013 with the most up to date data available at that time, which was their own locally agreed surface water flood data.
- The Environment Agency's updated Flood Maps for Surface Water (uFMfSW) were produced after the SWMPs and therefore, although less site specific, the data from these is more up to date.
- It is important to consider any flood alleviation schemes which have since been implemented and therefore change the flood risk in those locations.
- The council would advise that any scheme progressed on the basis of the SWMPs should be re-modelled based upon the most recent data available at that time and reassess the works / schemes proposed.

4.2. Hydraulic Modelling

The watercourses within the city of Gloucester with potential to flood the proposed development sites have been considered. The hydraulic models for these watercourses have been obtained and the extents examined to see if the sites fall within the extents. The results of which are shown in Table 4-2. Where these sites have previously been modelled, the models will be available for use within Stage 2 of the SFRA study. The majority of sites are covered by existing hydraulic modelling, however two sites are not covered and therefore may need additional hydrological and hydraulic modelling in order to produce a site specific Flood Risk Assessment.

Table 4-2 Watercourses modelled/not modelled

Site name	Model available	Sites within Catchment	Sites NOT Covered by model extents
Horsbere Brook	Has been modelled but model is owned by developer	SA10 SA04	
Wotton Brook	Yes	SA02 SA03	
Sud Brook	Yes	SA11	
River Twyver	Yes	SA09 SA01 SA15 SA07 SA08 SA20	SA06
Daniel's Brook	Yes		
Dimore Brook	Yes	SA13	
Whaddon Brook	Yes		
River Severn	Yes	SA14 SA17 SA16 SA21 SA19	SA12 SA18 SA23 SA22

The Environment Agency was consulted, and advised that all fluvial models are current. The potential issue with the models is they use the previous climate change guidance figure of 20%, and not the new climate change guidance figures. Development Plans should be produced using the latest guidance and therefore these models will need re-running with the new climate change figures. The Environment Agency has no plans to re-run the models with the new climate change factors at present and so it will be for developers/consultants to do this.

4.3. GIS datasets

A number of GIS datasets were requested and obtained from the Environment Agency and Local Authorities. These are listed below. The Environment Agency has commented on some of these datasets, see Section 5. The Environment Agency has suggested that all datasets are deemed suitable for use. However, some may need updating, especially Flood Zone or modelling data which will be affected by the new climate change guidance.

Table 4-3 presents the data availability for the SFRA for the city of Gloucester. The data is considered appropriate to conduct the required level of assessment. This has been verified through discussion with the Environment Agency.

Table 4-3 Available data register

Data Type	Data Provider	Comments
LiDAR	Environment Agency	Digital topographic data used in the modelling
Fluvial models	Environment Agency	Environment Agency fluvial models available for watercourses as detailed in Table 4-2.

Shapefile of proposed development sites	Gloucester City Council	Full list of 117 sites provided, however a number of sites are no longer being considered for development or have already been developed.
Historic landfill	Environment Agency	Eight main landfill sites within city boundary
Reservoir locations	Gloucester City Council	Reservoir locations, primarily outside the city boundary and within close proximity to main channel of River Severn.
Groundwater information	Gloucester City Council	Information on groundwater vulnerability, aquifer designation etc.
Surface Water Flood Maps	Gloucester City Council	Flood map showing extents of potential flooding from surface water

4.4. Site Specific Flood Risk Sheets

The data listed in the section above has been analysed and for each of the sites identified in Table 2-1 a site specific flood risk sheet has been produced. The site specific flood risk sheets contains the following information:

- Site name, area, National Grid Reference.
- Description of potential sources of flooding.
- An indication of access and egress routes.
- Recommendation/ future data needs.
- Maps showing extent of flooding (based on Environment Agency Flood Zones).

The site specific flood risk sheets can be updated during Stage 2 of the project with site specific modelling data (where available); an example of these is shown in the following figure.

5. Consultation with the Environment Agency

The available data sets have been discussed with the Environment Agency in order to understand if any improvements to the datasets are required in order to inform the SFRA update.

The Environment Agency commented that the data is suitable, however consideration must be given to the new climate change guidance for the existing river models and Flood Zone outlines. The previous guidance was to incorporate a 20% increase on peak river flows for climate change allowance. The new guidance now has a range of figures that may be applicable for a climate change allowance, as outlined in Section 3.

The Environment Agency has advised that as this work is for a development plan that the 70% figure be used (this is the 'Upper End' figure for 2070 – 2115). This is considered appropriate because Local Plans can cover a range of development vulnerabilities that are likely to be in place for the long-term (i.e. +100 years). This is so that the development plan is in accordance with the latest planning guidance and to ensure that development is appropriate taking climate change into account.

The Environment Agency has advised that the 'Upper End' climate change allowance of 70% (for 2070 – 2115) should be applied

Table 5-1 EA comments on the available data register

Data Type	Description	Environment Agency Comments
LiDAR	Digital topographic data used in the modelling	LiDAR is OK to use and widely available. It may get slightly out of date over time. The Environment Agency only commission new fly-overs if there is a specific project/reason to do so, and this would not be that common but any updated data would then be made available.
Fluvial models	Environment Agency fluvial models available for watercourses. Horsbere Brook Wotton Brook Sud Brook River Twyver Daniel's Brook Dimore Brook Whaddon Brook River Severn	The Environment Agency advise that all fluvial models are current and ok to use. These models are currently used by the Environment Agency when reviewing and advising on development as they are best available information. They may be reviewed and updated in future, but at present they are ok to use. The main consideration with these models is they use the previous climate change guidance figure of 20%, and not the new climate change guidance figures. Development Plans should be using the latest guidance and therefore these models will need re-running with the new climate change figures. At present the Environment Agency has no plans to re-run the models with the new climate change figures so it will be for developers/consultants/LAs to do this.
Groundwater information	Information on groundwater vulnerability, aquifer designation etc.	This information is ok to use and current. The aquifer designation maps are not likely to be altered (it should be ensured that the 'Principle' and 'Secondary' Aquifer maps, and not the old 'major and minor' aquifer maps, are being used). The groundwater vulnerability information will be updated at some point, possibly over the next year. The current data is based on 250km maps and the new data will be based on 50km maps so the groundwater vulnerability information will be more detailed and accurate in future. However the current data sets are the best available information at present and are ok to use.
Surface Water Flood Maps	Flood map showing extents of potential flooding from surface water	The Environment Agency originally produced this information, but now just 'hold' it and it is LLFA data. The LLFA is responsible for any updates.

6. Recommendations for Stage 2

A Level 2 SFRA is required, providing an update to that conducted in 2011. The Level 2 SFRA should:

- Improve existing flood outline information for key watercourses. Where required, this will include updating in line with new climate change guidance issued in February 2016, and, more specifically, in line with guidance from the Environment Agency to test the Upper End flow allowance of 70%.
- Assess the flood hazard posed by these watercourses.
- Assess the residual flood risk posed by these watercourses (blockages and defence failures).
- Assess the risk of flooding from surface waters.
- Consider the revised SALA document and any additional sites.

The data available to undertake this work has been collected and reviewed and the Environment Agency has been consulted on data quality. Based on this analysis the scope to undertake this work is outlined below.

Table 6-1 Stage 2 Outline Scope

Number	Stage	Description and assumptions
1	Review any additional SALA sites with Flood Zones to identify any further sites requiring modelling.	The sites have been screened by Flood Zone, these will be reviewed and any new allocations considered.
2	Discuss with the EA.	Discuss initial findings with the Environment Agency for agreement on which sites require modelling. Agree proposed modelling methodology. Agree approach for remaining sites.
3	Run hydraulic models with a 70% climate change uplift for agreed sites.	Use existing hydraulic models listed in this report to assess the impact of a 70% flow increase.
4	Assess impact on surface water flood risk.	Use the SWMP and surface water flood maps to assess risk to sites. Agree with the Environment Agency if these need to be updated to reflect climate change guidance.
5	Update site specific sheets for all sites.	Use more detailed information to update existing site specific sheets to inform potential developers. Assess residual risk and access and egress. Identify next steps/further work for developers.
6	Level 2 SFRA.	Use previous stages to produce a Level 2 SFRA report.

Appendix A. Data Requested

Item	Dataset / information
Reports	Strategic Flood Risk Assessment (SFRA)
	Local Flood Risk Management Strategy (LFRMS)
	Any additional reports held by Gloucester City that contain information relating to flooding
Modelling Data	Fluvial modelling data (including models if available)
	Surface Water Management Plan (SWMP) modelling data (including models if available)
LiDAR	Highest Resolution LiDAR available (preferably 1m resolution or better)
Water resources	Location of any springs
	Location of any known culverted watercourses
	Surface water gauging station flow measurements, Q95 – please provide the nearest gauging stations to be used if there are none within the study area
Groundwater	Groundwater Vulnerability
	Aquifer Bedrock Geology Designation
	Aquifer Superficial Deposits Designation
	Areas Susceptible to Ground Water Flooding
	Water level monitoring information from EA monitoring boreholes
	Location of any Source Protection Zones (SPZs)
Flood Risk	Flood Map
	Flood Risk Areas
	Risk of Flooding from Rivers and Sea – Detailed
	Risk of Pluvial Flooding
	Risk of groundwater Flooding
	Risk of Reservoir flood risk
	Flood zones
Permits	Licensed abstractions (groundwater and surface)
	Discharge consents – with receiving water environment stated - i.e. to groundwater or surface water
Other	Environmental permits (with discharges to controlled waters)
	Historic Landfill
	Permitted Waste Sites - Authorised Landfill Site Boundaries
Existing drainage infrastructure	Details of the existing drainage system
OS Mapping	OS 1:10,000 Scale Colour Raster
	OS 1:25,000 Scale Colour Raster
	OS 1:50,000 Scale Colour Raster

Appendix B. Site specific Flood Risk Sheets

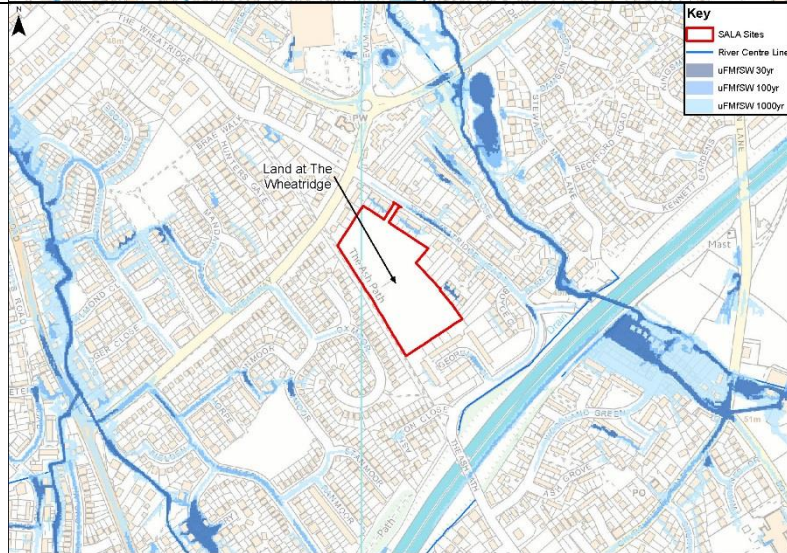
City Plan Reference	SA01	
SALA Reference	SUB09	
Site Address	Land at The Wheatridge, Upton St Leonards, Gloucester, GL4 5DP	
National Grid Reference	386057, 215504	
Catchment	River Twyver	
Primary Source of Flood Risk	None	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	2.28	
Area within FZ1 (Ha)	2.28 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	No.	
Is the site at risk from groundwater flooding?	<25% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Likely as site is greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via The Wheatridge East.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via The Wheatridge East.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration	

of climate change scenarios will be required, potentially reducing the developable area of the site.

Environment Agency Flood Zone Map

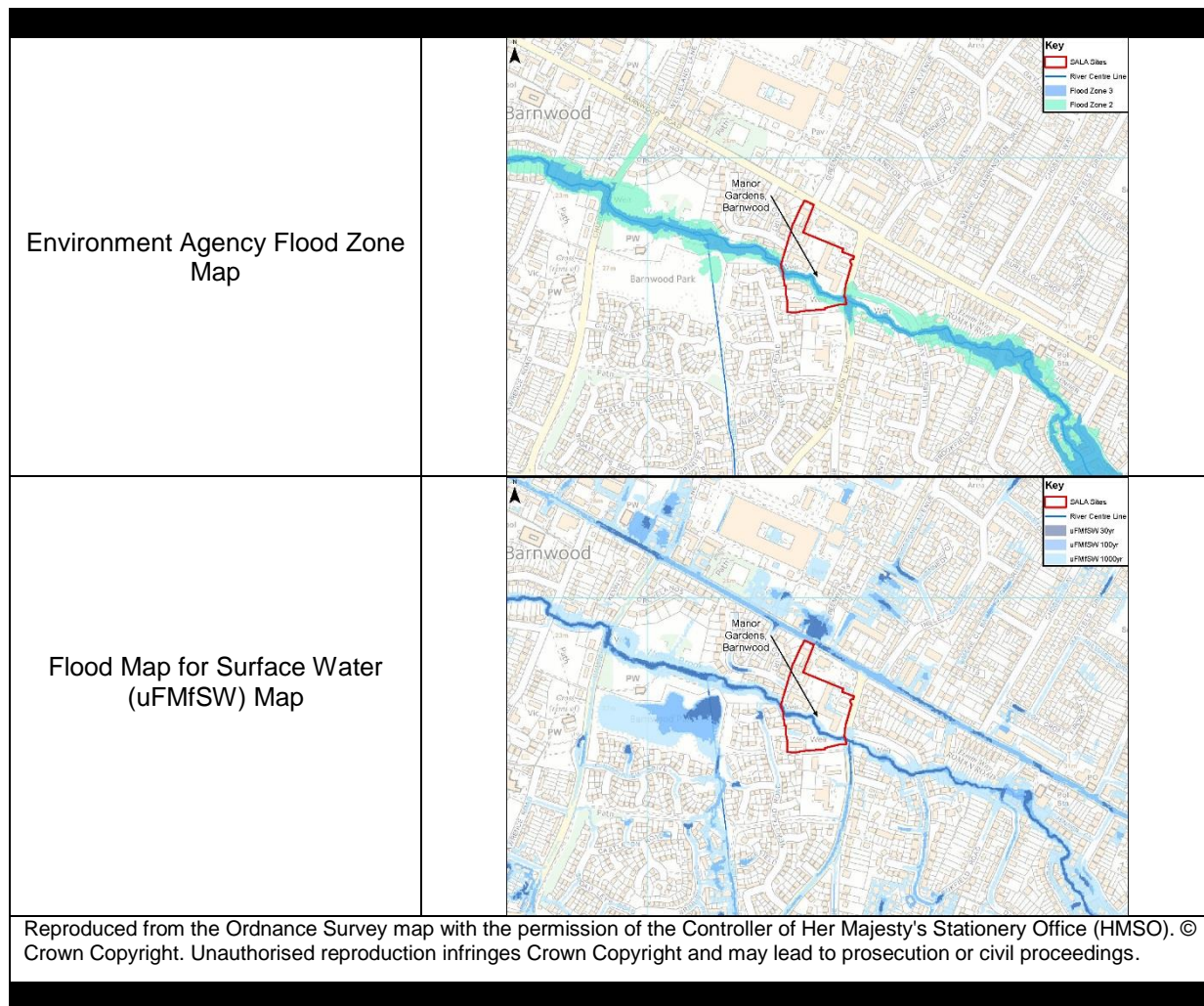


Flood Map for Surface Water (uFMfSW) Map

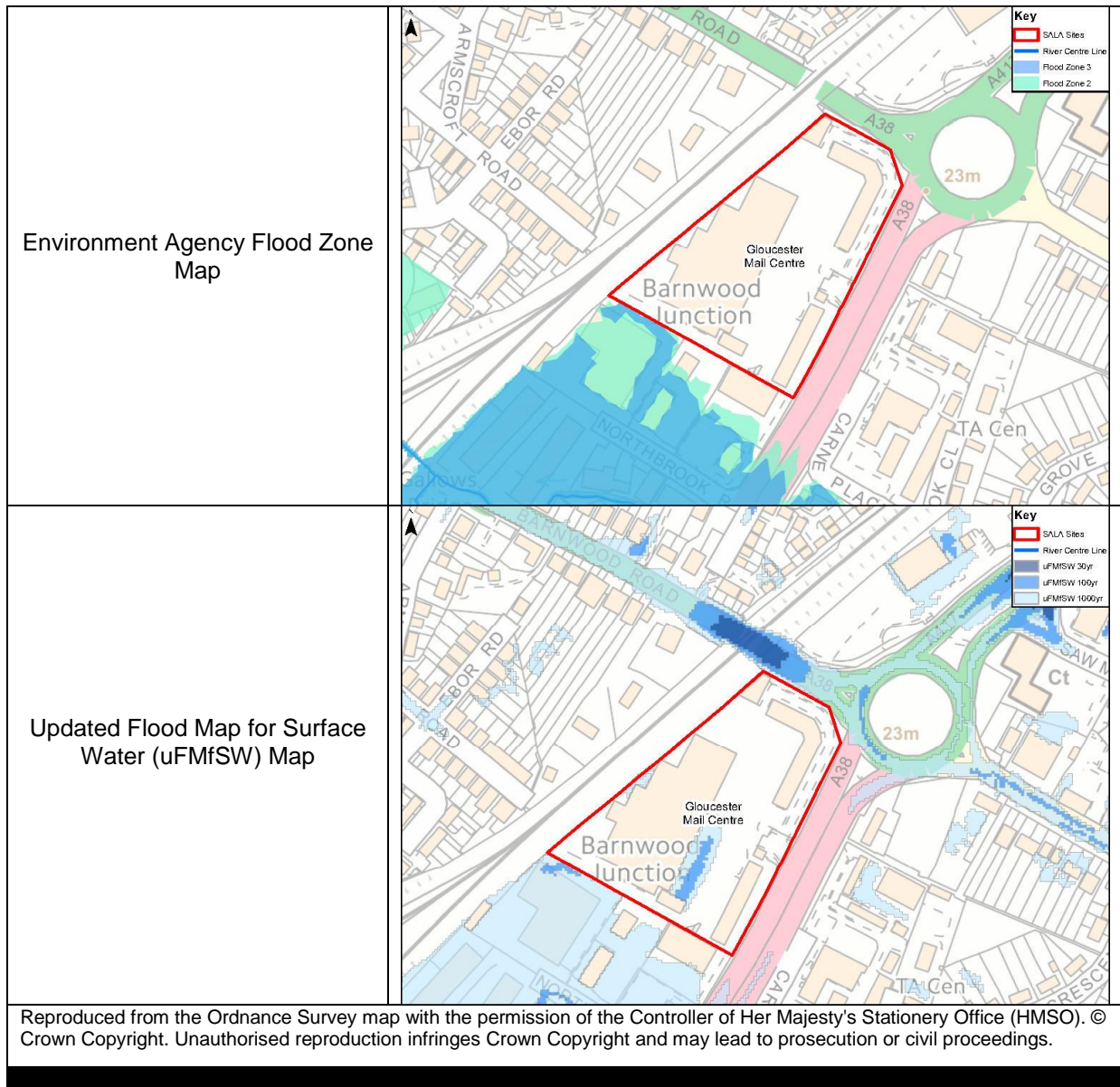


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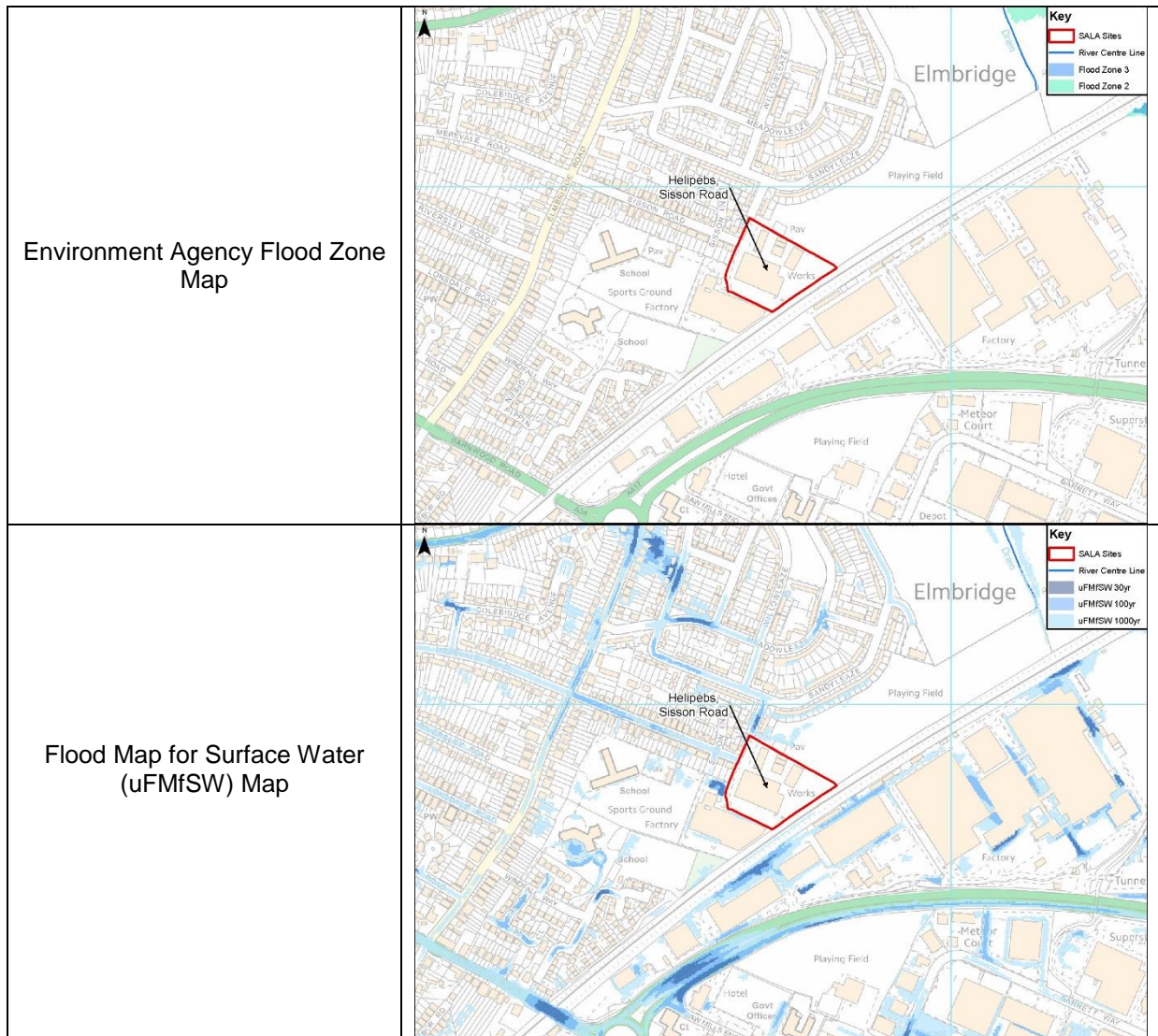
City Plan Reference	SA02	<p>The map shows the site location in Gloucester, near Barnwood. A red outline indicates the SALA Site, and a blue line shows the River Centre Line. The site is located near Manor Gardens, Barnwood, and Wotton Brook. The map includes a key and a north arrow.</p>
SALA Reference	SUB25	
Site Address	Manor Gardens, Barnwood, Gloucester, GL4 3TQ	
National Grid Reference	386335, 217775	
Catchment	Wotton Brook	
Primary Source of Flood Risk	Wotton Brook	
Secondary Sources of Flood Risk	Surface water	
Site Area (Ha)	1.95	
Area within FZ1 (Ha)	1.66 (85%)	
Area within FZ2 (Ha)	0.28 (15%)	
Area within FZ3 (Ha)	0.18 (9%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	>= 25% <50% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	The majority of the site is brownfield but developed greenfield areas may mean an increase in surface water runoff from the site.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Barnwood Road, North Upton Lane and Newstead Road.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Barnwood Road, North Upton Lane and Newstead Road.	
Is the site covered by flood warnings?	Yes, part of the site lies in a Flood Alert area.	
Is compensatory flood storage required?	Yes.	
Can the loss of floodplain be compensated for within the site boundaries?	Possibly.	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site is largely outside Flood Zone 2 and 3 and has safe access and egress the Exception Test is likely to be passed. However, due to parts of the site lying in Flood Zone 3 'Highly Vulnerable' development types would not be allowable in some areas.	
Recommendations / Future Data Needs	Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should be avoided in the Flood Zone 2 and 3 areas where possible. A Flood Risk Assessment will need to be undertaken by the developer. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site. No development shall take place within 8m of top of bank to either side of watercourse.	



City Plan Reference	SA03	
SALA Reference	SUB56	
Site Address	Gloucester Mail Centre, Eastern Avenue, Gloucester, GL4 3AA	
National Grid Reference	385274, 218355	
Catchment	Wotton Brook	
Primary Source of Flood Risk	Surface water	
Secondary Sources of Flood Risk	Wotton Brook	
Site Area (Ha)	2.25	
Area within FZ1 (Ha)	2.25 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No	
Is the site at risk from surface water flooding?	Yes	
Is the site at risk from groundwater flooding?	>=50% <75%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No	
Will the development potentially result in off-site impacts, e.g. increased runoff?	The site is brownfield so no increase is expected.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Eastern Avenue.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Eastern Avenue.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Further assessment on the Wotton Brook may be required, as the site is on the edge of the fluvial Flood Zone 2 and 3. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



City Plan Reference	SA04	
SALA Reference	SUB04	
Site Address	Helipebs, Sisson Road, Gloucester, GL2 0RE	
National Grid Reference	385692, 218861	
Catchment	Horsbere Brook	
Primary Source of Flood Risk	None	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	1.67	
Area within FZ1 (Ha)	1.67 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	No.	
Is the site at risk from groundwater flooding?	>= 50% <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Unlikely as it is a brownfield site.	
Is there safe access and egress to the site during a flood event for occupants?	Yes for fluvial, via playing field to the north east. Adjacent roads shown to be at risk from surface water flooding.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes for fluvial, via playing field to the north east. Adjacent roads shown to be at risk from surface water flooding.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	

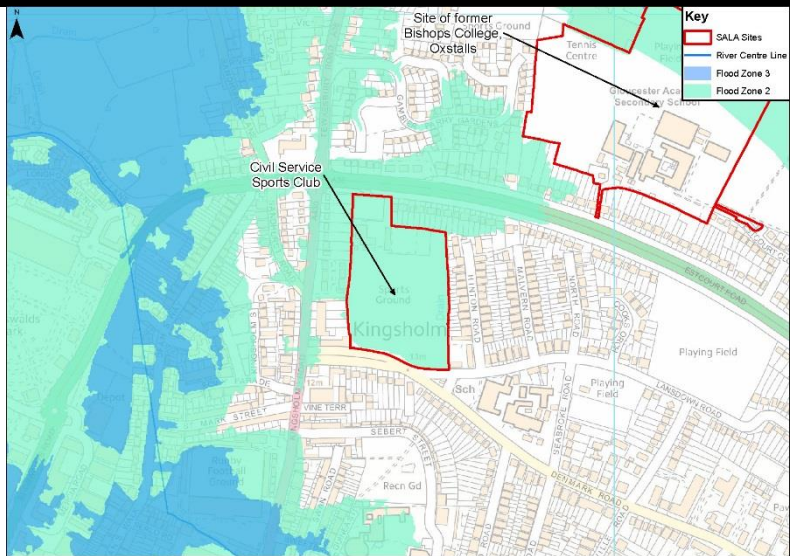


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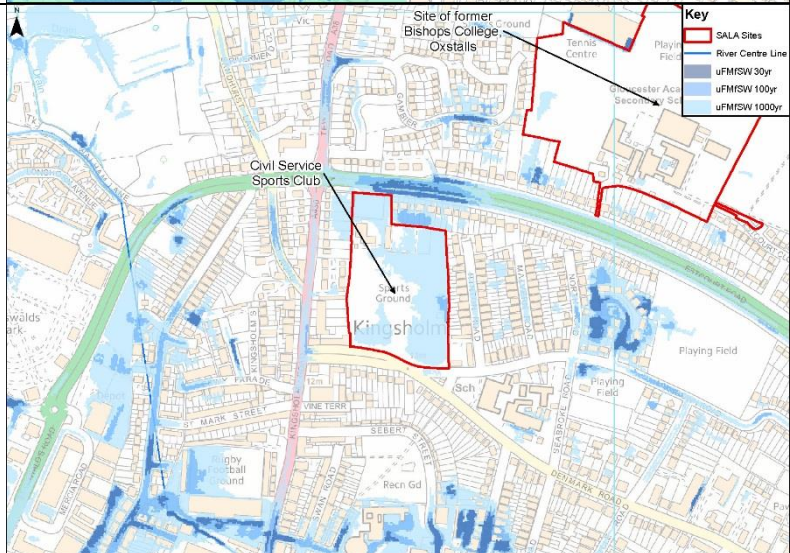
City Plan Reference	SA06	
SALA Reference	SUB52	
Site Address	Civil Service Sports Club, Hinton Rd, Gloucester, GL1 3JS	
National Grid Reference	383652, 219561	
Catchment	River Twyver	
Primary Source of Flood Risk	River Twyver	
Secondary Sources of Flood Risk	Surface water	
Site Area (Ha)	3.67	
Area within FZ1 (Ha)	0.09 (2.5%)	
Area within FZ2 (Ha)	3.58 (97.5%)	
Area within FZ3 (Ha)	0.00 (0.0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes majority of the site is predicted to flood from surface water. The drain running along the eastern boundary of the site may require further investigation.	
Is the site at risk from groundwater flooding?	>= 50% <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes, the site is currently greenfield (sports ground).	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Denmark Road to the south.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Denmark Road to the south.	
Is the site covered by flood warnings?	No, falls just outside a Flood Warning area.	
Is compensatory flood storage required?	If the updated 100 year plus climate change boundary is shown to encroach on the site then compensation will be required.	
Can the loss of floodplain be compensated for within the site boundaries?	Potentially.	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	Site falls almost entirely within Flood Zone 2 and is susceptible to surface water flooding, however access and egress routes exist therefore the Exception Test could be passed, dependent on the development type.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration</p>	

of climate change scenarios will be required, potentially reducing the developable area of the site.

Environment Agency Flood Zone Map

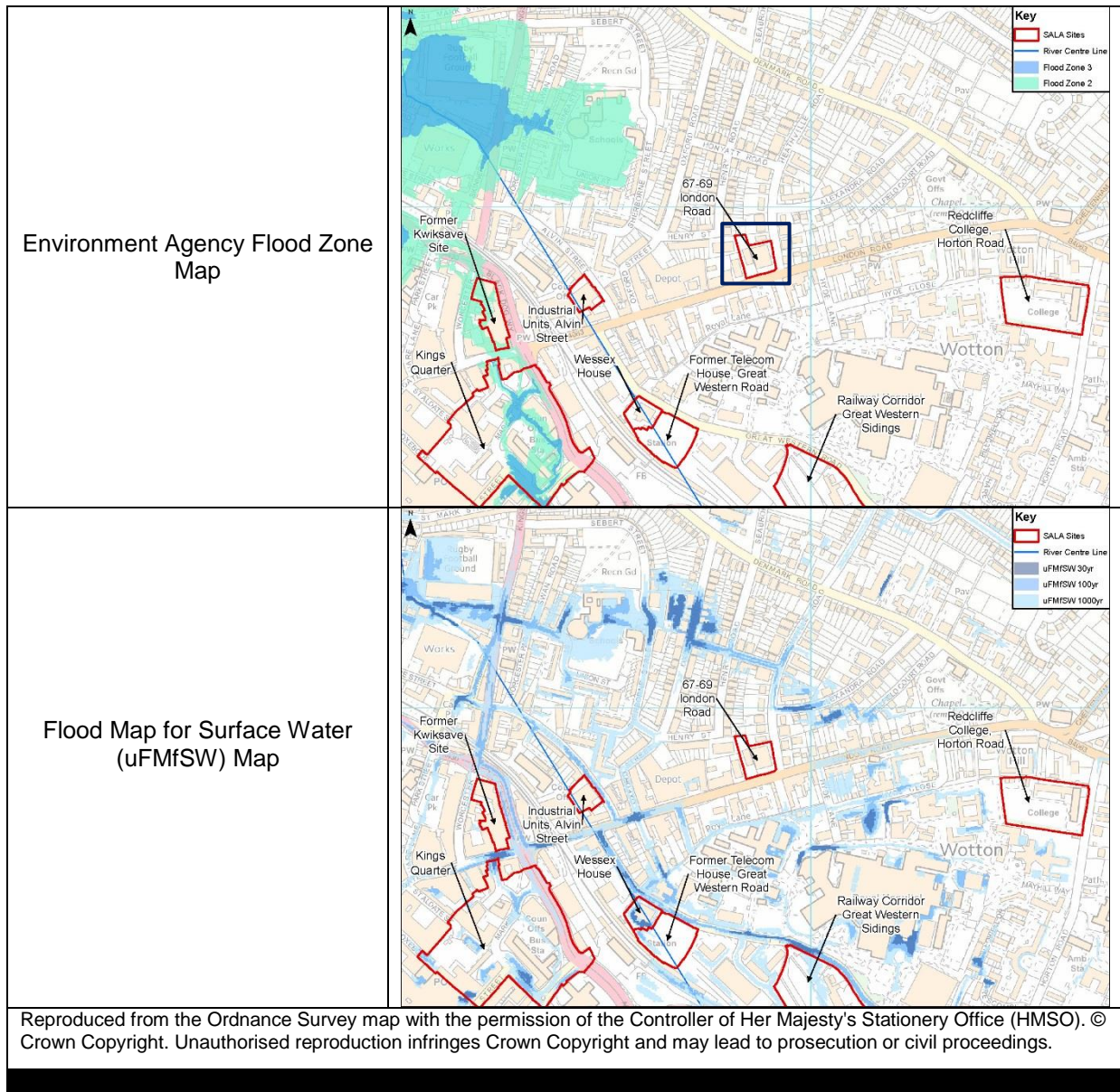


Flood Map for Surface Water (uFMfSW) Map

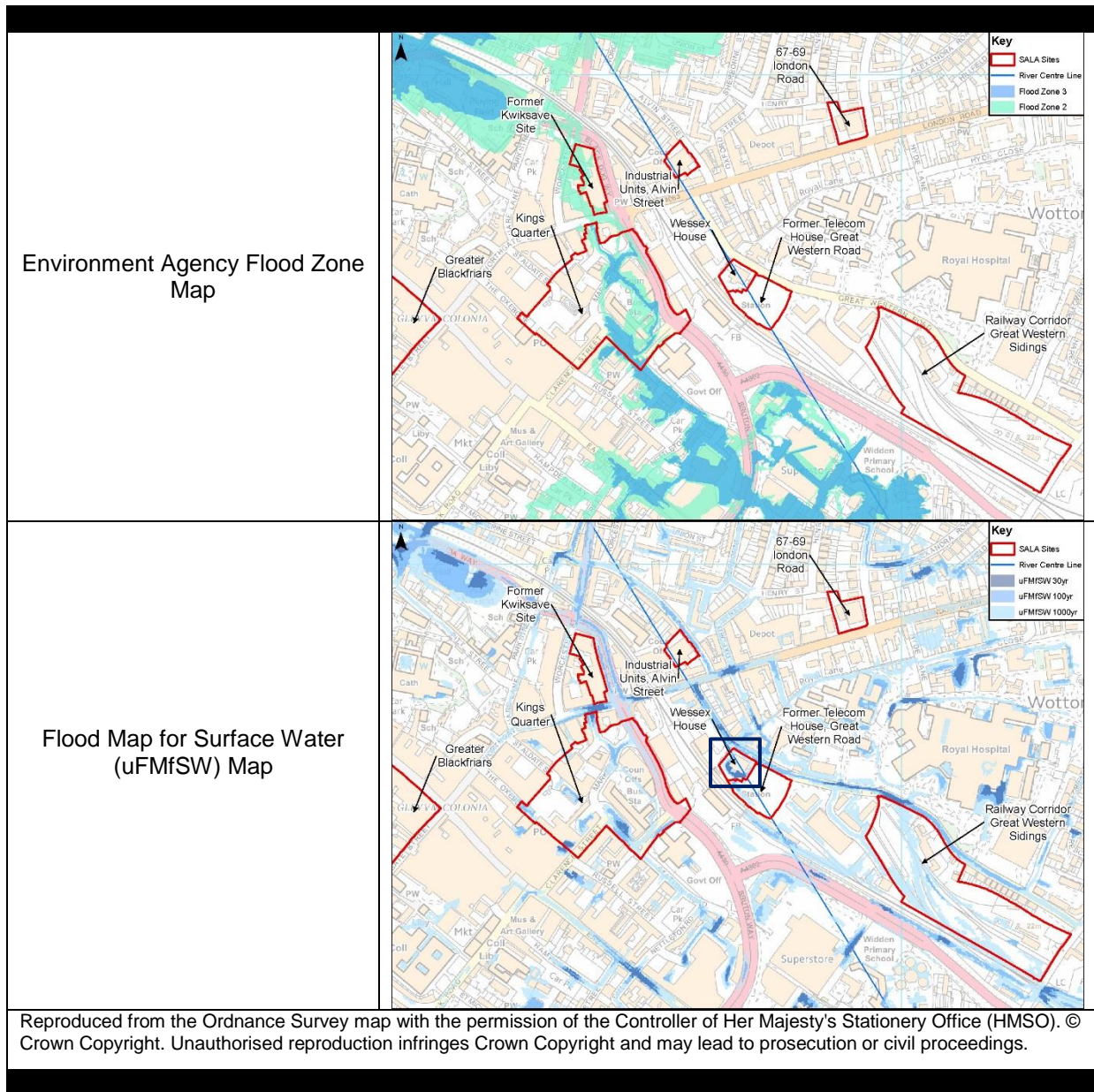


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City Plan Reference	SA07	
SALA Reference	ED044	
Site Address	67-69 London Road, Gloucester, GL1 3DP	
National Grid Reference	383903, 218912	
Catchment	River Twyver	
Primary Source of Flood Risk	River Twyver	
Secondary Sources of Flood Risk	No	
Site Area (Ha)	0.35	
Area within FZ1 (Ha)	0.35 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?		
Is the site at risk from surface water flooding?		No.
Is the site at risk from groundwater flooding?		>=50% - <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.
Is the site at risk from reservoir flooding?		No.
Will the development potentially result in off-site impacts, e.g. increased runoff?		The site is brownfield so no increase is expected.
Is there safe access and egress to the site during a flood event for occupants?		Yes, via Heathville Road and London Road.
Is there safe access and egress to the site during a flood event for emergency service vehicles?		Yes, via Heathville Road and London Road.
Is the site covered by flood warnings?		No.
Is compensatory flood storage required?		No.
Can the loss of floodplain be compensated for within the site boundaries?		N/A
Can the development reduce flood risk?		Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.
What is the Likelihood of the Exception Test being passed?		As the site falls within Flood Zone 1 the Exception Test is not required.
Recommendations / Future Data Needs		Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.

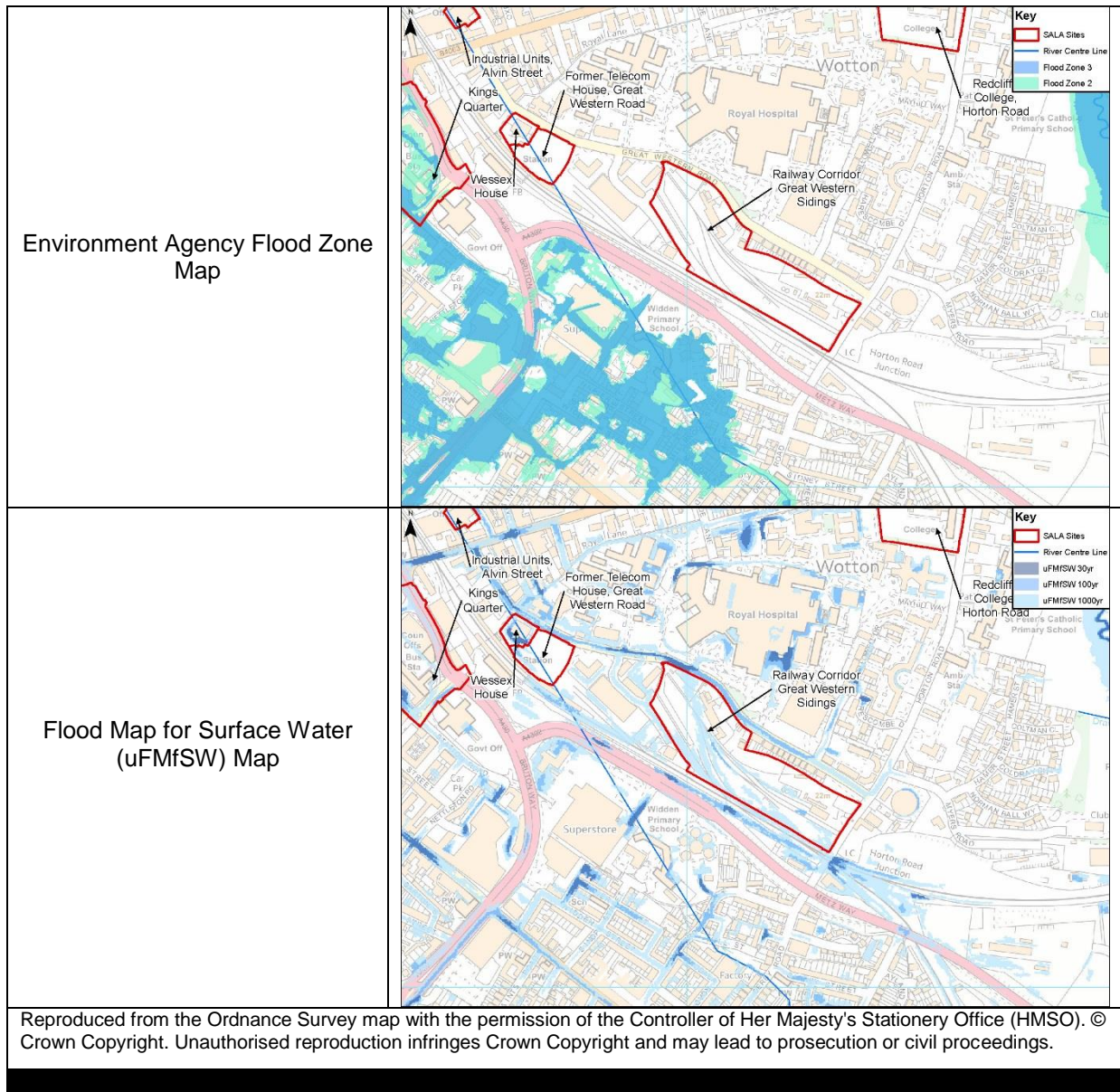


City Plan Reference	SA08	
SALA Reference	SUB51	
Site Address	Wessex House, Great Western Rd, Gloucester GL1	
National Grid Reference	383701, 218633	
Catchment	River Twyver	
Primary Source of Flood Risk	Surface water	
Secondary Sources of Flood Risk	River Twyver	
Site Area (Ha)	0.25	
Area within FZ1 (Ha)	0.25 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No but the River Twyver is culverted beneath the site.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	>= 50% <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Unlikely, predominately a brownfield site.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Great Western Road under fluvial events. However, surface water flood maps indicate that the majority of the road network surrounding the site is at risk of flooding.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Great Western Road under fluvial events. However, surface water flood maps indicate that the majority of the road network surrounding the site is at risk of flooding.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be understood and managed, and a suitable surface water strategy produced.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site. No development shall take place within 8m of top of bank to either side of watercourse.</p>	



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City Plan Reference	SA09	
SALA Reference	HA20	
Site Address	Railway Corridor Great Western Sidings, Great Western Rd, GL1 3NF	
National Grid Reference	384103, 218403	
Catchment	River Tywyver	
Primary Source of Flood Risk	Surface water	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	4.34	
Area within FZ1 (Ha)	4.34 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	>= 25% <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes, as much of site is semi-permeable at present.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Horton Road. Great Western Road to the north liable to surface water flooding.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Horton Road. Great Western Road to the north liable to surface water flooding.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



City Plan Reference	SA10	
SALA Reference	HA26	
Site Address	Land at Leven Close and Paygrove Lane, Gloucester, GL2 0AZ	
National Grid Reference	385685, 219877	
Catchment	Horsbere Brook	
Primary Source of Flood Risk	Horsbere Brook	
Secondary Sources of Flood Risk	Surface water	
Site Area (Ha)	2.18	
Area within FZ1 (Ha)	1.95 (89.5%)	
Area within FZ2 (Ha)	0.23 (10.5%)	
Area within FZ3 (Ha)	0.11 (4.9%)	
Is the site protected by flood risk management assets?	Yes.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	<p>>=50% - <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.</p>	
Is the site at risk from reservoir flooding?	Yes, from Witcombe reservoir.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes as the site is greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Paygrove Lane.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Paygrove Lane.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	Yes.	
Can the loss of floodplain be compensated for within the site boundaries?	Possibly.	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	<p>The site is split into two separate areas. The eastern area has an area falling within Flood Zone 3, but does have safe access and egress so may therefore pass the Exception Test. The western area is within Flood Zone 1 so the Exception Test would not be required.</p>	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should avoid areas shown to be within Flood Zone 2 and 3.A Flood Risk Assessment will need to be undertaken by the developer.</p>	

Treating these as two distinct sites may be more beneficial as the eastern site is likely to require further investigation whereas the western does not.

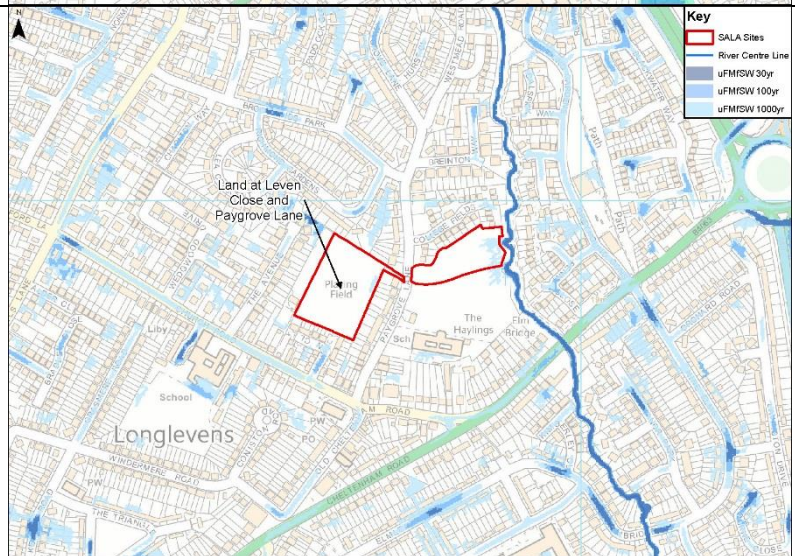
Surface water flood risk will need to be managed and a suitable surface water strategy produced.

The recent change to climate change guidance (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.

Environment Agency Flood Zone Map

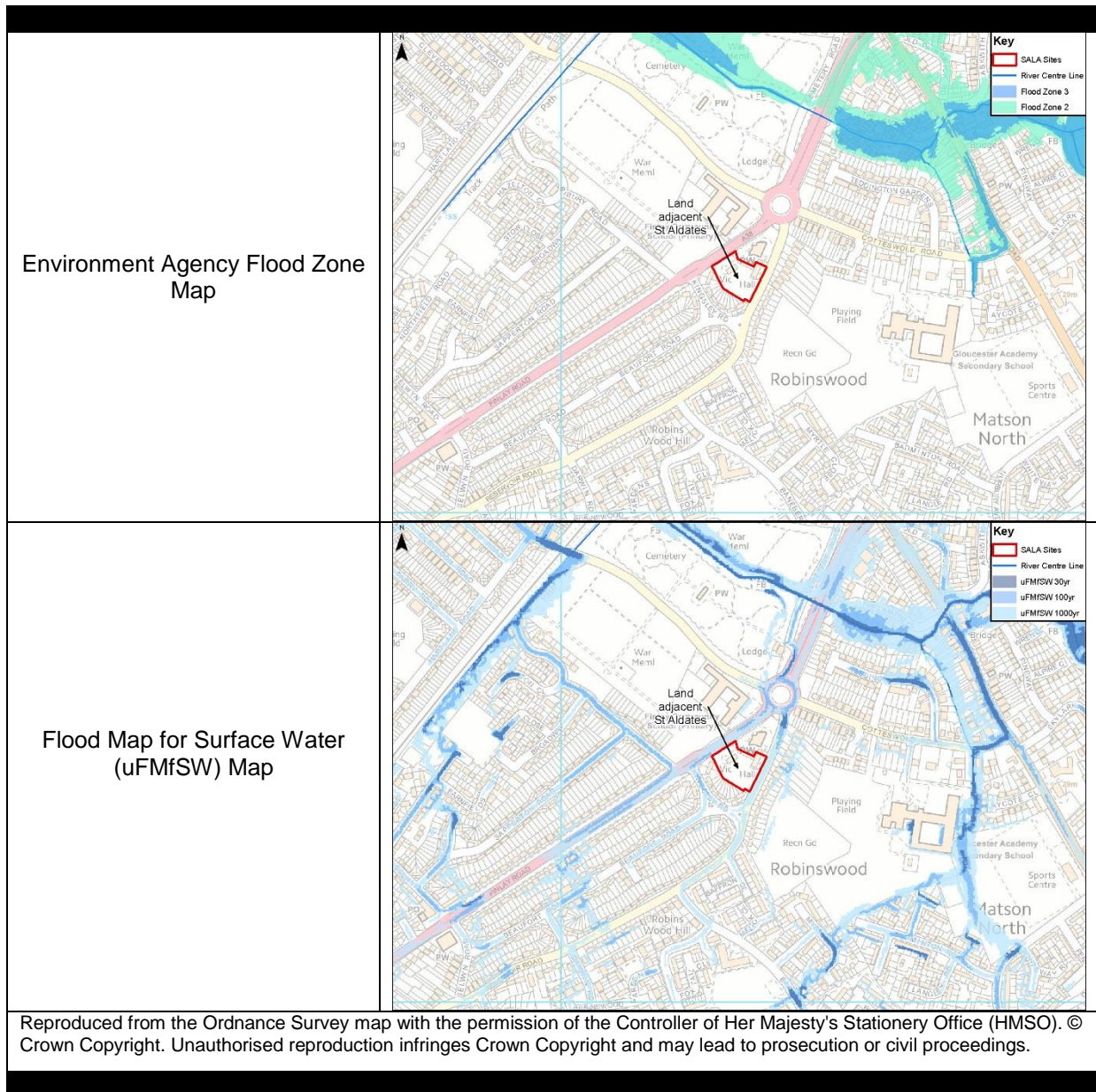


Flood Map for Surface Water (uFMfSW) Map

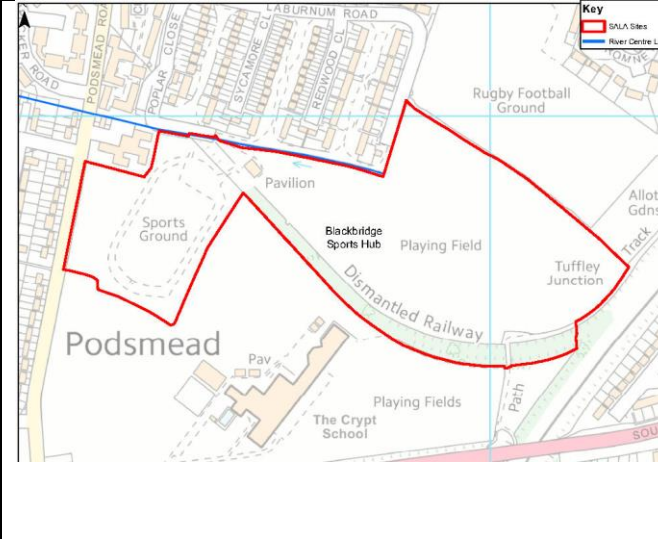


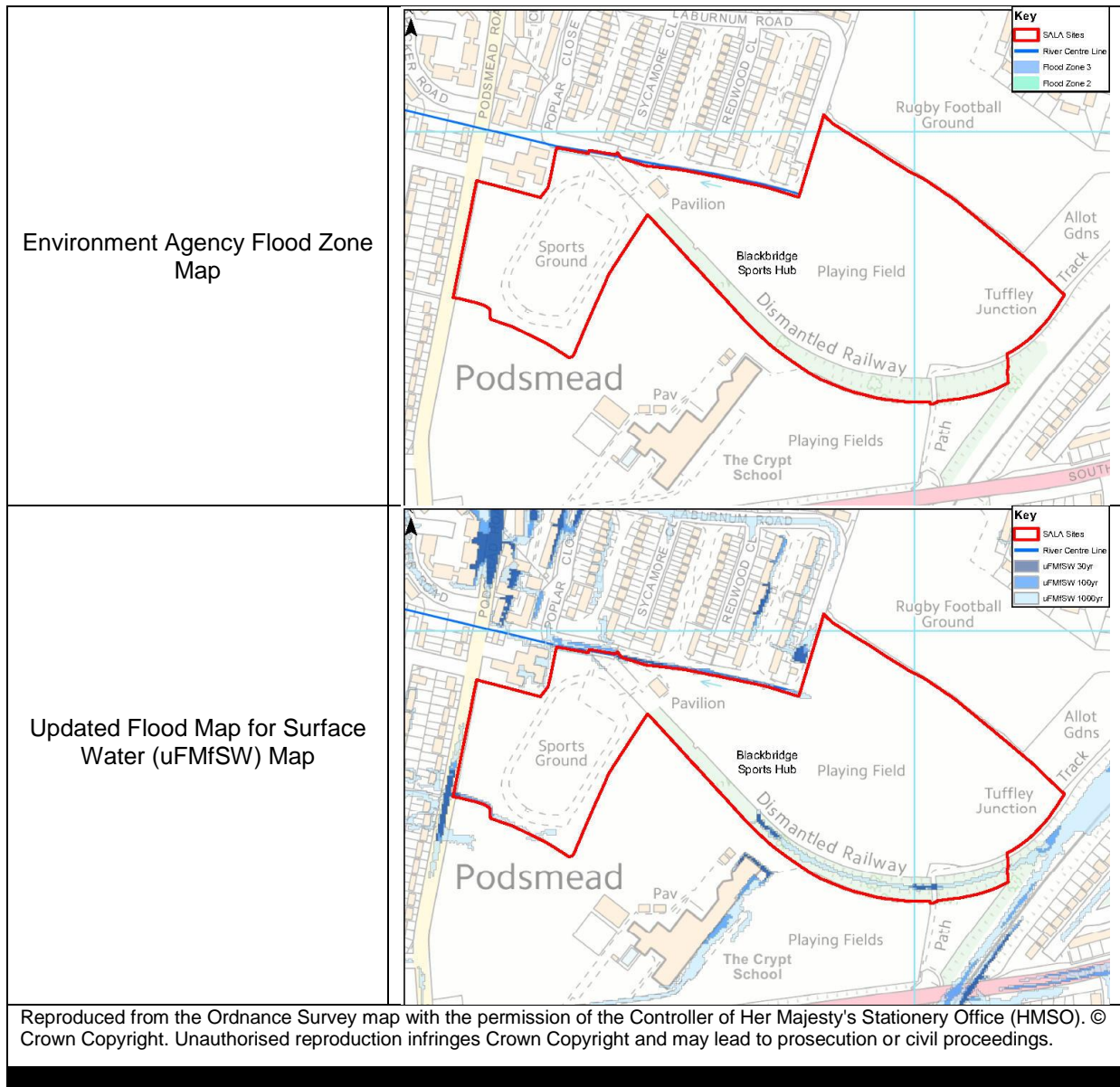
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City Plan Reference	SA11	
SALA Reference	FS13	
Site Address	Land adjacent St Aldates, Reservoir Rd, Gloucester, GL4 6RW	
National Grid Reference	384323, 216428	
Catchment	Sud Brook	
Primary Source of Flood Risk	Surface water	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	0.50	
Area within FZ1 (Ha)	0.50 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	No, although the surrounding roads are susceptible to surface flooding in the 1 in 1000-year event.	
Is the site at risk from groundwater flooding?	≥ 50% <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	A significant part of site is greenfield so increase could be expected.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Reservoir Road and Finlay Road for fluvial events. But the entire road network around the site is predicted to flood with surface water in 1 in the 1000-year event.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Reservoir Road and Finlay Road for fluvial events. But the entire road network around the site is predicted to flood with surface water in 1 in the 1000-year event.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Further consideration will need to be made into providing safe access and egress in a surface water flooding event. Surface water flood risk will need to be managed and a suitable surface water strategy produced.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	

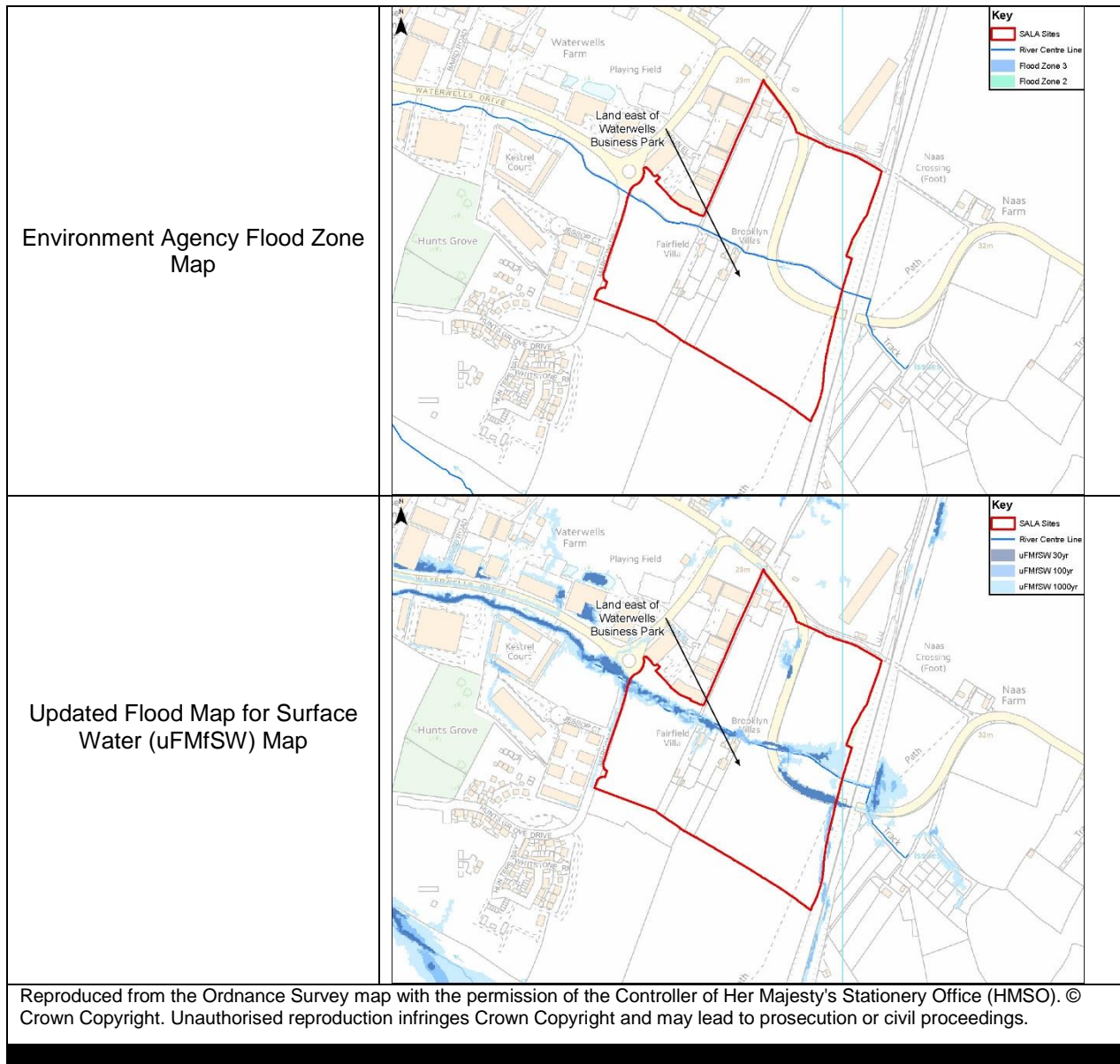


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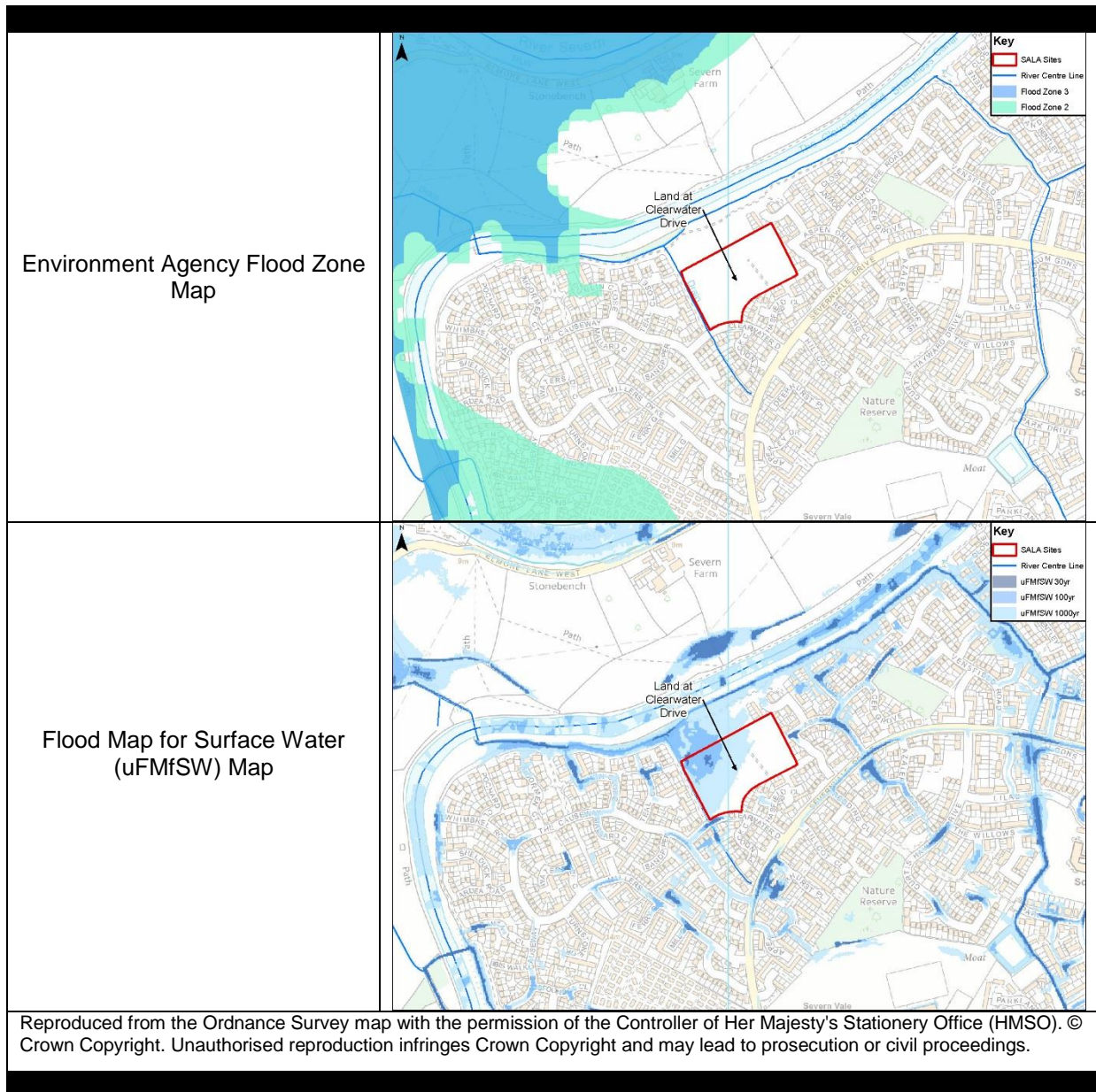
City Plan Reference	SA12	
SALA Reference	N/A	
Site Address	Blackbridge Sports Hub, Laburnum Rd, Gloucester, GL1 5PQ	
National Grid Reference	382943, 215888	
Catchment	River Severn	
Primary Source of Flood Risk	None	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	10.47	
Area within FZ1 (Ha)	10.47 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	Information not available.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes, as the site is currently greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Podsmead Road and partially via Poplar Close.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Podsmead Road.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere.</p> <p>Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



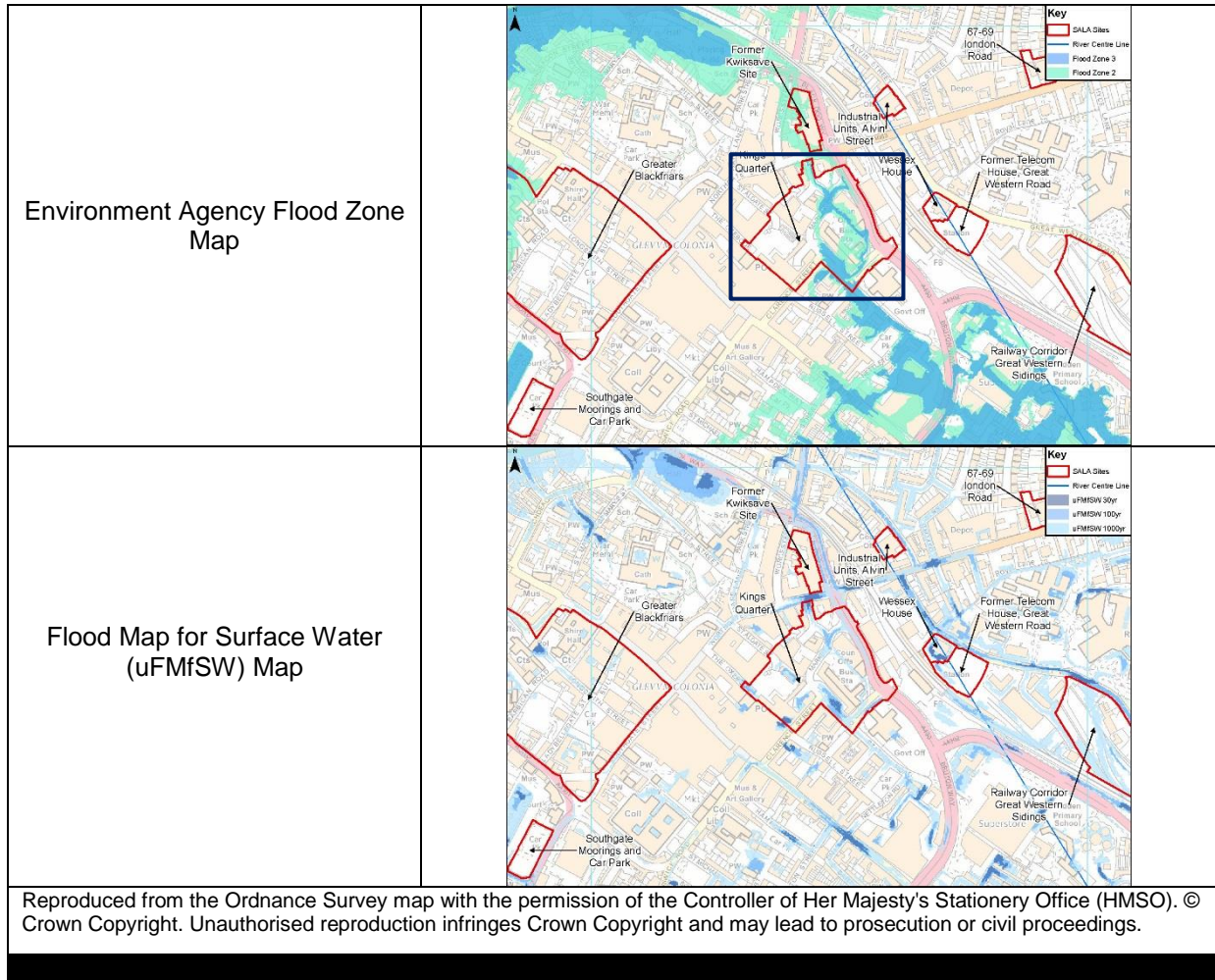
City Plan Reference	SA13	<p>The map shows the site location in Gloucester, near Waterwells Farm and the River Centre Line. The site is outlined in red. Key features include Waterwells Farm, Playing Field, Land east of Waterwells Business Park, Kestrel Court, Hunts Grove, Fairfield Villa, Broadon Villa, Naas Crossing (Foot), Naas Farm, and the River Centre Line. A north arrow is present in the top left corner.</p>
SALA Reference	EA03	
Site Address	Land east of Waterwells Business Park, Gloucester, GL2 2AL	
National Grid Reference	381832, 212467	
Catchment	Dimore Brook	
Primary Source of Flood Risk	Dimore Brook	
Secondary Sources of Flood Risk	Surface water	
Site Area (Ha)	16.04	
Area within FZ1 (Ha)	16.04 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	<25%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Likely since the site is currently largely greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Naas Lane.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Naas Lane.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Further assessment of the Dimore Brook which runs through the centre of the site maybe required. Development should avoid areas shown to be at risk from surface water flooding where possible. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site. No development shall take place within 8m of top of bank to either side of watercourse.</p>	



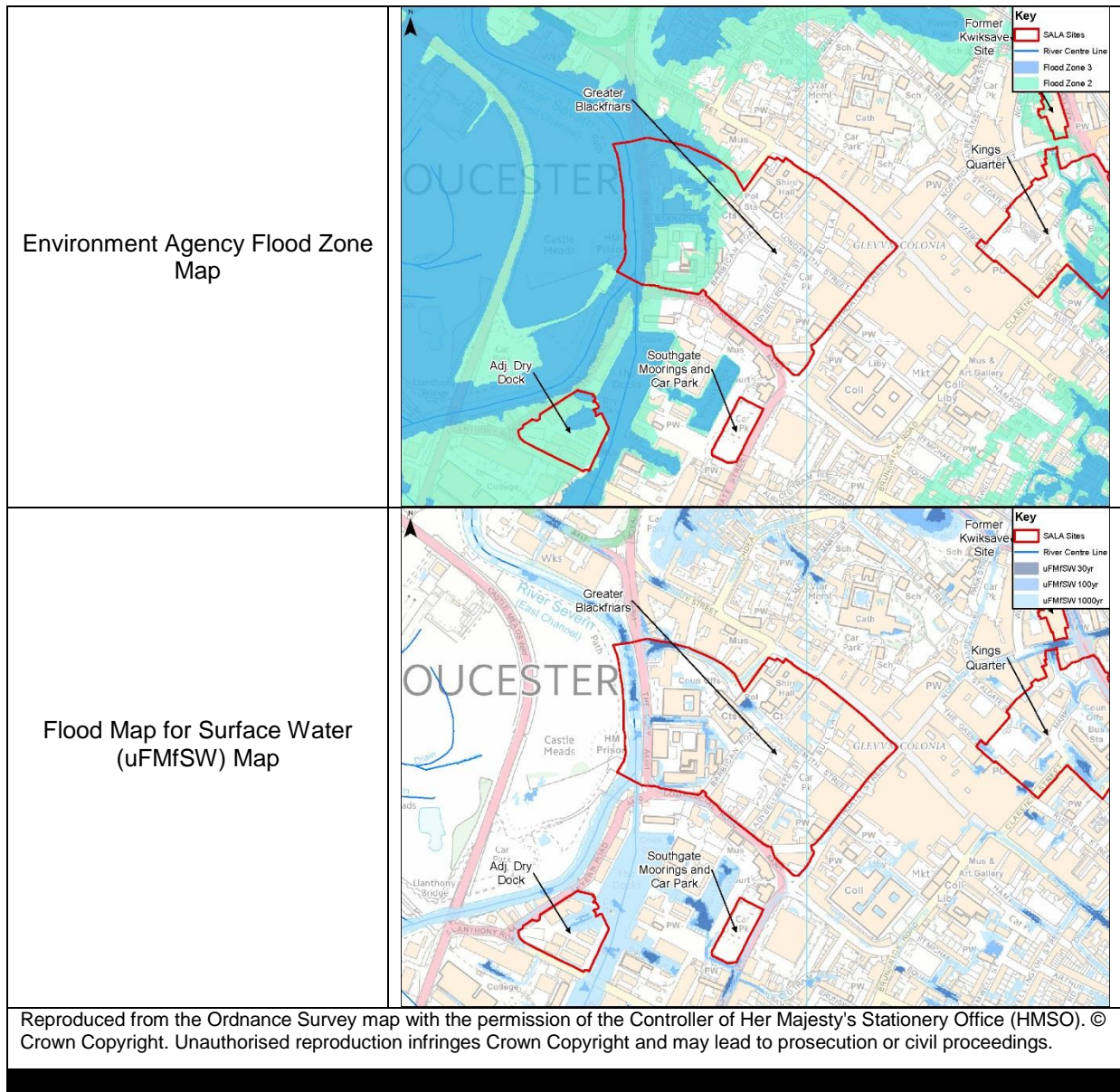
City Plan Reference	SA14	
SALA Reference	SUB18	
Site Address	Land at Clearwater Drive, Gloucester, GL2 4GJ	
National Grid Reference	380018, 214486	
Catchment	River Severn	
Primary Source of Flood Risk	Surface Water	
Secondary Sources of Flood Risk	Gloucester and Sharpness Canal	
Site Area (Ha)	2.10	
Area within FZ1 (Ha)	2.10 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	<25% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes potentially since the site is currently greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Clearwater Drive.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Clearwater Drive.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. A large proportion of the site is shown to be at risk from surface water flooding which should be investigated further.</p> <p>Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



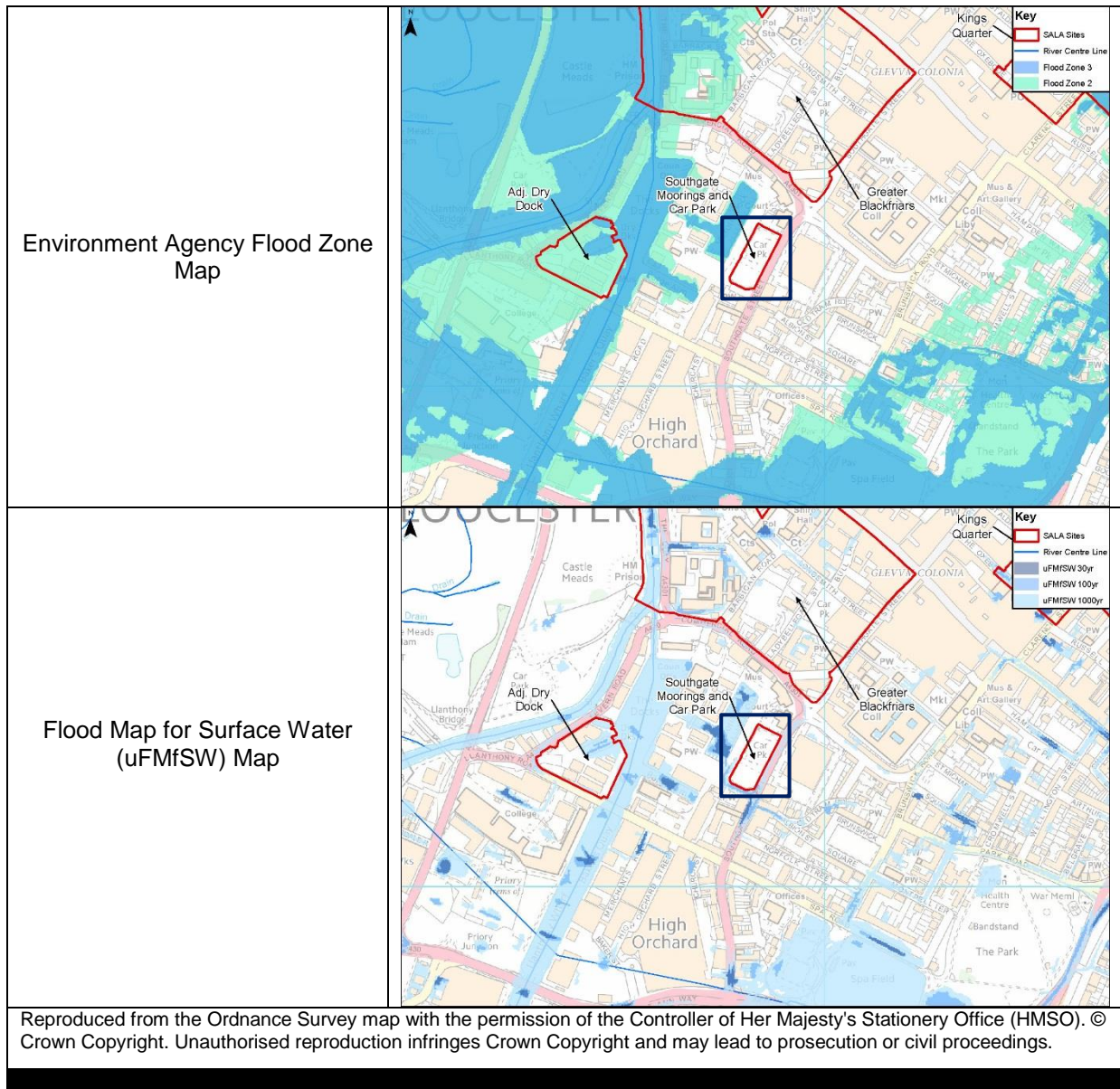
City Plan Reference	SA15	
SALA Reference	HA02	
Site Address	Kings Quarter, Station Rd, Gloucester, GL1	
National Grid Reference	383463, 218587	
Catchment	River Twyver	
Primary Source of Flood Risk	River Twyver	
Secondary Sources of Flood Risk	Surface water	
Site Area (Ha)	4.48	
Area within FZ1 (Ha)	3.23 (72%)	
Area within FZ2 (Ha)	1.25 (28%)	
Area within FZ3 (Ha)	0.50 (11%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	>= 75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	The site is brownfield so no increase is expected.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Clarence Street.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Clarence Street.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	Yes.	
Can the loss of floodplain be compensated for within the site boundaries?	Unlikely given heavily developed nature of site.	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site is largely outside Flood Zone 3 the Exception Test is likely to be passed. However, due to parts of the site lying in Flood Zone 3 'Highly Vulnerable' development types would not be allowable in some areas.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should be avoided in the Flood Zone 3 area. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



City Plan Reference	SA16	
SALA Reference	HA17	
Site Address	Greater Blackfriars, Gloucester, GL1	
National Grid Reference	382893, 218564	
Catchment	River Severn	
Primary Source of Flood Risk	River Severn	
Secondary Sources of Flood Risk	Surface Water	
Site Area (Ha)	11.90	
Area within FZ1 (Ha)	7.66 (63.4%)	
Area within FZ2 (Ha)	4.34 (36.5%)	
Area within FZ3 (Ha)	2.48 (21.0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	>=25% - <75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Potentially yes, as part of the site is semi-permeable at present.	
Is the site covered by flood warnings?	Yes, a small section to the west of the site is covered.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, multiple access and egress routes.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, multiple access and egress routes.	
Is compensatory flood storage required?	Yes, if development encroaches on existing floodplain.	
Can the loss of floodplain be compensated for within the site boundaries?	Possibly (e.g. by lowering car park areas).	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	The majority of the site is in Flood Zone 1, and for those areas within Flood Zone 2 and 3 there are access and egress routes available.	
Recommendations / Future Data Needs	<p>Development may be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should avoid areas within Flood Zone 2 and 3 where possible. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site. No development shall take place within 8m of top of bank to either side of watercourse.</p>	

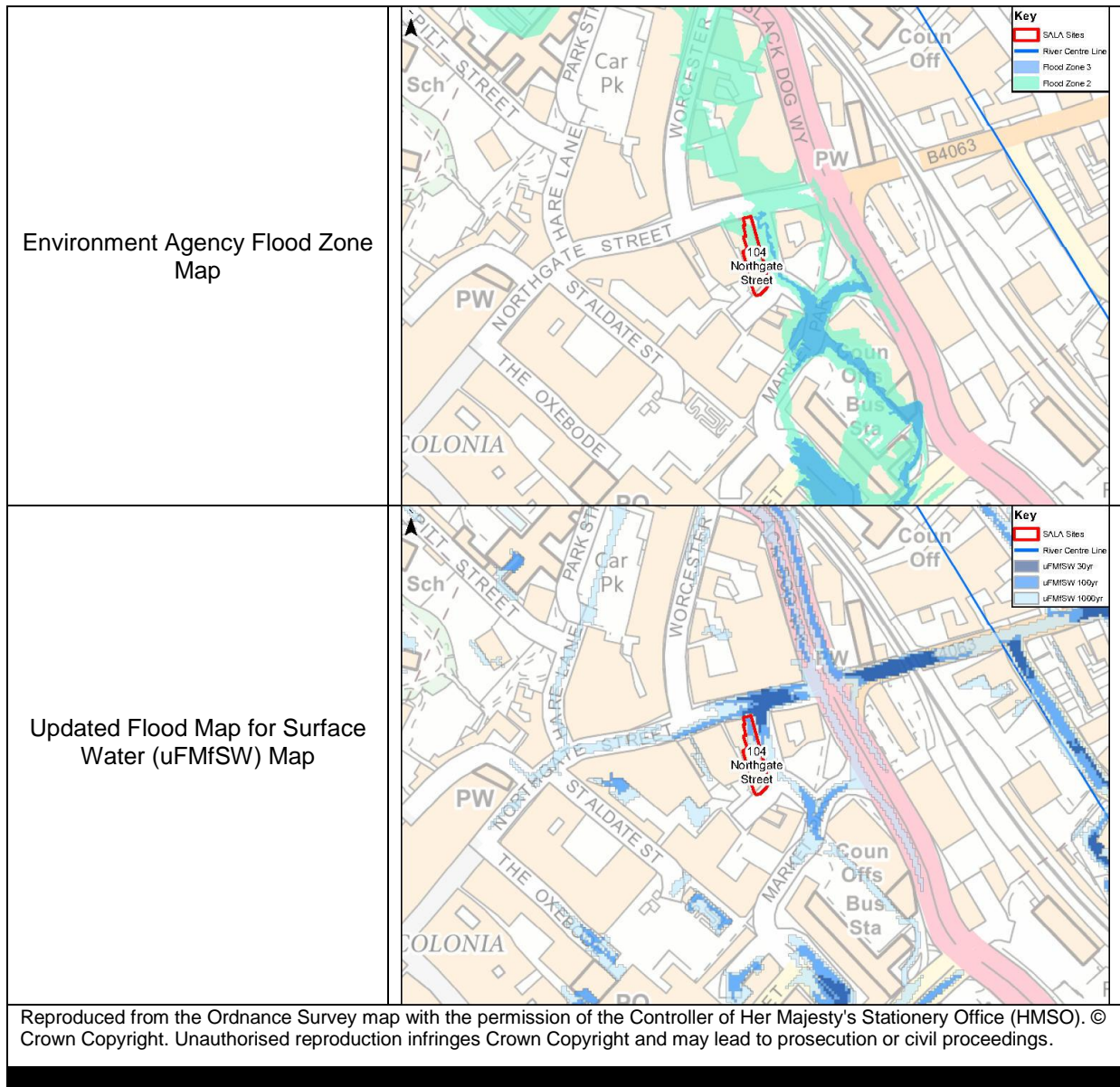


City Plan Reference	SA17	
SALA Reference	FS02	
Site Address	Southgate Moorings and Car Park, Southgate St, Gloucester, GL1 1UB	
National Grid Reference	382877, 218228	
Catchment	River Severn	
Primary Source of Flood Risk	None	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	0.53	
Area within FZ1 (Ha)	0.53 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	No.	
Is the site at risk from groundwater flooding?	<25% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	The site is brownfield so no increase is expected.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via A4301 (Southgate Street).	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via A4301 (Southgate Street).	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



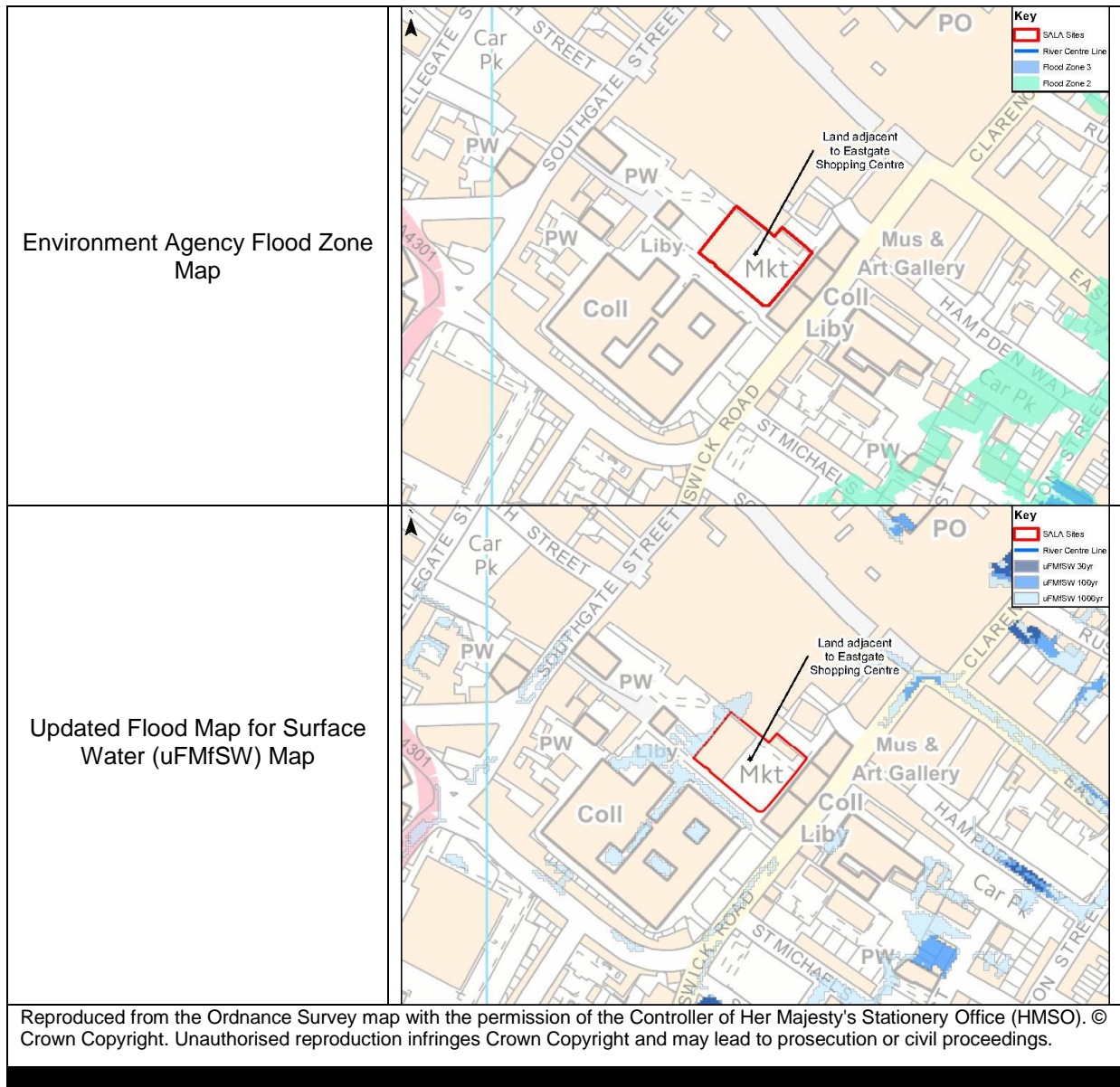
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City Plan Reference	SA18	
SALA Reference	FS10	
Site Address	104 Northgate Street, Gloucester, GL1 1SL	
National Grid Reference	383427, 218687	
Catchment	River Severn	
Primary Source of Flood Risk	River Severn	
Secondary Sources of Flood Risk	Surface Water	
Site Area (Ha)	0.06	
Area within FZ1 (Ha)	0.04 (67%)	
Area within FZ2 (Ha)	0.02 (33%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No	
Is the site at risk from surface water flooding?	Yes	
Is the site at risk from groundwater flooding?	>=50% <75%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes as the site is currently greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, south via Spread Eagle Road. Access to the north and east are limited as flooding occurs on both sides.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes but limited, via Spread Eagle Road which lead to a narrow egress through a car park. Access to the north and east are limited as flooding occurs on both sides.	
Is the site covered by flood warnings?	Yes.	
Is compensatory flood storage required?	Yes.	
Can the loss of floodplain be compensated for within the site boundaries?	Possibly.	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	One third of the site falls within Flood Zone 2 and is susceptible to surface water flooding, however due to a potential lack of safe access and egress routes for emergency vehicles, it is unlikely the exception test will be passed.	
Recommendations / Future Data Needs	Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should avoid areas shown to be within Flood Zone 2. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.	



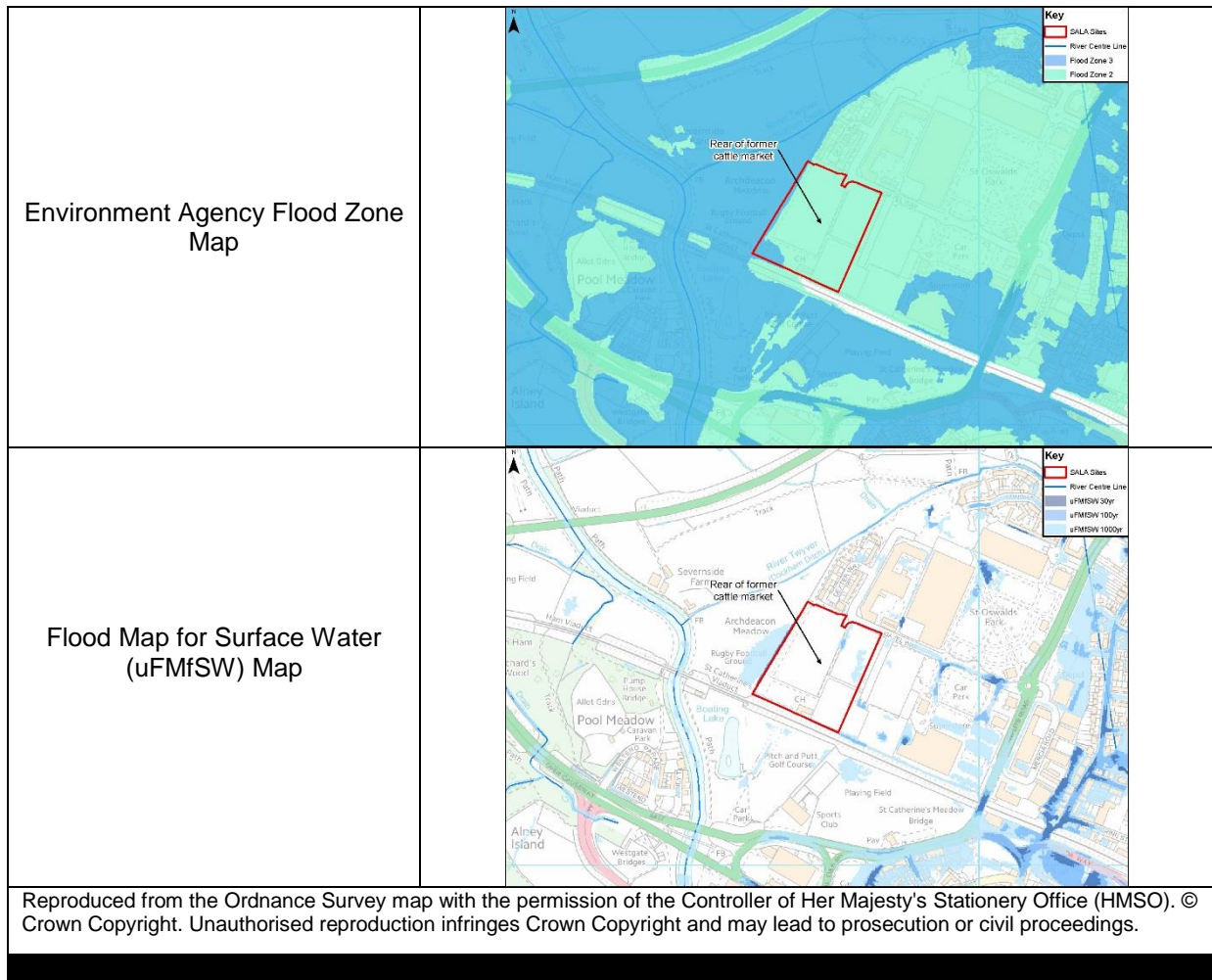
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City Plan Reference	SA19	
SALA Reference	FS16	
Site Address	Land adjacent to Eastgate Shopping Centre, Gloucester, GL1	
National Grid Reference	383168, 218342	
Catchment	River Severn	
Primary Source of Flood Risk	None	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	0.32	
Area within FZ1 (Ha)	0.32 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No	
Is the site at risk from surface water flooding?	No	
Is the site at risk from groundwater flooding?	>=50% <75%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes, as the site is currently predominately greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes, east to Brunswick Road.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, east to Brunswick Road.	
Is the site covered by flood warnings?	No.	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Surface water flood risk will need to be managed and a suitable surface water strategy produced. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.	

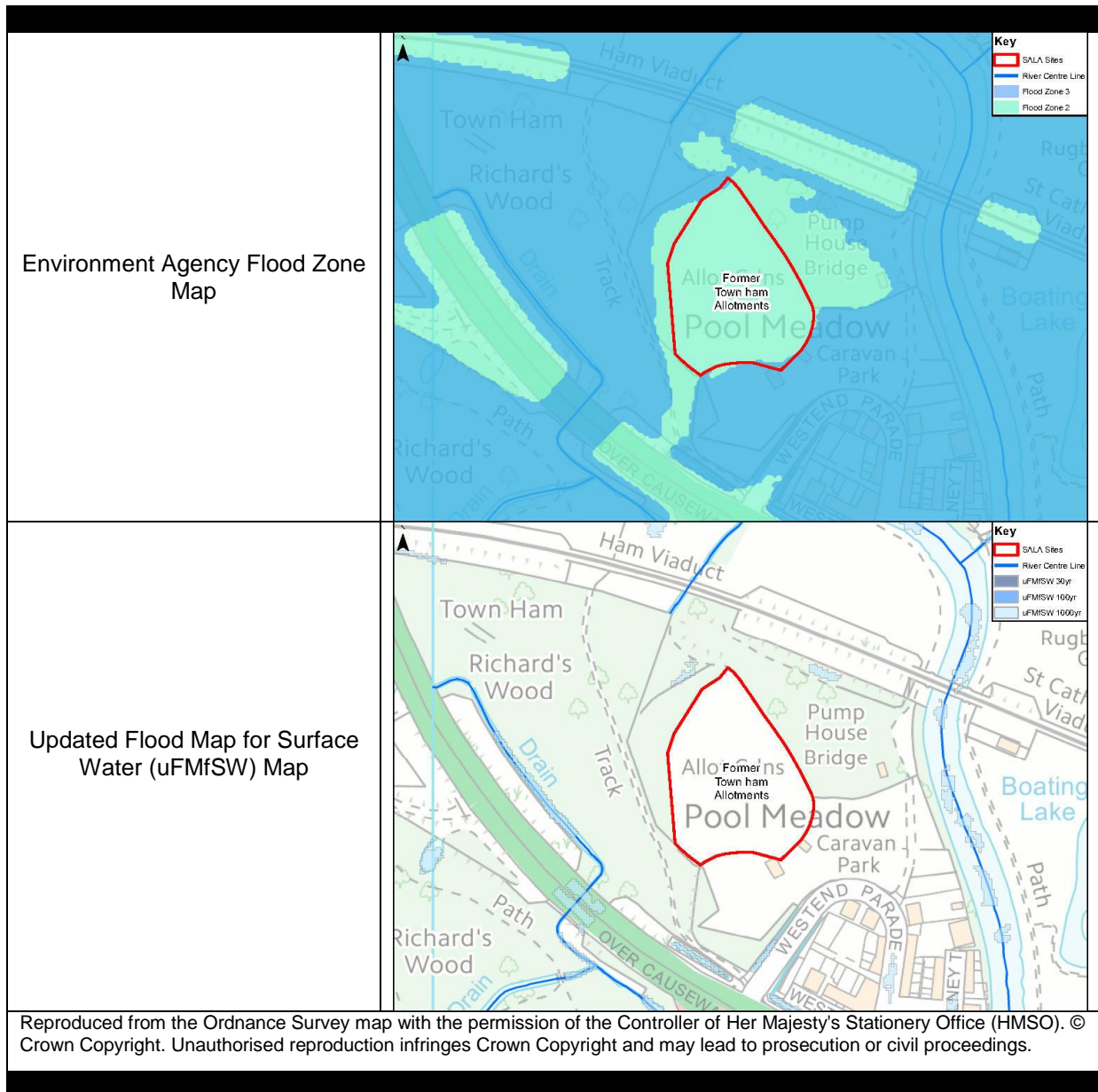


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City Plan Reference	SA20	
SALA Reference	SUB28	
Site Address	Rear of former cattle market, Longhorn Ave, Gloucester, GL1 2DS	
National Grid Reference	382678, 219401	
Catchment	River Twyver/Severn	
Primary Source of Flood Risk	River Severn	
Secondary Sources of Flood Risk	River Twyver and surface water	
Site Area (Ha)	3.81	
Area within FZ1 (Ha)	0.00 (0%)	
Area within FZ2 (Ha)	3.81(100%)	
Area within FZ3 (Ha)	0.32 (9%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	Yes.	
Is the site at risk from groundwater flooding?	>= 75% category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes, as much of the site is currently either permeable or without a positive drainage network.	
Is there safe access and egress to the site during a flood event for occupants?	No, the entire site lies within Flood Zone 2 and is surrounded by Flood Zone 3.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Flood depth information is not available but based on the extent of floodplain this is considered unlikely.	
Is the site covered by flood warnings?	Yes, the site is in a Flood Warning area and Flood Alert area.	
Is compensatory flood storage required?	Yes.	
Can the loss of floodplain be compensated for within the site boundaries?	Unlikely given built up nature of the area.	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site is largely outside Flood Zone 3 the Exception Test is likely to be passed. However, due to a potential lack of safe access and egress routes for emergency vehicles, it is unlikely the exception test will be passed.	
Recommendations / Future Data Needs	Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should be avoided in the Flood Zone 3 area. A Flood Risk Assessment will need to be undertaken by the developer. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.	

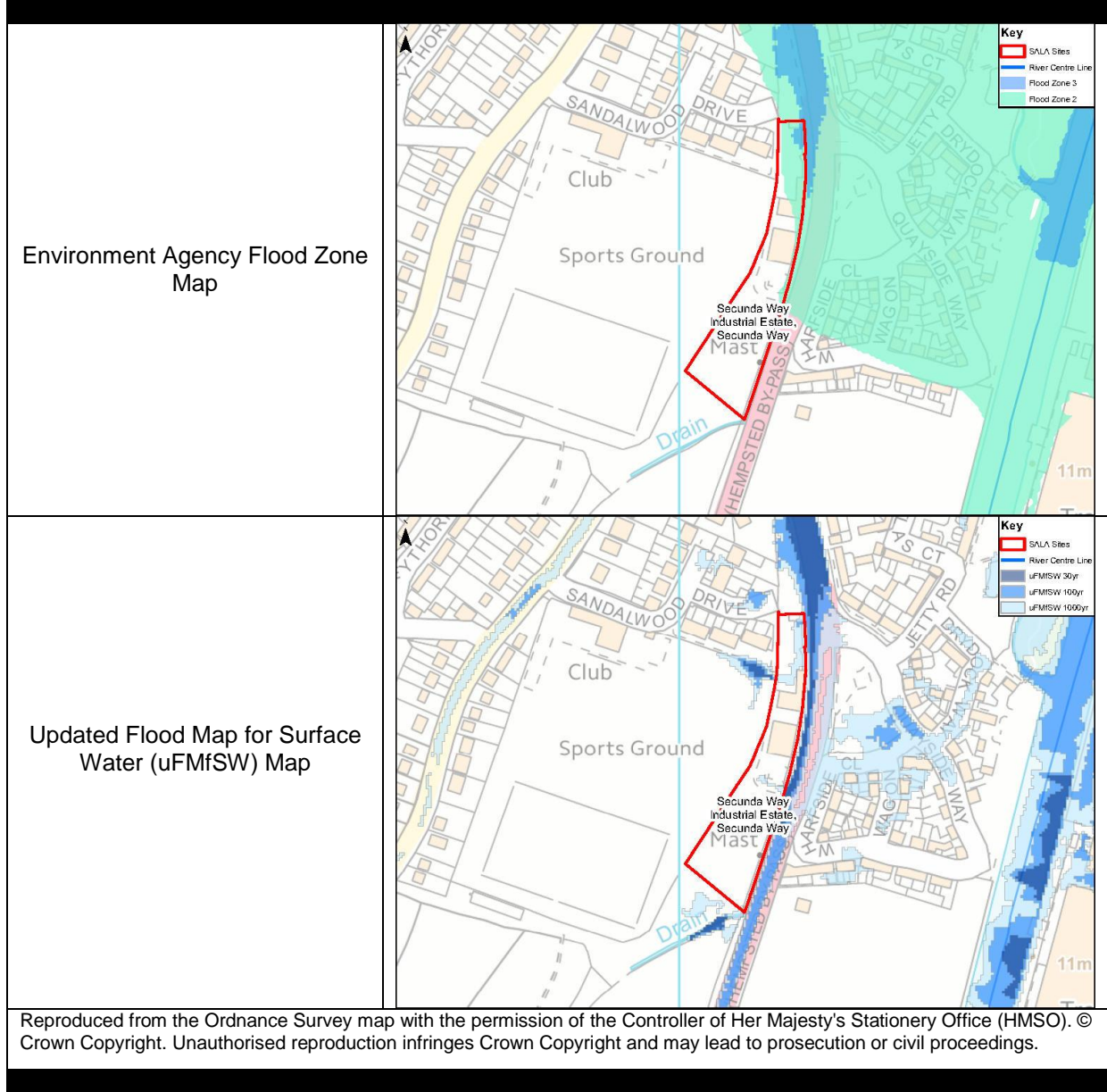


City Plan Reference	SA21	
SALA Reference	N/A	
Site Address	Former Town Ham Allotments, Three Choirs Way, Gloucester, GL1 2RX	
National Grid Reference	382206, 219315	
Catchment	River Severn	
Primary Source of Flood Risk	River Severn (East channel)	
Secondary Sources of Flood Risk	River Severn (West channel)	
Site Area (Ha)	1.1	
Area within FZ1 (Ha)	0.00 (0%)	
Area within FZ2 (Ha)	1.1 (100%)	
Area within FZ3 (Ha)	0.02 (2%)	
Is the site protected by flood risk management assets?	No.	
Is the site at risk from surface water flooding?	No.	
Is the site at risk from groundwater flooding?	>=75%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No.	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes, as the site is currently greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	No, the entire site lies within Flood Zone 2 and is largely surrounded by Flood Zone 3.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Flood depth information is not available but based on the extent of floodplain this is considered unlikely.	
Is the site covered by flood warnings?	Yes.	
Is compensatory flood storage required?	Yes.	
Can the loss of floodplain be compensated for within the site boundaries?	Unlikely.	
Can the development reduce flood risk?	No	
What is the Likelihood of the Exception Test being passed?	Site does not have safe access and egress, and is predominately located within Flood Zone 2 and surrounded by Flood Zone 3, therefore the Exception Test is unlikely to be passed.	
Recommendations / Future Data Needs	<p>Development may be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Development should avoid areas shown to be within Flood Zone 2 and 3. Further consideration will need to be made into providing safe access and egress in flooding event.</p> <p>A Flood Risk Assessment will need to be undertaken by the developer. Surface water flood risk will need to be managed and a suitable surface water strategy produced.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate change scenarios will be required, potentially reducing the developable area of the site.</p>	



City Plan Reference	SA22	
SALA Reference	EA04	
Site Address	Secunda Way Industrial Estate, Gloucester, GL2	
National Grid Reference	382055, 217253	
Catchment	Gloucester and Sharpness Canal	
Primary Source of Flood Risk	Gloucester and Sharpness Canal	
Secondary Sources of Flood Risk	Surface water	
Site Area (Ha)	0.7	
Area within FZ1 (Ha)	0.57 (81%)	
Area within FZ2 (Ha)	0.13 (19%)	
Area within FZ3 (Ha)	0.01 (1%)	
Is the site protected by flood risk management assets?	No	
Is the site at risk from surface water flooding?	Yes	
Is the site at risk from groundwater flooding?	<25%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Potentially yes, as about half of the site is currently greenfield.	
Is there safe access and egress to the site during a flood event for occupants?	Yes although limited, via Secunda Way, because some surface water flooding predicted to occur on Secunda Way.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	No.	
Is the site covered by flood warnings?	Yes	
Is compensatory flood storage required?	No, as long as the development does not lie in Flood Zone 2 and 3.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site is largely outside Flood Zone 3 the Exception Test is likely to be passed. However, safe access and egress needs to be provided.	
Recommendations / Future Data Needs	<p>Development will be possible if it can be demonstrated safe access and egress can be provided and that flood risk will not be exacerbated elsewhere. Development should avoid the small areas in Flood Zone 2 or 3. A Flood Risk Assessment will need to be undertaken by the developer.</p> <p>Surface water flood risk will need to be managed and a suitable surface water strategy produced.</p> <p>The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate</p>	

change scenarios will be required, potentially reducing the developable area of the site.



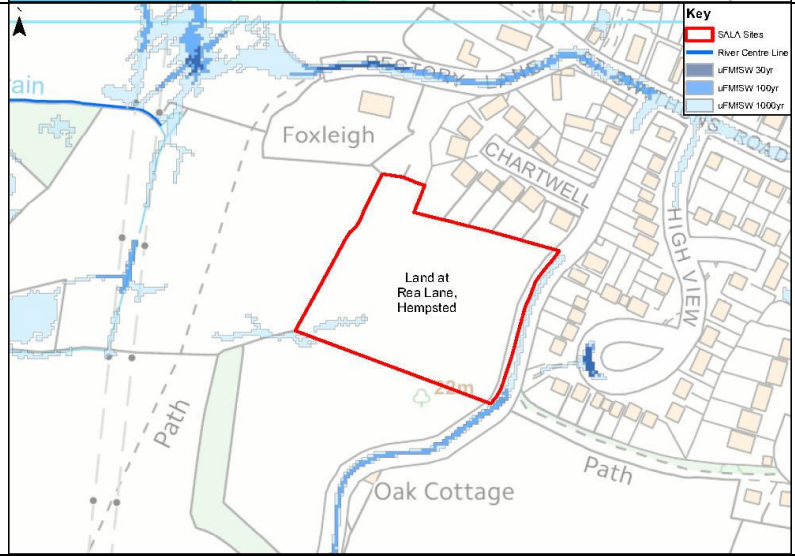
City Plan Reference	SA23	
SALA Reference	SUB54	
Site Address	Land at Rea lane, Hempsted, Gloucester, GL2	
National Grid Reference	381265, 216825	
Catchment	River Severn	
Primary Source of Flood Risk	Surface water	
Secondary Sources of Flood Risk	None	
Site Area (Ha)	1.5	
Area within FZ1 (Ha)	1.5 (100%)	
Area within FZ2 (Ha)	0.00 (0%)	
Area within FZ3 (Ha)	0.00 (0%)	
Is the site protected by flood risk management assets?	No	
Is the site at risk from surface water flooding?	Yes	
Is the site at risk from groundwater flooding?	<25%, category for susceptibility to groundwater flood emergence (based on Areas Susceptible to Groundwater Flooding dataset). This shows the proportion of each 1km grid square where geological and hydrogeological conditions show that groundwater might emerge.	
Is the site at risk from reservoir flooding?	No	
Will the development potentially result in off-site impacts, e.g. increased runoff?	Yes as the site is currently greenfield	
Is there safe access and egress to the site during a flood event for occupants?	Yes, via Rea Lane although some surface water flooding predicted to occur in extreme events. Data on flood depth are not available, therefore further investigation maybe required.	
Is there safe access and egress to the site during a flood event for emergency service vehicles?	Yes, via Rea Lane although some surface water flooding predicted to occur in extreme events. Data on flood depth are not available, therefore further investigation maybe required.	
Is the site covered by flood warnings?	Yes	
Is compensatory flood storage required?	No.	
Can the loss of floodplain be compensated for within the site boundaries?	N/A	
Can the development reduce flood risk?	Sustainable Drainage Systems (SuDS) can be used to attenuate surface water and may therefore reduce flood risk elsewhere.	
What is the Likelihood of the Exception Test being passed?	As the site falls within Flood Zone 1 the Exception Test is not required.	
Recommendations / Future Data Needs	Development will be possible if it can be demonstrated that flood risk will not be exacerbated elsewhere. Further assessment maybe required, as the site is very close to Flood Zone 2 limit. Surface water flood risk will need to be managed and a suitable surface water strategy produced. A Flood Risk Assessment will need to be undertaken by the developer. The recent change to climate change guidance (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances) will mean further consideration of climate	

change scenarios will be required, potentially reducing the developable area of the site.

Environment Agency Flood Zone Map



Updated Flood Map for Surface Water (uFMfSW) Map



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Lucy Willis

**Atkins
The Hub
500 Park Avenue
Aztec West
Bristol
BS32 4RZ**

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