Sandwell Metropolitan Borough Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site details	
Site Code	SM2
Address	Lion Farm Estate, Whiteheath Gate, Causeway Green, Oldbury, B69 1EF
Area	21ha
Current land use	Playing fields
Proposed land use	Mixed use: allotment / green space (10%), residential (30%), employment (20%), 5x full size pitches (40%)
Flood Risk Vulnerability	Mixed use – highest class is "More Vulnerable" due to the residential development.
Sources of flood risk	
Location of the site within the catchment	The site is located in the south-west of Sandwell, with Oldbury to the north and Rowley Regius to the south. The site is located to the south of Wolverhampton Road (A4123), which borders the site's northern boundary. The site is currently a green space, with an industrial estate bordering the eastern boundary and residential areas to the south and west. The site is located in the River Tame catchment. The watercourse runs approximately 950m to the north of the site, which drains most of the borough and eventually flows into the River Trent and River Severn, respectively. In addition, the Birmingham Canal is approximately 730m north of the site and the Titford Canal is approximately 500m to the south-east of the site.
Topography	Environment Agency 1m resolution LiDAR across the site shows that the elevation slopes relatively gently downwards from the south-west to the north-east of the site. The highest elevation is approximately 165m AOD in the south-west corner of the site and the lowest elevation is approximately 156m AOD in the north of the site. This gives an elevation difference of approximately 9m across the site.
Existing drainage features	Whiteheath Brook, an EA Main River, flows northwards and eventually feeds into the source of the River Tame, approximately 1km north of the site. There are no existing drainage features on the site. As the site is currently undeveloped, it likely does not drain into the surface water network. Environment agency modelling and ordinary watercourse mapping shows a number of watercourses on the site, however these do not appear on aerial photography, therefore it is possible that there are watercourses culverted under the playing fields. This will need to be investigated and confirmed as part of a site-specific flood risk assessment.
Critical Drainage Area	The site is not located within a Critical Drainage Area (CDA).
Fluvial and tidal	**The proportion of site at risk FMFP:** **FZ3 – 6.6%** **FZ2 – 2.8%** **FZ1 – 90.6%** *The Flood Zone values quoted show the percentage of the site at flood risk from that particular Flood Zone/event, including the percentage of the site at*

	flood risk at a higher risk zone. This is because the values quoted are the area covered by each Flood Zone/extent within the site boundary. For example: Flood Zone 2 includes Flood Zone 3. Flood Zone 1 is the remaining area outside Flood Zone 2 (FZ2+ FZ1 = 100%). **Defended model outputs:** **3.3% AEP fluvial event – 1.2%** **1% AEP fluvial event –5.4%** **0.1% AEP fluvial event – 2.8%** *Modelled results show the percentage of site at risk from a given AEP flood event.* **Available data:** Proportion of the sites at flood risk are determined from the Environment Agency's Flood Map for Planning Flood Zones. This represents the undefended scenario. **Flood characteristics:** Fluvial flooding on site is associated with the watercourses shown on ordinary watercourse mapping- as these do not appear on satellite imagery, it is likely that these are culverted. This will need to be confirmed as part of a site-specific flood risk assessment and updated modelling will be required to confirm the true risk to the site. The FMfP shows that the north-east of the site is within Flood Zones 2 and 3, both of which follow the line of the watercourse shown on mapping to feed into the River Tame further downstream. The south and west of the site is in Flood Zone 1 and is therefore unaffected by present day fluvial flooding. The Whiteheath model is one of five models which were updated as part of Black Country model in 2017. The model is a 1D-2D fluvial model, therefore depth, hazard and velocity outputs are available. The present-day defended model outputs are shown above. These results are consistent with the FMfP flood zones and similarly indicates that the north-east of the site is affected by present day fluvial flooding. Developers should undertake updated fluvial modelling to confirm the true risk to the site considering the impacts of any culverts on flood risk.
Fluvial plus Climate Change	Climate change outputs from the Whiteheath fluvial model are also available. The climate change scenarios tested were the central allowances (20%) for the 1% AEP plus 20% CC (Flood Zone 3a plus Central climate change) and 3.3% plus 20% CC (Flood Zone 3b plus Central climate change). The 1.3% AEP event (75-year return period) was used to define the 3.3% plus 20% CC scenario by calculating the peak flow of the 3.3% AEP event, adding 20% to the estimate and comparing to the peak flows that have been modelled. **Climate change model outputs:** **1% AEP plus 20% CC – 7.1%** **3.3% AEP plus 20% CC – 6.3%**
Surface Water	**Proportion of site at risk (RoFSW):** **3.3% AEP** – 1.7% Max depth – 0.30-0.60m Max velocity –0.50-1.00m/s **1% AEP** – 7.8% Max depth – 0.60-0.90m Max velocity – 1.00-2.00m/s **0.1% AEP** – 24.8% Max depth – 0.30-0.60m

	Max velocity – m/s *The % SW extents quoted show the % of the site at surface water risk from that particular event, including the percentage of the site at flood risk at a higher risk zone (e.g. 100-year includes the 30-year %).* **Available data:** The Environment Agency's Risk of Flooding from Surface Water mapping was used in this assessment. **Description of surface water flow paths:** In the 3.3% AEP event, only small areas in the south-west and north are affected. The maximum depths are 0.60m and the maximum velocity is 1.00m/s. In the 1% AEP event, the flood extents are greater with ponding in the centre and west of the site. The maximum flood depths are 0.90m and the maximum velocity of flow is 2.00m/s. The flood extents increase significantly in the 0.1% AEP event, with the flooding around Whiteheath Brook more extensive crossing the site and flowing towards Wolverhampton Road. Ponding in the north- and south-west of the site also increases. The maximum flood depths are 0.60m and the maximum velocity is >2m/s. Maximum hazard is danger for most.
Reservoir	The site is not at risk of reservoir flooding in either the dry day or wet day scenarios.
Groundwater	The JBA Groundwater Flood Emergence Mapping (5m resolution) shows the site is at not at risk of groundwater emergence. The site is deemed to have negligible risk from groundwater flooding due to the nature of the geological deposits. This should be confirmed through additional site investigation work.
Sewers	The site is located within a postcode area with 6 incidences of sewer flooding, according to the Severn Trent Water Hydraulic Sewer Flood Risk Register.
Flood history	The site is not located in or near historic flood outlines in accordance with the Environment Agency's Historic Flood Map and Recorded Flood Outline map dataset.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset shows that there is an area of engineered high ground parallel to the northern boundary of the site. However, this is located on the opposite side of the watercourse bank to the site.
Residual risk	Ordinary watercourse mapping shows ordinary watercourses present within the site, however these do not appear on satellite imagery. They may therefore be culverted and could pose a residual risk to the site in the event of blockage and/collapse. The presence of culverted watercourses should be confirmed and the risk posed in the event of blockage assessed as part of a site specific Flood Risk Assessment, supported by detailed modelling.
Emergency planning	
Flood warning	The site is not located within, or in close proximity (within 100m) to, a Flood Alert or Warning Area.
Access and egress	Access and egress to the site is currently via Newbury Lane, to the west of the site, and Oldbury Road (A4034), to the east of the site. For Flood Zones 2 and 3, access along either route is not impeded, however Wolverhampton Road (A4123) to the north of the site is in both flood zones

	where the watercourse flows. Access from both Newbury Lane and Oldbury Road is still available. For surface water events, access and egress from Newbury Lane and Oldbury Road is impeded, however the extents are minimal in the 3.3% AEP event and the maximum depth only reaches 0.30m. The maximum depths taking into account all scenarios is 0.60m, with a maximum velocity of greater than 2m/s. The greatest hazard rating is of flooding on both access routes in the 3.3% AEP event is minimal, with maximum depths of 0.30m. Flooding along Newbury Lane is more extensive in the 1% AEP and 0.1% AEP events with maximum depths of up to 0.60m in both events. The highest hazard rating across all events is 'Danger for most'. In the design surface water event (1% AEP plus 40% CC), access is impeded from Newbury Lane and Oldbury Road, with maximum depths of 0.90m. The maximum velocity is greater than 2m/s along both roads, particularly Newbury Lane. The maximum hazard rating is 'Danger for most' along both access points.
Dry Islands	The site does not become a Dry Island in any source of flooding.
Climate change	
Implications for the site	**Management Catchment: Tame, Anker and Mease** Increased storm intensities due to climate change may increase the extent, depth, velocity, hazard, and frequency of both fluvial and surface water flooding **Fluvial Flooding (Whiteheath Brook):** Fluvial data from the Whiteheath model is 1D-2D, therefore depth, hazard and velocity data is also available. Climate change outputs for FZ3a (1% AEP) are available, however a proxy was used for FZ3b (3.3% AEP) plus climate change. This is represented using a 1.33% AEP event present day model. This is because the 3.3% AEP event plus climate change data is not available. The 1.33% AEP event peak flow estimate was in between the 2% AEP (50yr) and 1% AEP (100yr) peak flows. The 1.33% peak flow was also compared against the correct 3.3% plus climate change peak flow and it was representative of this value. As the proposed development is 'Mixed Use', comprising both employment and residential land use, the Central (1% AEP plus 20% CC) and Upper End (1% AEP plus 30% CC) allowances have been used to reflect the different lifetimes of development. Fluvial flood extents for the 1% AEP plus climate change are shown to be slightly greater than that of the 1.33% AEP (representing the FZ3b plus climate change event). Both areas of flooding are along Whiteheath brook, within the site boundary. Due to the proximity of the flooding to the watercourse, it is possible that these extents will increase with future climate change. Because a proxy for FZ3b plus climate change has been used for this study, any site-specific flood risk assessment for the site to support a planning application should include detailed hydraulic modelling of the site (including 2D outputs with depth, hazard and velocity outputs) for FZ3b plus climate change (3.3% AEP plus climate change) using the latest climate change allowances. Any modelling undertaken for the site should be informed by investigations into the true layout of culverted watercourses on site. **Surface Water:** The design event for rainfall intensities is the upper climate allowance for the 2070s epoch. As such, the design event is the 1% AEP plus 40% CC.

	Development proposals at the site must address the potential changes associated with climate change and be designed to be safe for the intended lifetime. The provisions for safe access and egress must also address the potential increase in severity and frequency of flooding.
Requirements for drainage control and impact mitigation	

Broad-scale assessment of possible SuDS	**Geology & Soils**
	• The geology consists of:
	  ○ Bedrock formed of siltstone and sandstone with subordinate mudstone.
	  ○ There are no superficial deposits within the site.
	• The soil is comprised of slightly acid loamy and clayey soils with impeded drainage (soilscape 8).
	SuDS
	• The site is not considered to be susceptible to groundwater flooding, due to the nature of the local geological conditions. This should be confirmed through additional site investigation work.
	• BGS data suggests that the underlying geology is likely to have variable permeability and should be confirmed through infiltration testing. Off-site discharge in accordance with the SuDS hierarchy may be required to discharge surface water runoff.
	• The site is not within a Groundwater Source Protection Zone.
	• The site is within the River Trent (source to confluence with Derwent) Nitrate Vulnerability Zone (NVZ) and is within a Secondary A Superficial Aquifer designation zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality.
	• The site is within a Historic Landfill site. A thorough ground investigation will be required as part of a detailed site-specific FRA to determine potential mitigation for contamination and the impact this may have on SuDS. As such, proposed SuDS should be discussed with the relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints.
	• Surface water discharge rates should not exceed pre-development discharge rates for the site and should be designed to be as close to greenfield runoff rates as reasonably practical in consultation with the LLFA. It may be possible to reduce site runoff by maximising the permeable surfaces on site using a combination of permeable surfacing and soft landscaping techniques.

Opportunities for wider sustainability benefits and integrated flood risk management	• Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should consider the impacts of future climate change over the projected lifetime of the development. • Opportunities to incorporate infiltration techniques such as filter strips, filter drains and bioretention areas must be considered. Consideration should be made to the existing condition of receiving waterbodies and their Water Framework Directive objectives for water quality. The use of multistage SuDS treatment will clean and improve water quality of surface water runoff discharged from the site and reduce the impact on receiving waterbodies. • If culverts are identified to be present on site, these ideally should be opened up and the watercourse integrated into the overall SuDS/drainage strategy for the site to reduce flood risk and provide environmental benefits. • Opportunities to incorporate source control techniques such as green roofs, permeable surface and rainwater harvesting must be considered in the design of the site. • The Risk of Flooding from Surface Water (RoFSW) mapping indicates the presence of surface water flow paths during the 0.1% AEP event.

	Existing flow paths should be retained and integrated with blue-green infrastructure and public open space.
NPPF and planning implications	
Exception Test requirements	The Local Authority will need to confirm that the Sequential Test has been carried out in line with national guidelines. The Sequential Test will need to be passed before the Exception Test is applied. As the site is within Flood Zone 3 and Flood Zone 2, classified as 'More Vulnerable' and has some surface water flood risk, the Exception Test is required for this site.
Requirements and guidance for site-specific Flood Risk Assessment	**Flood Risk Assessment:** Section 2 of the Level 2 SFRA and Sections 2 and 3 of the Level 1 SFRA have more guidance on this section and any relevant policies and information applicable to development within Birmingham. • Consultation with Sandwell Metropolitan Borough Council, South Staffordshire Water, Severn Trent Water, Canal and River Trust and the Environment Agency should be undertaken at an early stage. • The developer will need to show, through an FRA, that future users of the development will not be placed in danger from flood hazards throughout its lifetime. It is for the applicant to show that the development meets the objectives of the NPPF's policy on flood risk. For example, how the operation of any mitigation measures can be safeguarded and maintained effectively through the lifetime of the development. (Para 048 Flood Risk and Coastal Change PPG). • The site-specific FRA should be supported by detailed modelling. Prior to modelling, investigations into the potential for culverted watercourses on the site should be undertaken to ensure any modelling considers the true watercourse layout. Hydraulic modelling should consider the residual risk posed by blockage/collapse of any culverts identified on the site. • Developers should consult with Severn Trent Water to ensure that the development aims to help achieve the targets of the Drainage and Wastewater Management Plan. • Development within 20m of a main river or flood defence will require specific planning permissions. • Development plans should use their Level 1 and 2 SFRA for Sandwell, as well as the Local Flood Risk Management Strategies to identify cumulative flood risk issues. It should also promote an integrated approach to water management. Drainage should be designed and implemented in ways that promote multiple benefits. • Any FRA should be carried out in line with the National Planning Policy Framework; Flood Risk and Coastal Change Planning Practice Guidance; Sandwell MBC's Local Plan Policies and Sustainable Drainage Design and Evaluation Guide for developers. **Guidance for site design and making development safe:** • Development should be steered away from areas at greatest risk, namely around the north-east of the site where Whiteheath Brook flows. • The risk from surface water flow routes should be quantified as part of a site-specific FRA, including a drainage strategy, so runoff magnitudes from the development are not increased by development across any ephemeral surface water flow routes. A drainage strategy should help inform site layout and design to ensure runoff rates are as close as possible to greenfield rates.

- Should the presence of culverted watercourses be confirmed on site, ideally these should be opened up as part of development proposals to reduce flood risk and provide wider environmental benefits.
- Access and egress is shown to be impeded in both the 1% and 0.1% AEP surface water events and careful consideration will need to be given to how safe access/egress can be maintained.
- Consultation with RMAs early on should be implemented to ensure an appropriate flood evacuation plan is put in place for the site.
- Flood resilience and resistance measures should be implemented where appropriate during the construction phase, e.g. raising of floor levels. These measures should be assessed to make sure that flooding is not increased elsewhere. If the floor levels cannot be raised to meet the minimum requirements, developers will need to:
    - raise them as much as possible.
    - consider moving vulnerable uses to upper floors.
    - include extra flood resistance and resilience measures.
- Other examples of flood resistance and resilience measures include:
    - using flood resistant materials that have low permeability to at least 600mm above the estimated flood level.
    - making sure any doors, windows or other openings are flood resistant to at least 600mm above the estimated flood level.
    - by raising all sensitive electrical equipment, wiring and sockets to at least 600mm above the estimated flood level.

Key messages

The north-east of the site is at risk of fluvial flooding in the present day. Flood extents are similar for fluvial flooding plus climate change, situated around Whiteheath Brook.

The site is shown to be at risk of pluvial flooding in the 3.3%, 1% and 0.1% AEP events. The site is considered to be at residual risk of flooding from Whiteheath Brook. The site is considered to be 'More Vulnerable' due to the proposed residential development within the site plan, therefore the Exception Test is required once the Sequential Test has been applied. The development may be able to proceed, considering the following:

- A site-specific Flood Risk Assessment demonstrates that site users will be safe in the design surface water and fluvial events, including an allowance for climate change. This will need to show that the site is not at an increased risk of flooding in the future and that development of the site does not increase the risk of surface water flooding on the site and to neighbouring properties. This should include investigations into the layout of potential culverted watercourses on the site, and detailed modelling of the watercourse considering the true watercourse arrangement. Ideally any culverted watercourses would be opened up as part of development proposals.
- Development should be located in areas of lowest risk, in line with the Sequential Test, by steering sites to river Flood Zone 1 and avoiding where possible areas with a high risk of surface water flooding. If a Sequential Test is undertaken and a site at flood risk is identified as the only appropriate site for the development, the Exception Test shall be undertaken. If development can't be avoided in a high-risk surface water Zone, then part "b" of the Exception Test should be satisfied.
- Raise residential and commercial finished floor levels 300mm above the 1 in 100-year plus climate change flood level. Protect and promote areas for future flood alleviation schemes.
- A carefully considered and integrated flood resilient and sustainable drainage design should be put forward and a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan submitted along with the FRA.
- There are access and egress issues with the 1% AEP, 0.1% AEP surface water event and the design surface water event (1% AEP plus 40% CC). Safe access and egress will need to be demonstrated in the 1% AEP fluvial and surface water events including an appropriate allowance for climate change.

- If flood mitigation measures are implemented, then they are tested to ensure that they will not displace water elsewhere (for example, if land is raised to permit development on one area, compensatory flood storage will be required in another).

Mapping Information

The key datasets used to make planning recommendations for this site were the Environment Agency's Flood Map for Planning and the Environment Agency's Risk of Flooding from Surface Water map. More details regarding data used for this assessment can be found below.

Flood Zones	Flood Zones 2 and 3 have been taken from the Environment Agency's Flood Map for Planning mapping.
Climate change	The latest climate change allowances (updated May 2022) have been applied to the EA's RoFSW and the Whiteheath fluvial model. Despite the age of the model, the updated climate change allowances have been checked against the model results and the allowances are still representative of the management catchment.
Fluvial extents, depth, velocity and hazard mapping	This has been assessed using the present-day results (3.3% AEP, 1% AEP and 0.1% AEP events) from the Environment Agency's Whiteheath model.
Surface Water	The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map has been used to define areas at risk from surface water flooding.
Surface water depth, velocity and hazard mapping	The Environment Agency's Risk of Flooding from Surface Water (RoFSW) map has been used to define areas at risk from surface water flooding.