City of Wolverhampton Council Level 2 Strategic Flood Risk Assessment Detailed Site Summary Tables

Site details	
Site Code	**E14**
Address	Chillington Fields
Area	0.57ha
Current land use	Brownfield
Proposed land use	Employment
Flood Risk Vulnerability	Less Vulnerable
Sources of flood risk	
Location of the site within the catchment	The site is bisected by Chillington Fields road in the central area of the site, with Willenhall Road (A454) at the northern boundary and Hickman Avenue at the south-western boundary of the site. Otherwise, the site is surrounded by residential housing, a church, and employment buildings. The site falls within the urbanised upstream reach of the Tame (Wolverhampton arm) source to confluence Oldbury Water Body, with the culverted River Tame approximately 670m south-east of the site. The River Tame flows eastwards where it then flows towards Birmingham.
Topography	Environment Agency 1m resolution LiDAR across the site shows that the majority of the site is relatively flat with an elevation between 138m AOD and 137m AOD with an area of higher elevation in the west with a maximum elevation of 140.2m AOD. The site is situated within a densely populated, developed urban area and LiDAR data is unlikely to be representative of the actual site topography, this may have an impact on some of the flood risk datasets used in this assessment.
Existing drainage features	There are no drainage features within the site. The site is likely to drain into the surface water sewer network where there are urban extents, which is in turn likely to then drain into the River Tame.
Critical Drainage Area	The site is not located within a Critical Drainage Area (CDA).
Fluvial	**The proportion of site at risk FMFP:** **FZ3 – 0%** **FZ2 – 0%** **FZ1 – 100%** *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%).* **Available data:**

	Flood Zones are determined from the Environment Agency's Flood Map for Planning (FMfP). **Flood characteristics:** The site is situated entirely within Flood Zone 1 and is highly unlikely to encounter fluvial flood at the site.
Surface Water	**Proportion of site at risk (RoFfSW):** **3.3% AEP** – 0.52% Max depth – 0.15 – 0.3m Max velocity – 0.25 – 0.5m/s **1% AEP** – 11.03% Max depth – 0.15 – 0.3m Max velocity – 0.5 – 1.0m/s **0.1% AEP** – 50.91% Max depth – 0.6 – 0.9m Max velocity – 1.0 – 2.0m/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, surface water within the site is limited to encroachment at the upper area of Chillington Fields, where maximum depths are between 0.15 to 0.3m, and the maximum velocity is between 0.25 to 0.5m/s. The extent has a hazard rating of 'Caution'. In the 1% AEP event, there is encroachment at Chillington Fields and ponding that connects to the flow path at the site's northern boundary in the central area. Both extents have a maximum depth between 0.15 to 0.3m, with a maximum velocity of 0.5 to 1.0m/s within the encroachment at Chillington Fields. These have a predominant hazard rating of 'Caution', which a maximum hazard rating of 'Danger for Some' for Chillington Fields at the boundary of the site. In the 0.1% AEP event, a flow path is present along Chillington Fields, with the majority of the eastern and central areas subject to a flow path. Depths are predominantly under 0.6m, however there is a maximum depth between 0.6 to 0.9m where Chillington Fields joins Willenhall Road. Maximum velocities between 1.0 to 2.0 m/s along the flow path on Chillington Fields. The maximum hazard rating is 'Danger to Most' in the central area and along Chillington Fields.
Reservoir	The site is shown to not be at risk of Dry Day and Wet Day reservoir flooding according to the Environment Agency's reservoir flood mapping.
Groundwater	The JBA Groundwater Flood Emergence Mapping (5m resolution) shows the site is at no risk, as such there is likely negligible risk from groundwater flooding due to the nature of the geological deposits.
Sewers	The site is located within a postcode area with seven incidences of sewer flooding, according to the Severn Trent Water Hydraulic Sewer Flood Risk Register. These instances occurred in 2000, 2005, and 2018.
Flood history	The site is not located in or near historic flood outlines in accordance with flood records provided by the City of Wolverhampton Council and the

	Environment Agency's Historic Flood Map and Recorded Flood Outline Map datasets.
Flood risk management infrastructure	
Defences	The Environment Agency AIMS dataset that there no flood defence within or near the site.
Residual risk	There is no residual risk from culverts or reservoir flood extents at the site.
Emergency planning	
Flood warning	The site is not within an Environment Agency Flood Alert or Flood Warning Area.
Access and egress	Access and egress to the site is through Willenhall Road along the northern boundary, Chillington Fields through the site to join Willenhall Road (the road south is a no-through road), and Hickman Avenue at the south-western boundary. In the 3.3% AEP surface water event, access to the western area of the site is maintained though Hickman Avenue with access from the north and south of the road. Access to the central and eastern areas is maintained from a westwards direction from Willenhall Road where depths are less than 0.3m though the maximum velocity is between 0.5 to 1.0m/s, the resultant hazard rating is 'Caution'. Access from the east of Willenhall Road is impeded as depths are between 0.6 to 0.9m and have a hazard rating of 'Danger to Most'. In the 1% AEP surface water event, access to the western area of the site is maintained through Hickman Avenue in a northern and southern direction. Access from Willenhall Road to the site is impeded as along the road are between 0.3 to 0.6m with velocities between 1.0 to 2.0m/s, particularly in the area where Chillington Fields joins Willenhall Road. The extents across Willenhall Road have a predominant and maximum hazard rating of 'Danger to Most'. In the 0.1% AEP surface water event, access to the western area of the site is maintained through Hickman Avenue in a southern direction. Access and egress from Willenhall Road are impeded from both the eastern and western directions. The are depths that are between 0.3 to 0.9m across the road at the site's boundary with depths exceeding 1.2m east of the site. Velocities exceed 2.0m/s and are predominantly between 1.0 to 2.0m/s, resulting in a predominant hazard rating of 'Danger to Most' and a maximum rating of 'Danger to All' along the eastern area of the site. The design surface water event (1% AEP plus 40% climate change allowance) extents are similar to that of the 0.1% AEP event, and as such, access and egress issues are expected to be similar. Maximum depths within the extent along Willenhall Road are 1.2m to the immediate east of the site, with a maximum velocity of 2.2m/s at the eastern area of the site. Similarly, the hazard rating is predominantly 'Danger to Most' and a maximum rating of 'Danger to All' along the eastern area of the site. Arrangements for safe access and egress will need to be demonstrated for the 1% AEP plus an allowance for climate change rainfall events, using the depth, velocity, and hazard outputs. Any raising of access routes should not impede surface water flows or contribute to increasing flood risk off-site. If detailed modelling (including consideration of breach scenarios) suggests that the site is at significant risk of flooding which affects access routes, a Flood Warning and Evacuation Plan will be required.
Dry Islands	There site is not on or contain a dry island.
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 **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 + 40% CC. The extent of the design event is similar to that of the present day 0.1% AEP event, with maximum depths of 0.64m where Chillington Fields crosses the site's northern boundary. With an increase in extent, the site is shown to be slightly sensitive to increased surface water flood risk due to climate change. 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 mudstone, siltstone, sandstone, coal, ironstone and ferricrete, which forms the Pennine Middle Coal and the South Wales Middle Coal Measures Formations.
	  ○ Superficial deposits consisting of diamiction till.
	• The soil is comprised of slowly permeable, seasonally wet, acidic loamy and clayey soils.
	
	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 with site investigations.
	• 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 in a Groundwater Source Protection Zone, nor does it contain historical landfill.
	• The site is within the River Trent (source to confluence with Derwent) Nitrate Vulnerability Zone, and in an undifferentiated Secondary Superficial Aquifer Designation Zone. As such, infiltration techniques may not be appropriate at the site in order to preserve water quality.
	• 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.
	• If it is proposed to discharge runoff to a watercourse or sewer system, the condition and capacity of the receiving watercourse or asset should be confirmed through surveys and the discharge rate agreed with the asset owner.

Opportunities for wider sustainability benefits and integrated flood risk management	• Implementation of SuDS at the site could provide opportunities to deliver multiple benefits including volume control, water quality, amenity and biodiversity. This could provide wider sustainability benefits to the site and surrounding area. Proposals to use SuDS techniques should be discussed with relevant stakeholders (LPA, LLFA and EA) at an early stage to understand possible constraints. • Development at this site should not increase flood risk either on or off site. The design of the surface water management proposals should take

	into account the impacts of future climate change over the projected lifetime of the development • Opportunities to incorporate filtration 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 water bodies. • Opportunities to incorporate source control techniques such as green roofs, permeable surfaces and rainwater harvesting must be considered in the design of the site.
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. While the site is within Flood Zone and classified as 'Less Vulnerable' and has surface water flood risk, it is recommended that the Exception Test is applied 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 Wolverhampton. • Consultation with City of Wolverhampton Council, Severn Trent Water, and the Environment Agency should be undertaken at an early stage. • 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 plans should use their Level 1 and 2 SFRA for Wolverhampton, 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; Birmingham City Council's Local Plan Policies and Sustainable Drainage Design and Evaluation Guide for developers. • **From the Black Country Core Strategy – Policy ENV5 (2011)** The Wolverhampton Local Plan succeeds the Black Country Core Strategy building upon policies from the Strategy. Until the Local Plan is adopted the Strategy still applies. Developers should ensure the correct policy is applied. The following development principles will apply to assist in both reducing the extent and impact of flooding: ○ incorporate Sustainable Drainage Systems (SuDS), unless it would be impractical to do so, in order to significantly reduce surface water run-off and improve water quality. The type of SuDS used will be dependent on ground conditions; ○ on sites requiring a Flood Risk Assessment, reduce surface water flows back to equivalent greenfield rates; ○ create new green space, increase tree cover and/or provide green roofs. **Guidance for site design and making development safe:** • 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). • Should built development be proposed within the 1% AEP surface water flood extent, careful consideration will need to be given to flood resistance and resilience measures. • 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. • Arrangements for safe access and egress will need to be demonstrated for the 1% AEP pluvial events with an appropriate allowance for climate change, using the depth, velocity, and hazard outputs. • In accordance with information supplied by Severn Trent Water, the site is likely to be served by the Barnhurst wastewater treatment works, which has been assessed as "not expected be an issue… (to estimated spare capacity)" and "no scope to provide additional capacity" for surface water discharge into watercourses. As such surface water disposal measures (detailed in the broad-scale assessments of SuDS section) should be undertaken by the developer. • Developers should adhere to CWC's guidance on SuDS as laid out in Policy ENV 13 – Sustainable Drainage Systems (SuDS) and Surface Water Management: o All developments must incorporate Sustainable Drainage Systems (SuDS) and provide for their adequate adoption, ongoing maintenance, and management over the lifetime of the development, in accordance with any surface water drainage strategy required for the development under Policy ENV12. o SuDS must be designed in accordance with Local Lead Flood Authority standards, as follows: ▪ demonstrate application of the surface water discharge hierarchy: Re-Use (Water Harvesting); Infiltration; Discharge to a watercourse; Discharge to a surface water sewer; Discharge to a combined sewer; ▪ manage surface run-off as close to the source as possible to reduce flood risk and improve water quality; ▪ include mitigation within storage calculations for future climate change, designed to 100yr + Climate Change (currently 40%); ▪ designed to accord with the Environment Agency's Guidance on Flood Risk and Coastal Change, Construction Industry Research and Information Association (CIRIA) guidance, and Department for Environment Food & Rural Affairs (DEFRA) non-statutory technical standards; ▪ designed to be daylight (open), natural and contribute to the conservation and enhancement of biodiversity and green infrastructure in the wider area, as far as is practical and viable. o For all major developments, surface water flows must be reduced back to equivalent greenfield rates. If greenfield runoff rates are not considered to be feasible for viability or other reasons, then the developer must submit evidence demonstrating what the constraints to achieving this are and how their development will accommodate runoff rates that are as close as reasonably possible to greenfield rates. o For all minor developments, a minimum reduction of 30% over pre-development run-off rates will be required. Under no circumstances will post-development runoff rates that are greater than pre-development run-off rates be permitted. o A hydrogeological risk assessment must be provided where infiltration SuDS is proposed for anything other than clean roof drainage in a Source Protection Zone 1.

	• 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 site is at risk from surface water in the 1% AEP, 0.1% AEP and the design (1% AEP plus 40% climate change allowance) surface water events. There are access and egress issues within these events as well. Development may proceed if:

- The Exception Test shall be undertaken and passed. The vast majority of the site is shown to be at risk during the design surface water event, therefore part "b" of the Exception Test must be satisfied. If the Exceptions Test is failed, development is unlikely to be able to be proceed.
- A site-specific Flood Risk Assessment demonstrates that site users will be safe in the 1% AEP fluvial and surface water events, including an allowance for climate change. This will need to use detailed fluvial/surface water modelling 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 off site.
- Safe access and egress can be demonstrated in the 1% AEP plus upper climate change fluvial and surface water events. If this is not possible, an appropriate Flood Warning and Evacuation Plan is needed.
- A carefully considered and integrated flood resilient and sustainable drainage design is put forward, including a site-specific Surface Water Drainage Strategy, and SuDS maintenance and management plan and supported by detailed modelling (as above), with development to be steered away from the areas identified to be at highest risk of surface water flooding within the site. This is in line with the sequential approach to site layout.
- Raise commercial finished floor levels 600mm above the 1 in 100-year plus climate change flood level. Protect and promote areas for future flood alleviation schemes.
- 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 dataset.
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	The Environment Agency's Risk of Flooding from Surface Water (RoFSW) has been used to define areas at risk from surface water flooding.

and hazard mapping	