



Knowsley Metropolitan Borough Council

GRACE PARK

Flood Risk Assessment and Drainage Strategy



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FLOOD RISK ASSESSMENT (VERSION 1) PUBLIC

PROJECT NO. 70119719

OUR REF. NO. 70119719_WSP_HDG_RP_0002

DATE: DECEMBER 2025

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	First Issue			
Date	December 2025			
Prepared by	Zoe Hooton			
Signature	 Digitally signed by Zoe.Hooton@wsp.com DN: cn=Zoe.Hooton@wsp.com Date: 2025.12.19 12:25:05			
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Authorised by	Gareth Hardwick			
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Project number	70119719			
Report number	70119719_WSP_HDG_RP_0002			
File reference	\\uk.wspgroup.com\central data\Projects\70119xxx\70119719 KMBC Halewood LUF RIBA 3\03 WIP\Drainage Engineer\05 Reports			

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1 INTRODUCTION

1.1 BACKGROUND

- 1.1.1. This Flood Risk Assessment (FRA) has been prepared by WSP on behalf of Knowsley Metropolitan Borough Council (KMBC) to accompany a full planning application for the development known as *Grace Park* (hereafter referred to as the 'Proposed Development').
- 1.1.2. Grace Park is an existing community space at the heart of Halewood. The site incorporates a number of functions and activities, including an existing children's play area, public park and playing fields for Halewood Town Junior Football Club (a local junior football club).
- 1.1.3. WSP has prepared this report in accordance with the instructions of the client, KMBC, for their sole and specific use relating to the above site. Any person who uses any information contained herein does so at their own risk and shall hold WSP harmless in any event.
- 1.1.4. Whilst this report was prepared using the reasonable skill and care ordinarily exercised by engineers practicing under similar circumstances and reasonable checks have been made to verify the accuracy of any data, WSP accepts no liability in relation to the report should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP. In any event, WSP shall not be liable for any loss or damages arising under or in connection to the use of this report.

1.2 OBJECTIVE OF STUDY

- 1.2.1. In accordance with the National Planning Policy Framework (NPPF), the aim of this FRA is to identify existing flood risk on the Proposed Development and provide an assessment of flood risk following the proposed development. Where a risk has been identified, appropriate mitigation has been proposed to manage the risk over the lifetime of the development, accounting for the impact of climate change.
- 1.2.2. This FRA has been produced in line with the NPPF and associated Flood Risk and Coastal Change Planning Practice Guidance (PPG), Environmental Agency Standing Advice, as well as thorough consultation with the Lead Local Flood Authority (LLFA) and KMBC.

1.3 SCOPE OF ASSESSMENT

- 1.3.1. The FRA is conducted in accordance with the NPPF. The assessment includes the following:
 - A description of the proposed development and existing site conditions;
 - Review of the relevant policy, legislation and guidance;
 - A review of the existing flood risk;
 - An assessment of the post-development flood risk within the area; and
 - Provision of appropriate flood mitigation measures, including a surface water drainage strategy, as discussed and agreed with the LLFA.

1.4 RESOURCES

- 1.4.1. The Environment Agency, KMBC and United Utilities (UU) have provided baseline information to inform the production of this FRA.

1.4.2. The report has been informed by, and refers where appropriate, to the following documents and policies:

- Environment Agency's Flood Map for Planning (accessed February 2025);
- Environment Agency's Risk of Surface Water Flooding Map (accessed February 2025);
- Environment Agency's Flood Risk from Reservoirs Map (accessed February 2025);
- Knowsley Council and Sefton Council Level 1 Strategic Flood Risk Assessment (2009);
- Knowsley Metropolitan Borough Council Preliminary Flood Risk Assessment Report (2011);
- Knowsley Metropolitan Borough Council Level 2 Strategic Flood Risk Assessment (2012);
- Knowsley Metropolitan Borough Council Local Flood Risk Management Strategy (2017);
- Knowsley Local Plan: Core Strategy (2016);
- British Geological Survey Online Geology of Britain Viewer;
- DEFRA Magic Map;
- LandIS Soilscales online viewer;
- WSP Halwood LUF: Flood Risk & Drainage Desktop Appraisal (2023);
- WSP Halewood LUF – Halewood Leisure Centre and Grace Park Phase 2 Geo-Environmental Assessment Report (October 2025).

1.4.3. This FRA makes partial use of third-party information and contains Environment Agency information © Environment Agency.

1.4.4. This study also contains public sector information licensed under the Open Government Licence v3.0.

1.5 PROPOSED DEVELOPMENT

1.5.1. Grace Park is a community space located off Leather's Lane and Wood Road in Halewood in Knowsley. The site is owned by KMBC and managed in part by Halewood Town Council (Wood Road Fields) and partly by Halewood Town Junior Football Club (Greengates Playing Field). Delivering improvements to Grace Park are an essential part of the Council's Halewood LUF Investment Programme.

1.5.2. Grace Park is an existing community space at the heart of Halewood. The site incorporates a number of functions and activities, including an existing children's play area, public park and playing fields for Halewood Town Junior Football Club (a local junior football club). Grace Park covers an area of approx. 7.1ha. However, the area of the Proposed Development itself covers an area of approx. 6.22ha. The remaining area of 0.88ha is proposed for a temporary construction compound and it is not part of the permanent Proposed Development. The construction compound area is proposed for development in the future and will be subject to a separate planning application. The location of Grace Park is shown in Figure 1.1



Figure 1-1 - Location Plan of Site

1.5.3. The Proposed Development will consists of:

- Two artificial grass playing pitches;
- A 5 v 5 mini soccer pitch;
- A clubhouse;
- A car park;
- A Civic Plaza;
- Landscaping and public realm works ; and
- A feature play area.

1.5.4. The area adjacent to the southern edge of the proposed car park is proposed to be used as a temporary construction compound for the Proposed Development, and it is included in the planning application boundary. However, it needs to be noted that this area is not part of the permanent Proposed Development. The area of the temporary construction compound will come forward in the future for development, and it will be subject to a separate planning application

1.5.5. The Proposed Development layout is shown in Appendix A.

1.6 CONSULTATION

1.6.1. A summary of all consultation undertaken to the date and relevant to flood risk and drainage is provided in Table 1-1.

Table 1-1 – Summary of Relevant Consultation to Date

Organisation	Date of Consultation	Summary
United Utilities	23/08/2024 (online)	Submission of Pre-Development Enquiry application
	02/09/2024 (email)	UU reply to the Pre-Development Enquiry:

Organisation	Date of Consultation	Summary
		- Surface water management to follow the drainage hierarchy; - If other options of surface water disposal are discounted (evidence needed), surface water runoff can be discharged to a 600mm diameter public surface water sewer via MH 8101 in Leather's Lane; - Surface water discharge rate should be agreed with the LLFA; - Foul flow is allowed to discharge with unrestricted rate to 300mm dia combined sewer located in Leather's Lane.
	25/11/2024 (email)	UU acceptance of post-development surface water discharge rate of 10 l/s from the Proposed Development into United Utilities-owned public surface water sewer in Leather's Lane.
	06/12/2024 (email)	UU confirmed that foul flows from the Proposed Development can be discharged to MH 8102 in Leather's Lane with unrestricted rate. UU also confirmed depths for manholes 8101 and 8102.
	18/12/2024 (email)	UU provided reference and depth for their manhole located at the junction of Wood Road and Wensley Avenue (MH6403, depth 1.71m). UU advised that the provided manhole depth is indicative, and WSP should carry out their own survey.
	03/11/2025 (email)	As the UU response to Pre-Development Enquiry expired after 12 months, WSP re-submitted summary of the proposed drainage strategy agreed previously with UU for their approval.
	04/11/2025 (email)	UU advised that as their original response expired, the Pre-Development Enquiry should be submitted to them for review.
	25/11/2025 (email)	WSP re-submitted Pre-Development Enquiry.
	05/12/2025 (email)	UU provided response to Pre-Development Enquiry. UU confirmed that there is no change to the previously agreed approach to drainage strategy.
Knowsley Metropolitan Borough Council (Lead Local Flood Authority (LLFA))	21/10/2025 (call)	WSP provided description of the proposed drainage strategy. LLFA agreed with the proposal in principle.
	30/10/2025 (email)	WSP submitted a high-level estimation of attenuation storage volumes for the construction compound for a range of return periods.

Organisation	Date of Consultation	Summary
	05/11/2025 (call)	LLFA confirmed the following: - If the construction compound area is converted back to its original state (greenfield), attenuation storage for that area can be designed for return period of 1 in 5 years and 1 in 10 years event; - If the construction compound area will retain as hardstanding area after the Proposed Development is completed, attenuation storage for that area should be designed for the 1 in 100 year event with climate change allowance.
Knowsley Metropolitan Borough Council (James Tower Technical Manager, Environmental Sustainability)	17/12/2025 (call & email)	KMBC confirmed that the temporary construction compound will consist of permeable hardstanding that will be retained post-construction. Considering the clayey soils with impeded drainage underlaying the Proposed Development, KMBC advised that 'permeable hardstanding' is to be considered the same as 'converted to greenfield' as it would mimic the existing situation.

2 SITE DESCRIPTION

2.1 SITE LOCATION AND DESCRIPTION

- 2.1.1. The Proposed Development (National Grid Reference for the centre of the site SJ 44640 85264) covers an area of approximately 6.22ha without temporary construction compound (approx. 7.1ha with the temporary construction compound) and is situated in Halewood, a primarily residential area approximately 11.30km southeast of Liverpool City Centre. The location of the Proposed Development is shown in
- 2.1.2. Figure 1-1. It is bordered to the east by Leather's Lane, residential properties to the north-east, north and south, and Wood Road running alongside its west perimeter.
- 2.1.3. A topographical survey was undertaken at the Proposed Development in August 2023 by Survey Operations. The topographical survey drawing is included in Appendix B. There are three small, raised embankments, with the remainder of the site gently sloping in an easterly direction from a maximum elevation of approximately 27mAOD in the south-west corner to a minimum elevation of approximately 22mAOD in the north-east corner.

2.2 HYDROLOGY AND SURFACE WATER FEATURES

- 2.2.1. There are no watercourses within or in close proximity to the Proposed Development. The nearest watercourse is an unnamed tributary of Ditton Brook, approximately 620m to the east of the Proposed Development.
- 2.2.2. A small pond is currently present within the Proposed Development boundary. A review of Greengates Pitch Construction drawing provided by KMBC, suggests that the existing sport pitches are provided with under drains that eventually discharge to a soakaway located under that pond.

2.3 GEOLOGY AND HYDROGEOLOGY

- 2.3.1. The Proposed Development area is underlain by the Etruria Formation – comprised of Mudstone, Sandstone and conglomerate and classified as a Secondary A Aquifer. The overlying superficial deposits are identified as Till, Devensian – Diamicton designated a Secondary (Undifferentiated) Aquifer. A Secondary A Aquifer is described as aquifers comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers. Secondary Undifferentiated are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type.
- 2.3.2. The Proposed Development area is not located in the groundwater Source Protection Zone (SPZ).
- 2.3.3. A ground investigation (GI) was carried out at the Proposed Development area in January 2025. A review of the results of the GI carried out in the Proposed Development area shows that the site is underlain by topsoil (sandy clayey silt) with underlying made ground (clay with occasional pockets of sand) up to approx. 5m below ground level (bgl). Glacial Till comprising clay with frequent pockets of sand was recorded below made ground.
- 2.3.4. The GI results also show that groundwater seepage and groundwater table were recorded across the site. Groundwater seepage was recorded in range between 0.9m bgl and 2.5m bgl, and groundwater was encountered at levels in range between 1.9m bgl and 2.7m bgl. Considering the clayey soils underlying the Proposed Development, the recorded groundwater level may be

associated with perched groundwater rather than groundwater table. Perched groundwater is defined as groundwater that sits on a layer of impermeable or low-permeability material, for example, clay, which separates it from the main groundwater table. No groundwater monitoring was undertaken as part of the GI. A summary of the GI findings in relation to groundwater is shown in Table 2-1. The location of exploratory holes is shown in Appendix C.

Table 2-1 – Ground Investigation – Recorded Groundwater Seepage and Groundwater Table

Exploratory Hole	Groundwater Seepage (m bgl)	Groundwater (m bgl)
TP01	1.1	-
TP04	0.9	-
TP12	2.5	-
TP13	-	1.9
TP15	-	2.7
TP18	1.9	-
TP23	2.0	-

2.4 SOIL INFILTRATION

- 2.4.1. A soakaway test was carried out as part of the GI. The test was run for 300 minutes and the water table dropped by 0.04m during this time. The results therefore show that infiltration is not feasible at the area of Proposed Development. The results of the soakaway test are shown in Appendix D. The GI report concludes that considering the soakaway results and geology underlying the Proposed Development area, direct infiltration via soakaways is unlikely to be feasible.
- 2.4.2. A review of the Soilscales mapping confirms that the Proposed Development is underlain by slowly permeable loamy and clayey soils with impeded drainage.

2.5 SOIL CONTAMINATION

- 2.5.1. The GI report states that no visual or olfactory evidence of contamination was recorded in any of the exploratory hole locations.

2.6 EXISTING DRAINAGE

- 2.6.1. A review of the United Utilities (UU) asset location plan shows that there is no formal public drainage infrastructure within Grace Park. The UU plan also shows a 600mm diameter surface water sewer and a 300mm diameter combined public sewer located in Leather's Lane to the east of the Proposed Development area. A 450mm diameter surface water and 225mm diameter foul water sewers are located along Wood Road that creates a western boundary of the Proposed Development. The UU sewers records are shown in Appendix E.
- 2.6.2. There is a pond located in the centre of the Proposed Development area. A review of the topographical survey information shows two inlet pipes connected to the pond. It is uncertain which

areas are drained via these outfalls. However, it is assumed that parts of the Proposed Development area are provided with land drains which outfalls into the pond.

- 2.6.3. A review of Greengates Pitch Construction drawing suggests that the existing sport pitches are provided with under drains which eventually discharge to a soakaway. The drawing suggests that a shallow depression was created in the location of the soakaway (with the soakaway been located below the bottom of the lowered ground area). Considering the low permeability of the underlying geology, it is likely that the lowered ground area was filled up with rainwater, creating the existing pond. The Greengates Pitch Construction drawing is shown in Appendix F.

3 PLANNING CONTEXT

- 3.1.1. Flood risk is assessed in accordance with the NPPF and local planning policy relevant to the proposed location of the new cycle path. A summary of these policies is provided in this section.

3.2 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

- 3.2.1. The NPPF as updated in February 2025 and Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change' documents provide guidance on how new developments must take into account flood risk, including allowance for the impacts of climate change.
- 3.2.2. In relation to flood risk, the NPPF encourages decision makers to:
- Focus development in areas with the lowest risk of flooding from any source. Development should not be permitted if there are alternative sites available where there is a lower risk of flooding;
 - Prevent an increase in flood risk elsewhere and reduce flood risk through design and the appropriate application of sustainable drainage systems;
 - Reduce flood risk by allocating space for flood storage; and
 - Use regeneration to help relocate development to lower risk locations when climate change is expected to compromise the long-term sustainability of a development.

3.3 SUSTAINABLE DRAINAGE

- 3.3.1. The Non-Statutory Technical Standards for Sustainable Drainage Systems provides general guidance for the design, maintenance and operation of sustainable drainage systems (SuDS). Detailed design and guidance is provided in The SuDS Manual (C753F).
- 3.3.2. In addition, the NPPF promotes the use of SuDS and states that major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:
- Take account of advice from the lead local flood authority;
 - Have appropriate proposed minimum operational standards;
 - Have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
 - Where possible, provide multifunctional benefits.

3.4 THE FLOOD AND WATER MANAGEMENT ACT 2010

- 3.4.1. The Flood and Water Management Act 2010 (FWMA) introduces new responsibilities for local authorities to manage flood risk and sets out new requirements for the management of sustainable drainage.

LEAD LOCAL FLOOD AUTHORITIES

- 3.4.2. Under the FWMA the County Council or unitary authority responsible for the governance of an area is designated as the LLFA and is responsible for the management of flood risk from surface water,

groundwater and ordinary watercourses. The LLFA is also typically the consenting authority for any works located near or within ordinary watercourses.

3.5 LOCAL PLANNING POLICY

KNOWSLEY LOCAL PLAN CORE STRATEGY (JANUARY 2016)

3.5.1. Policy CS24 of the Knowsley Local Plan: Core Strategy stipulates the following in regard to the management of flood risk:

- New development that may cause an unacceptable risk of flooding on the site or elsewhere will not be permitted.
- New development should preferably be located in areas of low probability of flooding. New development in areas of medium or high flood risk will only be permitted if evidence has been submitted demonstrating that the development could not be practicably located in an area of lower flood risk and if applicable the 'exception test' has been complied with, in accordance with national guidance.
- All development which is within or otherwise affects an area of flood risk or is larger than one hectare in size shall be accompanied by a site-specific Flood Risk Assessment (FRA).
- New development shall include flood mitigation measures, where necessary, to manage flood risk associated with or caused by the development. These measures shall be derived from the Strategic Flood Risk Assessment (SFRA), relevant FRA(s) or a local strategy for flood risk management, and:
 - Be designed to contribute to the biodiversity of the borough unless it can be demonstrated that this would not be technically feasible;
 - Incorporate a Sustainable Drainage System;
 - Be fully described in the planning application; and
 - Be funded by the developer, including long term maintenance.
- The drainage of new development shall be designed to reduce surface water run-off rates to those associated with a green-field site by treating it at its source. The chosen method of implementation should take account of site size, ground contamination or conditions, and potential damage to adjacent buildings or sites.

4 DEFINITION OF FLOOD RISK

4.1 DEFINITION OF FLOOD RISK

- 4.1.1. Flood risk is the product of the likelihood of a flood event occurring (flood frequency) and the subsequent impact (flood consequence).

4.2 FLOOD FREQUENCY

- 4.2.1. Flood frequency can be defined by determining the return period and annual probability of a potential flood event. For example, a 1 in 100-year flood event has a 1% annual probability of occurring. Table 4-1 provides a conversion between return period and annual flood probability.

Table 4-1 - Flood Probability Conversion

Return Period (Years)	2	5	10	20	50	100	200	1000
Annual Probability %	50	20	10	5	2	1	0.5	0.1

- 4.2.2. In accordance with the NPPF, a potential development site can be classified as Flood Zone 1, 2, 3a or 3b depending on the annual probability of fluvial and/or tidal flooding (or flood frequency) in that area. The zones refer to the probability of river (fluvial) and sea (tidal) flooding, whilst ignoring the presence of defences. Table 4-2 summarises the relationship between Flood Zone classification and flood frequency.

Table 4-2 - Definition of Flood Zones

Flood Risk Area	Identification	Annual Probability of Fluvial Flooding	Annual Probability of Tidal Flooding
Zone 1	Low probability	< 0.1%	< 0.1%
Zone 2	Medium probability	1% - 0.1%	0.5% - 0.1%
Zone 3a	High probability	>1%	>0.5%
Zone 3b*	Functional Floodplain	>5%	>5%

In this instance and determined using the EA's Flood Map for Planning, the annual probability of fluvial and tidal flooding across the Proposed Development is less than 0.1%. As such, the Proposed Development falls into Flood Zone 1.

4.3 FLOOD VULNERABILITY

- 4.3.1. The consequence of a flood event describes the potential damage, danger and disruption caused by flooding. This is dependent on the mechanism and characteristics of the flood event and the vulnerability of the affected land and land use.
- 4.3.2. The NPPF identifies five classifications of flood risk vulnerability and provides guidance on the compatibility of each vulnerability classification with the Flood Zones. This is outlined in Table 4-3.

Full details of the Flood Zones and flood risk vulnerability classifications can be found in Annex 3 of the NPPF and the Planning Practice Guidance (PPG) 'Flood Risk and Coastal Change'.

Table 4-3 - Flood Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b	Exception Test Required	✓	✗	✗	✗

✓ Development considered acceptable

✗ Development considered unacceptable

- 4.3.3. In accordance with the guidance, the Proposed Development, is considered as 'Less Vulnerable' development, and it is acceptable in Flood Zone 1.

5 SEQUENTIAL AND EXCEPTION TESTS

5.1 SEQUENTIAL TEST

- 5.1.1. The PPG and NPPF Guidance states that Planning Authorities should complete a risk based "Sequential Test", to ascertain areas most suitable for development, from a flood risk perspective.
- 5.1.2. The essence of the "Sequential Test" is to "steer new developments to areas with the lowest risk of flooding from any source" (Paragraph 162 of the NPPF, September 2023).
- 5.1.3. Developments within Flood Zone 2 and Flood Zone 3 require a sequential test if a sequential test has not already been carried out for the development type in question as part of the local plan / consented schemes.
- 5.1.4. The entire Proposed Development is located within low-risk Flood Zone 1, hence it fulfils the requirements of the Sequential Test.

5.2 EXCEPTION TEST

- 5.2.1. While the Sequential Test is employed on all sites to direct development to locations having the lowest probability of flooding, the Exception Test is used on select sites where it is shown necessary, through the Sequential Test, to apply development of a given Flood Risk Use Vulnerability in a Flood Zone that is ordinarily reserved for a less vulnerable use.
- 5.2.2. The Proposed Development, including the Proposed Development, is considered as 'less vulnerable' development and it is located entirely in Flood Zone 1. Therefore, the Exception Test is not required.

6 EXISTING FLOOD RISK

6.1 SOURCES OF FLOODING

6.1.1. In accordance with the NPPF, the following sources of flooding have been considered in this assessment:

- Fluvial water from watercourses,
- Tidal,
- Overland surface water runoff from adjacent sites,
- Surcharging of sewers,
- Groundwater, and
- Artificial sources such as canals and reservoirs.

6.2 HISTORIC FLOODING

6.2.1. According to KMBC's Level 2 SFRA and LFRMS, there have been several recorded instances of historic flooding in Halewood, although the precise location and reasoning is not discussed.

6.2.2. KMBC has advised there have been a number of reported flooding events from local residents to the north-east of Grace Park. KMBC believes that it is caused by runoff generated in Grace Park that does not infiltrate quickly enough due to clayey soils, and flows overland and pond in localised depressions.

6.3 FLOODING FROM FLUVIAL AND TIDAL SOURCES

6.3.1. A review of the Environment Agency's Flood Map for Planning, the entire Proposed Development falls within Flood Zone 1. Consequently, the risk of fluvial and tidal flooding is negligible and does not necessitate further mitigation. The extract from the Environment Agency's Flood Map for Planning is shown in Figure 6-1.

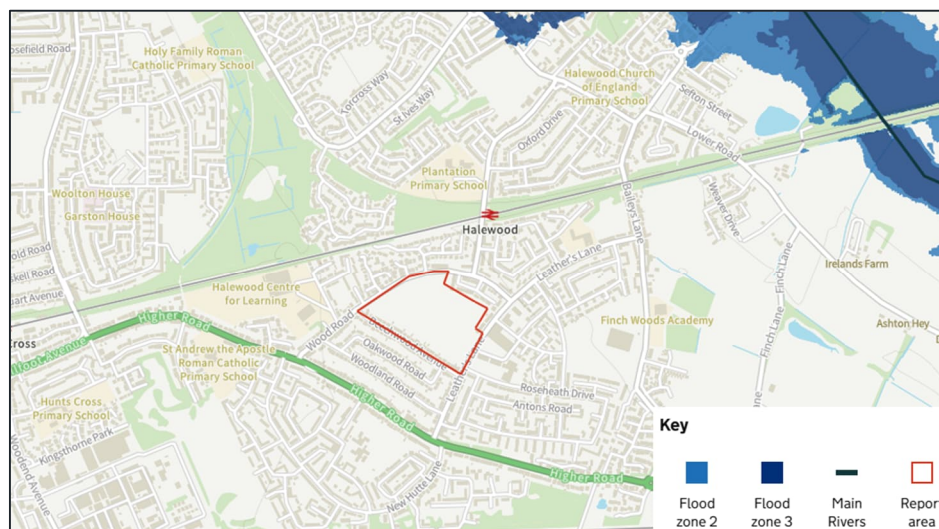


Figure 6-1 - Environment Agency's Flood Map for Planning

6.4 FLOODING FROM SURFACE WATER

- 6.4.1. A review of the Environment Agency's Flood Risk from Surface Water map indicates that the vast majority the Proposed Development area is not at risk of flooding from surface water. The same mapping shows that there are isolated areas across the site indicated to be at low to high risk of flooding from surface water. These areas are associated with the localised depressions in the ground where water could pond during prolonged and intense rainfall. There are also mounds present within the Proposed Development boundary which act as an obstruction to overland flows causing water to pond adjacent to them.
- 6.4.2. The mapping also indicates a surface water overland flow path along Wood Road. The mapping suggests that flows could enter Grace Park from the west, and pond in the grassed area adjacent to the park boundary. The risk of flooding associated with the overland flow path is indicated to be low.
- 6.4.3. The Environment Agency's Flood Risk from Surface Water map also shows potential flood depths associated with the surface water flooding described above. The surface water flood depth map indicates that only the existing pond area would have a high chance of flood depths of up to 0.2m. No flood depths are shown for the other areas within the Proposed Development boundary. This information suggests that the depth of flooding in the other areas has a very low chance of flooding up to depths of 0.2m or more.
- 6.4.4. An extract from the Environment Agency's Flood Risk from Surface Water mapping is shown in Figure 6-2.



Figure 6-2 - Environment Agency's Flood Risk from Surface Water Map

6.5 FLOODING FROM GROUNDWATER

- 6.5.1. Groundwater flooding occurs when water stored below the ground reaches the surface. It is commonly associated with porous underlying geology, such as chalk, limestone and gravels.
- 6.5.2. As discussed in Section 2.3 of this report, seepage and groundwater was encountered during the GI carried out at the Proposed Development area. Groundwater seepage was recorded at a range of

depths between 0.9m bgl and 2.5m bgl, and the groundwater was recorded at depth of 1.9m bgl and 2.7m bgl. Considering the clayey soils underlying the Proposed Development, the recorded groundwater levels may be associated with perched groundwater rather than groundwater table. The GI survey was carried in wintertime (January) which is considered as wet season in the UK. The recorded groundwater levels are therefore considered conservative. Details of the groundwater findings are shown in Table 2-1 in Section 2.3 of this report, and the location of exploratory holes are shown in Appendix C.

- 6.5.3. Figure 6-3 has been extracted from Knowsley's Preliminary Flood Risk Assessment Report and shows that the Proposed Development area could be susceptible to groundwater flooding.

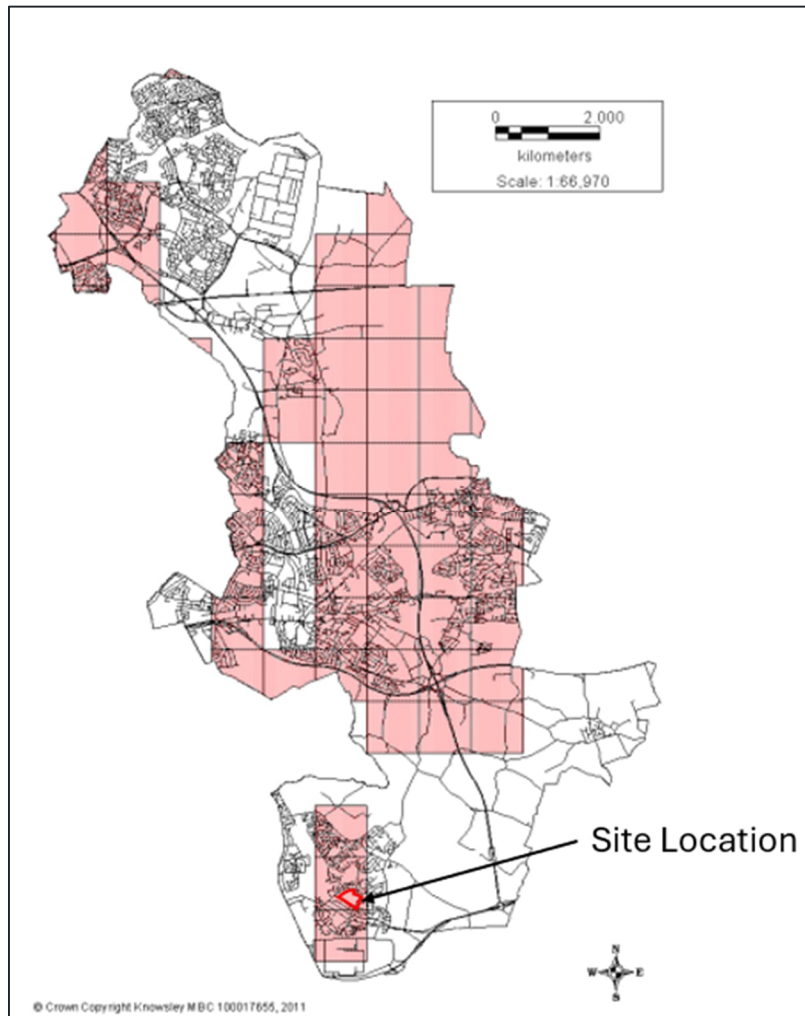


Figure 6-3 - Areas Susceptible to Groundwater Flooding

- 6.5.4. A review of the Cranfield Soils mapping highlights that the soils in this area are clayey with impeded drainage. This suggests that the potential for groundwater emergence is limited. However, considering the results of the GI, and the above information, the risk of flooding from groundwater is assessed to be low to medium.

6.6 FLOODING FROM SEWAGE AND DRAINAGE INFRASTRUCTURE

- 6.6.1. In accordance with the UU sewer records, no public sewers are located within the boundary of the Proposed Development.
- 6.6.2. The UU sewer records also show their assets located under the roads surrounding the proposed Development area. The Proposed Development is located on grounds slightly higher than the surrounding roads. The potential flood water from the public sewers is therefore unlikely to impact the Proposed Development.
- 6.6.3. Considering the above information, the risk of flooding from sewers is assessed to be low.

6.7 FLOODING FROM ARTIFICIAL SOURCES

- 6.7.1. The Environment Agency's Risk of Flooding from Reservoirs mapping shows that the Proposed Development does not lie within the area at risk of flooding from reservoirs. The risk of flooding from artificial sources is therefore regarded as negligible.
- 6.7.2. An extract from the Environment Agency's Risk of Flooding from Reservoirs mapping is shown in Figure 6-4.

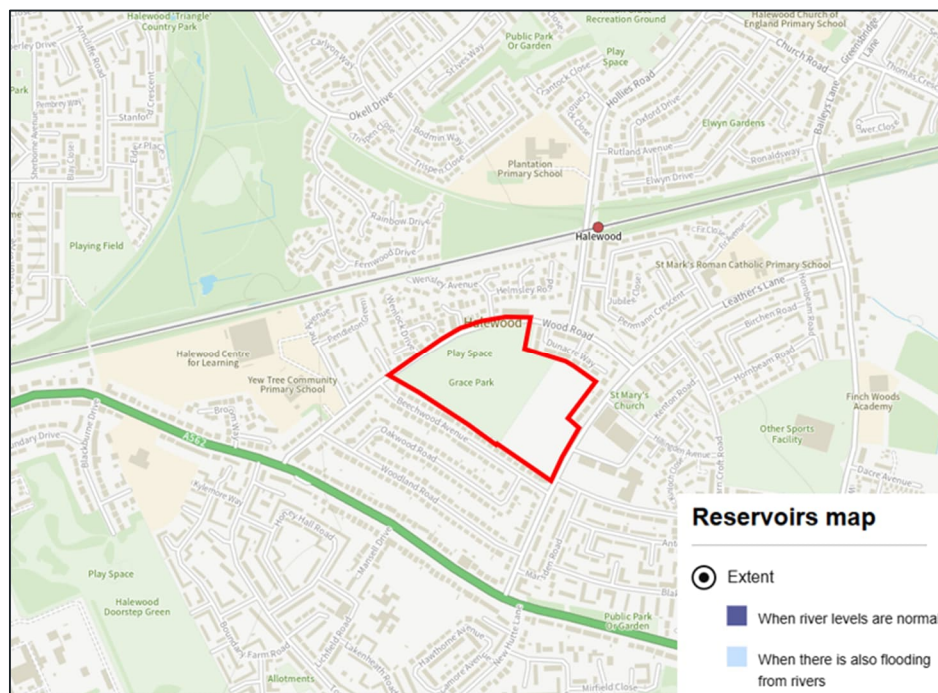


Figure 6-4 - Environment Agency's Risk of Flooding from Reservoirs Map

7 CLIMATE CHANGE

7.1 BACKGROUND INFORMATION

- 7.1.1. As explained in the Climate Change Adaptation Sub-Committee Progress Report 2014, increased flood risk is the greatest threat to the UK caused by climate change. The frequency and intensity of rainfall is expected to increase in addition to sea-level rise.
- 7.1.2. In 2016 the Environment Agency published guidance relating to the use of allowances to account for the projected impact of climate change on peak rainfall intensity, peak river flow and sea-level rise.
- 7.1.3. As of the most recent update in May 2022, climate change allowances for peak river flows are calculated based on percentiles, whereby a percentile is a measure of the proportion of possible scenarios that fall below an allowance level (e.g. a 50% percentile means that the allowance has 50% chance of not being exceeded).
- 7.1.4. In terms of peak rainfall, the Environment Agency stipulates a central and upper end allowance depending on expected design life.

7.2 IMPACT OF CLIMATE CHANGE

- 7.2.1. The Proposed Development has an expected lifetime of 100 years.
- 7.2.2. Climate change allowances for peak river flows have not been considered within the scope of this FRA due to the absence of fluvial flood risk.
- 7.2.3. Peak rainfall rates are envisaged to increase during the lifetime of the Proposed Development due to climate change. The climate change allowances for a development in the Lower Mersey Management Catchment with a lifetime beyond 2100 are summarised in Table 7-1.

Table 7-1 - Peak Rainfall Climate Change Allowances - Lower Mersey Management Catchment

Return Period	Central Allowance	Upper End Allowance
1-in-30 year	30%	40%
1-in-100 year	30%	45%

- 7.2.4. Taking into account the Environment Agency's most recent guidance related to climate change, as discussed above, the surface water runoff generated in the Proposed Development will be managed up to and including the 1 in 100 year event with 45% climate change allowance to ensure no increase in the risk of flooding within the Proposed Development boundary and elsewhere.

8 PROPOSED MITIGATION OF FLOOD RISK

- 8.1.1. The assessment of the existing risk of flooding shows that the Proposed Development is at negligible risk of flooding from the fluvial and tidal sources, and reservoirs. Therefore, mitigation measures for the flooding from these sources are not required. The assessments also shows that the Proposed Development is at potential risk of flooding from surface water and groundwater. Therefore, mitigation measures will be required to reduce these risks.

8.2 MITIGATION OF SURFACE WATER FLOOD RISK

- 8.2.1. An increase in the rainfall intensity and peak runoff due to climate change is envisaged to occur during the design life of the Proposed Development. To mitigate the increase in the risk of flooding, surface water runoff from the Proposed Development will be managed within the site boundary for up to and including the 1 in 100 year event with a 45% climate change allowance. The proposed drainage strategy is discussed in Section 9 of this report.
- 8.2.2. As discussed in Section 6.4 of this report, there is a risk that the overland flow path from Wood Road could enter the Proposed Development from the west, and cause surface water ponding adjacent to the western boundary. In addition, the isolated areas within the Proposed Development indicated to be at risk of flooding from surface water are associated with areas of low ground where water will pond during and/or after prolonged rainfall events. Similarly, isolated areas adjacent to the existing mounds are shown to be at risk of flooding from surface water as the mounds act as a barrier to overland flows. The ground levels across the Proposed Development will be regraded as part of the landscape design, which would provide mitigation for the previously described surface water flood risk. For example, areas of lower ground levels will be created within the landscaped areas to allow for surface water ponding, away from the vulnerable areas such as residential properties adjacent to the Proposed Development – subject to detailed design.

8.3 MITIGATION OF GROUNDWATER FLOOD RISK

- 8.3.1. High groundwater levels have potential to ingress into the proposed below ground drainage features which would reduce the available attenuation storage. There is also a risk that high groundwater table could impact the integrity of the proposed below ground drainage features and potentially make them float above the ground level due to the upward force of groundwater.
- 8.3.2. The proposed below ground attenuation storage features will be lined with impermeable membrane to prevent groundwater ingress. In addition, anti-buoyancy solution may be required for each of the proposed attenuation features to mitigate the risk of their floating above ground. The need for floatation mitigation measures is subject to further investigation at the detailed design stage of the project.
- 8.3.3. There is also risk of groundwater using the pipe bedding material as a conduit. Clay stanks in the pipe bedding or similar solution are proposed to be provided to mitigate this potential risk. The specifics of this are subject to detailed design.

The proposed building finished floor level may have to be set above the finished ground level to mitigate the potential risk of groundwater ingress. High groundwater table may also have to be considered in the building foundation design. The need for the groundwater mitigation measures related the proposed clubhouse is subject to further investigation at the detailed design stage.

9 SURFACE WATER MANAGEMENT STRATEGY

9.1 SURFACE WATER MANAGEMENT HIERARCHY

9.1.1. The surface water drainage strategy should consider surface water disposal in accordance with the Flood Risk and Coastal Change PPG, which stipulates that surface water runoff not collected for reuse must be discharged to one or more of the following in order of priority:

- Discharge into ground (via infiltration); or, where not reasonably practicable,
- Discharge to a surface water body (watercourse / body); or, where not reasonably practicable,
- Discharge to a surface water sewer, highway drain, or another drainage system; or, where not reasonably practicable,
- Discharge to a combined sewer.

9.2 DISCHARGE VIA INFILTRATION

9.2.1. As discussed In Section 2.4 of this report, a soakaway test was carried out as part of the GI at the Proposed Development area. The test was undertaken in a 3m deep trial pit, and the results show that infiltration is not feasible at the site.

9.2.2. In addition, during the GI, discussed in more details in Section 2.3 and Section 6.5 of this report, groundwater seepage was recorded at depths in range between 0.9m bgl and 2.5m bgl, and groundwater was recorded at depths 1.9m bgl and 2.7m bgl. No groundwater monitoring was carried out as part of the GI but the recorded groundwater information suggests potentially medium to high groundwater levels across the site. Drainage infiltration features require depth of minimum 1m between a bottom of a feature and groundwater level. Considering the findings from the GI, infiltration techniques are not considered appropriate for disposal of runoff from the Proposed Development.

9.3 DISCHARGE TO A WATERBODY

9.3.1. As there are no surface water bodies within the immediate vicinity of the Proposed Development, the management and discharge of surface water runoff via this method is not considered viable.

9.4 DISCHARGE TO A SEWER

9.4.1. The UU sewer records show that there is a 600mm dia surface water sewer located along Leather's Lane. A Pre-Development Enquiry was submitted to the UU in September 2024 to confirm whether discharge to their sewers is acceptable, agree the allowable discharge rate and preferable connection point. In their response, UU have confirmed that discharge of surface water runoff from the Proposed Development to their sewer is acceptable. UU also confirmed that the discharge rate of 10l/s and the proposed connection point (UU manhole reference SJ44858101) are acceptable. An appropriate application for a sewer connection will have to be submitted to UU prior to any construction works to obtain their approval. Correspondence with UU is included in Appendix G.

9.4.2. The UU response to the Pre-Development Enquiry was valid for 12 months. The UU requested that as their response expired, a Pre-Development Enquire is re-submitted for their review. A Pre-Development Enquiry application was re-submitted to UU in mid-November 2025. A response from UU was received in early December 2025, and it confirms that the approach to the drainage strategy original agreed with UU is still valid.

9.5 DESIGN PRINCIPLES

GREENFIELD RUNOFF RATE CALCULATIONS

Proposed Development

- 9.5.1. The Proposed Development is currently greenfield and covers an area of approx. 6.22ha (without temporary construction compound area). Construction of the Proposed Development will introduce approx. 2.19ha of impermeable area. The area of the proposed temporary construction compound is not part of the permanent Proposed Development, and therefore was excluded from the greenfield calculations for the Proposed Development.
- 9.5.2. The greenfield runoff rates for the entire Proposed Development area were calculated using FEH methodology, and scaled down based on the proposed impermeable area to estimate the post-development discharge rates. The results are shown in Tables 9-1 and 9-2 respectively. Details of the calculations are shown in Appendix H.

Table 9-1 – Proposed Development Entire Area - Estimated Greenfield Runoff Rates

Return Period	1 in 1 year	Q_{BAR}	1 in 30 year	1 in 100 year
Greenfield Runoff Rate (l/s)	33.7	38.8	65.9	80.6

Table 9-2 – Proposed Development Impermeable Area – Runoff Rates

Return period	1 in 1 year	Q_{BAR}	1 in 30 year	1 in 100 year
Runoff Rate (l/s)	11.9	13.7	23.2	28.4

Temporary Construction Compound

- 9.5.3. The proposed construction compound is currently greenfield and covers an area of approx. 0.88ha. The greenfield runoff rates for the temporary construction compound area were calculated separately to allow for estimation of the attenuation storage volumes required for that area during construction phase. The greenfield runoff rates were calculated using the FEH methodology, and the results are shown in Table 9-2. Details of the calculations are shown in Appendix H.

Table 9-3 – Temporary Construction Compound – Estimated Greenfield Runoff Rates

Return Period	1 in 1 year	Q_{BAR}	1 in 30 year	1 in 100 year
Greenfield Runoff Rate (l/s)	4.8	5.5	9.3	11.4

9.6 SURFACE WATER DISCHARGE RATE

- 9.6.1. Surface water runoff from the Proposed Development is proposed to be discharged to the UU surface water sewer located along Leather's Lane. The discharge rate is proposed to be limited to 10l/s. The proposal was accepted by both UU and the LLFA.
- 9.6.2. Surface water runoff from the construction compound will be discharged to the surface water drainage proposed for the Proposed Development, with the discharge rate limited to 2l/s. This information should be passed to an appointed contractor, to ensure they provide appropriate flow control to limit the discharge rate from the construction compound as designed. The proposed arrangement will be temporary, as the area of the construction compound is planned to be developed in the future, and it will be provided with a separate drainage system. Once the construction compound area is developed in the future, the temporary connection to the drainage system serving the Proposed Development will be removed.

9.7 ATTENUATION STORAGE REQUIREMENTS

PROPOSED DEVELOPMENT

- 9.7.1. The attenuation storage for the Proposed Development will be designed to manage surface water runoff for up to and including 1 in 100 year event with 45% climate change allowance.
- 9.7.2. At this stage of the project, it is proposed that the required attenuation storage is provided in a system of ponds and detention basins, granular layer under MUGA and sport pitch, and cellular crates under the car park. For the clubhouse, rainwater harvesting or green roof is proposed – subject to detailed design. Appropriate flow controls will be incorporated in the proposed surface water drainage system to ensure that a final discharge rate into the UU sewer does not exceed the agreed discharge rate of 10l/s. The proposed surface water drainage also allows for additional flow of 2l/s from the temporary construction compound. The proposed surface water drainage layout is shown in Appendix I. Typical details of the proposed attenuation storage features are shown in Appendix J. The supporting drainage calculations are included in Appendix K.
- 9.7.3. It needs to be noted that this stage of the project, it is proposed that Ponds 1 to 5 have a permanent water level of approx. 200mm, with attenuation volume provided above that level. Pond 6 is proposed to be a dry pond with cellular crates underneath to provide the required extra storage. Pond 7 is proposed to be a detention basin.
- 9.7.4. The above ground attenuation storage features are designed to allow for approximately 300mm freeboard.
- 9.7.5. A comparison of storage volumes available up to top of banks (including freeboard), and required storage volumes is shown in Table 9-3.

Table 9-4 – Proposed Development – Attenuation Storage Volumes

Attenuation Feature	Available Storage Volume (m ³), including freeboard	1 in 100 year +45% CC Required Storage Volume (m ³)
Pond 1	129.10	109.02

Attenuation Feature	Available Storage Volume (m ³), including freeboard	1 in 100 year +45% CC Required Storage Volume (m ³)
Pond 2	225.30	196.59
Pond 3	388.80	313.71
Pond 4	77.60	70.74
Pond 5	37.50	29.87
Pond 6 (incl. cellular crates)	319.00	309.91
Pond 7	943.60	602.10
Sport Pitch	445.20	334.92
MUGA	95.3	65.72
Cellular Crates (under car park)	83.60	74.82
Total	2,745.00	2107.40

TEMPORARY CONSTRUCTION COMPOUND

- 9.7.6. KMBC advised that the construction compound is likely to consist of permeable hardstanding, that is planned to be retained once the construction phase is completed. Considering the clayey soils with impeded drainage underlying the Proposed Development, 'permeable hardstanding is considered the same as 'converted to greenfield' as it would mimic the existing situation. The LLFA advised that attenuation storage required for the temporary construction compound is therefore expected to be designed for return period of between 1 in 5 years and 1 in 10 years event.
- 9.7.7. The proposed construction compound area covers an area of approx. 0.88ha. At this stage of the project, the extent of a permeable hardstanding area within the construction compound is uncertain. A worst-case approach was taken to estimate preliminary attenuation volumes for the construction compound therefore the entire compound area was assumed to be permeable hardstanding. The discharge rate to the surface water drainage serving the Proposed Development is allowed to be 2l/s to avoid significant oversize of the permanent attenuation storage features serving the Proposed Development. Information on the discharge rate required for the construction compound runoff should be provided to appointed contractor to ensure that they will provide appropriate flow control mechanism.
- 9.7.8. The results of preliminary storage calculations are shown in Table 9-5. Details of calculations are shown in Appendix L.

Table 9-5 – Temporary Construction Compound – Preliminary Storage Estimation

Return Period	1 in 5 year	1 in 10 year
Attenuation storage volume (m ³)	295	348

- 9.7.9. It needs to be noted that the design of attenuation storage for construction compound is not included in the scope of the permanent drainage strategy for the Proposed Development. The attenuation storage volumes shown in Table 9-5 are preliminary only, and should be confirmed prior to construction. Detailed storage calculations, design of the attenuation storage, and provision of appropriate pollution mitigation measures, including silt management, and flow control is a responsibility of appointed contractor, and should be included in their Method Statement and Construction Environmental Management Plan.

9.8 ATTENUATION STORAGE REQUIREMENTS RELATED TO GROUNDWATER LEVELS

- 9.8.1. Considering the information related to the presence of potentially high groundwater, as discussed in Sections 2.3, 6.5 and 8.3 of this report, the proposed below ground attenuation storage features may require the provision of appropriate measures to counteract the uplift forces in order to mitigate the risk of hydrostatic uplift pressures. The need for such mitigation measures, and their design if needed, will be investigated further during the detailed design stage.
- 9.8.2. In addition, appropriate mitigation measures will be provided to prevent groundwater ingress into the proposed attenuation storage features. Details of these required mitigation measures will be derived during detailed design stage of the project.

9.9 EXCEEDANCE FLOW ROUTES

- 9.9.1. The results of simulation of the proposed surface water drainage network show no flooding from the system for up to and including the 1 in 100-year event with 45% climate change allowance.
- 9.9.2. The ground levels across the Proposed Development area will be designed so that, in the event of extreme rainfall or blockage/failure of the drainage system, flows will be directed towards the drainage features and/or into less vulnerable areas such as green space or a car park.

9.10 WATER QUALITY MANAGEMENT

PROPOSED DEVELOPMENT

- 9.10.1. The SuDS Manual sets out a common approach to managing the quality of surface water runoff. The document describes risks posed by surface water runoff to the receiving environment as a function of:
- The pollution hazard at a particular site (i.e. the pollution source);
 - The effectiveness of SuDS treatment components in reducing the level of pollution to environmentally acceptable levels (i.e. the pollutant pathway); and
 - The sensitivity of the receiving environment (the environmental receptor).
- 9.10.2. Table 4.3 of The SuDS Manual stipulates the minimum water quality management requirements for discharge to surface and groundwater based on the pollution hazard level associated with a particular land-use.
- 9.10.3. Under the simple index approach, the level of mitigation provided by the proposed SuDS components (the total SuDS mitigation index) should exceed the pollution hazard index for each contaminant type (Total Suspended Solids (TSS), Metals and Hydrocarbons).

- 9.10.4. It is proposed that surface water runoff generated in shared-use active travel route, play areas and Civic Plaza is discharged to a system of ponds, which would act as pollution control. Surface water runoff generated in the car park is proposed to flow through Class 1 by-pass oil separator prior to discharge to a cellular crate system. Permeable paving could be also considered for the car park area – subject to detailed design. In addition, catchpits will be incorporated in the proposed surface water drainage system to capture silt and debris.

TEMPORARY CONSTRUCTION COMPOUND

- 9.10.5. An appointed contractor will be responsible for provision of appropriate pollution control, including silt management, prior to the discharge to the drainage system serving the Proposed Development.

9.11 OPERATIONAL AND MAINTENANCE REQUIREMENTS

- 9.11.1. The proposed surface water drainage strategy will be designed in accordance with the relevant design standards (e.g. The SuDS Manual, Building Regulations Part H).
- 9.11.2. The proposed orifice flow control mechanisms are prone to blockage due to the small diameter of the openings. Therefore, they require regular inspection and maintenance to ensure they work correctly. It is recommended that the orifice plates are inspected monthly, and after severe rainfall events. Any material that could cause a blockage, such as vegetation, silt or stones, identified during inspection, should be removed.
- 9.11.3. The proposed surface water drainage system, including attenuation ponds, detention basins, will require regular maintenance to ensure the effective long-term operation of SuDS and other elements of the proposed drainage system.
- 9.11.4. The maintenance regime required for detention basins, ponds, rainwater harvesting and green roofs is summarised in Tables 9-6 to 9-9 respectively.
- 9.11.5. KMBC confirmed the following in relation to the responsibility for maintenance activities, including maintenance of the drainage features:
- The north-west corner of the Proposed Development, including the proposed two artificial grass pitches, clubhouse and detention basin, as well as proposed car park area will be maintained by Halewood Town Junior Football Club;
 - The remainder of the Proposed Development will be maintained by KMBC.

Plan indicating the maintenance responsibility areas is show in Appendix M.

Table 9-6 - Operation and Maintenance Requirements for Detention Basins

Maintenance Type	Required action	Frequency
Regular maintenance	Remove litter and debris	Monthly
	Cutt grass	Monthly or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required

Maintenance Type	Required action	Frequency
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Inspect flow control mechanisms for blockage, and clear if required.	Monthly
	Tidy all dead growth before start of growing season	Annually
Occasional maintenance	Vegetation replacement / reseed areas of poor vegetation growth	As required
Remedial actions	Repair erosion or other damage by re-seeding or re-turfing	As required (inspect after major storms during the first year)
	Repair / rehabilitation of inlets and outlets	As required

Table 9-7 - Operation and Maintenance Requirements for Ponds

Maintenance Type	Required action	Frequency
Regular maintenance	Remove litter and debris	Monthly
	Inspect vegetation and remove nuisance plants (for first 3 years)	Monthly at start, then as required
	Cut the grass	Monthly or as required
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and / or physical damage	Monthly
	Inspect waterbody for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then half-yearly or as required

Maintenance Type	Required action	Frequency
	Inspect flow control mechanisms for blockage, and clear if required.	Monthly
	Tidy all dead growth before start of growing season	Annually
Occasional maintenance	Vegetation replacement / reseed areas of poor vegetation growth	As required
Remedial actions	Repair erosion or other damage	As required
	Repair / rehabilitation of inlets and outlets	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required

Table 9-8 - Operation and Maintenance Requirements for Rainwater Harvesting Systems

Maintenance Type	Required action	Frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters	Annually, and following poor performance
	Cleaning of tank, inlets, outlets, gutters, withdrawal devices and roof drain filters of silt and debris	Annually, and following poor performance
Occasional maintenance	Cleaning and/or replacement of any filters	Three monthly, or as required
Remedial actions	Repair of overflow erosion damage or damage to tank	As required
	Pump repairs	As required

Table 9-9 - Operation and Maintenance Requirements for Green Roofs

Maintenance Type	Required action	Frequency
Regular inspections	Inspect all components including soil substrate, vegetation, drains,	Annually and after severe storms

Maintenance Type	Required action	Frequency
	irrigation systems (if applicable), membranes and roof structure for proper operation, integrity of waterproofing and structural stability	
	Inspect soil substrate for evidence of erosion channels and identify any sediment sources	Annually and after severe storms
	Inspect drain inlets to ensure unrestricted runoff from the drainage layer to the conveyance or roof drain system	Annually and after severe storms
	Inspect underside of roof for evidence of leakage	Annually and after severe storms
Regular maintenance	Remove debris and litter to prevent clogging of inlet drains and interference with plant growth	Six monthly, or as required
	During establishment (i.e. year one), replace dead plants as required	Monthly
	Post establishment, replace dead plants as required (where >5% of coverage)	Annually (in Autumn)
	Remove fallen leaves and debris from deciduous plant foliage	Six monthly, or as required
	Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate	Six monthly, or as required
Remedial actions	If erosion channels are evident, these should be stabilised with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
	If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

10 FOUL WATER MANAGEMENT STRATEGY

- 10.1.1. Foul water flows generated within the proposed clubhouse are proposed to be discharged with unrestricted rate to a 300mm public combined water sewer. UU confirmed that the proposal is acceptable. Correspondence with UU is shown in Appendix G.

11 CONCLUSIONS

- 11.1.1. The Proposed Development area is currently considered as greenfield. The Proposed Development will introduce approx. 2.19ha of impermeable area. The area adjacent to the southern edge of the proposed car park is proposed to be used as a temporary construction compound for the Proposed Development, and it is included in the planning application boundary. However, this area is not part of the permanent Proposed Development. The area of the temporary construction compound will come forward in the future for development, and it will be subject to a separate planning application.
- 11.1.2. The Proposed Development area is assessed to be at low risk of from fluvial and tidal sources, sewers and reservoirs.
- 11.1.3. A review of the Environment Agency's Risk of Flooding from Surface Water map shows that the vast majority of the Proposed Development area is not at risk of flooding from surface water. There is a risk that the overland flow path from Wood Road could enter the Proposed Development from the west, and cause surface water ponding adjacent to the western boundary. In addition, the isolated areas within the Proposed Development indicated to be at risk of flooding from surface water are associated with areas of low ground where water will pond during and/or after prolonged rainfall events. Similarly, isolated areas adjacent to the existing mounds are shown to be at risk of flooding from surface water as the mounds act as a barrier to overland flows. The ground levels across the Proposed Development will be regraded as part of the landscape design, which would provide mitigation for the previously described surface water flood risk by creating areas away from local residential properties where water could pond. Details of this mitigation measures will be derived during detailed design.
- 11.1.4. Considering the results of GI and the underlying geology, the risk of flooding from groundwater is assessed to be low to medium.
- 11.1.5. A soakaway test was carried out as part of GI. The results show that infiltration techniques are not feasible on site.
- 11.1.6. Surface water runoff generated in the Proposed Development is proposed to be attenuated in a system of ponds, detentions basins, granular layer under proposed sport pitches and cellular crates. In addition, a green roof or rainwater harvesting is considered for the proposed Clubhouse. Attenuation storage will be designed to manage up to and including the 1 in 100 year event with 45% climate change allowance. Surface water runoff is proposed to be discharged with the rate restricted to 10l/s to a public surface water sewer in Leather's Lane. UU confirmed that the proposal is acceptable. The proposed surface water drainage strategy was also accepted in principle by the LLFA.
- 11.1.7. An appropriate Section 106 application for a sewer connection (for both proposed surface water and foul water connections) will have to be submitted to UU prior to any construction works to obtain their formal approval.
- 11.1.8. Surface water runoff from the construction compound is proposed to be temporarily discharged to the permanent attenuation storage features serving the Proposed Development. The discharge rate from the construction compound into these attenuation features will be limited to 2l/s to avoid significant oversize of the permanent attenuation storage features serving the Proposed Development. The proposed arrangement will be temporary, as the area of the construction compound is planned to be developed in the future, and it will be provided with a separate drainage

system. Once the construction compound area is developed in the future, the temporary connection to the drainage system serving the Proposed Development should be removed.

- 11.1.9. Design of attenuation storage for construction compound is not included in the scope of the permanent drainage strategy for the Proposed Development. Detailed attenuation storage calculations, design of the attenuation storage, provision of appropriate flow control to limit the discharge rate to 2l/s, and appropriate silt management and water quality control is a responsibility of appointed contractor, and should be included in their Method Statement and Construction Environmental Management Plan. These requirements shall be provided by an appointed contractor to ensure no detrimental impacts on the permanent surface water drainage system serving the Proposed Development.
- 11.1.10. Foul water flows generated in the proposed Clubhouse are proposed to be discharged with unrestricted rate to a public combined sewer located in Leather's Lane. UU confirmed that the proposal is acceptable.
- 11.1.11. The original Pre-Development Enquiry was submitted to UU in September 2024, and it was valid for 12 months. UU therefore requested that the Pre-Development Enquiry is re-submitted for their review. A Pre-Development Enquiry was re-submitted in mid-November 2025. A response from UU was received in early December 2025. UU confirmed that the approach to the drainage strategy originally agreed with UU is still valid.
- 11.1.12. The GI results suggests presence of potentially high groundwater within the area of Proposed Development. The proposed below ground attenuation storage features may therefore require the provision of appropriate measures to counteract the uplift forces in order to mitigate the risk of hydrostatic uplift pressures. The need for such mitigation measures, and their design if needed, will be investigated further during the detailed design stage. In addition, appropriate mitigation measures will be provided to prevent groundwater ingress into the proposed attenuation storage features. There is also risk of groundwater using the pipe bedding material as a conduit. Clay stanks in the pipe bedding or similar solution are proposed to be provided to mitigate this potential risk – subject to detailed design. The proposed building finished floor level may have to be set up above the finished ground level to mitigate the potential risk of groundwater ingress. High groundwater table may also have to be considered in the building foundation design. The need for the groundwater mitigation measures related the proposed Clubhouse is subject to further investigation at the detailed design stage.
- 11.1.13. It is proposed that surface water runoff generated in shared-use active travel route, play areas and Civic Plaza is discharged to a system of ponds, which would act as pollution control. Surface water runoff generated in the car park is currently proposed to flow through a Class 1 by-pass oil separator prior to discharge to a cellular crate system. Permeable paving could be also considered for the car park area – subject to detailed design. In addition, catchpits will be incorporated in the proposed surface water drainage system to capture silt and debris.

Appendix A

PROPOSED SITE LAYOUT



Appendix B

TOPOGRAPHIC SURVEY



Appendix C

LOCATION OF EXPLORATORY HOLES



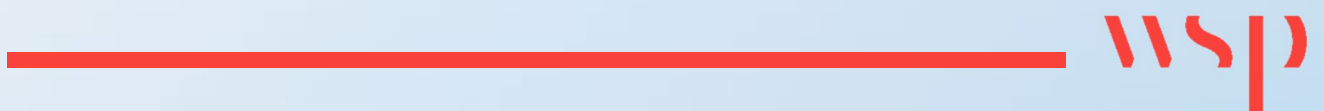
Appendix D

SOAKAWAY RESULTS



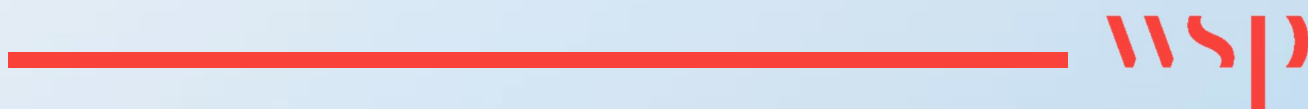
Appendix E

UNITED UTILITIES SEWER RECORDS



Appendix F

GREENGATE PITCH CONSTRUCTION DRAWING



Appendix G

UNITED UTILITIES
CORRESPONDANCE



Appendix H

GREENFIELD RUNOFF CALCULATIONS



Appendix I

PROPOSED DRAINAGE STRATEGY



Appendix J

ATTENUATION STORAGE FEATURES – TYPICAL DETAILS



Appendix K

SURFACE WATER DRAINAGE CALCULATIONS



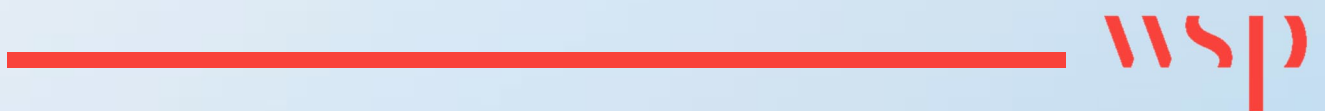
Appendix L

CONSTRUCTION COMPOUND –
PRELIMINARY ATTENUATION
STORAGE CALCULATIONS



Appendix M

MAINTENANCE RESPONSIBILITIES





1st Floor Station House
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