



Knowsley Metropolitan Borough Council

HALEWOOD LEISURE CENTRE

Flood Risk Assessment and Outline Drainage
Strategy



Knowsley Metropolitan Borough Council

HALEWOOD LEISURE CENTRE

Flood Risk Assessment and Outline Drainage Strategy

FLOOD RISK ASSESSMENT (VERSION 1) PUBLIC

PROJECT NO. 70119719

OUR REF. NO. 70119719_WSP_HDG_RP_0001

DATE: FEBRUARY 2025

WSP

1st Floor Station House
Tithebarn Street, Exchange Station
Liverpool
L2 2QP

Phone: +44 151 331 8100

WSP.com



QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	For client comments			
Date	February 2025			
Prepared by	Zoe Hooton			
Signature	Hooton, Zoe (UKZMH001) Digitally signed by Hooton, Zoe (UKZMH001) DN: cn=Hooton, Zoe (UKZMH001), ou=Active, email=Zoe.Hooton@wsp.com Date: 2025.02.14 10:57:14			
Checked by	Elzbieta Szostak			
Signature	Szostak, Elzbieta (SzostakE) Digitally signed by Szostak, Elzbieta (SzostakE) DN: cn=Szostak, Elzbieta (SzostakE), ou=Active, email=Elzbieta.Szostak@wsp.com Reason: I have reviewed this document Date: 2025.02.14 11:20:58			
Authorised by	Jon Price			
Signature	Price, Jon (PriceJ) Digitally signed by Price, Jon (PriceJ) DN: cn=Price, Jon (PriceJ), ou=Active, email=Jon.Price@wsp.com Reason: I am approving this document Date: 2025.02.14 11:39:05			
Project number	70119719			
Report number	70119719_WSP_HDG_RP_0001			
File reference	\\uk.wspgroup.com\central data\Projects\70119xxx\70119719 KMBC Halewood LUF RIBA 3\03 WIP\Drainage Engineer\05 Reports			

CONTENTS

1	INTRODUCTION	1
1.1	BACKGROUND	1
1.2	OBJECTIVE OF ASSESSMENT	1
1.3	SCOPE OF ASSESSMENT	1
1.4	RESOURCES	1
1.5	PROPOSED DEVELOPMENT	2
1.6	CONSULTATION	3
2	SITE DESCRIPTION	4
2.1	SITE LOCATION AND TOPOGRAPHY	4
2.2	HYDROLOGY AND SURFACE WATER FEATURES	4
2.3	GEOLOGY AND HYDROGEOLOGY	4
2.4	SOIL INFILTRATION	4
2.5	EXISTING DRAINAGE	5
3	PLANNING CONTEXT	6
3.2	NATIONAL PLANNING POLICY FRAMEWORK (NPPF)	6
	SUSTAINABLE DRAINAGE	6
3.3	THE FLOOD AND WATER MANAGEMENT ACT 2010	6
	LEAD LOCAL FLOOD AUTHORITIES	6
3.4	LOCAL PLANNING POLICY	7
4	DEFINITION OF FLOOD RISK	8
4.1	DEFINITION OF FLOOD RISK	8
4.2	FLOOD FREQUENCY	8

4.3	FLOOD VULNERABILITY	8
5	SEQUENTIAL AND EXCEPTION TESTS	10
5.1	SEQUENTIAL TEST	10
5.2	EXCEPTION TEST	10
6	EXISTING FLOOD RISK	11
6.1	SOURCES OF FLOODING	11
6.2	HISTORIC FLOODING	11
6.3	FLOODING FROM FLUVIAL AND TIDAL SOURCES	11
6.4	FLOODING FROM OVERLAND FLOWS	12
6.5	FLOODING FROM GROUNDWATER	12
6.6	FLOODING FROM SEWAGE AND DRAINAGE INFRASTRUCTURE	13
6.7	FLOODING FROM ARTIFICIAL SOURCES	14
7	CLIMATE CHANGE	15
7.1	BACKGROUND INFORMATION	15
7.2	IMPACT OF CLIMATE CHANGE	15
8	PROPOSED MITIGATION OF FLOOD RISK	16
8.2	MITIGATION OF FLOOD RISK FROM SURFACE WATER	16
9	PROPOSED SURFACE WATER MANAGEMENT STRATEGY	17
9.1	SURFACE WATER MANAGEMENT HIERARCHY	17
9.2	DISCHARGE VIA INFILTRATION	17
9.3	DISCHARGE TO A WATERBODY	17
9.4	DISCHARGE TO A SEWER	17
9.5	DESIGN PRINCIPLES	17
9.6	EXCEEDANCE FLOW ROUTES	18
9.7	WATER QUALITY MANAGEMENT	18
9.8	OPERATIONAL AND MAINTENANCE REQUIREMENTS	19

APPENDICES

APPENDIX A

PROPOSED SITE PLAN

APPENDIX B

TOPOGRAPHICAL SURVEY

APPENDIX C

UTILITIES SURVEY

APPENDIX D

AS BUILT DRAWING

APPENDIX E

UNITED UTILITIES PLANS

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 proposed development at the existing Halewood Leisure Centre site (hereafter referred to as the 'Application Site'). The proposed changes to the existing site will be referred to as the 'Proposed Development'
- 1.1.2. The Application Site is a community leisure centre owned by KMBC located on Bailey's Lane in Halewood in Knowsley. Delivering improvements to Halewood Leisure Centre are an essential part of the council's Halewood LUF Investment Programme. Halewood Leisure Centre is an important existing recreational and sporting asset at the heart of Halewood.
- 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 ASSESSMENT

- 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 Application Site 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 condition;
 - 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 an outline 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 where appropriate, refers 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 Halewood LUF: Flood Risk & Drainage Desktop Appraisal (2023).

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. Halewood Leisure Centre is a community leisure centre owned by KMBC located on Bailey's Lane in Halewood in Knowsley.

1.5.2. At present, the Application Site incorporates a number of functions and activities, including an existing football pitch, tennis and basketball courts, swimming pool, gym, and other sporting facilities, as well as a car park. The location of Halewood Leisure Centre is shown in Figure 1-1.



Figure 1-1 - Location Plan of Site

1.5.3. The Proposed Development will feature:

- The introduction of future sports facilities to the west of the existing leisure centre;
- Reconfiguration and improvements to the on-site car parking facilities;
- Installation of floodlights to mini MUGA;
- Installation of CCTV and general lighting;
- Additional buffer planting throughout the site, as well as natural biodiverse areas and meadow landforms throughout the Leisure Centre site;
- A shared-use pedestrian and cycle route, accentuated by an avenue of trees as well as new cycle storage space and a 'learn to cycle loop' to encourage active travel usage throughout the site and the wider Halewood area;
- Potential future provision of a temporary pop-up area to the south of the existing leisure centre site for village market days;
- Improvements to the existing coach drop-off area to the east of the site, allowing direct access to the site which can be used by community and educational groups when visiting the site;
- Separate areas of SuDS, such as swales and rain gardens, have been identified to improve the site's existing drainage.

1.5.4. The existing leisure centre buildings and football pitch will be retained as part of the proposed development, with the existing entry points at Bailey's Lane and Barn Croft Road to be enhanced.

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

1.6 CONSULTATION

1.6.1. A summary of 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
Lead Local Flood Authority (Knowsley Metropolitan Borough Council)	03/12/2024	WSP provided description of the proposed drainage strategy for LLFA comments. The outline strategy has been discussed with the LLFA but discussions are ongoing to agree allowable discharge rates for the site.
United Utilities	03/12/2024	WSP provided description of the proposed drainage strategy for UU comments.
	06/12/2024	UU advised that the proposal is acceptable in principle. UU also advised that they also would like to see details of the CCTV survey and the current assumptions to be confirmed. UU also advised that the new discharge rate from the site is expected to be as close to greenfield runoff rate of 47l/s as possible. UU also advised they are open for further conversations once the current assumptions are confirmed / clarified.

2 SITE DESCRIPTION

2.1 SITE LOCATION AND TOPOGRAPHY

- 2.1.1. The Application Site (National Grid Reference for the centre of the site SJ 45242 85150) covers an area of approximately 6.5 ha and is situated in Halewood, a primarily residential area approximately 11 km southeast of Liverpool City Centre. The location of the Application Site is shown in Figure 1-1. The Application Site is bordered to the east by Baileys Lane and the recently constructed Halewood Oaks residential development. To the west, it is bordered by Barn Croft Road and to the north and south it is bordered by residential properties.
- 2.1.2. A topographical survey was undertaken at the Application Site in August 2023 by Survey Operations. The topographical survey drawing is included in Appendix B. The ground levels across the Application Site gently slope down from the south-west corner (approximately 23mAOD) to the north-east corner of the site (approximately 15mAOD). It is also noted that two large mounds are located at the north-west and south-west corners of the Application Site.

2.2 HYDROLOGY AND SURFACE WATER FEATURES

- 2.2.1. There are no watercourses within or in close proximity to the Application Site. The nearest watercourse is an unnamed tributary of Ditton Brook, approximately 200m to the east of the Application Site.

2.3 GEOLOGY AND HYDROGEOLOGY

- 2.3.1. British Geological Survey (BGS) mapping indicates that the Application Site is underlain by the bedrock in form of Kinnerton Sandstone Formation - Sandstone, designated a Principal Aquifer. The overlaying superficial deposits are identified as Tilt, Devensian – Diamicton, designated a Secondary (Undifferentiated) Aquifer. A Principal Aquifer is described as layers of rock or drift deposits that have high intergranular and / or fracture permeability – meaning they usually provide a high level of water storage. Principal Aquifers may support water supply and/or river base flow on a strategic scale. 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. A review of the old borehole logs available from the BGS website shows that there are borehole records in the vicinity of the Application Site. An examination of borehole logs from within the Application Site's vicinity indicates that the superficial deposits extend to a depth in excess of 40m below ground level, with large deposits of stiff clay present (BGS reference: SJ48NW12). The implication of this is that infiltration will likely not be possible, although it is recommended that ground investigation should be conducted, nevertheless.
- 2.3.3. The Environment Agency Groundwater Source Protection Zone (SPZ) mapping shows that the Application Site is located within Zone 3 of the groundwater SPZ. This is defined as the area around a supply source within all the groundwater ends up at the abstraction point.

2.4 SOIL INFILTRATION

- 2.4.1. Ground investigation, including soil infiltration testing, is currently ongoing at the Application Site. The results of the investigation are not yet available to inform this assessment.

- 2.4.2. A review of the Soilsmap mapping shows that the Application Site is underlain by slowly permeable loamy and clayey soils with impeded drainage.
- 2.4.3. There are no existing soakaways identified at the application site.

2.5 EXISTING DRAINAGE

- 2.5.1. The Application Site consists of the existing leisure centre building with sport pitches, MUGA pitches and the car park, surrounded by grassed areas. Surface water runoff generated on the existing building, car park and sport pitches is managed by the drainage system, which was surveyed in March 2024 by Geospatial Engineering Services. A drawing showing the existing utilities, including drainage system, serving the Application Site is shown in Appendix C. The utilities survey drawing shows that surface water runoff from the existing car park is drained via a series of gullies and discharges to the United Utilities combined sewer located in Baileys Lane, outside the eastern boundary of the Application Site.
- 2.5.2. Part of the existing surface water drainage system was amended in 2020 as part of a 3G sports pitch project. An as built drainage layout drawing produced in May 2020 by McArdle Sport Tec, indicates that surface water runoff generated from the northern part of the leisure centre building's roof and the 3G football pitch is attenuated in an oversized 1200mm dia pipe located between the pitch and the building. From reviewing the utilities survey, it has also been assumed that the existing MUGA pitch drains to this attenuation pipe. It is assumed that this drainage system discharges to the United Utilities sewer located in Baileys Lane. The as built drawing is shown in Appendix D.
- 2.5.3. It is believed that the discharge of surface water runoff from the existing site into the United Utilities sewer is limited by a flow control device. However, the precise location of the flow control device, type and existing discharge rate is still to be confirmed. A CCTV survey of the existing drainage system is currently ongoing to confirm the arrangements of the existing surface water drainage system serving the existing leisure centre site.
- 2.5.4. A review of the United Utilities sewer records shows two public surface water sewers that run parallel to each other along the southern boundary of the Application Site. In addition, public foul water sewers are identified within the south-west and south-eastern corners of the Application Site. The United Utilities sewer records are shown in Appendix E.
- 2.5.5. The existing drainage system, serving the application site, lacks oil separators or other forms of pollution control, with the exception of trapped road gullies.

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 December 2024 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.

SUSTAINABLE DRAINAGE

- 3.2.3. 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).
- 3.2.4. 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.

3.3 THE FLOOD AND WATER MANAGEMENT ACT 2010

- 3.3.1. 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

- 3.3.2. Under the FWMA, the Knowsley Council is designated as the Lead Local Flood Authority (LLFA) for this area 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.

3.4 LOCAL PLANNING POLICY

KNOWSLEY LOCAL PLAN CORE STRATEGY (JANUARY 2016)

3.4.1. 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 (SuDS);
 - 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 greenfield 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%

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 Application Site, including 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 Application Site 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 Application Site, 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. There are no known records of flooding within the Application Site.

6.2.2. According to Knowsley Metropolitan Borough Council Level 2 Strategic Flood Risk Assessment and Local Flood Risk Management Strategy, there have been several recorded instances of historic flooding in Halewood, although the precise location and cause is not discussed.

6.3 FLOODING FROM FLUVIAL AND TIDAL SOURCES

6.3.1. A review of the Environment Agency's Flood Map for Planning, the entire Application Site 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.

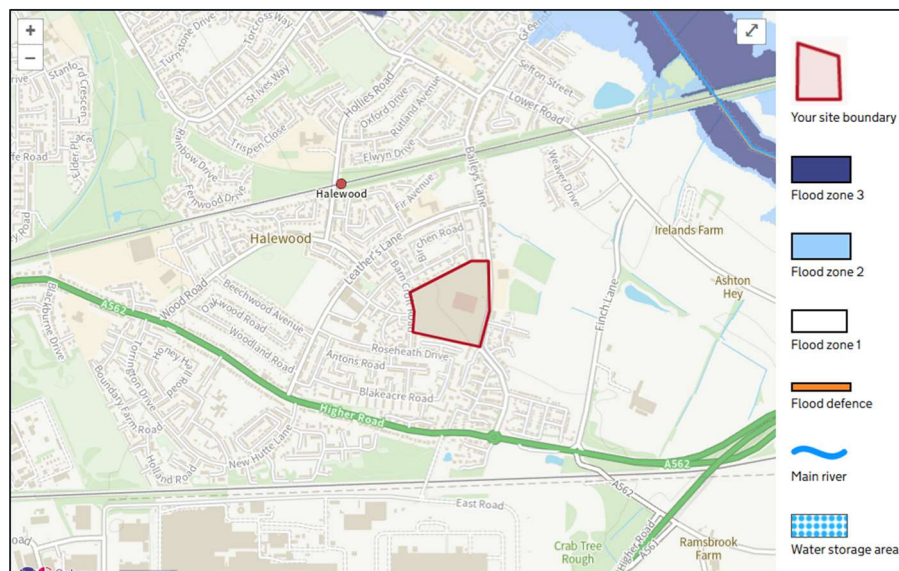


Figure 6-1 – Environment Agency's Flood Map for Planning

6.4 FLOODING FROM OVERLAND FLOWS

- 6.4.1. A review of the Environment Agency's Flood Risk from Surface Water map indicates that the vast majority of the Application Site is at very low risk of flooding from surface water. The same mapping shows that the existing building is located in the area of the low risk of flooding from surface water, with the area adjacent to the main entrance shown to be at high risk of flooding from surface water. It is likely that this risk is associated with the existing finished ground levels in this area.
- 6.4.2. In addition, small areas in the eastern part of the Application Site are indicated to be at low risk of flooding from surface water. It is likely that these are associated with the localised depression in the ground where water could pond during prolonged and intense rainfall. Minor area of the Application Site adjacent to Barn Croft Road is also shown to be at low risk of flooding. The Environment Agency mapping suggests that it may be associated with surface water runoff generated in Hillingden Avenue and Barn Croft Road being conveyed into the Application Site which is located on lower grounds.
- 6.4.3. An extract from the Environment Agency's Flood Risk from Surface Water mapping is shown in Figure 6-2.

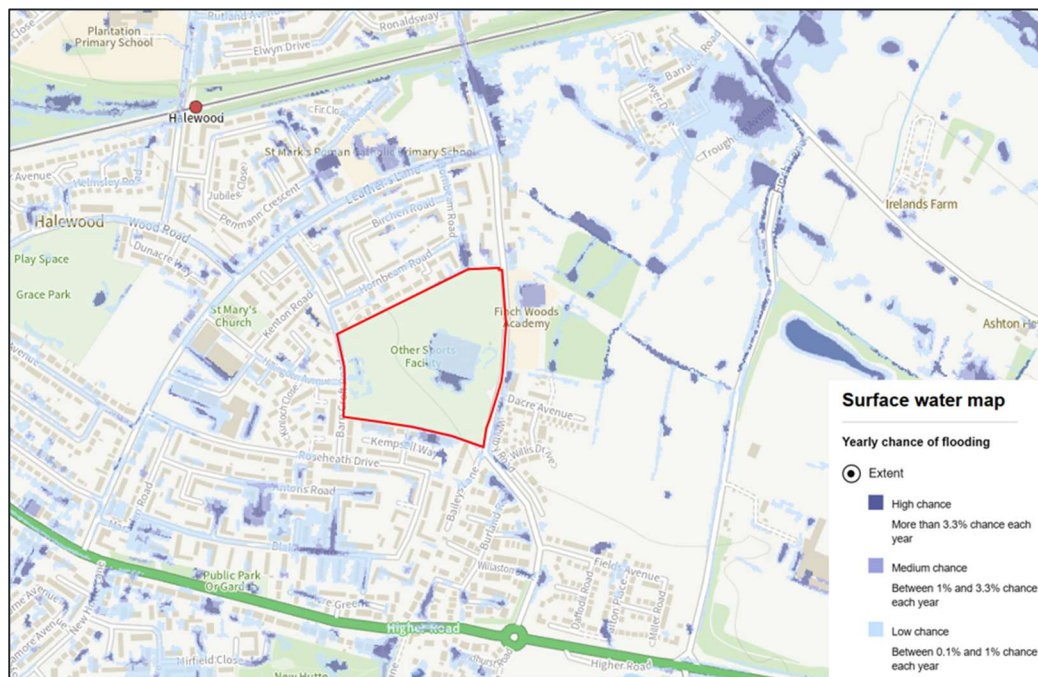


Figure 6-2 – Environment Agency's Flood Risk from Surface Water Map

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. 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.
- 6.5.3. Figure 6-3 has been extracted from Knowsley's Preliminary Flood Risk Assessment Report and shows that the site is not susceptible to groundwater flooding.

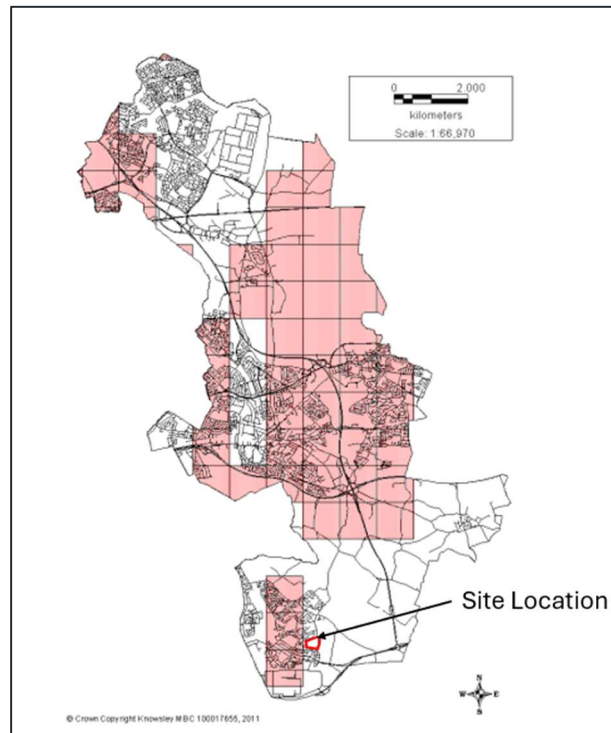


Figure 6-3 - Areas Susceptible to Groundwater Flooding

- 6.5.4. Considering the above information, the risk of flooding from groundwater resources is assessed to be low.

6.6 FLOODING FROM SEWAGE AND DRAINAGE INFRASTRUCTURE

- 6.6.1. There are no known records of flooding from the existing sewers within the boundary of Application Site. The existing on-site drainage system is believed to be of sufficient capacity and appropriately maintained. The risk of flooding from the on-site drainage system is therefore assessed to be low.
- 6.6.2. The United Utilities sewer records show their assets located under the roads surrounding the Application Site. The Application Site 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. A review of the United Utilities records also show public sewers located within the Application Site along its southern boundary. Flows potentially coming out of these public sewers will follow the ground levels towards the revised car park. Temporary inundation of the car park is acceptable under the NPPF, as car park is classified as a less vulnerable area. Considering the topography between the United Utilities assets and the remainder of the Proposed Development, it is unlikely that potential flows from these sewers will have an impact on other parts of the site. Considering this, 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 Application Site 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 “Managing Climate Risks to Wellbeing and the Economy: ASC Progress Report 2014” produced by the Climate Change Adaptation Sub-Committee, 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 rainfall intensities 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 peak rainfall 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 Application Site boundary and elsewhere.

8 PROPOSED MITIGATION OF FLOOD RISK

- 8.1.1. The assessment of the existing risk of flooding shows that the Application Site is at negligible risk of flooding from the fluvial and tidal sources, groundwater and reservoirs. Therefore, mitigation measures for the flooding from these sources are not required.

8.2 MITIGATION OF FLOOD RISK FROM SURFACE WATER

- 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.

9 PROPOSED 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 and NPPF, 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. The feasibility of direct infiltration for the Application Site area is currently unknown. Ground investigation, including soil infiltration testing, is currently ongoing on the Application Site. The results of the ground investigation and soil infiltration testing are not yet available to confirm the most appropriate drainage strategy.

9.2.2. As discussed and agreed with the LLFA, it has been assumed that infiltration is not possible as this would provide the worst case for discharge of surface water runoff from the Application Site. Once the results of the soil infiltration testing are available, the proposed drainage strategy will be reviewed with the LLFA and amended accordingly if infiltration is considered feasible.

9.3 DISCHARGE TO A WATERBODY

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

9.4 DISCHARGE TO A SEWER

9.4.1. As stated in the previous paragraphs, soil infiltration rates for the Application Site are currently unknown. For the purpose of this assessment, it is assumed that no infiltration is feasible, and surface water runoff from the Proposed Development will continue to be discharged to the United Utilities sewers. The proposed approach provides an agreed worst-case scenario approach, which will be further discussed with the LLFA and UU once the results of the soil infiltration testing are available and amended accordingly, where appropriate.

9.5 DESIGN PRINCIPLES

9.5.1. The Proposed Development consists of the following:

- Rearrangement of the existing car park;
- Rearrangement of the hard surfaced area adjacent to the southern and eastern side of the existing building; and
- Removal of the existing 2 No MUGAs, and introduction of 3 No new MUGAs proposed to the west of the existing building. The existing MUGAs are constructed with a permeable surface and covers an area of approx. 1640m². The proposed MUGAs will be also constructed with a permeable surface with an underdrainage and a perimeter filter drain to ensure that surface water

runoff generated in this area is appropriately managed. The new MUGAs will cover an area of approx. 2700m². The total increase in the MUGA area is approx. 1060m².

- 9.5.2. The proposed changes to the site layout will result in the increase of paved impermeable surfaced area by approx. 800m².
- 9.5.3. It is proposed to utilise the existing connections to the public sewer without increasing the existing discharge rates (noting that these have yet to be confirmed and agreed with the LLFA and UU). To achieve the latter, additional surface water attenuation storage will need to be provided on site, which will be designed for the 1 in 100 year event with 45% climate change allowance. No new connections to the United Utilities sewers are proposed.
- 9.5.4. The revised car park and paved surfaces adjacent to the existing building are proposed to continue to be discharged to the existing drainage system, with additional attenuation storage provided if needed. It is also proposed that the revised car park will incorporate a system of rain gardens connected to the existing on-site drainage system. This will slow down the flows entering the public sewer and also provide pollution control for the runoff generated in this area.
- 9.5.5. Surface water runoff from the new footpath crossing the Application Site, as well as paved new - surfaced areas adjacent to the existing building, will be discharged into a swale to be constructed alongside the new footpath. The swale will provide initial attenuation storage of runoff from these areas prior to discharging to the existing drainage system serving the Application Site.
- 9.5.6. The proposed approach to surface water management is subject to ongoing consultation with the LLFA and UU.

9.6 EXCEEDANCE FLOW ROUTES

- 9.6.1. The potential exceedance flows will be managed within the Application Site boundary to ensure there is no increase in the risk of flooding elsewhere. The finished ground levels will be established so that the exceedance flows are directed to green areas where water can pond without increasing the risk of flooding to people and the development.

9.7 WATER QUALITY MANAGEMENT

- 9.7.1. 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).
 - The sensitivity of the receiving environment (the environmental receptor).
- 9.7.2. 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.
- 9.7.3. 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).

- 9.7.4. At this stage of the project, it is proposed that surface water runoff generated in the car park area is drained via a system of SuDS in the form of rain gardens before discharging to the existing on-site drainage system and eventually to the public sewers. A new swale is also proposed to be incorporated in the proposed drainage strategy. Both the rain gardens and the swales will provide pollution control measures as well as slowing down the flows entering the public sewers, this will provide betterment to the existing situation.

9.8 OPERATIONAL AND MAINTENANCE REQUIREMENTS

- 9.8.1. The detailed design of the proposed surface water drainage systems will be designed in accordance with the relevant design standards (e.g. The SuDS Manual).
- 9.8.2. The proposed surface water drainage system, including rain gardens and swales, will require regular maintenance to ensure the effective long-term operation of SuDS and other elements of the proposed drainage system.
- 9.8.3. The maintenance regime required for rain gardens and swales is summarised in Table 9-1 and Table 9-2 respectively.

Table 9-1 - Operation and Maintenance Requirements for Rain Gardens

Maintenance Type	Required action	Frequency
Regular maintenance	Inspect infiltration surfaces for silting and ponding	Quarterly
	Check operation of underdrains by inspection of flows after rain	Quarterly
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect culvert inlet and outlets for blockages and clear if required	Monthly
	Remove litter and surface debris and weeds	Monthly or as required
Occasional maintenance	Removal of sediment, litter and debris build-up from around inlets	Quarterly or as required
	Vegetation replacement to maintain planting density	As required
	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required

Maintenance Type	Required action	Frequency
Remedial actions	Remove and replace filter medium and vegetation above	As required

Table 9-2 - Operation and Maintenance Requirements for Swales

Maintenance Type	Required Action	Frequency
Regular maintenance.	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Remove litter and surface debris and weeds from ditch and adjacent areas.	Monthly or as required
	Grass Cutting – to maintain within design range	As required or monthly (during growth season)
	Inspect culvert inlet and outlets for blockages and clear if required	Monthly
	Shrub Maintenance	As required or annually
Occasional maintenance	Sediment Removal	As required or half yearly
	Vegetation replacement	As required
Remedial Maintenance	Reconstruct ditch/check dams if performance deteriorates significantly or failure occurs.	As required.
	Repair erosion or other damage by re-seeding or re-turfing	As required

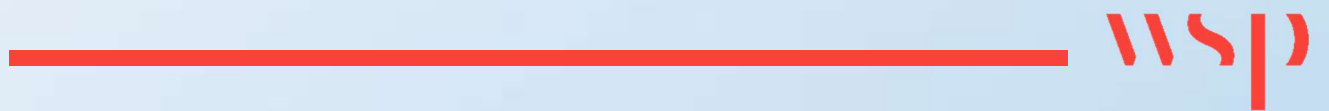
- 9.8.4. The tradition drainage systems will also need regular inspections and maintenance as necessary, to ensure they are functioning and there is no build up on silt and debris in the system.

10 CONCLUSIONS

- 10.1.1. The Application Site consists of the existing leisure centre building with sport pitches, MUGA pitches and the car park, surrounded by grassed areas. The Proposed Development involves rearrangement of the existing site layout, which results in an increase of approx. 800m² of the drained impermeable area.
- 10.1.2. The application Site is at negligible risk from fluvial and tidal sources, as well as groundwater, sewers and reservoirs.
- 10.1.3. A review of the Environment Agency's Flood Risk from Surface water mapping shows that the vast majority of the application Site is at very low risk of flooding from surface water. Localised areas in the eastern part of the Application Site are indicated to be at low risk of flooding from surface water. There is a minor area of the Application Site, adjacent to Barn Croft Road, which is also shown to be at low risk of flooding. The Environment Agency mapping suggests that it may be associated with surface water runoff generated in Hillingden Avenue and Barn Croft Road being conveyed into the Application Site which is located on lower grounds. The area adjacent to the main entrance to the building is indicated to be at high risk of flooding from surface water. The indicated risk of flooding from surface water is likely to be associated with the localised low grounds where water will pond during and after prolonged and intense rainfalls. The finished ground level, specially at the main entrance to the building can be adjusted as part of the Proposed Development, to mitigate the risk of flooding in these areas.
- 10.1.4. Ground investigation, including soil infiltration testing is currently ongoing. Once the results of the infiltration testing is available, the proposed drainage strategy will be revised accordingly if required.
- 10.1.5. At this stage of the project, it is assumed that no infiltration techniques are feasible on site. The proposed approach has been agreed with the LLFA to initially consider a 'worst case scenario' for surface water discharge. It will be discussed further with the LLFA and UU once the soil infiltration techniques are available and revised as agreed appropriate.
- 10.1.6. At this stage of the project, surface water runoff generated within the Proposed Development is proposed to be discharged to the existing drainage system serving the Application Site. No increase in the existing discharge rate from the Application Site is proposed and no new connections to the public sewers are proposed. To achieve this, attenuation storage will be provided for the Proposed Development area this will be subject to agreement of discharge rates with the LLFA. The attenuation storage will be designed for up to and including the 1 in 100 year event with 45% climate change allowance.
- 10.1.7. It is proposed that surface water runoff generated in the car park area, new footpath and areas adjacent to the existing building will be drained via system of SuDS including swales and rain gardens. The proposed SuDS will provide pollution control measures and also will slow down the flows entering the public sewers what would provide betterment to the existing situation.

Appendix A

PROPOSED SITE PLAN





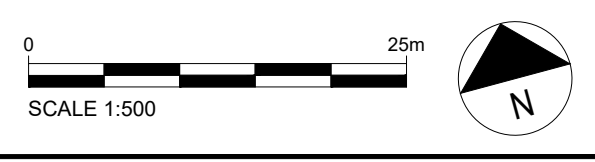
- Note.
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER SCHEME DRAWINGS AND DOCUMENTS.
LOCATION PLAN
70119719_WSP_LUD_HLC_DR_LA_0002
EXISTING SITE PLAN
70119719_WSP_LUD_HLC_DR_LA_0003
HARD LANDSCAPE PLAN
70119719_WSP_LUD_HLC_DR_LA_0005
SOFT LANDSCAPE STRATEGY
70119719_WSP_LUD_HLC_DR_LA_0006
PROVIDED LEVELS SHALL BE VERIFIED AND CONFIRMED WITH DESIGNER PRIOR TO ANY WORKS COMMENCING.
 2. FOR LIGHTING PROPOSALS REFER TO LIGHTING IMPACT ASSESSMENT
HAL-WSP-XX-XX-RP-Y-0002
 3. FOR ARBORICULTURAL TREE ROOT PROTECTION PLAN REFER TO DRAWING
70119719-ARB-TRPP-HLC-1.0
 4. FOR TRANSPORT DESIGN REFER TO DRAWINGS
UK0029106.9719- SK02
UK0029106.9719- VT04
UK0029106.9719- VT05
UK0029106.9719- VT06
UK0029106.9719- VT07

ALL LAYOUTS ARE SUBJECT TO ADDITIONAL SURVEY WORKS AND DESIGN INCLUDING:

- GROUND INVESTIGATION
- DRAINAGE DESIGN
- MATERIAL MANAGEMENT PLAN

- DO NOT SCALE
- LEGEND:
- Application Site Boundary
- EXISTING:
- 1 Main vehicular and pedestrian entrance from Bailey's Lane to be enhanced
 - 2 Halewood Leisure Centre Building
 - 3 Secondary pedestrian entrance from Barn Croft Lane to be enhanced
 - 4 All Weather Pitch to be retained
- PROPOSED:
- 5 Main cycle and pedestrian entrance from Barn Croft Lane
 - 6 Shared cycle route with thermoplastic line-marking 'LEISURE CENTRE'
 - 7 Flexible-use space with outdoor electricity access points
 - 8 Car park with 186 standard bays, 12 accessible bays and 4 electric vehicle charging bays
 - 9 Planted swale
 - 10 Boardwalk & Viewing platform over planted swale for access from car park to entrance space
 - 11 3x Multi-use games areas, fenced sports pitch 30x20m with 3G synthetic turf
 - 12 Amenity lawn grassed area for recreational use
 - 13 Active loop with outdoor gym equipment
 - 14 Future opportunity site for further sports developments subject to separate planning application
 - 15 Future opportunity site for Community development subject to separate planning application

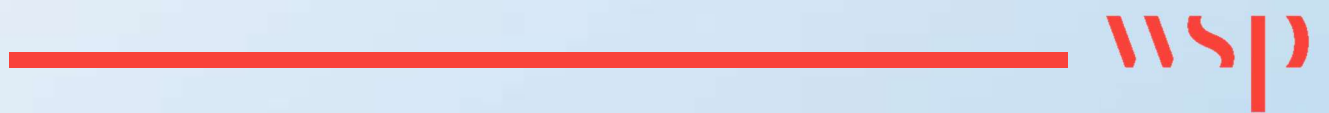
P01	10/02/25	ZY	First Issue	ER	RW
REV	DATE	BY	DESCRIPTION	CHK	APP
DRAWING STATUS					
S3 - FOR REVIEW					
					
1st Floor Station House, Exchange Station, Tineham Street, Liverpool, L2 2QP, UK T+44 (0) 151 600 5500 wsp.com					
CLIENT: KMBC					
ARCHITECT: WSP					
PROJECT: Halewood LUF					
TITLE: Halewood Leisure Centre Proposed Site Plan					
SCALE BAS	1:500	CHECKED	ER	APPROVED	RW
PROJECT NO.	70119719	DRAWN	JY	DATE	February 25
DRAWING NO.	70119719_WSP_LUD_HLC_DR_LA_0004	REV			P01
© WSP UK Ltd					



This drawing may contain Ordnance Survey data © Crown copyright and database right 2024.

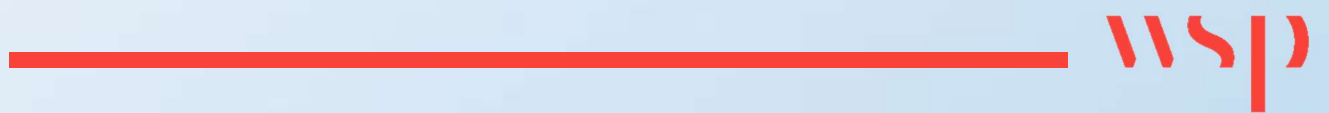
Appendix B

TOPOGRAPHICAL SURVEY



Appendix C

UTILITIES SURVEY





UNDERGROUND UTILITIES LEGEND & NOTES

UE

ELECTRIC

FV

FDBL-WATER SEWER

UG

GAS PIPE

SV

SURFACE-WATER SEWER

TV

TELECOM/CATV

U

UNKNOWN

UV

WATER

(AB) - ASSUMED ROUTE (GTT)

EDT - END OF TRACE

UTL - UNABLE TO LIFT

D - DEPTH (m)

TFR - TAKEN FROM RECORDS

UTT - UNABLE TO TRACE

1. All underground services shown have been identified from above ground without excavation using electro-magnetic and/or ground penetrating radar (GPR) methods. Results using these methods are not infallible and we recommend that excavations are carried out to confirm any identifications, positions and depths of any services that could be affected by subsequent works.

2. Any areas on the drawing where services or features have not been shown are not necessarily clear of services or features but are an indication that no items have been identified during our investigations. All reasonable care and normal good practice should still be employed during design and construction processes.

3. We have used all reasonable care to research available service records, but the completeness or use of the service records supplied to us by us cannot be guaranteed. Therefore we cannot guarantee the accuracy of features annotated as 'taken from records' (TFR).

4. Depths obtained using electro-magnetic or GPR are effected by ground conditions and should be treated as indicative only. Electro-magnetic depths to utilities and services are generally taken to the centre of a feature. GPR depths to the top of a feature and drainage depth shown to inverts, unless otherwise indicated.

5. Drainage pipe sizes have been obtained without entering the chambers and therefore should be treated as approximate. Pipe dimensions which have not been obtained visually will be taken from records where available.

6. All services, drainage and utilities routes are assumed straight between access points, unless otherwise stated. The numbers of cables in runs will not be shown unless specifically requested. All services are below ground unless indicated as 'OH' (overhead).

NOTES

1. All linework shown in colour comprises the results of an Underground Utilities Survey by Geospatial Engineering Services Ltd.

2. These results have been directly overlaid on a Topographical Survey plan by Survey Operations Ltd at the request of our Client. (Colours changed to grey).

3. This survey has been presented at the survey scale indicated below with its accuracy commensurate with that scale.

4. All invert levels are in metres.

SURVEY GRID

REFER TO SURVEY OPERATIONS LTD DRAWING REF: 23G236001

LEVEL DATUM

REFER TO SURVEY OPERATIONS LTD DRAWING REF: 23G236001

0	ORIGINAL ISSUE		AEB	MPW	14/03/24
REV	DESCRIPTION		BY	CHK	DATE
DRAWN	AEB	CHECKED	MPW	DATE	14 MARCH 2024

TITLE

UNDERGROUND UTILITIES SURVEY AT
HALEWOOD LEISURE CENTRE
BAILEYS LANE, LIVERPOOL L26 0TY

CLIENT

CLANCY CONSULTING LTD

SURVEYED BY

GEOSPATIAL
ENGINEERING
SERVICES LTD

ANFIELD BUSINESS CENTRE
58 BRECKFIELD ROAD SOUTH
LIVERPOOL, L6 5QR

TEL 0151-280-2021
EMAIL: mail@GESuk.net

GES

CAD FILE

01250-U.DWG

SCALE

1 : 500

SHT

A0

DRAWING No

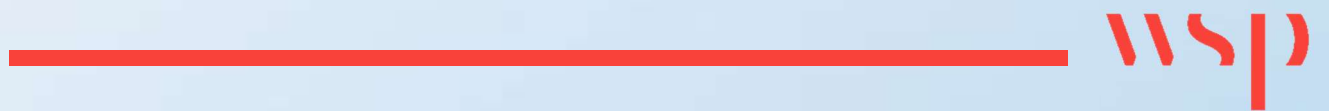
01250-U

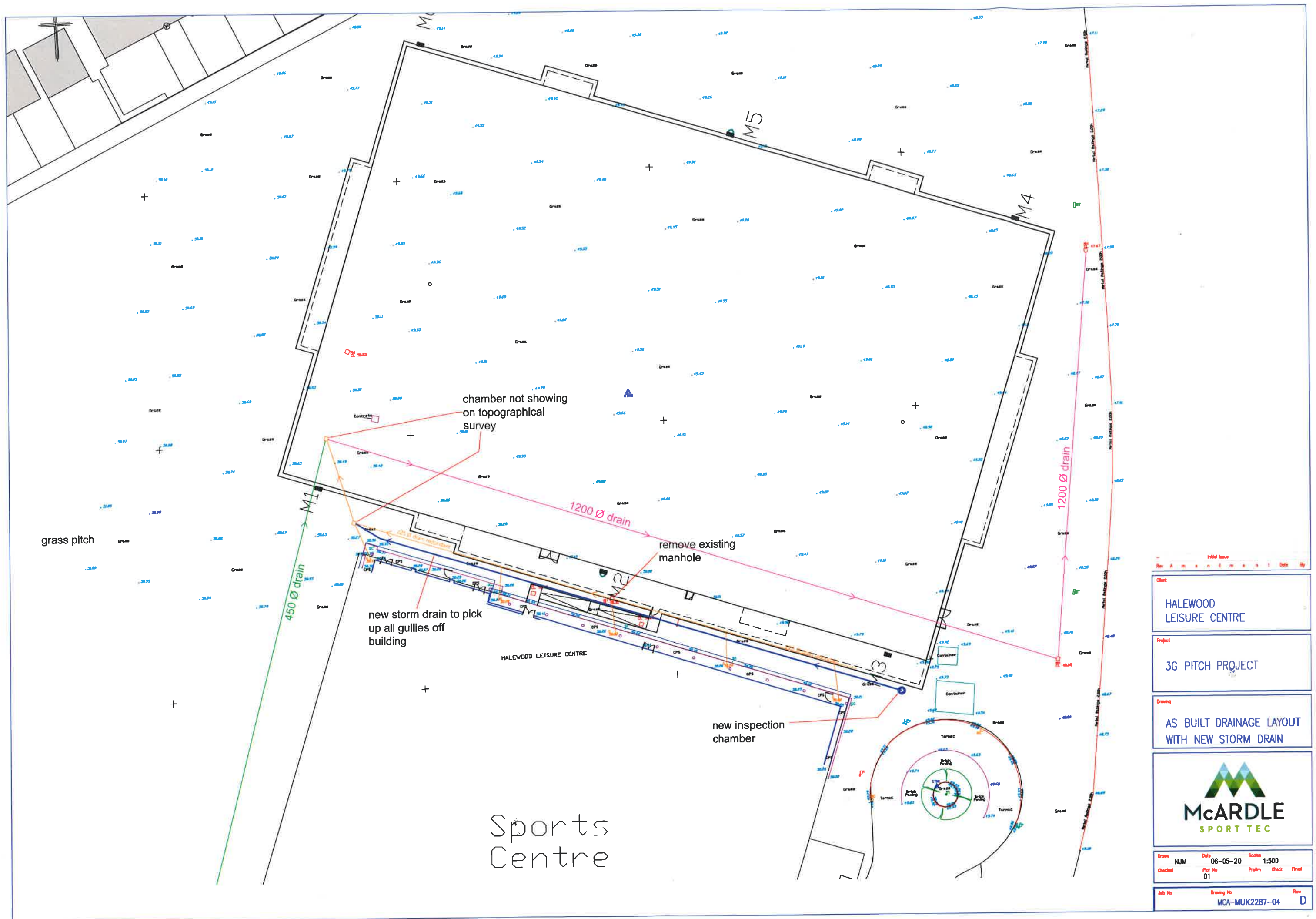
REVISION

O

Appendix D

AS BUILT DRAWING

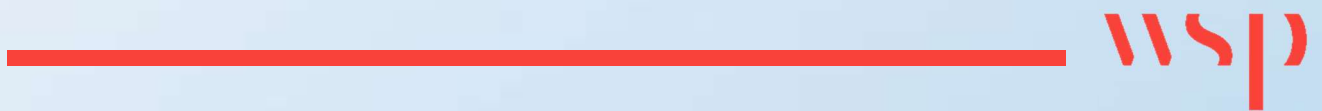


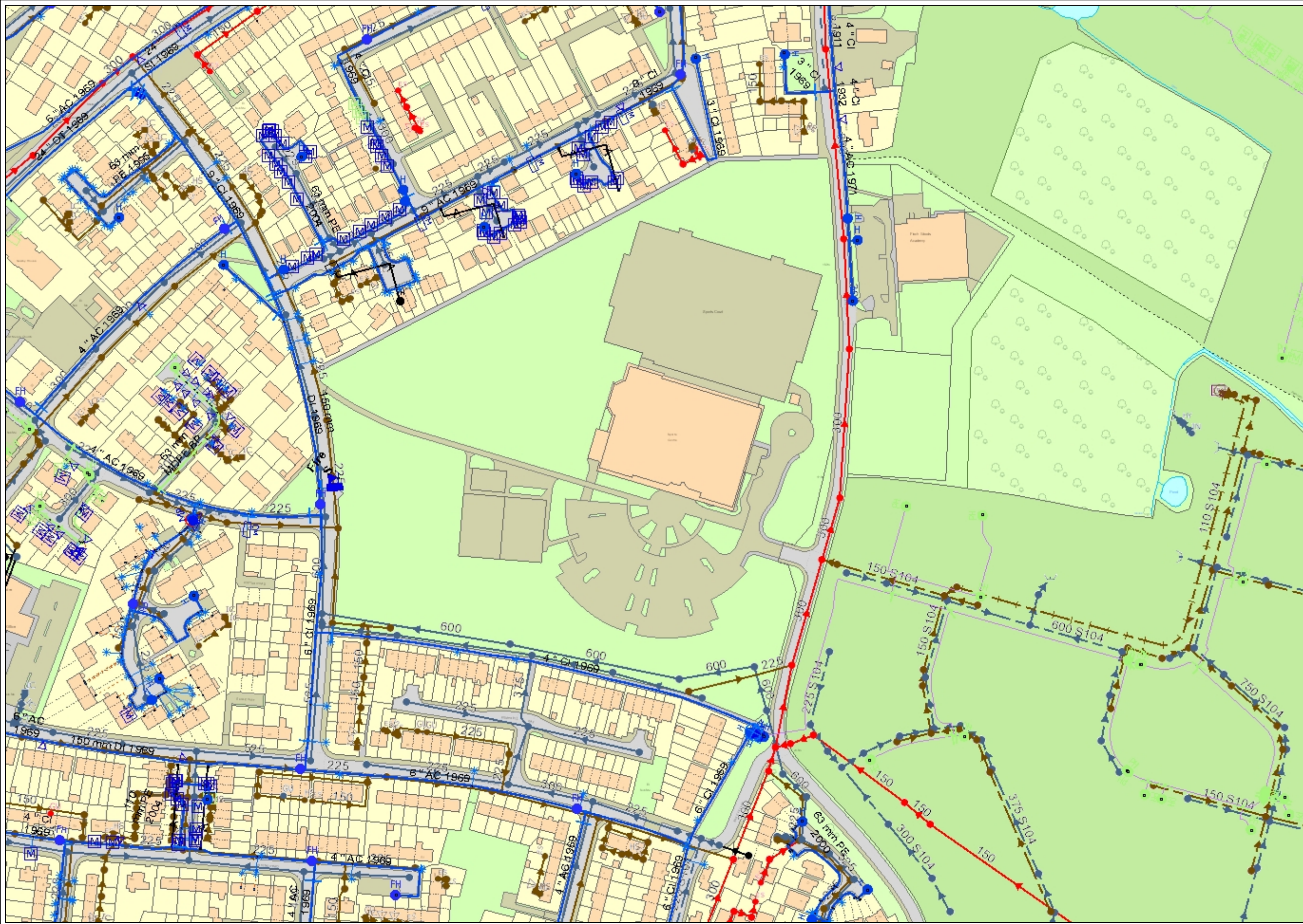


Initial Issue						
Rev	A	M	E	N		
Client						
HALEWOOD LEISURE CENTRE						
Project						
3G PITCH PROJECT						
Drawing						
AS BUILT DRAINAGE LAYOUT WITH NEW STORM DRAIN						
						
Drawn	NJM	Date	06-05-20	Scale	1:500	
Checked		Plot No	01	Printed	Check	Final
Job No	Drawing No				Rev	
MCA-MUK2287-04					D	

Appendix E

UNITED UTILITIES PLANS





United Utilities Maps
for SafeDig

Date :	26/10/2023 10:32:17
Centre X:	345289
Centre Y:	385153
Scale :	2000
UserName:	NW2JC8

Extract from maps of United Utilities'
Underground Assets

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. The actual positions may be different from those shown on the plan and private service pipes may be shown by a blue broken line. United Utilities Water will not accept liability for any damage caused by the actual position being different from those shown.

Crown copyright and database rights 2023.Ordnance Survey 100022432 This plan is based on the Ordnance Survey Map with the sanction of the Controller of H.M. Stationary Office. Crown and United Utilities Water copyrights are reserved. Unauthorised reproduction will infringe these copyrights.





1st Floor Station House
Tithebarn Street, Exchange Station
Liverpool
L2 2QP

wsp.com

WSP UK Limited makes no warranties or guarantees, actual or implied, in relation to this report, or the ultimate commercial, technical, economic, or financial effect on the project to which it relates, and bears no responsibility or liability related to its use other than as set out in the contract under which it was supplied.