Weetwood
Development • Planning • Environment

LAND AT HOME FARM ROAD, KNOWSLEY

FLOOD RISK AND DRAINAGE ASSESSMENT

Final Report v1.1
August 2026

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Report Title	**Land at Home Farm Road, Knowsley** Flood Risk and Drainage Assessment Final Report v1.1
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Contents

Signature Sheet i
Contents ii
List of Tables, Figures & Appendices iii
List of Abbreviations iv

1 Introduction 1

1.1 Purpose of Report 1
1.2 Structure of the Report 1
1.3 Relevant Documents and Planning Policy 1
1.4 Third Party Surveys, Drawings and Assessments 2
1.5 Explanatory Note on Flood Probability 2

2 Site Details and Proposed Development 3

2.1 Site Location 3
2.2 Proposed Development 3
2.3 Surface Waterbodies in the Vicinity of the Site 3
2.4 Topographic Levels 4
2.5 Ground Conditions 5

3 Planning Policy and Guidance 6

3.1 National Planning Policy and Policy Guidance 6
3.2 Local Planning Policy 8
3.3 Drainage Technical Guidance 9
3.4 Water Framework Directive 9
3.5 Land Drainage Consent 10

4 Review of Flood Risk 11

4.1 Historical Records of Flooding 11
4.2 Flood Risk from Rivers (Fluvial) 11
4.3 Flood Risk from Small Watercourses and Surface Water (Pluvial) 13
4.4 Flood Risk from Reservoirs, Canals and Other Water Impounding Structures 14
4.5 Flood Risk from Groundwater 15
4.6 Flood Risk Mitigation 16
4.7 Flood Risk Elsewhere 16
4.8 Flood Risk Sequential Test 16
4.9 Exception Test 17

5 Foul Water Management 18

5.1 Existing Assets 18
5.2 New Connections 18
5.3 Easements, Diversions and Disconnections 18

6 Surface Water Management 19

6.1 Surface Water Drainage at the Existing Site 19
6.2 Surface Water Drainage at the Developed Site 19

7 Summary and Recommendations 24

List of Tables

Table 1: Greenfield Runoff Rate 19
Table 2: Maintenance Requirements 21

List of Figures

Figure 1: Site Location 3
Figure 2: Location of Surface Waterbodies 4
Figure 3: Digital Terrain Model from LiDAR Data 4
Figure 4: Flood Map for Planning (Flood Zones 2 and 3) 11
Figure 5: Croxteth Brook and Fluker's Brook Modelled Flood Extents 12
Figure 6: Ormskirk Road Modelled Flood Extents 12
Figure 7: Long Term Flood Risk (Surface Water) 14
Figure 8: Long Term Flood Risk (Reservoirs) 15
Figure 9: JBA Groundwater Flood Risk Indicator Map 15

List of Appendices

Appendix A: Illustrative Framework Plan
Appendix B: Drainage Survey, Invek Surveys, April 2025
Appendix C: Topographical Survey
Appendix D: Soakaway Testing Records, Lithos, April 2025
Appendix E: United Utilities Public Sewer Record
Appendix F: United Utilities Pre-Planning Enquiry
Appendix G: Preliminary Drainage Layout
Appendix H: Watershed Analysis
Appendix I: Greenfield Runoff Calculations
Appendix J: Surface Water Attenuation - Storage Volume Calculations
Appendix K: Knowsley Council SuDS Pro-forma

List of Abbreviations

AEP	Annual Exceedance Probability	ha	Hectare
AOD	Above Ordnance Datum	IDB	Internal Drainage Board
ASGWF	Areas Susceptible to Groundwater Flooding	km	Kilometres
bgl	Below Ground Level	LFRMS	Local Flood Risk Management Strategy
BGS	British Geological Survey	LiDAR	Light Detection and Ranging
BRE	Building Research Establishment	LLFA	Lead Local Flood Authority
BSI	British Standards Institute	LPA	Local Planning Authority
CC	Climate Change	l/s	Litres per Second
CCMA	Coastal Change Management Area	m	Metres
CDA	Critical Drainage Area	m^2	Square Metres
CFMP	Catchment Flood Management Plan	m^3	Cubic Metres
CIRIA	Construction Industry Research and Information Association	NFM	Natural Flood Management
		NGR	National Grid Reference
CRT	Canal and River Trust	NPPF	National Planning Policy Framework
DEFRA	Department for Environment, Food and Rural Affairs	NVZ	Nitrate Vulnerable Zone
		OS	Ordnance Survey
EA	Environment Agency	PFRA	Preliminary Flood Risk Assessment
FCERM	Flood and Coastal Erosion Risk Management	PPG	Planning Practice Guidance
		QBAR	Mean annual maximum flow rate
FFL	Finished Floor Level	QMED	Median annual maximum flow rate
FMfP	Flood Map for Planning	RBD	River Basin District
FMP	Flood Management Plan	RBMP	River Basin Management Plan
FRA	Flood Risk Assessment	RFI	Request for Information (to the EA)
FRDA	Flood Risk and Drainage Assessment	RMA	Risk Management Authority
FRDSA	Flood Risk, Drainage and Sequential Assessment	RoFSW	Risk of Flooding from Surface Water
		SAC	Special Area of Conservation
FRMP	Flood Risk Management Plan	SFRA	Strategic Flood Risk Assessment
FRSA	Flood Risk and Sequential Assessment	SMP	Shoreline Management Plan
FRSSA	Flood Risk Sequential Site Assessment	SoP	Standard of Protection
FWA	Flood Warning Area	SSSI	Site of Special Scientific Interest
FWEP	Flood Warning and Evacuation Plan	SuDS	Sustainable Drainage System
FWMA	Flood and Water Management Act	SWMP	Surface Water Management Plan
FWS	Flood Warning System	UU	United Utilities
GSPZ	Groundwater Source Protection Zone	WFD	Water Framework Directive

1 INTRODUCTION

1.1 Purpose of Report

Weetwood Services Ltd ('Weetwood') has been instructed by Hallam Land Management Ltd to prepare a FRDA report to accompany an outline planning application for the proposed development of land at Home Farm Road, Knowsley ("the site") for residential use.

The assessment has been undertaken in accordance with the requirements of the NPPF and PPG.

1.2 Structure of the Report

The report is structured as follows:

Section 1 Introduction and report structure
Section 2 Provides background information relating to the development site
Section 3 Presents national and local flood risk and drainage planning policy
Section 4 Assesses the potential risk of flooding to the development site
Section 5 Presents an illustrative foul water drainage scheme
Section 6 Presents an illustrative surface water drainage scheme
Section 7 Presents a summary of key findings and the recommendations

1.3 Relevant Documents and Planning Policy

The assessment has been informed by the following documents, policy and information:

- National Standards for Sustainable Drainage Systems (SuDS), DEFRA, Updated 30 July 2025, https://www.gov.uk/government/publications/national-standards-for-sustainable-drainage-systems /national-standards-for-sustainable-drainage-systems-suds;
- National Planning Policy Framework, Ministry of Housing, Communities and Local Government, Updated 7 February 2025, https://www.gov.uk/ government/publications/national-planning-policy-framework--2;
- Preparing a Flood Risk Assessment - Standing Advice, EA, Updated 23 August 2024, https://www.gov.uk /guidance/flood-risk-assessment-standing-advice;
- Using Modelling for Flood Risk Assessments, EA, 12 December 2023, https://www.gov.uk/guidance/ using-modelling-for-flood-risk-assessments#when-to-consider-using-modelling;
- Flood Estimation Guidelines, Version 09, EA, December 2022, https://www.gov.uk/government /publications/ flood-estimation-guidelines;
- Planning Policy Guidance Section 7 - Flood Risk and Coastal Change, Ministry of Housing, Communities and Local Government, Updated on 25 August 2022, https://www.gov.uk/ guidance/flood-risk-and-coastal-change;
- Flood Risk Assessments - Climate Change Allowances, Government, Updated 27 May 2022, https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances;
- Design and Construction Guidance: Sewerage Sector Guidance Appendix C, Water UK, Approved Version 2.0, March 2020;
- Preliminary Flood Risk Assessment Addendum, Knowsley Council, November 2017;
- Local Flood Risk Management Strategy, Knowsley Council, October 2017;
- Sustainable Drainage & Surface Water Management: Technical Guidance for Developers, Knowsley Council, August 2016;
- BRE Digest 365 Soakaway Design, BRE, February 2016;
- Knowsley Local Plan Core Strategy, Knowsley Council, January 2016;
- The SuDS Manual (C753), CIRIA, December 2015;
- Level 2 Strategic Flood Risk Assessment, Knowsley Council, October 2012;
- Preliminary Flood Risk Assessment, Knowsley Council, June 2011;
- Level 1 Strategic Flood Risk Assessment, Knowsley Council, June 2009;
- HR Wallingford Greenfield Runoff Tool, www.uksuds.com;
- Soilscapes, Soil and AgriFood Institute, Cranfield University, www.landis.org.uk/soilscapes;

- National Geoscience Data Centre's Single Onshore Borehole Index, https://www.bgs.ac.uk/products/onshore/SOBI.html;
- BGS Mapping of Surface Geology, https://www.bgs.ac.uk/map-viewers/geoindex-onshore/;
- MAGIC, Natural England, https://magic.defra.gov.uk/.

1.4 Third Party Surveys, Drawings and Assessments

The assessment has been informed by the following third party surveys, drawings and assessments:

- Illustrative Framework Plan, Stantec, Ref. 333102382 0112, August 2025 (**Appendix A**);
- Drainage Survey, Invek Surveys - Survey undertaken in April 2025 (**Appendix B**);
- Topographical Survey, Powers & Tiltman Ltd - Survey undertaken in October 2017 (**Appendix C**);
- Preliminary Geoenvironmental Investigation, Lithos, Ref. 4405/1A, May 2025 (report submitted separately - Appendix F: Soakaway Testing Records extract provided in **Appendix D**); and
- Public sewer records provided by UU in January 2025 (**Appendix E**).

1.5 Explanatory Note on Flood Probability

This report refers to the likelihood of a flood event occurring in terms of an AEP expressed as a percentage. This terminology is consistent with the definition of flood zones presented in Table 1 of the PPG (refer to **Section 4.2** of this report).

The AEP is the reciprocal of the return period which describes the rarity of an event in terms of its statistical reoccurrence interval in years. For example, a '1 in 30 year flood' has a 1/30 = 0.033 (3.3%) probability of occurring or being exceeded in any one year, whilst a '1 in 100 year flood' has a 1/100 = 0.010 (1.0%) probability of occurring or being exceeded in any one year.

AEP	AEP (expressed as a %)	Return Period (years)	Alternative Expression
1.000	100.0%	1	1 in 1
0.500	50.0%	2	1 in 2
0.435	43.5%	2.3	1 in 2.3
0.100	10.0%	10	1 in 10
0.050	5.0%	20	1 in 20
0.033	3.3%	30	1 in 30
0.020	2.0%	50	1 in 50
0.010	1.0%	100	1 in 100
0.005	0.5%	200	1 in 200
0.001	0.1%	1,000	1 in 1,000

2 SITE DETAILS AND PROPOSED DEVELOPMENT

2.1 Site Location

The approximately 33.75 ha greenfield site is bordered by Knowsley Lane to the west and Home Farm Road to the north (the latter of which crosses the site) at OS NGR SJ 437 946, as shown in **Figure 1**.

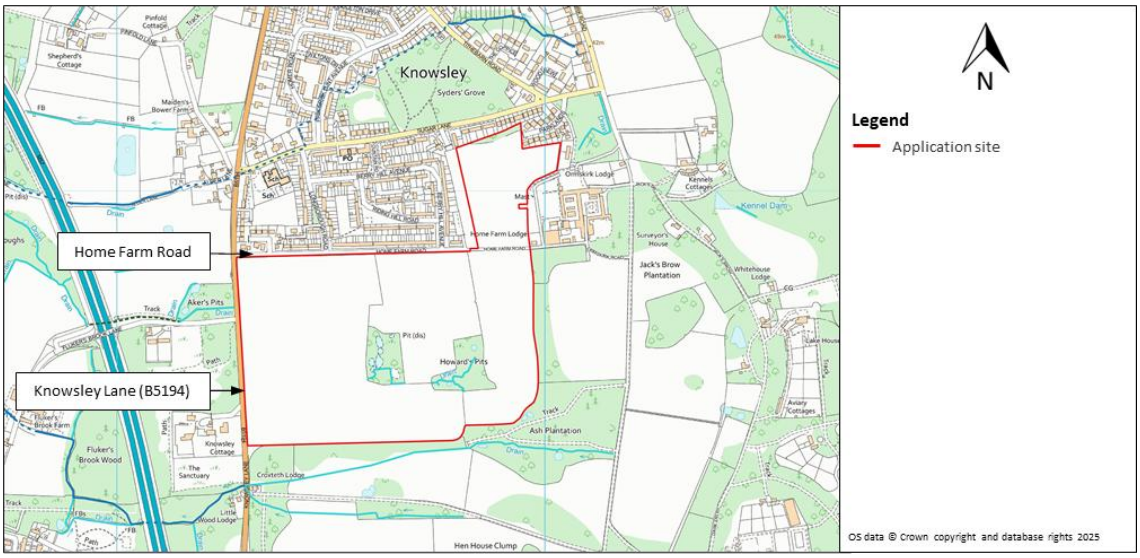


Figure 1: Site Location

2.2 Proposed Development

The outline application (including details of access to but not within the site) is for the erection of up to 700 dwellings together with public open space, landscaping, new vehicular access junctions, active travel links, sustainable urban drainage systems and other associated infrastructure. An Illustrative Framework Plan is provided in **Appendix A**.

The NPPF classifies residential development as More Vulnerable to flood risk.

2.3 Surface Waterbodies in the Vicinity of the Site

There are a number of surface waterbodies in the vicinity of the site (refer to **Figure 2**):

- Croxteth Brook flows north/north-west approximately 850 m to the west of the site;
- OS mapping indicates that the head of Fluker's Brook is located approximately 90 m to the south-west of the site. Fluker's Brook is subsequently culverted under the M57 before continuing west/north-west and ultimately outfalling to Croxteth Brook;
- The 2012 SFRA mapping indicates that two drainage ditches flow west approximately 20 m and 110 m to the south of the site (at their nearest points) and outfall into the head of Fluker's Brook in the vicinity of Knowsley Lane;
- A watercourse referred to as Ormskirk Road flows west in open channel and culvert approximately 190 m (at its nearest point) to the north of the site and outfalls to Croxteth Brook;
- Existing drainage ditches and ponds are present within the two wooded areas, known as Spookies Wood, in the centre of the site. OS mapping also indicates the presence of a number of drainage ditches and ponds within the locality of the site; and
- White Man's Dam is located approximately 800 m to the east of the site and is owned and maintained by the Earl of Derby's Estate.

During a site visit undertaken on 5 February 2025, a pipe outlet was identified to the west of Knowsley Lane, to the north-west of the site (refer to **Figure 2**). A CCTV survey of the pipe was undertaken by Invek Surveys in April 2025 (refer to **Appendix B**). This proved that the pipe is 300 mm diameter and enters the site under Knowsley Lane. The pipe was able to be surveyed for 50 m upstream of the headwall. The pipe was in

relatively poor condition throughout the length surveyed, with root ingress and joint displacement. The pipe was generally dry during the survey with no flow except where water was impounded behind blockages or sags/displace joints. This suggests that the pipe is land drainage and not a culverted watercourse.

Downstream of Knowsley Lane, the pipe outfalls to an existing drainage ditch within the wooded area to the west referred to as Aker's Pit. The drainage ditch was traced by Invek Surveys and proved that this outfalls to an ordinary watercourse to the west of the M57 via a 600/1050 mm diameter culvert, which in turn ultimately outfalls to Croxteth Brook.

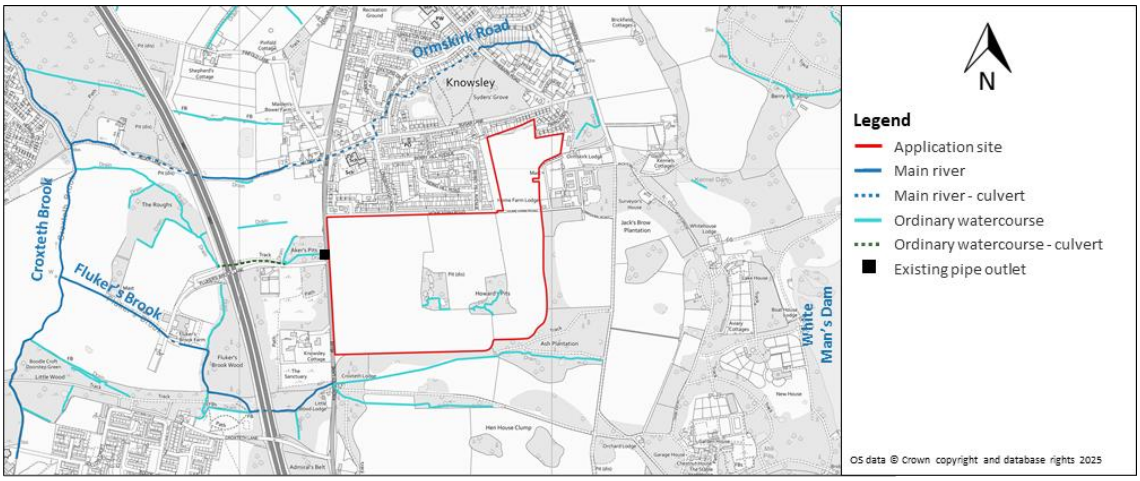


Figure 2: Location of Surface Waterbodies

2.4 Topographic Levels

A topographic survey of the site was undertaken by Powers & Tiltman in October 2017 (**Appendix C**) and LiDAR data has been used to develop a digital terrain model of the site and surrounding area as illustrated in **Figure 3**.

Site levels are indicated to fall from circa. 41.5 m AOD in the north-east and 36.0 - 38.0 m AOD in the east, to 26.0 - 26.8 m AOD in the west. Three depressions are evident along the western boundary of the site; to the north, south and centre of the site, where levels are indicated to be in the region of 25.2 - 26.0 m AOD.

Ground levels on Knowsley Lane are indicated to be in the region of 26.0 - 26.9 m AOD adjacent to the site.

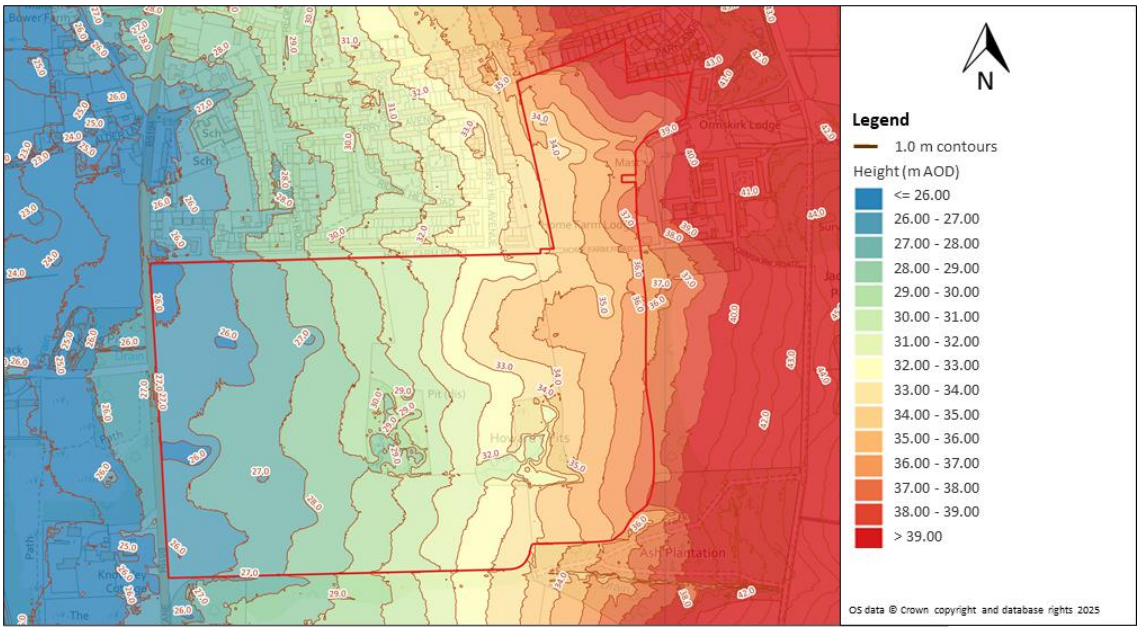


Figure 3: Digital Terrain Model from LiDAR Data

2.5 Ground Conditions

According to the Soilscapes soils dataset produced by the Cranfield Soil and AgriFood Institute[1], soil conditions at the site and within the surrounding area are described as slowly permeable seasonally wet loamy and clayey soils.

BGS mapping of surface geology[2] indicates the underlying bedrock formation comprises Chester Formation - Sandstone, overlain by Till, Devensian - Clay, Sandy, Gravelly, Cobbly superficial deposits.

According to the MAGIC website[3] the superficial deposits at the site are classified as a Secondary (undifferentiated) aquifer whilst the underlying bedrock is classified as a Principal aquifer. The site is shown to be located within a designated groundwater source protection zone 3 (SPZ3) ("Total Catchment"). SPZ's are used by the EA to control the risk to groundwater supplies from potentially polluting activities and accidental releases of pollutants. SPZ3 is defined as the area around a source within which all groundwater recharge is estimated to discharge at the source.

A preliminary geoenvironmental investigation has been undertaken by Lithos, including soakaway testing in 4 no. trial pits across the site in accordance with BRE365 in April 2025. The soakaway testing records are presented in **Appendix D**. Despite running each test for up to 3 hours, drainage rates were not sufficient to allow calculation of infiltration rates.

The trial pits were dug to a depth of 1.8 - 2.2 m bgl and the soakaway testing records state that groundwater was not apparent during excavation.

1 www.landis.org.uk/soilscapes/
2 https://www.bgs.ac.uk/map-viewers/geoindex-onshore/
3 https://magic.defra.gov.uk/MagicMap.aspx

3 PLANNING POLICY AND GUIDANCE

3.1 National Planning Policy and Policy Guidance

The thrust of national planning policy, as articulated in the NPPF is that inappropriate development in areas at risk of flooding should be avoided where possible, as stated and summarised below:

- *Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere* [NPPF para. 170].
- *A sequential risk-based approach should be taken to individual applications in areas known to be at risk now or in the future from any form of flooding* [NPPF para. 173]. *The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding* [NPPF para. 174].
- *The sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk)* [NPPF para. 175].
- *Applications for some minor development and changes of use should also not be subject to the sequential, nor the exception test but should still meet the requirements for site-specific flood risk assessments set out in footnote 63* [NPPF para. 176].
- *Having applied the sequential test, if it is not possible for development to be located in zones with a lower risk of flooding (taking into account wider sustainable development objectives) the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3* [NPPF para. 177]. For example, the exception test need not be applied for less vulnerable development in any flood zone, or for more vulnerable development in flood zones 1 or 2.
- Where the exception test must be applied, application of the test for development proposals at the application stage should be informed by a site-specific flood risk assessment. *To pass the exception test it should be demonstrated that: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; (b) and the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall* [NPPF para. 178]. *Both elements of the test should be satisfied for the development to be permitted* [NPPF para. 179].
- *A site-specific flood risk assessment should be provided for all development in flood zones 2 and 3. In flood zone 1, an assessment should accompany all proposals involving: sites of 1 ha or more; land which has been identified by the [EA] as having critical drainage problems; land identified in a [SFRA] as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use*]NPPF para. 181, footnote 63].
- Development should not increase flood risk elsewhere [NPPF para. 181].
- Development should only be allowed in areas at risk of flooding where the flood risk assessment (and the sequential and exception tests, as applicable), demonstrate that:
  a. *within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;*
  b. *the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;*
  c. *the development incorporates [SuDS], unless there is clear evidence that this would be inappropriate;*
  d. *any residual (flood) risk can be safely managed; and*
  e. *safe access and escape routes are included where appropriate, as part of an agreed emergency plan* [NPPF para. 181].

- *Applications which could affect drainage on or around the site should incorporate SuDS to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. [SuDS] provided as part of proposals for major development should:*
  a. *take account of advice from the [LLFA];*
  b. *have appropriate proposed minimum operational standards; and*
  c. *have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development* (NPPF para. 182).

Guidance on application of the sequential and exception test is provided in the PPG - Flood Risk and Coastal Change. For example:

- *The approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future [i.e. taking climate change into account] medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding* [PPG para. 7-023].
- *Where it is not possible to locate development in low risk areas, the Sequential Test should go on to compare reasonably available sites: within medium risk areas; and then, only where there are no reasonably available sites in low and medium risk areas, within high risk areas* [PPG para. 7-024].
- *Initially, the presence of existing flood risk management infrastructure should be ignored, as the long-term funding, maintenance and renewal of this infrastructure is uncertain. Climate change will also impact upon the level of protection infrastructure will offer throughout the lifetime of development* [PPG para. 7-024].
- *The Sequential Test should be applied to 'Major' and 'Non-major development' proposed in areas at risk of flooding, but will not be required where:*
  - The site has been allocated for development and subject to the test at the plan making stage (provided the proposed development is consistent with the use for which the site was allocated and provided there have been no significant changes to the known level of flood risk to the site, now or in the future which would have affected the outcome of the test);
  - The site is in an area at low risk from all sources of flooding, unless the [SFRA], or other information, indicates there may be a risk of flooding in the future;
  - The application is for a development type that is exempt from the test, as specified in [footnote 62] of the [NPPF] [PPG para. 7-027].
- *For individual planning applications subject to the Sequential Test, the area to apply the test will be defined by local circumstances relating to the catchment area for the type of development proposed. For some developments this may be clear, for example, the catchment area for a school. In other cases, it may be identified from other Plan policies. For example, where there are large areas in Flood Zones 2 and 3 (medium to high probability of flooding) and development is needed in those areas to sustain the existing community, sites outside them are unlikely to provide reasonable alternatives. Equally, a pragmatic approach needs to be taken where proposals involve comparatively small extensions to existing premises (relative to their existing size), where it may be impractical to accommodate the additional space in an alternative location. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority [LPA] boundary* [PPG para. 7-027].
- *'Reasonably available sites' are those in a suitable location for the type of development with a reasonable prospect that the site is available to be developed at the point in time envisaged for the development. These could include a series of smaller sites and/or part of a larger site if these would be capable of accommodating the proposed development. Such lower-risk sites do not need to be owned by the applicant to be considered 'reasonably available'* [PPG para. 7-028].
- *The Exception Test should only be applied as set out in Table 2 [of the PPG ("Flood Risk Vulnerability and Flood Zone Incompatibility")] and only if the Sequential Test has shown that there are no reasonably available, lower risk sites, suitable for the proposed development, to which the development could be steered* [PPG para. 7-032].

3.2 Local Planning Policy

3.2.1 Knowsley Local Plan Core Strategy, January 2016

The Knowsley Local Plan Core Strategy was adopted by Knowsley Council in January 2016. The following policies are relevant in respect of flood risk and drainage.

Policy CS2: Development Principles states that *"New development in Knowsley and the preparation of subsequent stages of the Local Plan will be expected to support the following development principles…Principle 4: Recognise environmental limits, protect and enhance environmental assets, enhance local character and promote quality of place by…j) Minimising negative impact upon flood risk, air quality, water quality, land quality, soil quality, and noise or vibration levels and ensuring any negative impacts are appropriately mitigated. Development that will have an unacceptable impact upon any of the above will only be permitted where the benefits of the proposal clearly outweigh the harm"*.

Policy CS22: Sustainable and Low Carbon Development states that *"New development will be required to meet high standards of sustainable design and construction and minimise carbon emissions. This should be achieved by…i) Managing flood risk, including through the use of [SuDS] and flood resilient design for infrastructure and property…"*.

Policy CS24: Managing Flood Risk

1. *New development that may cause an unacceptable risk of flooding on the site or elsewhere will not be permitted.*
2. *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.*
3. *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 [FRA].*
4. *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 [SFRA], relevant FRA(s) or a local strategy for flood risk management, and:*
    d. *Be designed to contribute to the biodiversity of the borough unless it can be demonstrated that this would not be technically feasible;*
    e. *Incorporate a [SuDS];*
    f. *Be fully described in the planning application; and*
    g. *Be funded by the developer, including long term maintenance.*
5. *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.*
6. *Further guidance on these issues will be provided in a proposed Supplementary Planning Document.*

The site is identified as 'Safeguarded Land' for residential use within the Knowsley Local Plan Core Strategy (Site Ref. KGBS 6 - Land at Knowsley Village) for which Policy SUE1: Sustainable Urban Extensions and Safeguarded Lane applies[4]. Policy SUE1 states that *"2) Land at Knowsley Village has also been removed from the Green Belt but has been identified as 'safeguarded land'. This site is not allocated for development at the present time"*. The suitability of the site for development is therefore considered to have been established, by virtue of its current Safeguarded Land designation (to meet longer term needs beyond 2028) in the adopted Local Plan.

[4] Safeguarded land comprises areas and sites which may be required to serve development needs in the longer term, i.e. beyond the end of the plan period (post 2028). Safeguarded land should be genuinely capable of development when needed and be where future development would be an efficient use of land, well integrated with existing development.

3.2.2 Level 2 Strategic Flood Risk Assessment, Knowsley Council, October 2012

Table 6-1 of the 2012 SFRA sets out the "Policy Recommendations for Development Management and Flood Risk Assessments". For sites in flood zone 1 and greater than 1 ha the following applies:

- *SuDS*
  - *New greenfield development to restrict runoff to existing rates and, where possible, volumes and to seek to maximise discharge to first soakaway, then watercourse and then sewer.*
  - *All new development across the Borough to include at least one 'at source' SuDS measure. Where no 'at source' SuDS measure is proposed, provide evidence to show that such measures are not feasible as a result of existing ground conditions.*
- *Local Sources of Flooding*
  - *Risk of flood from other local sources of flooding, i.e. surface water, groundwater, canals and reservoirs, must be fully considered and mitigated.*
- *Reducing Flood Risk*
  - *Provide a clear and concise statement summarising how the proposed redevelopment has contributed to a positive reduction in flood risk.*
  - *FRAs supporting proposed development should assess the proposed development against all elements of the Council's flood policy.*
  - *Undertake a FRA in line with the requirements of the NPPF.*
  - *The potential of the development to increase flood risk elsewhere should be identified.*
  - *Assess the vulnerability of the development to flooding over its lifetime (e.g. max water levels, flood extents, flow depths, flow velocities flow paths and hazard).*
  - *Where necessary a Sequential Test must be undertaken and approved by the [LPA].*
  - *Ground floor levels to be set at an appropriate height above surrounding ground levels to ensure surface water cannot enter.*
- *Reducing Residual Flood Risk*
  - *The development should not increase flood risk. This should be achieved by maintaining or reducing flood levels and not impacting overland flow routes.*

3.3 Drainage Technical Guidance

National standards for sustainable drainage systems (SuDS) published by DEFRA in June 2025 set out how surface water runoff generated by "everyday rainfall", and during the 50.0%, 3.3% and 1.0% AEP rainfall events should be managed, how peak runoff rates should be restricted, how water quality measures should be implemented, how amenity and biodiversity should be used in SuDS and how maintenance and management plans shall be considered.

3.4 Water Framework Directive

The WFD provides a legal framework for the protection, improvement and sustainable use of inland surface waters, groundwater, transitional waters, and coastal waters across England, and seeks to:

- Prevent deterioration in the status of surface water and groundwater bodies;
- Protect, enhance and restore surface water and groundwater bodies (except artificial or heavily modified water bodies) with the aim of achieving good ecological, chemical and groundwater quantitative status by December 2021;
- Protect and enhance artificial and heavily modified water bodies with the aim of achieving good ecological potential and good chemical status by December 2021;
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment and progressively reduce pollution of groundwater.

The WFD applies to any proposed development which has the potential to impact on a waterbody. Where this is the case, the EA may require evidence demonstrating that the proposed development does not compromise the aims of the WFD.

3.5 Land Drainage Consent

Land drainage consent may be required from the LLFA (Knowsley Council) for work to an ordinary watercourse.

4 REVIEW OF FLOOD RISK

4.1 Historical Records of Flooding

The EA Historic Flood Map[5] indicates that there are no records of flooding at or within the immediate vicinity of the site.

4.2 Flood Risk from Rivers (Fluvial)

The EA FMfP (Flood Zones 2 and 3) dataset[6] (**Figure 4**) indicates the site to be located in flood zone 1. This is reiterated on Figure B2-1 of the 2012 SFRA ("Environment Agency Flood Zones"), and Figure F1-4 of the 2009 SFRA ("PPS25 Updated Flood Zones - Knowsley 3").

Table 1 of the PPG defines flood zones as follows:

- Flood zone 1: Low Probability. Land having a less than 0.1% annual probability of river or sea flooding
- Flood zone 2: Medium Probability. Land having between a 1.0% and 0.1% annual probability of river flooding or between a 0.5% and 0.1% annual probability of sea flooding
- Flood zone 3a: High Probability. Land having a 1.0% or greater annual probability of river flooding or a 0.5% or greater annual probability of sea flooding
- Flood zone 3b: Functional Floodplain. Land where water from rivers or the sea has to flow or be stored in times of flood. Land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively or land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as a 0.1% annual probability of flooding).

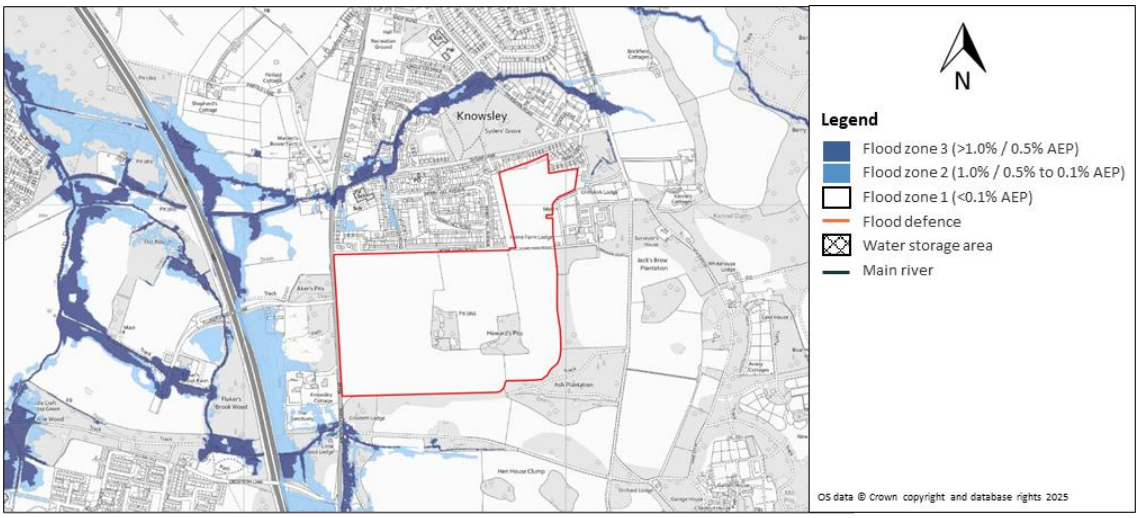


Figure 4: Flood Map for Planning (Flood Zones 2 and 3)
Source: gov.uk website; Accessed: August 2025

A 1D-2D Flood Modeller-TUFLOW hydraulic model of Croxteth Brook and Fluker's Brook was developed by the EA as part of the Upper Alt Tributaries study (March 2018). This assesses the risk of flooding from Croxteth Brook and Fluker's Brook for the 1.0% and 0.1% AEP events and the 1.0% AEP event +30%, +35% and +70% climate change.

A 1D-2D ESTRY-TUFLOW hydraulic model of Ormskirk Road was also developed by the EA as part of the NW Package 1 Ex-COWS: Ormskirk Road, Knowsley study (March 2015). This assesses the risk of flooding from Ormskirk Road for the 3.3%, 1.0% and 0.1% AEP events and the 1.0% AEP event +20% climate change. Blockage was also assessed at two locations for the 1.0% AEP event: one at the culvert outlet to the north-east of the site (location 1) and the other where there is a reduction in pipe culvert size (location 2).

The modelled flood extents from the modelling studies are provided in **Figure 5** and **Figure 6** respectively.

5 https://data.gov.uk/dataset/76292bec-7d8b-43e8-9c98-02734fd89c81/historic-flood-map
6 https://flood-map-for-planning.service.gov.uk/

The modelled outputs indicate that no flooding of the site would occur from Croxteth Brook, Fluker's Brook or Ormskirk Road during the aforementioned scenarios.

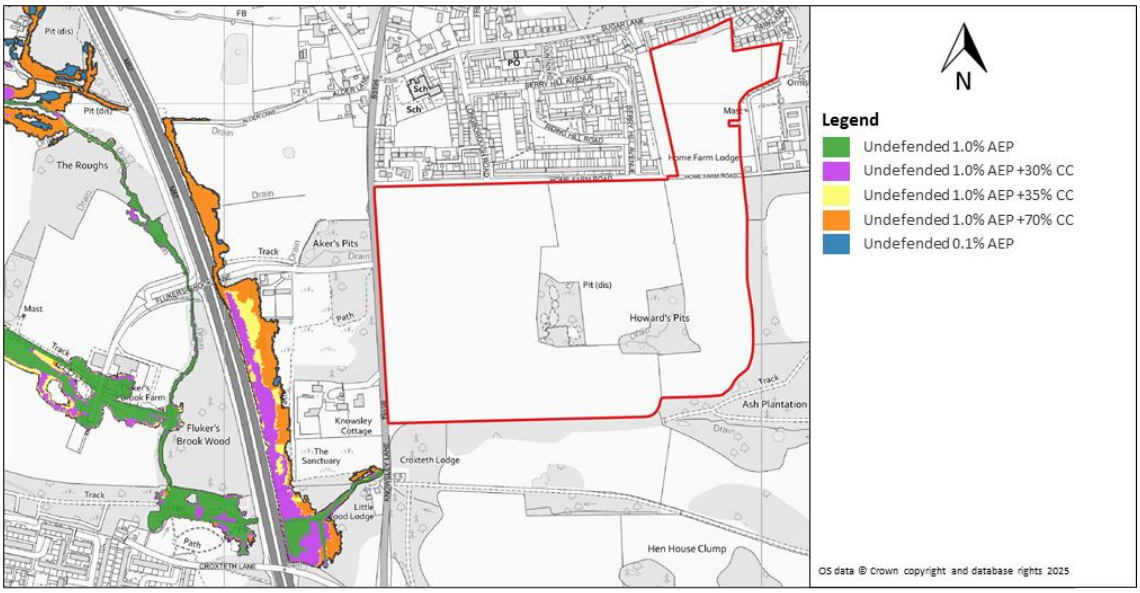


Figure 5: Croxteth Brook and Fluker's Brook Modelled Flood Extents
Source: Upper Alt Tributaries, EA, March 2015

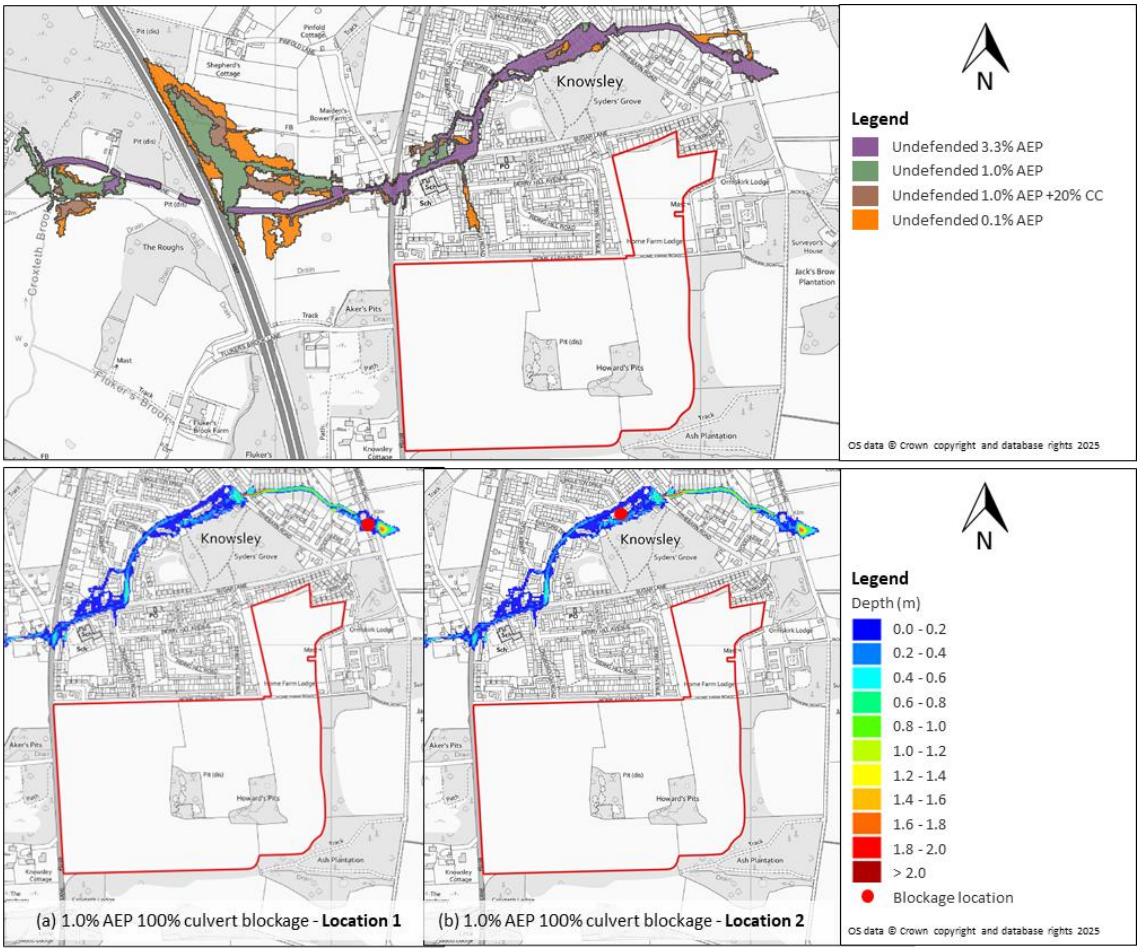


Figure 6: Ormskirk Road Modelled Flood Extents
Source: NW Package 1 Ex-COWS: Ormskirk Road, Knowsley, EA, March 2015

The current EA guidance on climate change allowances (May 2022) advises that for More Vulnerable development, the Central allowance should be used to assess flood risk for the lifetime of the development. The Central allowance for the Alt and Crossens management catchment is +44% (2080s). The modelling outputs from the Upper Alt Tributaries modelling study therefore present a conservative assessment of flood risk to the site when accounting for climate change and the above conclusion holds.

A +44% increase in peak river flows during a 1.0% AEP event for Ormskirk Road is unlikely to exceed that of the 0.1% AEP event and, as such, this is also not expected to affect the site. This is reiterated on the FMfP (River and Sea without Defences) dataset which accounts for climate change using the Central allowance for the 2080s epoch for river flooding.

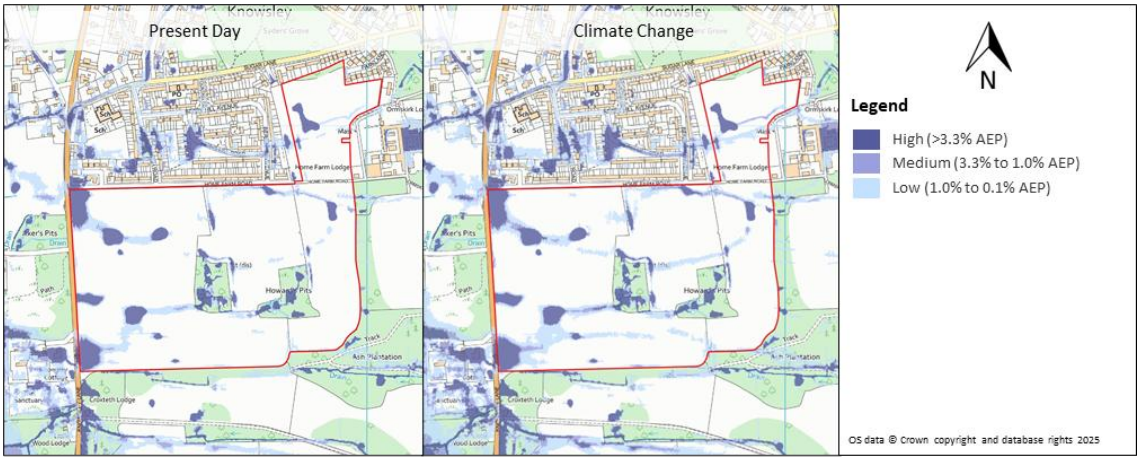
It is concluded that the site is at a Very Low risk of flooding from rivers (fluvial).

4.3 Flood Risk from Small Watercourses and Surface Water (Pluvial)

As detailed in **Section 2.3**, a number of drainage ditches are present on and within the vicinity of the site. No modelled information is available for these watercourses. The Long Term Flood Risk (Surface Water) dataset (**Figure 7**) has therefore been used to assess the risk of flooding from these sources and from surface water. The mapping indicates the following:

- The site is not at risk of flooding from the drainage ditches and ponds within the locality of the site;
- Ponding of surface water is indicated in several areas across the site; however, this represents local depressions in the existing topography; and
- Several overland flow routes develop in a Low (1.0% to 0.1% AEP) and Medium (3.3% to 1.0% AEP) risk event. However, the areas of identified risk are relatively confined and form where the natural contours of the land forms a shallow valley where overland flow would be directed to. The maximum flood depth within these areas is typically <0.2 m, with small areas of 0.2 - 0.3 m during a Low risk event when accounting for climate change (between 2040 and 2060).

It is concluded that the site is at a Very Low risk of flooding from small watercourses and is at a Very Low to Medium risk of surface water flooding.



(a) Extent



(b) Depth

Figure 7: Long Term Flood Risk (Surface Water)
Source: gov.uk website; Accessed: August 2025

4.4 Flood Risk from Reservoirs, Canals and Other Water Impounding Structures

LiDAR data indicates that ground levels around the perimeter of White Man's Dam are in the region of 64.5 - 65.0 m AOD. Levels subsequently rise to circa. 67.0 m AOD before falling to the west; however, levels are lower to the south-west of the lake. White Man's Dam is therefore unlikely to pose a direct risk from overtopping to the east of the site.

The Long Term Flood Risk (Reservoirs) dataset (**Figure 8**) indicates that the site is not at risk of flooding from such sources, except for a small area in the south-west, which appears to be associated with a failure of the southern tip of White Man's Dam. However, all large reservoirs are regularly inspected by reservoir panel engineers with essential safety work carried out as required. As detailed on the gov.uk website, reservoir flooding is therefore extremely unlikely to occur.

There are no canals or other water impounding structures located within the immediate vicinity of the site.

It is concluded that the site is at a Low risk of flooding from reservoirs and is not at risk of flooding from canals and other water impounding structures.



Figure 8: Long Term Flood Risk (Reservoirs)
Source: gov.uk website; Accessed: August 2025

4.5 Flood Risk from Groundwater

The JBA Groundwater Flood Risk Indicator map (**Figure 9**) indicates that groundwater levels at the site may be <0.025 m bgl (defined as High risk) during a 1.0% AEP groundwater flood event.

As detailed in **Section 2.5**, no groundwater was encountered to a depth of 1.8 - 2.2 m bgl during excavation of the trial pits for the infiltration testing undertaken by Lithos in April 2025.

Due to the topography of the site and surrounding area, any groundwater emerging at the surface would be expected to be directed east, away from the areas of proposed development and the site, towards Knowsley Lane, Fluker's Brook and Croxteth Brook. As such, this would not be expected to accumulate to any significant depth at the site itself.

It is concluded that the site is at a Medium risk of flooding from groundwater.

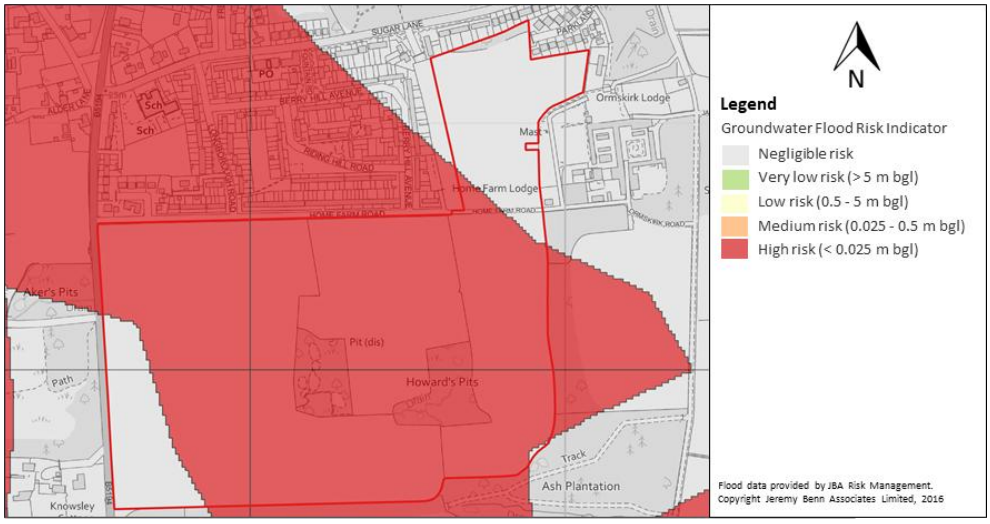


Figure 9: JBA Groundwater Flood Risk Indicator Map
Source: Blue Sky Maps; Accessed: January 2025

4.6 Flood Risk Mitigation

The site is assessed to be at risk of flooding from surface water and groundwater and at a negligible / low risk of flooding from all other identified sources.

The risk of flooding to the proposed development will be mitigated through the implementation of the following measures, which have been incorporated within the design of the Concept Masterplan:

- FFLs to be raised at least 0.15 m above adjacent ground levels following any reprofiling of the site, with ground levels sloping down from the dwellings.
- Localised low spots within the site topography where ponding of pluvial surface water is indicated to be retained within proposed landscaped areas. Where this is not feasible the site should be reprofiled accordingly to remove such depressions, thus eliminating any significant risk of surface water flooding in these areas.
- Existing surface water overland flow paths originating off-site managed through the design of the site.

These measures will, subject to the implementation of an appropriately designed surface water drainage scheme (**Section 6**), enable any potential overland flows to be conveyed safely across the site without affecting property.

4.7 Flood Risk Elsewhere

In accordance with the NPPF, PPG and local planning policy, development should not increase flood risk elsewhere. This typically applies to the "design flood", which is generally taken as the 1.0% AEP fluvial and 0.5% AEP tidal events including an allowance for climate change.

The site is not at risk of flooding during a 1.0% AEP fluvial and 0.5% AEP tidal event including an allowance for climate change. As such, the proposals would not be expected to impact flood risk elsewhere and no compensatory flood storage would need be provided on site.

4.8 Flood Risk Sequential Test

NPPF para. 175 states that *"the sequential test should be used in areas known to be at risk now or in the future from any form of flooding, except in situations where a site-specific flood risk assessment demonstrates that no built development within the site boundary, including access or escape routes, land raising or other potentially vulnerable elements, would be located on an area that would be at risk of flooding from any source, now and in the future (having regard to potential changes in flood risk)"*.

Recognising that there is a localised risk of flooding from surface water, groundwater and reservoirs at the site, planning policy requires that the flood risk sequential test is applied.

However, as detailed in **Section 3.2.1** the site is identified as 'Safeguarded Land' for residential use within the Knowsley Local Plan Core Strategy (Site Ref. KGBS 6 - Land at Knowsley Village). The suitability of the site for development is therefore considered to have been established, by virtue of its current Safeguarded Land designation (to meet longer term needs beyond 2028) in the adopted Local Plan.

Pegasus has consulted with Knowsley Council to establish its requirements for addressing the sequential test, presenting the following key considerations:

- The site forms part of the only Safeguarded Land identified within the Local Plan with all other existing undeveloped allocations required to meet the development needs identified for the adopted plan period.
- Undefined/non-allocated urban sites alone would not be sufficient to meet the Council's housing requirements towards the end/beyond the plan period.
- There is limited prospect of non-allocated Green Belt sites across the Borough being granted planning permission before 2028 (based on current local and national policy) and the Council has not specifically identified any 'Grey Belt' sites that would correspond to current draft definitions. Furthermore, the Council would generally favour Safeguarded Land coming forward over and above Green Belt/Grey Belt sites.
- The northern part of the Safeguarded Land is not sequentially preferable in respect of flood risk.

On the basis of the above, it is concluded that there are no sequentially preferable sites at a lower risk of flooding, that are available and suitable. The site is therefore considered to be compliant with the sequential approach to site selection as set out in the NPPF. Knowsley Council has confirmed that the above approach is reasonable[7].

4.9 Exception Test

The Exception Test need not be applied for 'More Vulnerable' development within flood zone 1. Notwithstanding this, the assessment presented in this report demonstrates that the proposed development passes element (b) of the test, i.e. the development will be safe for its lifetime taking account of the vulnerability of its users and will not increase flood risk elsewhere.

[7] Email from Planning at Knowsley Council to Graham Lamb of Pegasus on 5 March 2025

5 FOUL WATER MANAGEMENT

5.1 Existing Assets

An extract of the public sewer records obtained from UU is provided in **Appendix E**. This indicates that the following wastewater assets are present within/adjacent to the site boundary:

- A 225 mm diameter public foul sewer and 150 mm private surface water sewer cross the site in the north-east, between Parklands and Berry Hill Avenue.
- A 225 mm diameter public foul sewer and 225 mm public surface water sewer are located to the north of the site boundary in Home Farm Road

5.2 New Connections

The anticipated domestic foul loading from the site has been calculated in accordance with Design and Construction Guidance. The expected total peak flow rate from the development would be 35 l/s.

Under the Water Industry Act (1991), developers have a right to connect foul water flows from new developments to public sewer. The Act places a general duty on sewerage undertakers to provide the additional capacity that may be required to accommodate additional flows and loads arising from new domestic development.

UU has advised, by way of a pre-planning sewerage enquiry response (**Appendix F**), that there is existing capacity in the local foul sewerage network to receive and treat domestic foul water from the proposed development and that foul water can discharge without restriction into the 900 mm diameter combined sewer in Knowsley Lane North.

Given ground levels, it is likely that a pumped rising main would be required for at least the western part of the development. This would be established at the detailed design stage.

A preliminary foul water drainage layout is provided in **Appendix G**.

5.3 Easements, Diversions and Disconnections

A 3.0 m easement is required either side of the public foul sewer and private surface water sewer in the north-east of the site.

6 SURFACE WATER MANAGEMENT

6.1 Surface Water Drainage at the Existing Site

The site currently comprises multiple parcels of arable agricultural land. As such, no formal drainage is expected to be present. Given the topography and ground conditions at the site, surface water runoff would be expected to slowly infiltrate where conditions allow and flow overland towards Knowsley Lane.

The site has a total area of 33.6 ha; however, for the purposes of this assessment the proposed developable area is taken as approximately 10.2 ha, based on the assumption that 50% of the development area (i.e. excluding areas that are to remain greenfield and continue to drain as existing) will be impermeable. However, it should be noted that not all of the site is within the catchment of Knowsley Lane, and a watershed analysis has been undertaken (refer to **Appendix H**). The analysis demonstrates that the north-east corner of the proposed site is not within the catchment draining to Knowsley Lane and the greenfield runoff calculations will therefore only consider the 8.9 ha draining towards Knowsley Lane.

The greenfield surface water runoff rates for the site have been calculated using the ReFH2 hydrological model in accordance with the recommendations of the National SuDS Standards and the EA's Flood Estimation Guidelines. The peak flow estimates are presented in **Table 1** and details of the input parameters and the output results are provided in **Appendix I**.

Table 1: Greenfield Runoff Rate

AEP of Rainfall Event	Greenfield Runoff Rate for 8.9 ha Development Area (l/s)
100.0%	53.5
QMED	60.3
3.3%	125.1
1.0%	157.2

6.2 Surface Water Drainage at the Developed Site

6.2.1 Disposal of Surface Water

In accordance with the National Standards for SuDS, surface water runoff should be disposed of according to the following hierarchy: Collected for non-potable use; Into the ground (infiltration); To a surface water body; To a surface water sewer or another piped surface water drainage system; To a combined sewer.

The demand for non-potable water within the development is considered to be low. As such, the use of rainwater harvesting has been discounted.

Figure B11-1 of the 2012 SFRA ("Potential Suitability for SuDS") indicates that the site has a "Medium 2" potential suitability for SuDS. The Medium Probability Class (2) consists of impermeable/other types of drift above Sandstone solid geology.

As detailed in **Section 2.5**, infiltration testing undertaken by Lithos in April 2025 indicates that soakaways will not provide a suitable drainage solution for surface water runoff. Due to the nature of the underlying ground which has cohesive clay soils infiltration tests did not indicate any soakage potential and rates could not be calculated.

Recognising the above, it is proposed to direct all runoff to the existing culvert under Knowsley Lane in the north-west of the site, which flows into the existing drainage ditch within the wooded area to the west referred to as Aker's Pit, which then discharges to an ordinary watercourse and ultimately Croxteth Brook, as described in **Section 2.3**.

6.2.2 Post Development Impermeable Area

The area of impermeable surfaces within the proposed development has been estimated to be 10.2 ha, based on **Appendix A** and the assumption that 50% of the development platform would comprise impermeable surfaces.

6.2.3 Urban Creep

A uniform allowance of 10% additional impermeable area has been made to account for urban creep.

6.2.4 Peak Flow Control

It is proposed to restrict surface water runoff to the QMED greenfield runoff rate. Based on a contributing area of 8.9 ha the proposed discharge rate equates to 60.3 l/s (refer to **Table 1**).

6.2.5 Volume Control

Where reasonably practicable, for greenfield sites, the runoff volume from the proposed development to any surface water body in the 1.0% AEP, 6 hour rainfall event should not exceed the greenfield runoff volume for the same event.

As outlined within The SuDS Manual extra runoff volumes in extreme events may be managed by releasing all runoff (above the 100.0% AEP event) from the site at a maximum rate of 2 l/s/ha or QBAR, whichever is the higher value.

It is proposed to restrict peak discharge rates to the QMED greenfield runoff rate in up to the 1.0% AEP event, including an allowance for climate change. This is a slightly more conservative approach than adopting the QBAR greenfield runoff rate.

6.2.6 Attenuation Storage

Attenuation storage will be provided to store surface water runoff generated across the proposed roofs and hardstanding.

The attenuation storage facilities have been modelled using Causeway Flow (**Appendix J**). The facilities have been sized to store the 1.0% AEP rainfall event including a 45% increase in rainfall intensity to allow for climate change in accordance with Government guidance.

Assuming a peak discharge rate of 60.3 l/s, a total storage volume of 6367.8 m^3 would be required.

The storage volume could be accommodated within the sites pipe network and two attenuation basins, with a combined area of 7454.6 m^2 and a depth of 1.5 m.

A preliminary surface water drainage layout is provided in **Appendix G**.

6.2.7 Management of Everyday Rainfall

The National Standards for SuDS state that a SuDS approach shall be applied so that the first 5 mm of rainfall for the majority of rainfall events does not leave the site, and that evidence shall be provided that the approach to managing everyday rainfall has been developed alongside and in support of the management of runoff quality and the delivery of amenity and biodiversity benefits.

Given that infiltration drainage in not feasible on this site, the attenuation basins would be expected to prevent the first 5 mm of rainfall from leaving the site for an impermeable area 5 times the vegetated surface area of the basins (circa 3.75 ha). The remaining 6.45 ha will need to be managed by other methods. Given that the proposed layout is illustrative, to achieve the above, the use of permeable surfaces, swales, bioretention areas and/or rain gardens will be considered as the development proposals progress.

6.2.8 Exceedance Routes

Flows resulting from rainfall in excess of the 1.0% AEP rainfall event including an allowance for climate change will be managed in exceedance routes. It is assumed that as the development proposals progress, the design of the site would ensure flood flows are directed towards carriageways, with the site being profiled to ensure that flood flows are directed away from built development.

6.2.9 Pollution Control

Table 26.2 of the CIRIA SuDS Manual identifies residential roofs and individual driveways/low traffic roads as having a very low to low pollution hazard level and indicates that the pollution hazard indices associated with such uses for total suspended solids, hydrocarbons and metals are 0.20, 0.20 and 0.05, and 0.50, 0.40 and 0.40 respectively.

Attenuation basins can provide water quality benefits via the settlement of pollutants in still or slow moving water, adsorption by the soil, and biological activity. Table 26.3 of the CIRIA SuDS Manual 2015 indicates that the SuDS mitigation indices for attenuation basins for total suspended solids, hydrocarbons and metals are 0.50, 0.50 and 0.60 respectively.

Additional plot and site level SuDS features would be investigated further at the detailed design/full planning application stage. A robust SuDS treatment train upstream of the attenuation basins at both site and plot level could include permeable surfaces, swales, bioretention areas and/or rain gardens as dictated by the site layout.

6.2.10 Adoption and Maintenance of SuDS

The pipe network and attenuation basin, designed in accordance with Design and Construction Guidance, may be offered for adoption by UU.

SuDS elements within the curtilage of residential dwellings would be the responsibility of the owner of the property and SuDS in open spaces may be maintained by a management company.

An indicative maintenance schedule is presented in **Table 2**.

Table 2: Maintenance Requirements

Schedule	Required action	Frequency
Attenuation Basin		
Regular maintenance	Remove litter and debris	Monthly
	Cut grass	Monthly during grow season Or as required)
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	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
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets/outlets	Annually (or as required)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every two years, or as required
	Remove sediments from inlets/outlets and main basin when required	
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	
	Repair/rehabilitation of inlets/outlets	
	Relevel uneven surface and reinstate design levels	
Permeable Paving		
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations.

Schedule	Required action	Frequency
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosphate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth- if required, take remedial action	Three-monthly, 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies accumulation rates and establish appropriate removal frequencies	Annually
	Monitor inspection chambers	
Rain Gardens / Bioretention Areas		
Regular maintenance	Remove sediments, litter, surface debris and weeds	Quarterly
	Replace any plants, to maintain planting density.	As required
Occasional maintenance	Infill any holes or scour in the filter, improve erosion protection if required	
Remedial actions	Remove and replace filter and vegetation above	As required but likely to be > 20 years
Swales		
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by returfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	
Flow Control Unit		
	Remove litter and debris and inspect for sediment accumulation	Six Monthly

Schedule	Required action	Frequency
Routine maintenance	Remove sediment from sump	As necessary – Indicated by system inspections
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six Monthly
	Inspect flow control unit and establish appropriate replacement frequencies	Six Monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first year of operation, then every six months

7 SUMMARY AND RECOMMENDATIONS

This report has been prepared on behalf of Hallam Land Management Ltd and relates to the proposed development of land at Home Farm Road, Knowsley for residential use.

The EA FMfP (Flood Zones 2 and 3) indicates the site to be located in flood zone 1.

An assessment of flood risk from all identified potential sources of flooding has been undertaken using best available information. The site is assessed to be at risk of flooding from surface water and groundwater and at a negligible/low risk of flooding from all other identified sources.

The risk of flooding to the proposed development will be mitigated through the implementation of the following measures, which have been incorporated within the design of the Concept Masterplan:

- FFLs to be set at least 0.15 m above adjacent ground levels following any reprofiling of the site, with ground levels sloping down from the dwellings.
- Localised low spots within the site topography where ponding of pluvial surface water is indicated to be retained within proposed landscaped areas. Where this is not feasible the site is to be reprofiled accordingly to remove such depressions, thus eliminating any significant risk of surface water flooding in these areas.
- Existing surface water overland flow paths originating off-site to be managed through the design of the site.

The proposals would not be expected to have an adverse impact on flood risk elsewhere.

Recognising that there is a localised risk of flooding from surface water, groundwater and reservoirs at the site, planning policy requires that the flood risk sequential test is applied. However, the site is identified as 'Safeguarded Land' for residential use within the Knowsley Local Plan Core Strategy (Site Ref. KGBS 6 - Land at Knowsley Village). The suitability of the site for development is therefore considered to have been established, by virtue of its current Safeguarded Land designation (to meet longer term needs beyond 2028) in the adopted Local Plan.

All other existing undeveloped allocations are required to meet the development needs identified for the adopted plan period, with undefined/non-allocated urban sites alone not considered sufficient to meet the Council's housing requirements towards the end/beyond the plan period. Furthermore, there is limited prospect of non-allocated Green Belt sites across the Borough being granted planning permission before 2028. The northern part of the Safeguarded Land is not sequentially preferable in respect of flood risk.

It is subsequently concluded that there are no sequentially preferable sites at a lower risk of flooding, that are available and suitable. The site is therefore considered to be compliant with the sequential approach to site selection as set out in the NPPF.

The Exception Test need not be applied for More Vulnerable development within flood zone 1.

UU has advised that there is existing capacity in the local foul sewerage network to receive and treat domestic foul water from the proposed development and that foul water can discharge without restriction into the 900 mm diameter combined sewer Knowsley Lane North.

The assessment presents a preliminary scheme for the management of surface water from the proposed development. A summary of the principal findings is provided below:

- The site currently comprises multiple parcels of arable agricultural land. As such, no formal drainage is expected to be present.
- It is proposed to direct all runoff to the existing pipe under Knowsley Lane to the north-west of the site, which flows into an existing drainage ditch within the wooded area to the west of the site referred to as Aker's Pit, which then discharges to an ordinary watercourse and ultimately Croxteth Brook.
- It is proposed to restrict surface water runoff to the 50% AEP greenfield runoff rate. Calculated using FEH22 rainfall data and ReFH2 modelling software, and based on a contributing area of 8.9 ha, the proposed discharge rate equates to 60.3 l/s.

- The use of attenuation basins would provide water quality treatment measures. The potential for additional SuDS features, should be investigated further at the detailed design stage
- The pipe network and attenuation basin, designed in accordance with Design and Construction Guidance, may be offered for adoption by UU.

In conclusion, this report demonstrates that the proposed development may be completed in accordance with the requirements of planning policy.

APPENDIX A

Illustrative Framework Plan

SUGAR LANE

PARKLANDS

FOUNTAIN RD

BERRY HILL AVENUE

LDER LANE

B5194

LONGBOROUGH ROAD

RIDING HILL ROAD

BERRY HILL AVENUE

HOME FARM ROAD

25m

Revision Note Date Drn

- Application Boundary
- Existing Pedestrian Route Though Ross Close Playing Field
- Existing Public Right Of Way
- Existing Bus Stops
- Proposed Vehicle Access Point
- Indicative Active Travel Access Points
- Indicative Active Travel/ Emergency Access Point
- Indicative Bus Route including shared pedestrian/cycle route
- Shared Pedestrian/Cycle Route
- Shared Leisure Route
- Indicative Informal Routes
- Existing Trees & Vegetation
- Indicative Proposed Trees
- Proposed new hedge along Knowlsey Lane
- Public Open Space
- Indicative NEAP (play area)
- Indicative Kick About Space
- Indicative Community Orchard
- Key Marker Buildings

Drawing Title
Illustrative Framework Plan

Project
Land East of Knowsley Lane, Knowsley

Date	Scale	Drawn by	Approved by
01/08/2025	1:1500@A1	EF	JSB

Project No	Drawing No	Revision
333102382	0112	

Client
Hallam Land

Stantec

Stantec UK Limited

100 Barbirolli Square
Manchester
M2 3PW
T: 0161 245 8900

stantec.com\uk

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APPENDIX B

Drainage Survey, Invek Surveys, April 2025



N

Legend/Notes:

- Combined Sewer
- Foul Sewer
- SW Sewer
- Assumed Sewer (Not Proven)
- Rising Main
- Highway Drainage
- Culvert Sewer
- Open Water Course
- Overflow Line
- Treated Line
- RDP Rain Water Down Pipe
- FDP Foul Down Pipe
- CDP Combined Down Pipe
- GDP Grey Water Down Pipe
- Highway Gully
- Septic Tanks
- Direction of overland flows
- Line Trace Points

Survey Notes

Disclaimer:-

Please note that all levels shown on the drawings and associated manhole survey cards / survey data are in accordance with the model contract document for manhole surveys.
Cover levels are taken with a Leica CS10 GPS unit, and not from local site control points.
Survey data is for modeling purposes and should be checked prior to using for any construction purposes.

BUILDER'S PROFILE

CHAS Accredited Contractor CHAS.co.uk

INVEK SURVEYS LTD.
Warrington Business Park, Long Lane, Warrington, Cheshire, WA2 8TX
Tel: 01925 244376 Fax: 01925 241517
Email: kevin@invek.com – www.invek.com

Client
Weetwood

Drawing Title
Home Farm Road, Knowsley
Drainage Layout

Scale(s)	N.T.S	Drawn	PW
Date	15.04.25	Checked	RD
Job Number	2370	Approved	KN

Sheet Size, Drawing Number & Revision
A1_2370/01_Rev_00

APPENDIX C

Topographical Survey



Members of
THE SURVEY ASSOCIATION

Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
DPC	Damp proof coarsing level
Earth/ER	Earthing rod
ELEC	Electric cover
EP	Electricity pole
Fence I/R	Iron railing fence
Fence C/B	Closeboard fence
Fence C/P&P	Concrete post & panel fence
Fence Pa	Palisade fence
Fence P/W	Post and wire fence
Fence P/R	Post and rail fence
Fence P/P	Post and panel fence
FFL	Finished floor level
F/B	Flower bed
FH	Fire Hydrant
G	Gulley
GAS	Gas cover
IC	Inspection chamber
IL	Invert level
INV	Invert level
LP	Lamp post
LT	Light
MH	Manhole
Nynex	Telecommunications cover
OSBM	Ordnance Survey Bench Mark
PTM	Parking ticket machine
RE	Rodding eye
RS	Road sign
R/t wall	Retaining wall
SBX	Switch box
SP	Sign post
SPS	Safety playing surface
ST	Stop tap
SV	Service valve
TBM	Temporary Bench Mark
TP	Telegraph pole
TRP	Trial pit
TRL	Traffic light
W	Water cover
WL	Water level
WO	Wash out

SURVEY STATIONS

Name	Easting	Northing	Height
J1	343755.224	394867.077	32.551
J2	343668.355	394866.246	31.562
J3	343591.548	394864.569	30.541
J4	343540.084	394862.990	29.640
J5	343483.528	394861.016	28.632
J6	343401.460	394859.314	27.432
J7	343364.643	394858.228	26.849
J8	343340.434	394853.339	26.562
J9	343269.209	394848.987	25.981
J9A	343269.980	394985.680	25.701
J10	343279.803	394800.276	26.259
J11	343286.145	394700.439	26.909
J12	343293.262	394588.230	26.868
J13	343299.268	394487.623	26.477
J13A	343304.895	394400.275	26.522
J14	343307.353	394285.536	26.952
P1	343712.820	394753.602	32.637
P2	343592.822	394696.663	29.236
P3	343465.467	394742.886	27.587
P4	343474.337	394586.973	27.978
P4A	343587.863	394601.339	28.710
P4B	343613.483	394606.717	28.857
P4C	343621.118	394616.918	28.670
P4D	343609.150	394640.297	28.516
P4E	343629.126	394644.486	30.004
P4F	343651.812	394596.635	29.993
P5	343593.933	394497.464	29.378
P5A	343810.326	394531.288	32.798
P5B	343819.861	394532.842	33.769
P6	343723.515	394421.016	32.305
P7	343847.625	394489.921	34.357
P8	343928.029	394535.616	36.339
P9	343918.686	394654.577	35.624
P10	343902.814	394768.417	35.402
P11	343853.963	394862.898	34.299
P11A	343919.761	395002.353	36.533
P11B	344024.954	395090.519	41.273
P11C	343905.692	395136.149	40.056
P11D	343890.207	395126.263	38.705
P12	343817.517	394981.290	33.935
P13	343750.754	395152.300	35.044
P13A	343835.743	395155.725	37.978
P14	343920.045	395181.025	41.163
P15	343989.997	395211.595	43.151
P16	344031.984	395214.641	43.329
P16A	344046.711	395183.462	43.152
P16B	344016.630	395146.052	42.790
P16C	343962.118	395129.517	40.513
P17	344071.653	395230.771	43.183
P18	344119.754	395234.951	43.152
P19	344127.754	395246.425	43.052
P20	344106.761	395345.851	42.602
P21	344167.377	395140.782	43.514
S1	343804.257	394546.868	32.115
S2	343794.736	394561.925	31.941

KEY DIMENSIONS SHOULD BE CHECKED ON SITE
BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid and Levels related to OS
using active GPS data network

Amendments

	Date	Surveyor	Description of work

Powers&Tiltman Ltd
Land Surveyors

Meridian House
58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powerstiltman.co.uk
www.powerstiltman.co.uk

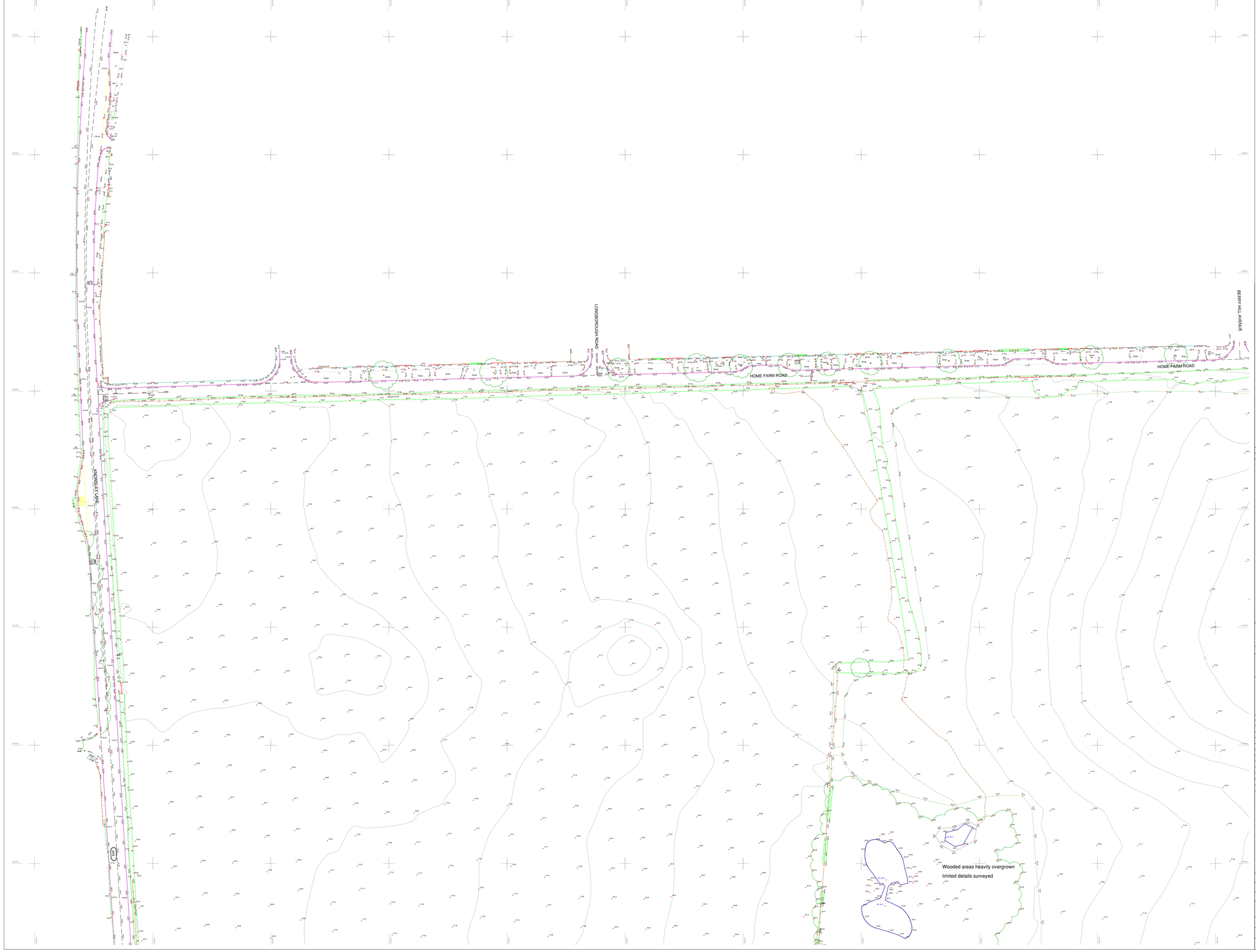
Land Off Home Farm Road

Knowsley

Topographical Survey

Client : Hallam Land Management

Surveyed By : PD/RM	Date : October 2017	A0 @
Drawn By : PD	Drawing No : 7935/01	1:500
Checked By : RM	Amendment :	Sheet 1 of 5



Members of

Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
DPC	Damp proof coarsing level
Earth ER	Earthing rod
ELEC	Electric cover
EP	Electricity pole
Fence LR	Lattice railing fence
Fence O/B	Closeboard fence
Fence C/P&P	Concrete post & panel fence
Fence Pa	Palisade fence
Fence P/W	Post and wire fence
Fence P/R	Post and rail fence
Fence P/P	Post and panel fence
FFL	Finished floor level
FJB	Flower bed
FH	Fire Hydrant
G	Gulley
GAS	Gas cover
IC	Inspection chamber
IL	Invert level
INV	Invert level
LP	Lamp post
LT	Light
MH	Manhole
Nynex	Telecommunications cover
OSBM	Ordnance Survey Bench Mark
PTM	Parking ticket machine
RE	Rodding eye
RS	Road sign
Rt wall	Retaining wall
SBX	Switch box
SP	Sign post
SPS	Safety playing surface
ST	Stop tap
SV	Service valve
TBM	Temporary Bench Mark
TP	Telegraph pole
TRP	Trial pit
TRL	Traffic light
W	Water cover
WL	Water level
WO	Wash out

SURVEY STATIONS

Name	Easting	Northing	Height
J1	343703.224	394807.077	32.551
J2	343840.335	394956.246	31.542
J3	343551.548	394844.589	33.541
J4	343551.548	394844.589	33.541
J5	343469.528	394851.516	34.632
J6	343421.460	394859.314	37.432
J7	343364.643	394858.238	36.644
J8	343345.424	394853.339	35.582
J9	343328.889	394849.680	34.710
J9A	343308.989	394855.685	35.731
J10	343279.800	394850.276	35.339
J11	343261.145	394750.439	35.926
J12	343240.262	394598.235	35.849
J13	343234.888	394598.235	35.849
J14	343234.888	394455.275	35.532
J15	343307.353	394260.536	35.602
J16	343312.820	394260.536	35.602
P1	343312.820	394304.662	37.597
P2	343440.467	394742.886	37.597
P4	343413.227	394938.373	37.619
P4A	343367.883	394601.339	39.713
P4B	343361.118	394601.339	39.713
P4C	343321.118	394618.918	39.616
P4D	343609.150	394642.297	39.516
P4E	343629.126	394644.486	39.504
P4F	343651.812	394646.635	39.985
P5	343651.812	394646.635	39.985
P5A	343615.209	394531.006	33.736
P5B	343519.867	394532.642	33.785
P6	343722.515	394421.516	32.245
P7	343647.925	394468.821	34.297
P8	343619.686	394454.577	33.924
P9	343619.686	394454.577	33.924
P10	343652.814	394768.417	35.482
P11	343652.814	394768.417	35.482
P11A	343614.761	395002.683	36.535
P11B	344024.854	395090.519	41.073
P11C	343953.692	395136.146	39.556
P11D	343690.207	395136.263	36.705
P11E	343690.207	395136.263	36.705
P12	343756.754	395152.330	35.594
P12A	343635.743	395155.725	37.978
P13	343623.045	395161.055	41.145
P14	343666.987	395211.595	43.191
P15	343666.987	395211.595	43.191
P16	344648.711	395169.442	43.152
P16B	344516.839	395146.052	42.790
P16C	344516.839	395146.052	42.790
P17	344511.628	395228.711	43.145
P18	344119.754	395234.901	43.152
P19	344127.744	395246.425	43.552
P20	344136.761	395345.851	42.602
P21	344136.761	395345.851	42.602
S1	343664.227	394544.068	32.115
S2	343794.736	394581.605	31.941

KEY DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid and Levels related to OS using active GPS data network

Amendments

	Date	Surveyor	Description of work

Powers & Tiltman Ltd
Land Surveyors

Meridian House
58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powerstiltman.co.uk
www.powerstiltman.co.uk

Land Off Home Farm Road

Knowsley

Topographical Survey

Client : Hallam Land Management

Surveyed By : PD/RM	Date : October 2017	A0 @ 1:500
Drawn By : PD	Drawing No : 7935/02	Sheet 2 of 5
Checked By : RM	Amendment :	



Members of

Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
DPC	Damp proof coarsing level
Earth/ER	Earthing rod
ELEC	Electric cover
EP	Electricity pole
Fence LR	Leylandii hedge
Fence O/B	Close boarded fence
Fence C/P&P	Concrete post & panel fence
Fence Pa	Palisade fence
Fence P/W	Post and wire fence
Fence P/R	Post and rail fence
Fence P/P	Post and panel fence
FFL	Finished floor level
F/B	Flower bed
FH	Fire Hydrant
G	Gulley
GAS	Gas cover
IC	Inspection chamber
IL	Invert level
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LP	Lamp post
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Nynex	Telecommunications cover
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PTM	Parking ticket machine
RE	Rodding eye
RS	Road sign
Rt wall	Retaining wall
SBX	Switch box
SP	Sign post
SPS	Safety playing surface
ST	Stop tap
SV	Service valve
TBM	Temporary Bench Mark
TP	Telegraph pole
TRP	Trial pit
TRL	Traffic light
W	Water cover
WL	Water level
WO	Wash out

SURVEY STATIONS

Name	Easting	Northing	Height
J1	343735.224	394667.077	32.521
J2	343677.328	394664.146	31.582
J3	343541.528	394664.166	30.541
J4	343540.994	394662.980	29.640
J5	343462.528	394661.216	28.432
J6	343421.460	394659.214	27.402
J7	343421.460	394659.214	27.402
J8	343344.434	394653.228	26.592
J9	343269.056	394648.987	25.981
J9A	343269.985	394665.680	25.731
J10	343379.803	394660.276	26.259
J11	343379.803	394660.276	26.259
J12	343393.092	394598.235	26.958
J13	343269.268	394467.633	26.477
J14	343531.655	394467.633	26.477
J15	343707.855	394550.016	29.642
J16	343707.855	394550.460	29.697
P1	343582.820	394468.643	29.236
P2	343405.467	394742.886	27.987
P3	343547.983	394742.886	27.987
P4A	343581.963	394661.338	28.719
P4B	343613.460	394658.717	28.897
P4C	343621.118	394619.918	28.676
P4D	343609.150	394643.287	28.916
P4E	343609.150	394643.287	28.916
P4F	343651.612	394598.635	29.092
P5	343593.933	394467.484	29.378
P5A	343613.328	394531.288	32.736
P5B	343619.991	394532.842	33.199
P6	343619.991	394532.842	33.199
P7	343647.625	394468.631	34.257
P8	343628.029	394535.616	36.539
P9	343628.029	394535.616	36.539
P10	343662.414	394766.417	30.400
P11	343653.963	394662.898	34.096
P11A	343615.761	395552.293	36.532
P11B	343624.954	395560.516	41.272
P11C	343624.954	395560.516	41.272
P11D	343666.207	395129.283	39.706
P12	343617.517	394981.286	33.685
P13	343782.794	395192.390	35.044
P13A	343635.743	395195.725	37.978
P14	343635.743	395195.725	37.978
P15	343665.997	395211.585	43.151
P16	344021.964	395214.641	43.529
P16A	344021.964	395214.641	43.529
P16B	344044.025	395146.662	42.796
P16C	343962.118	395139.917	42.513
P17	344011.653	395230.771	43.192
P18	344119.754	395234.851	43.152
P19	344119.754	395234.851	43.152
P20	344164.761	395249.661	42.692
P21	344167.077	395140.782	43.514
S1	343664.257	394546.998	32.115
S2	343764.726	394561.605	31.941

KEY DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid and Level related to OS using active GPS data network

Amendments

	Date	Surveyor	Description of work

Powers&Tiltman Ltd
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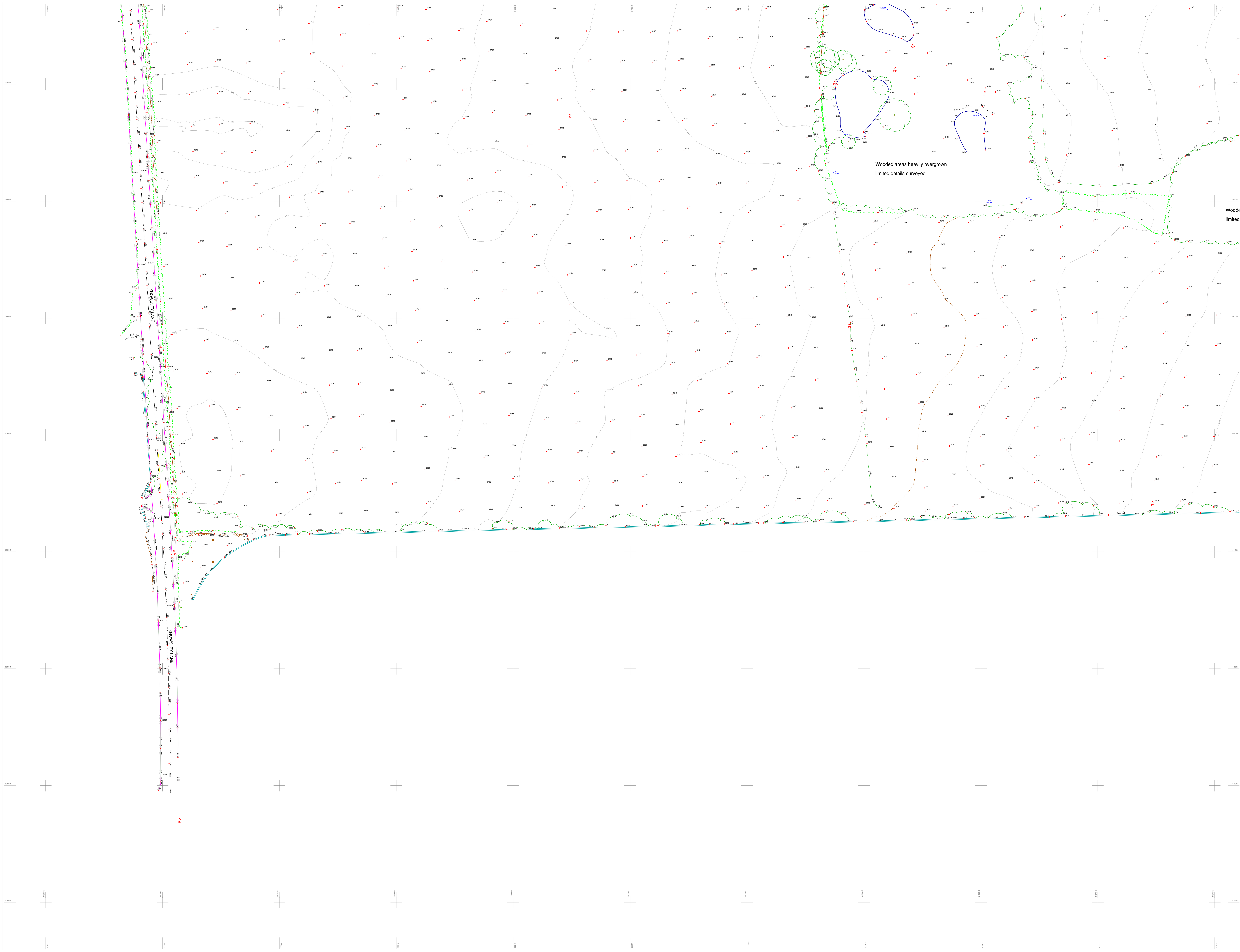
Land Off Home Farm Road

Knowsley

Topographical Survey

Client : Hallam Land Management

Surveyed By : PD/RM	Date : October 2017	A0 @ 1:500
Drawn By : PD	Drawing No : 7935/03	
Checked By : RM	Amendment :	



Members of THE SURVEY ASSOCIATION

Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
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SURVEY STATIONS

Name	Easting	Northing	Height
J1	343755.224	394867.077	32.551
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J8	343340.434	394853.339	26.562
J9	343269.209	394848.987	25.981
J9A	343269.980	394985.680	25.701
J10	343279.803	394800.276	26.259
J11	343286.145	394700.439	26.909
J12	343293.262	394588.230	26.868
J13	343299.268	394487.623	26.477
J13A	343304.895	394400.275	26.522
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P3	343465.467	394742.886	27.587
P4	343474.337	394586.973	27.978
P4A	343587.863	394601.339	28.710
P4B	343613.483	394606.717	28.857
P4C	343621.118	394616.918	28.670
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P4E	343629.126	394644.486	30.004
P4F	343651.812	394596.635	29.993
P5	343593.933	394497.464	29.378
P5A	343810.326	394531.288	32.798
P5B	343819.861	394532.842	33.769
P6	343723.515	394421.016	32.305
P7	343847.625	394489.921	34.357
P8	343928.029	394535.616	36.339
P9	343918.686	394654.577	35.624
P10	343902.814	394768.417	35.402
P11	343853.963	394862.898	34.299
P11A	343919.761	395002.353	36.533
P11B	344024.954	395090.519	41.273
P11C	343905.692	395136.149	40.056
P11D	343890.207	395126.263	38.705
P12	343817.517	394981.290	33.935
P13	343750.754	395152.300	35.044
P13A	343835.743	395155.725	37.978
P14	343920.045	395181.025	41.163
P15	343989.997	395211.595	43.151
P16	344031.984	395214.641	43.329
P16A	344046.711	395183.462	43.152
P16B	344016.630	395146.052	42.790
P16C	343962.118	395129.517	40.513
P17	344071.653	395230.771	43.183
P18	344119.754	395234.951	43.152
P19	344127.754	395246.425	43.052
P20	344106.761	395345.851	42.602
P21	344167.377	395140.782	43.514
S1	343804.257	394546.868	32.115
S2	343794.736	394561.925	31.941

KEY DIMENSIONS SHOULD BE CHECKED ON SITE
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using active GPS data network

Amendments

	Date	Surveyor	Description of work

Powers&Tiltman Ltd
Land Surveyors

Meridian House
58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powerstiltman.co.uk
www.powerstiltman.co.uk

Land Off Home Farm Road

Knowsley

Topographical Survey

Client : Hallam Land Management

Surveyed By : PD/RM	Date : October 2017	A0 @
Drawn By : PD	Drawing No : 7935/04	1:500
Checked By : RM	Amendment :	Sheet 4 of 5



Members of

Legend

AV	Air valve
BH	Borehole
BOL	Bollard
BT	British Telecom cover
CATV	Cable television cover
CL	Cover level
DPC	Damp proof coarsing level
Earth/ER	Earthing rail
ELEC	Electric cover
EP	Electricity pole
Fence L/R	Hedge/tree line
Fence C/B	Close board fence
Fence C/P&P	Concrete post & panel fence
Fence Pa	Palisade fence
Fence P/W	Post and wire fence
Fence P/R	Post and rail fence
Fence P/P	Post and panel fence
FFL	Finished floor level
FJB	Flower bed
FH	Fire Hydrant
G	Gulley
GAS	Gas cover
IC	Inspection chamber
IL	Invert level
INV	Invert level
LP	Lamp post
LT	Light
MH	Manhole
Nynex	Telecommunications cover
OSBM	Ordnance Survey Bench Mark
PTM	Parking ticket machine
RE	Rodding eye
RS	Road sign
Rt wall	Retaining wall
SBX	Switch box
SP	Sign post
SPS	Safety playing surface
ST	Stop tap
SV	Service valve
TBM	Temporary Bench Mark
TP	Telegraph pole
TRP	Trial pit
TRL	Traffic light
W	Water cover
WL	Water level
WO	Wash out

SURVEY STATIONS

Name	Easting	Northing	Height
J1	343756.224	394657.677	32.551
J2	343648.355	394666.246	31.582
J3	343551.548	394564.549	30.541
J4	343434.084	394662.898	29.646
J5	343347.988	394653.214	28.642
J6	343421.468	394859.214	27.422
J7	343304.843	394858.228	26.646
J8	343343.424	394953.599	26.540
J9	343398.899	394948.981	25.870
J10A	343324.209	394948.980	25.761
J10	343375.600	394953.276	26.230
J11	343288.145	394750.439	26.889
J12	343284.268	394647.433	26.417
J13	343284.268	394457.433	26.417
J13A	343304.895	394450.275	26.522
J14	343357.053	394350.536	26.830
P1	343712.823	394753.693	32.607
P2	343648.407	394753.693	31.582
P3	343468.467	394742.886	27.597
Pa	343474.337	394566.973	27.978
Pa5	343567.883	394451.339	28.716
P4B	343613.483	394636.717	29.497
P4C	343613.483	394636.717	29.497
P4D	343626.155	394646.237	28.516
P4E	343629.126	394644.486	30.004
P4F	343631.826	394644.486	30.004
P4	343543.633	394497.464	28.236
P5a	343613.335	394531.288	32.796
P5B	343613.661	394532.642	33.790
P5	343725.515	394421.016	32.955
P6	343626.528	394532.616	36.036
P6	343626.528	394532.616	36.036
P6	343516.696	394634.577	35.624
P10	343622.914	394768.417	35.430
P11	343652.963	394662.898	34.299
P11A	343652.963	394662.898	34.299
P11B	344024.854	395068.516	41.272
P11C	343993.892	395136.149	40.556
P11D	343993.892	395136.149	39.556
P12	343972.227	394951.260	33.418
P13	344045.754	394951.260	33.944
P13A	343825.745	395150.735	37.976
P14	343825.045	395181.025	41.183
P15	344024.984	395214.441	42.528
P16	344031.984	395214.441	43.028
P16A	344046.711	395183.482	43.152
P16B	344046.638	395146.052	42.795
P16C	343962.118	395139.017	42.672
P17	344013.754	395224.441	43.152
P18	344118.754	395224.441	43.152
P19	344127.754	395240.425	43.092
P20	344159.761	395345.451	43.630
P21	344167.277	395140.782	43.614
P22	344167.277	395140.782	43.614
S2	343784.796	394951.025	31.941

KEY DIMENSIONS SHOULD BE CHECKED ON SITE BEFORE COMMENCEMENT OF ANY WORKS

NOTE

Grid and Level related to OS using active GPS data network

Amendments

	Date	Surveyor	Description of work

Powers & Tiltman Ltd
Land Surveyors

Meridian House
58/60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473 Fax: 01928 735573
Email: mail@powerstiltman.co.uk
www.powerstiltman.co.uk

Land Off Home Farm Road

Knowsley

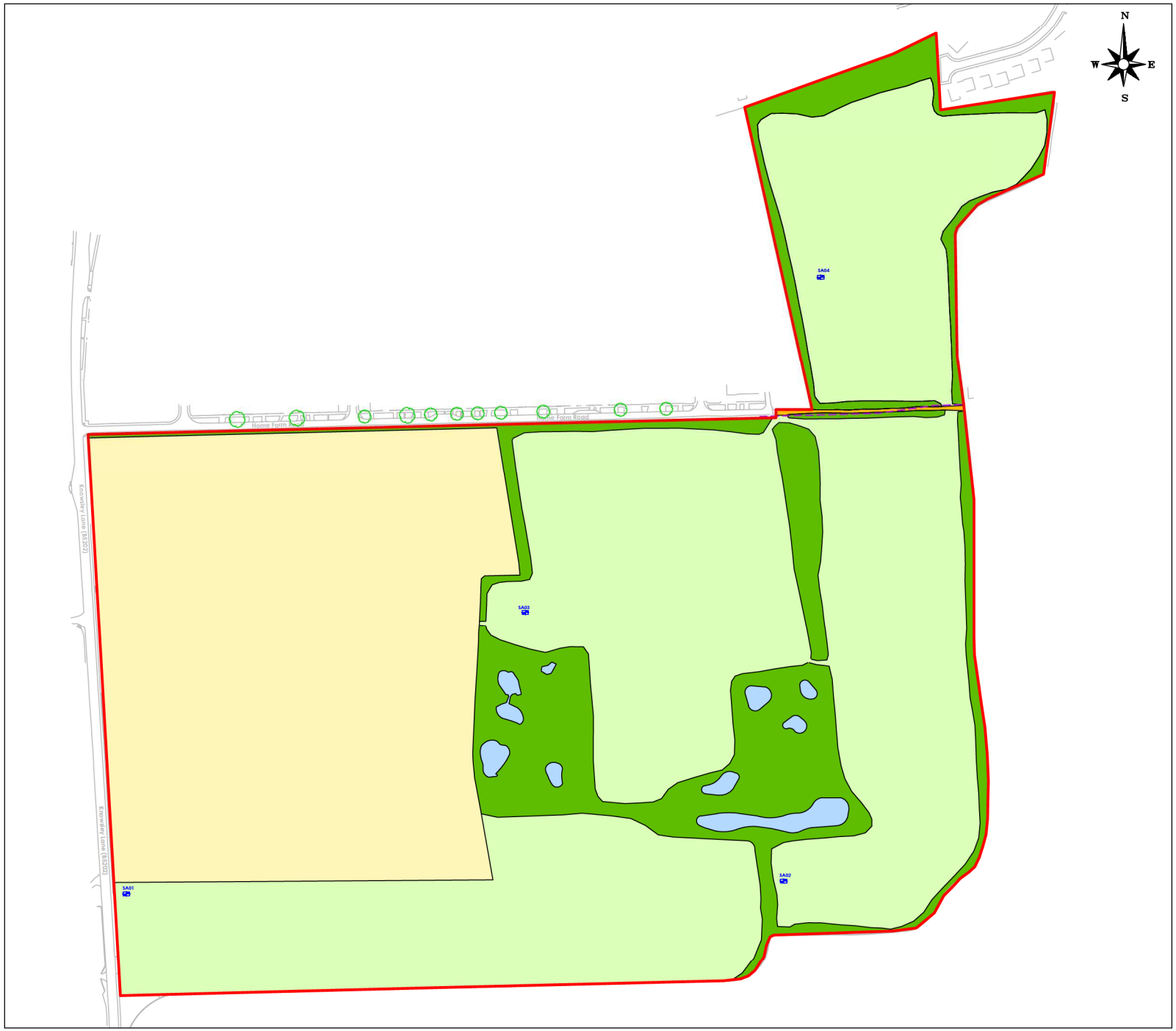
Topographical Survey

Client : Hallam Land Management

Surveyed By :PD/RM	Date : October 2017	A0 @
Drawn By : PD	Drawing No : 7935/05	1:500
Checked By : RM	Amendment :	Sheet 5 of 5

APPENDIX D

Soakaway Testing Records, Lithos, April 2025



NOTES

SOAKAWAY PIT LOCATION

APPROXIMATE SITE BOUNDARY

EXPLORATORY HOLE LOCATIONS BASED ON DATA FROM A HAND-HELD GPS (+/- 3M ACCURACY)

REV.	DESCRIPTION	DATE

LITHOS CONSULTING

info@lithos.co.uk
www.lithos.co.uk

Tel 01937 545330

CLIENT

HALLAM LAND MANAGEMENT LTD

JOB TITLE

HOME FARM ROAD, KNOWSLEY

DRAWING TITLE

EXPLORATORY HOLE LOCATIONS

DRAWN	DATE	STATUS
WN	17 04 2025	FOR COMMENT ☐
CHECKED	DATE	FOR APPROVAL ☐
REG	17 04 2025	DRAFT ☐
		FINAL ☑

SCALE	SHEET	DRAWING NO.	REVISION
1:3000	A3	4405/6	

LITHOS CONSULTING

Trial Pit Log

Trialpit No
SA01
Sheet 1 of 1

Project Name: Home Farm Road	Project No. 4405	Co-ords: 343311.00 - 394486.00 Level:	Date 16/04/2025
Location: Knowsley		Dimensions (m): 1.5 × 0.6, Depth 2.20	Scale 1:20
Client: Hallam Land Management Ltd			Logged WN

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mixed lithology. (TOPSOIL)
				0.30			Dark grey sandy CLAY. (COHESIVE GLACIAL DEPOSITS)
				1.10			Light grey slightly clayey fine to medium SAND. (GRANULAR GLACIAL DEPOSITS)
							Soakaway testing undertaken.
				2.20			End of pit at 2.20 m

1
2
3
4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Trial pit dug using a JCB 3CX excavator. 3. Groundwater was not apparent during excavation. 4. Backfilled with materials arising upon completion. 5. Co-ordinates from hand held GPS, hole not surveyed in.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 1991

Client:	Hallam Land
Engineer	Will Newton
Job Name:	Home Farm Road, Knowsley
Job No.:	4405

Date:	**16/04/2025**
Trial Pit No.	**SA01**
Test No.	**1**

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
09:49	0	1.09	1090
09:50	1	1.08	1080
09:51	2	1.08	1080
09:52	3	1.09	1090
09:53	4	1.09	1090
09:54	5	1.10	1100
09:59	10	1.10	1100
10:09	20	1.10	1100
10:19	30	1.10	1100
10:49	60	1.10	1100
11:49	120	1.11	1110
12:49	180	1.12	1120
13:19	210	1.12	1120

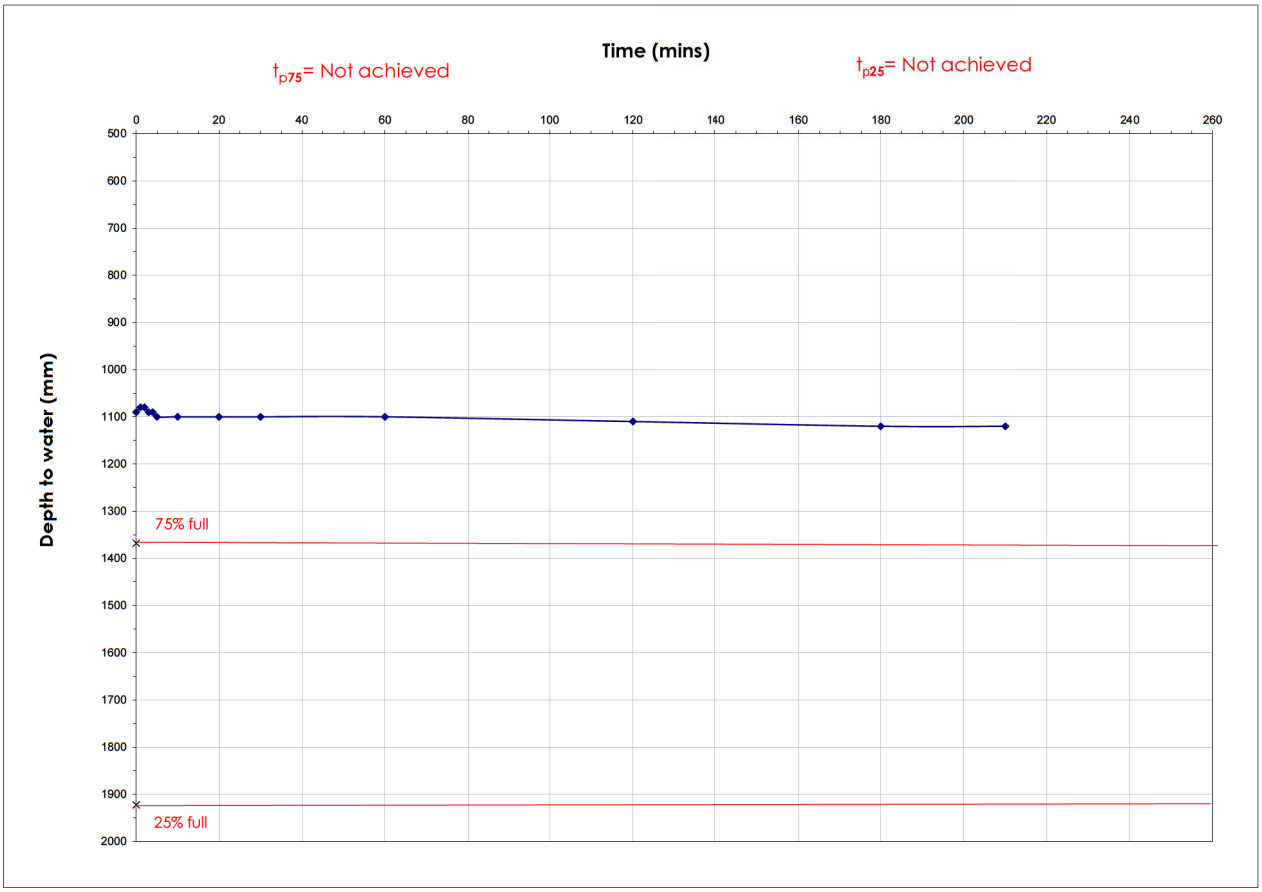
SOAKAWAY TRIAL PIT			
Dimensions		**(m)**	**(mm)**
Length	=	1.50	1500
Width	=	0.60	600
Depth	=	2.20	2200

Effective Depth (% full)		**(mm)**	**(m)**
0.25	=	1922.5	1.92
0.50	=	1645	1.65
0.75	=	1367.5	1.37

Depth at start of test (mm)	=	1090
Depth at end of test (mm)	=	1120

Base area of pit	=	0.9
a_{p50} - 50% internal surface area inc. base	=	3.231
V_{p75-25} - Volume 75 - 25%	=	0.4995

Read from the graph:		
$t_{p\ 75}$ (min)	=	n/a
$t_{p\ 25}$ (min)	=	n/a



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

LITHOS CONSULTING

Trial Pit Log

Trialpit No
SA02
Sheet 1 of 1

Project Name: Home Farm Road	Project No. 4405	Co-ords: 343825.00 - 394496.00 Level:	Date 16/04/2025
Location: Knowsley		Dimensions (m): 1.5 × 0.6, Depth 1.80	Scale 1:20
Client: Hallam Land Management Ltd			Logged WN

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mixed lithology. (TOPSOIL)
				0.30			Stiff dark brown and reddish brown slightly sandy CLAY. (COHESIVE GLACIAL DEPOSITS)
							Soakaway testing undertaken.
				1.80			End of pit at 1.80 m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Trial pit dug using a JCB 3CX excavator. 3. Groundwater was not apparent during excavation. 4. Backfilled with materials arising upon completion. 5. Co-ordinates from hand held GPS, hole not surveyed in.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 1991

Client:	Hallam Land
Engineer	Will Newton
Job Name:	Home Farm Road, Knowsley
Job No.:	4405

Date:	16/04/2025
Trial Pit No.	SA02
Test No.	1

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
10:36	0	0.73	730
10:37	1	0.74	740
10:38	2	0.74	740
10:39	3	0.74	740
10:40	4	0.74	740
10:41	5	0.74	740
10:46	10	0.74	740
10:56	20	0.74	740
11:06	30	0.74	740
11:36	60	0.75	750
12:36	120	0.75	750
13:36	180	0.75	750

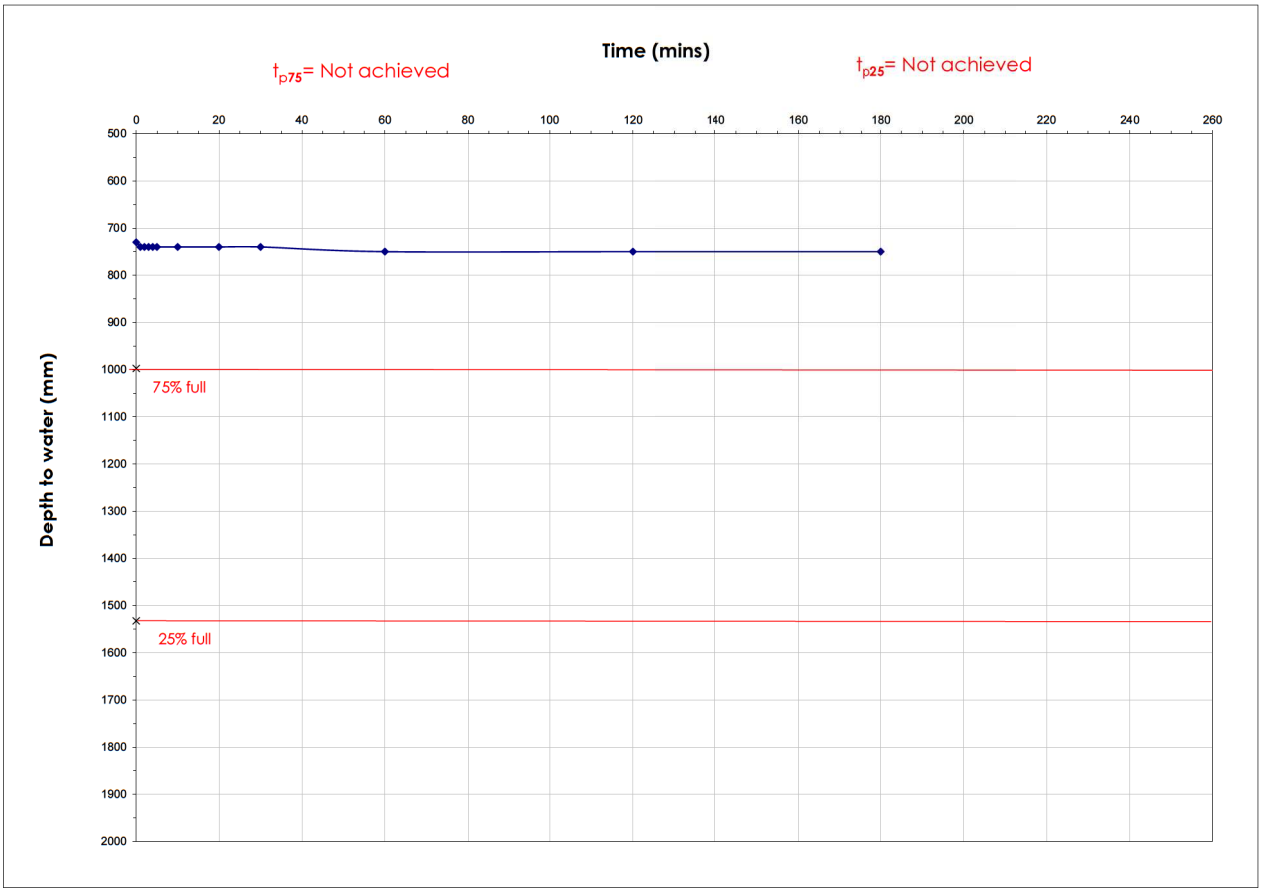
SOAKAWAY TRIAL PIT			
Dimensions		**(m)**	**(mm)**
Length	=	1.50	1500
Width	=	0.60	600
Depth	=	1.80	1800

Effective Depth (% full)		**(mm)**	**(m)**
0.25	=	1532.5	1.53
0.50	=	1265	1.27
0.75	=	997.5	1.00

Depth at start of test (mm)	=	730
Depth at end of test (mm)	=	750

Base area of pit	=	0.9
a_{p50} - 50% internal surface area inc. base	=	3.147
V_{p75-25} - Volume 75 - 25%	=	0.4815

Read from the graph:		
$t_{p\,75}$ (min)	=	n/a
$t_{p\,25}$ (min)	=	n/a



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

LITHOS CONSULTING

Trial Pit Log

Trialpit No
SA03
Sheet 1 of 1

Project Name: Home Farm Road	Project No. 4405	Co-ords: 343623.00 - 394706.00 Level:	Date 16/04/2025
Location: Knowsley		Dimensions (m): 1.5 × 0.6 Depth 1.80	Scale 1:20
Client: Hallam Land Management Ltd			Logged WN

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mixed lithology. (TOPSOIL)
				0.30			Stiff dark reddish brown slightly sandy CLAY. (COHESIVE GLACIAL DEPOSITS)
							Soakaway testing undertaken.
				1.80			End of pit at 1.80 m

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Trial pit dug using a JCB 3CX excavator. 3. Groundwater was not apparent during excavation. 4. Backfilled with materials arising upon completion. 5. Co-ordinates from hand held GPS, hole not surveyed in.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 1991

Client:	Hallam Land
Engineer	Will Newton
Job Name:	Home Farm Road, Knowsley
Job No.:	4405

Date:	**16/04/2025**
Trial Pit No.	**SA03**
Test No.	**1**

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
11:10	0	0.73	730
11:11	1	0.74	740
11:12	2	0.74	740
11:13	3	0.74	740
11:14	4	0.75	750
11:15	5	0.75	750
11:20	10	0.75	750
11:30	20	0.76	760
11:40	30	0.78	780
12:10	60	0.82	820
13:10	120	0.87	870
14:10	180	0.89	890

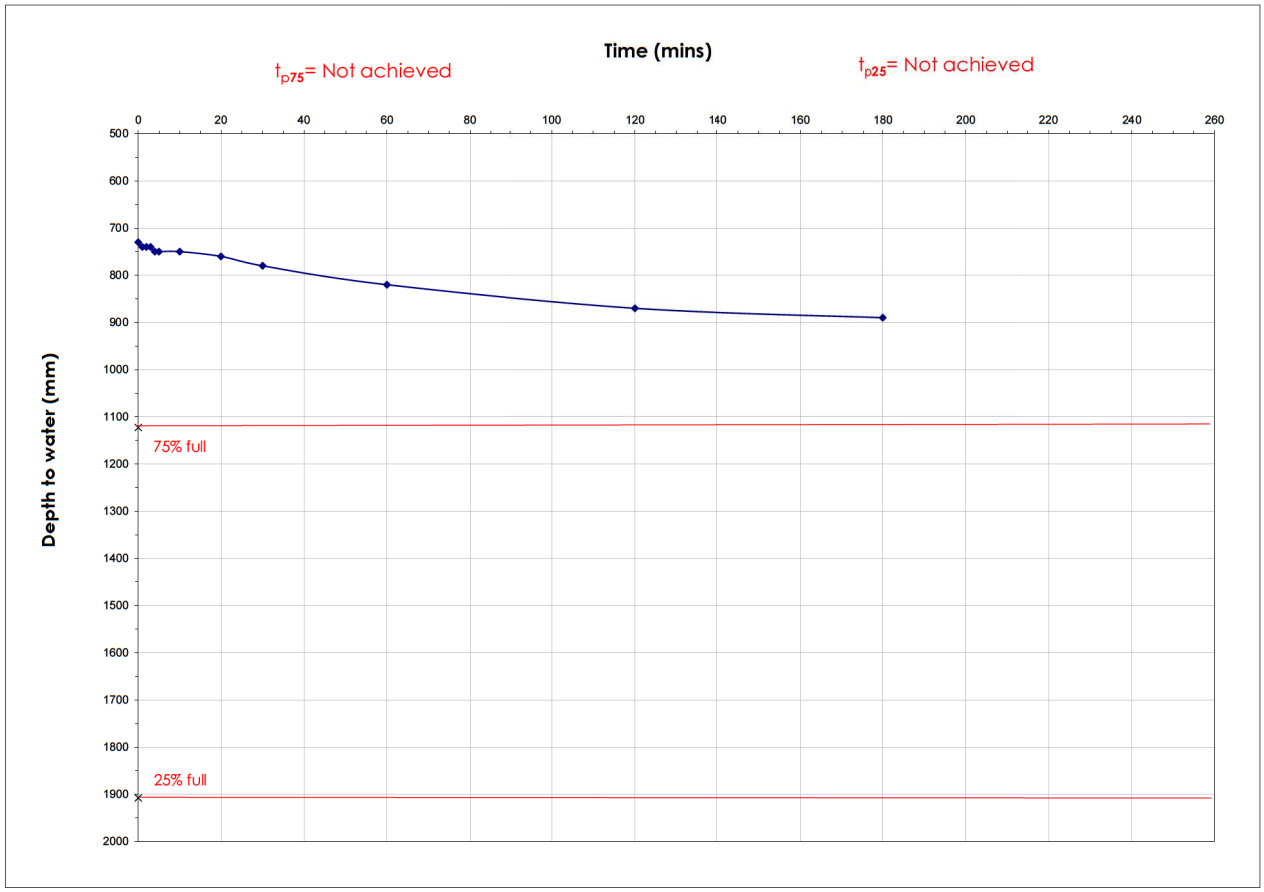
SOAKAWAY TRIAL PIT			
Dimensions		**(m)**	**(mm)**
Length	=	1.50	1500
Width	=	0.60	600
Depth	=	2.30	2300

Effective Depth (%full)		**(mm)**	**(m)**
0.25	=	1907.5	1.91
0.50	=	1515	1.52
0.75	=	1122.5	1.12

Depth at start of test (mm)	=	730
Depth at end of test (mm)	=	890

Base area of pit	=	0.9
a_{p50} - 50% internal surface area inc. base	=	4.197
V_{p75-25} - Volume 75 - 25%	=	0.7065

Read from the graph:		
$t_{p\ 75}$ (min)	=	n/a
$t_{p\ 25}$ (min)	=	n/a



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

LITHOS CONSULTING

Trial Pit Log

Trialpit No
SA04
Sheet 1 of 1

Project Name: Home Farm Road	Project No. 4405	Co-ords: 343854.00 - 394968.00 Level:	Date 16/04/2025
Location: Knowsley		Dimensions (m): 1.5 × 0.6 Depth 2.20	Scale 1:20
Client: Hallam Land Management Ltd			Logged WN

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							Dark brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded to rounded of mixed lithology. (TOPSOIL)
				0.30			Stiff dark reddish brown slightly sandy CLAY. (COHESIVE GLACIAL DEPOSITS)
							Soakaway testing undertaken.
				2.00			Light grey slightly clayey fine to medium SAND. (GRANULAR GLACIAL DEPOSITS)
				2.20			End of pit at 2.20 m

1
2
3
4

Remarks: 1. Prior to excavation a Cable Avoidance Tool (CAT) survey was carried out. 2. Trial pit dug using a JCB 3CX excavator. 3. Groundwater was not apparent during excavation. 4. Backfilled with materials arising upon completion. 5. Co-ordinates from hand held GPS, hole not surveyed in.

Stability: 1. The sides of the trial pit remained stable during excavation.

AGS

SOIL INFILTRATION RATE IN ACCORDANCE WITH BRE DIGEST 365: 1991

Client:	Hallam Land
Engineer	Will Newton
Job Name:	Home Farm Road, Knowsley
Job No.:	4405

Date:	**16/04/2025**
Trial Pit No.	**SA04**
Test No.	**1**

Time	Elapsed Time	Depth to water from ground level	
	(min)	(m)	(mm)
11:37	0	0.85	850
11:38	1	0.85	850
11:39	2	0.85	850
11:40	3	0.85	850
11:41	4	0.85	850
11:42	5	0.85	850
11:47	10	0.85	850
11:57	20	0.85	850
12:07	30	0.85	850
12:37	60	0.85	850
13:37	120	0.85	850
14:22	165	0.85	850

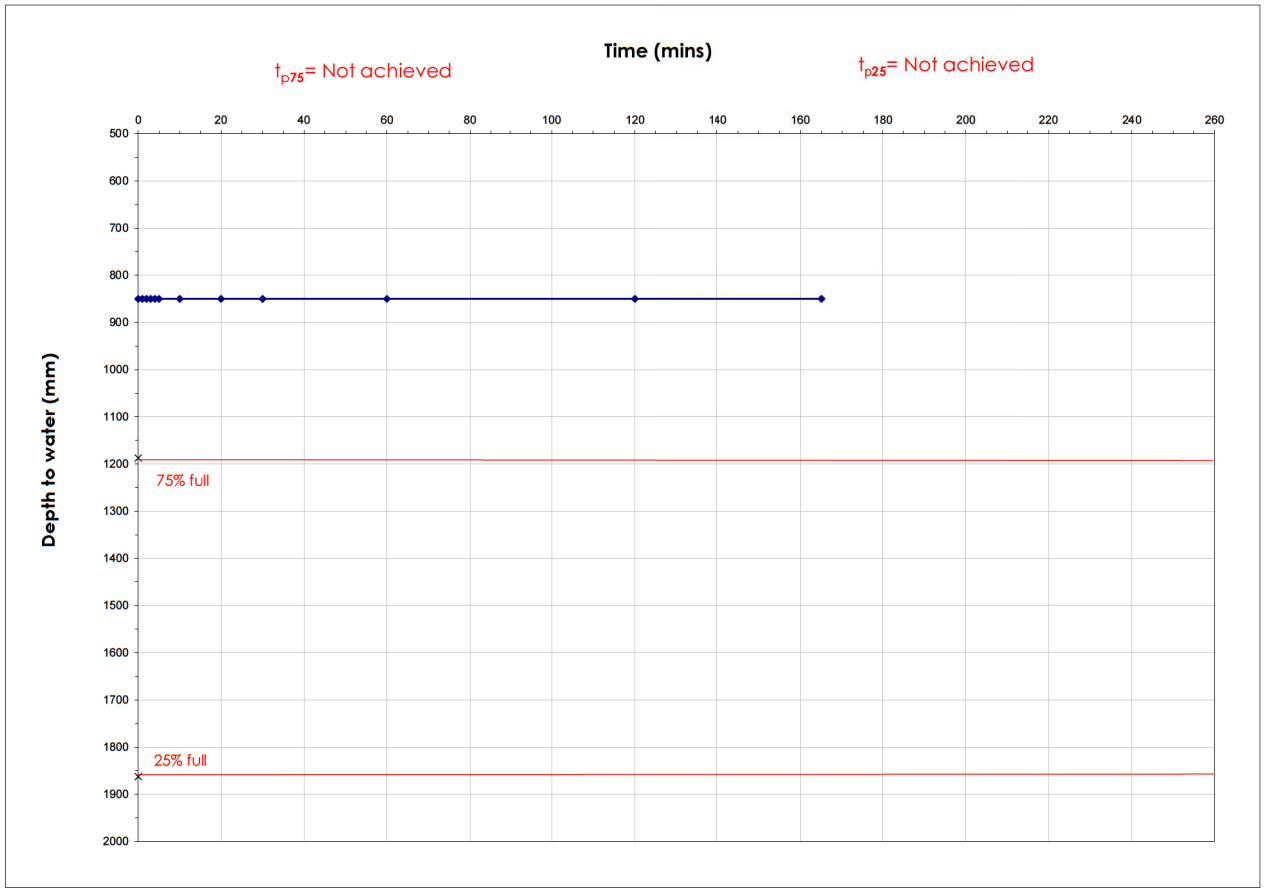
SOAKAWAY TRIAL PIT			
Dimensions		**(m)**	**(mm)**
Length	=	1.50	1500
Width	=	0.60	600
Depth	=	2.20	2200

Effective Depth (% full)		**(mm)**	**(m)**
0.25	=	1862.5	1.86
0.50	=	1525	1.53
0.75	=	1187.5	1.19

Depth at start of test (mm)	=	850
Depth at end of test (mm)	=	850

Base area of pit	=	0.9
a_{p50} - 50% internal surface area inc. base	=	3.735
V_{p75-25} - Volume 75 - 25%	=	0.6075

Read from the graph:		
$t_{p\ 75}$ (min)	=	n/a
$t_{p\ 25}$ (min)	=	n/a



Test did not attain 25% Effective depth. Unable to calculate soil infiltration rate

APPENDIX E

United Utilities Public Sewer Record



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4008		FO		150			VC	9.816648	
4008		FO		150			VC	9.816648	
4008		FO		150			VC	9.816648	
4008		FO		150			VC	9.816648	
1003		SW	0	900			CO	5.62028	
1003		SW	0	900			CO	5.62028	
4904	28.03	SW	25.41	375			VC	64.84597	1 in 540
4904	28.03	SW	25.41	375			VC	64.84597	1 in 540
4916		SW		100			VC	8.985729	
4916		SW		100			VC	8.985729	
4916		SW		100			VC	8.985729	
4916		SW		100			VC	8.985729	
1002	24.06	SW	22.5	900			CO	13.14752	
1002	24.06	SW	22.5	900			CO	13.14752	
1017	24	OV	23.1	200			CO	1.263741	
1017	24	OV	23.1	200			CO	1.263741	
5909		FO		150			VC	18.45108	
5909		FO		150			VC	18.45108	
4909		FO		150			VC	8.298813	
4909		FO		150			VC	8.298813	
4909		FO		150			VC	8.298813	
4909		FO		150			VC	8.298813	
4005	27.52	SW	24.36	825			CO	134.6588	1 in 119
4016		CO		100			VC	10.03094	
4016		CO		100			VC	10.03094	
4906		FO		150			VC	6.688992	
4906		FO		150			VC	6.688992	
4906		FO		150			VC	6.688992	
4906		FO		150			VC	6.688992	
4802	28.62	SW	27.16	225			VC	58.0517	1 in 33
4802	28.62	SW	27.16	225			VC	58.0517	1 in 33
2002	24.29	CO	22.03	300			VC	55.14001	1 in 613
2002	24.29	CO	22.03	300			VC	55.14001	1 in 613
4920		FO		150			VC	9.272546	
4920		FO		150			VC	9.272546	
2003	25.49	SW	23.19	900			CO	32.75668	
2003	25.49	SW	23.19	900			CO	32.75668	
4903	27.86	SW	25.29	375			VC	21.37756	1 in 356
4903	27.86	SW	25.29	375			VC	21.37756	1 in 356
4920		FO		150			VC	17.04774	
4920		FO		150			VC	17.04774	
4006	28.31	SW	24.91	750			CO	17.69181	1 in 161
4006	28.31	SW	24.91	750			CO	17.69181	1 in 161
4905		FO		150			VC	19.46961	
4905		FO		150			VC	19.46961	
4905		FO		150			VC	19.46961	
4905		FO		150			VC	19.46961	
2902		CO		150			VC	17.38084	
2902		CO		150			VC	17.38084	
4801	28.68	FO	27.05	225			VC	58.46367	1 in 27
4801	28.68	FO	27.05	225			VC	58.46367	1 in 27
4015		CO		150			VC	2.472956	
4015		CO		150			VC	2.472956	
5801	30.22	SW	28.58	225			VC	78.02563	1 in 55
4902	27.99	FO	24.91	225			VC	69.28925	1 in 210
4902	27.99	FO	24.91	225			VC	69.28925	1 in 210
4003	28.41	CO	24.31	225			VC	48.27007	1 in 302
4003	28.41	CO	24.31	225			VC	48.27007	1 in 302
4917		FO		100			VC	1.644285	
4917		FO		100			VC	1.644285	
4917		FO		100			VC	1.644285	
4917		FO		100			VC	1.644285	
4007	28.37	SW	25.18	750			CO	46.87217	1 in 174
4007	28.37	SW	25.18	750			CO	46.87217	1 in 174
5001	29.68	FO	26.98	225			VC	99.32271	1 in 37
5001	29.68	FO	26.98	225			VC	99.32271	1 in 37
3903	26.12	SW	24.36	300			VC	21.0238	1 in 210
3903	26.12	SW	24.36	300			VC	21.0238	1 in 210
2108		CO		100			VC	83.47771	
5002	29.72	SW	27.1	600			CO	94.42987	
5002	29.72	SW	27.1	600			CO	94.42987	
3902		SW		375			VC	43.08132	
3802	26.66	SW	25.73	225			VC	43.04649	1 in 61
3901	26.72	SW	24.86	225			VC	7.211102	
2006		SW	0	900			CO	9.433981	
2006		SW	0	900			CO	9.433981	
1011	24.15	CO	22.58	300			VC	25.08869	1 in 64
1011	24.15	CO	22.58	300			VC	25.08869	1 in 64
1001	24	CO	21.85	300			CI	0.334363	1 in 2
1001	24	CO	21.85	300			CI	0.334363	1 in 2
4001	27.61	CO	23.99	300			VC	156.7827	1 in 104
4901	27.85	FO	24.58	225			VC	39.45884	1 in 146
4901	27.85	FO	24.58	225			VC	39.45884	1 in 146
1016	24	CO	22.37	450			VC	7.444842	
1016	24	CO	22.37	450			VC	7.444842	
2008		CO		100			VC	21.33625	
2008		CO		100			VC	21.33625	
2011		CO		100			VC	16.58112	
2011		CO		100			VC	16.58112	
4019		FO		150			VC	17.18412	
4019		FO		150			VC	17.18412	
5802	29.22	FO	27.47	225			VC	45.04442	1 in 107
2001	25.42	CO	22.48	300			VC	58.91114	1 in 131
2001	25.42	CO	22.48	300			VC	58.91114	1 in 131
3801	26.56	SW	25.3	225			VC	21.0238	1 in 72
3809		FO		150			VC	5.22318	
1013	24	CO	22.17	300			CI	6.489813	1 in 20
1013	24	CO	22.17	300			CI	6.489813	1 in 20
1012	24	CO	22.19	300			VC	1.541892	1 in 77
1012	24	CO	22.19	300			VC	1.541892	1 in 77
3803	26.62	SW	25.01	225			VC	26	1 in 217
2901	26	SW	24.23	300			VC	4	
2901	26	SW	24.23	300			VC	4	
2101		SW	0	150			CO	60.37384	
3808		FO		150			VC	3.104425	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

All point assets follow the standard colour convention:
red - combined   blue - surface water
brown - foul   purple - overflow

- HS Head of System
- ES Extent of Survey
- RE Rodding Eye
- IN Inlet
- DP Discharge Point
- HY Vortex
- PE Penstock
- WO Washout Chamber
- VA Valve
- AV Air Valve
- NRV Non Return Valve
- SO Soakaway
- GU Gully
- CA Cascade
- FM Flow Meter
- HA Hatch Box
- OI Oil Interceptor
- SM Summit
- DS Drop Shaft
- OP Orifice Plate
- Manhole
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO Foul
SW Surface Water
CO Combined
OV Overflow

SEWER SHAPE

CI Circular
EG Egg
OV Oval
FT Flat Top
RE Rectangular
SQ Square
TR Trapezoidal
AR Arch
BA Barrel
HO HorseShoe
UN Unspecified

SEWER MATERIAL

AC Asbestos Cement
BR Brick
PE Polyethylene
RP Reinforced Plastic Matrix
CO Concrete
CSB Concrete Segment Bolted
CSU Concrete Segment Unbolted
CC Concrete Box Culverted
PSC Plastic / Steel Composite
GRC Glass Reinforecd Plastic
DI Ductile Iron
PVC Polyvinyl Chloride
CI Cast Iron
SI Spun Iron
ST Steel
VC Vitrified Clay
PP Polypropylene
PF Pitch Fibre
MAC Masonry, Coursed
MAR Masonry, Random
U Unspecified

Address or Site Reference:

55 HOME FARM ROAD,
KNOWSLEY,
PRESCOT,
L34 0EB

OS sheet Number: SJ4394NW
Scale: 1:1250 **Date:** 29/03/2022
Nodes: 105
Sheet: 4 of 9

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

APPENDIX F

United Utilities Pre-Planning Enquiry

WASTEWATER PRE-DEVELOPMENT ENQUIRY

United Utilities Grasmere House, 2nd Floor
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

03.06.2025

Dear **Dan,**

Pre-Development Enquiry for **Home Farm Road, Knowsley, Liverpool, L34 0EG** UU Reference Number: **07454839**

We have assessed your application based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your strategy will need review by other authorities as part of the planning process. We advise conducting necessary site investigations to confirm viability of your proposals.

Modelled Flood Risk

I can confirm that we do have modelled flood risk within the vicinity of the proposed development.

Please note that our modelling data is indicative, and only representative of the 1:100year storm event.

Please see **comment 2** of the attached guidance sheet

Asset Protection

According to our public sewer records, there are public sewers located within your site boundary. This requires an easement of 6m. If you cannot achieve the required clearance, you may wish to consider diverting and or abandoning the public sewer. Please see **comment 3** of the attached guidance sheet and **Working Near Our Pipelines Guidance document**

Foul Water

Foul flow from this site will be allowed to drain into the public foul water/combined sewer system.

Our preferred point of discharge would be to the 900mm combined public sewer within Knowsley Lane North of your proposed development at an unrestricted rate.

I note there is a foul sewer onsite, if you do wish to discharge to this sewer, we would ask that the majority is sent to the 900mm and then the rest is sent to the 225mm foul sewer on site.

Manhole reference SJ43952001, **Grid reference** 343273, 395033

Please see the images on **page 3** for clarification

WASTEWATER PRE-DEVELOPMENT ENQUIRY

Surface Water

Follow the National Planning Policy Guidance drainage hierarchy and provide evidence for discounting higher options before considering public sewer discharge. Consult the Lead Local Flood Authority regarding surface water concerns.

Please see comment **4** within the guidance sheet

Infiltration

Please see comment **4** within the guidance sheet

Thank you for discounting infiltration.

Waterbody

If an evidence-based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the **watercourses** located within close proximity of the proposed site.

We would encourage you to engage with any third-party landowner and riparian owner to agree access and discharge rights to the water body if this is not in your ownership.

Public Sewer

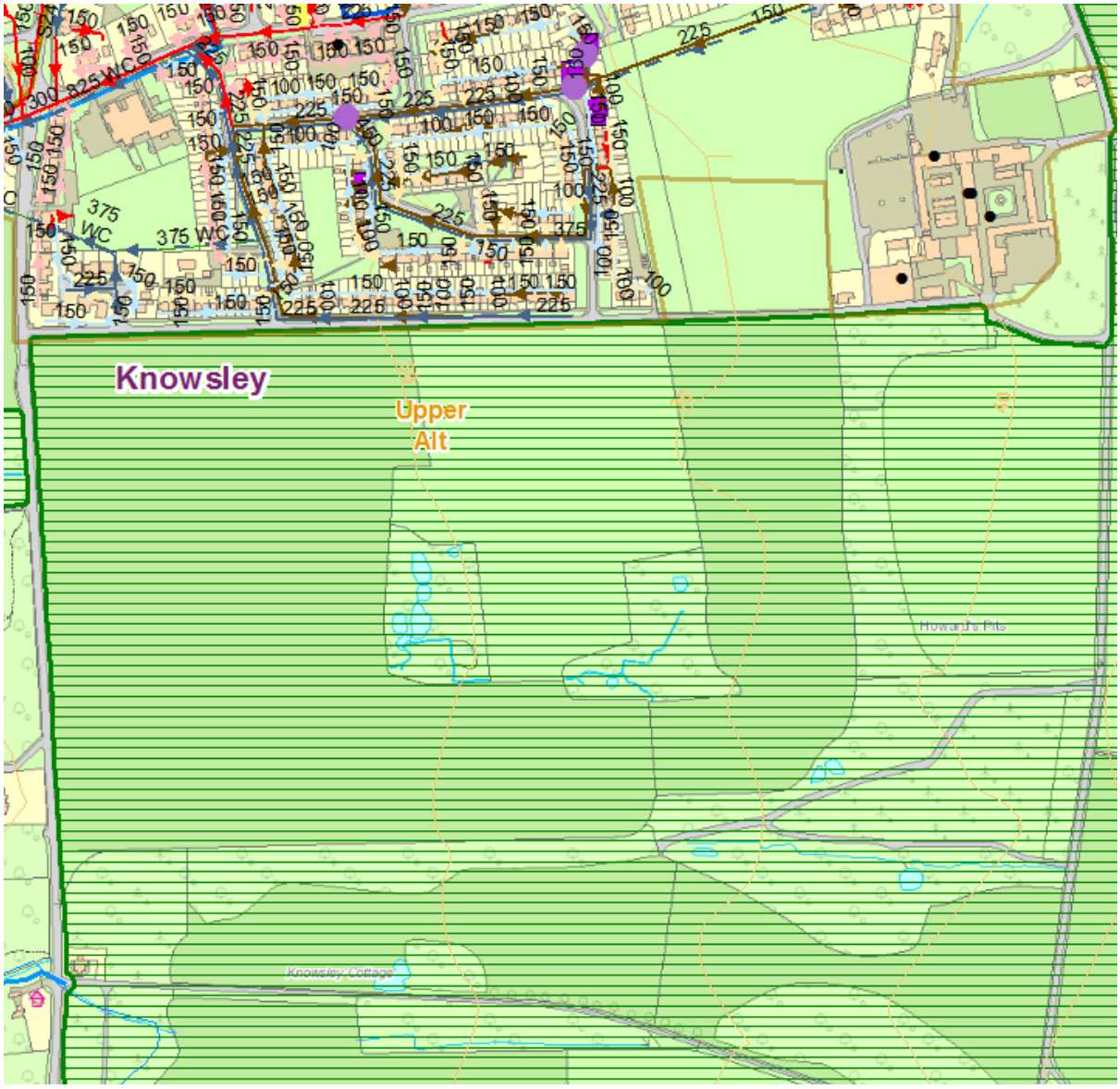
At this time, we do not believe a surface water connection to the public sewer is required at this time due to the watercourses located within the vicinity of the site boundary.

WASTEWATER PRE-DEVELOPMENT ENQUIRY

United Utilities
Water for the North West

Site Images

Location plan



Modelling information from manholes detailing modelled flood water levels]

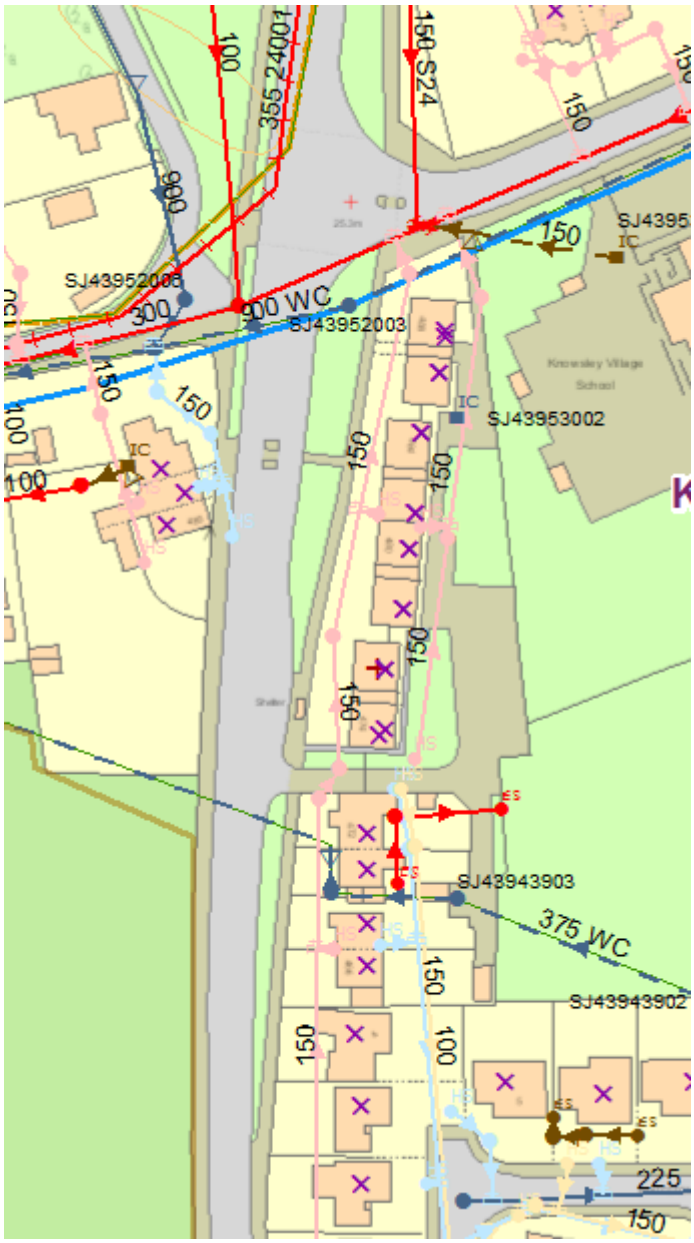
UUMH SJ43952001

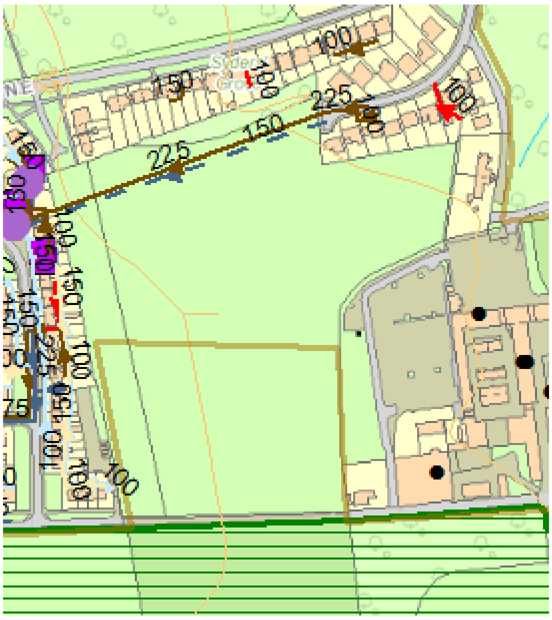
Max_TWL_100Y_m_aod	25.585

WASTEWATER PRE-DEVELOPMENT ENQUIRY

United Utilities
Water for the North West

Points of connection snapshots




100
150
225
150
225
100
100
150
100
150
150
100
225
75
150
100
100
100

APPENDIX G

Preliminary Drainage Layout

N

3.0 m SEWER EASEMENT TO EITHER SIDE OF EXISTING SEWERS

LOCATION OF MANHOLES BASED ON SITE VISIT UNDERTAKEN ON 05/02/2025, NOT RECORDED BY TOPO SURVEY

SJ43952001
CL=25.42
IL=22.48

Ex. 900Ø PUBLIC COMBINED SEWER

12 m

3 m WIDE ACCESS TRACK

ONLINE ATTENUATION BASIN 2

3414 m² x 1.5 m DEEP
TOP LEVEL = 26.60
BASE LEVEL = 25.1
SIDE SLOPES = 1:5

MAXIMUM WATER LEVEL 1.0% 24 HOUR STORM EVENT WITH 45% ALLOWANCE FOR CLIMATE CHANGE = 26.15 m AOD

11 m

DUE TO LOCATION AND LEVEL OF PUBLIC FOUL SEWER AN ADOPTED PUMPING STATION MAY BE REQUIRED. FOR TYPICAL LAYOUT REFER TO FIGURE D 3 IN DESIGN AND CONSTRUCTION GUIDANCE.

48 m LONG ROUTE WITH 0.2 m FALL = 1:240 GRADIENT

EXISTING WATERCOURSE OUTLET HEADWALL IL=24.54 mAOD

300Ø PIPE AT 1:294 (GRADIENT ASSUMED). PIPE FULL FLOW CAPACITY = 64.3 l/s

FLOW CONTROL MH LOCATION FLOW RATE = 60.3 l/s

EXISTING PIPE UNDER ROAD, IL=24.60 mAOD

375 m LONG ROUTE WITH 2.1 m FALL = 1:178 GRADIENT

3 m WIDE ACCESS TRACK

ONLINE ATTENUATION BASIN 1

4040 m² x 1.5 m DEEP
TOP LEVEL = 28.50
BASE LEVEL = 27.00
SIDE SLOPES = 1:5

MAXIMUM WATER LEVEL 1.0% 24 HOUR STORM EVENT WITH 45% ALLOWANCE FOR CLIMATE CHANGE = 28.14 m AOD

FLOW CONTROL MH LOCATION FLOW RATE = 20.0 l/s

DUE TO THE SURFACE WATER DRAINAGE OUTFALL (CULVERT) LOCATION AND GROUND LEVELS, LAND RAISING MAY BE REQUIRED IN THE SOUTH-WEST CORNER OF THE SITE TO ACHIEVE A GRAVITY CONNECTION.

Wooded areas heavily overgrown, limited details surveyed

TOTAL SITE AREA = 33.5 ha (APPROX.)

DEVELOPMENT PLATFORM EXTENT = 20.4 ha (DEVELOPMENT AREA 1 AND 2)

PROPOSED IMPERMEABLE AREA = 50% OF DEVELOPMENT PLATFORM EXTENT, I.E. 20.4 x 0.5 = 10.2 ha

TOTAL PROPOSED IMPERMEABLE AREA, INCLUDING A 10% ALLOWANCE FOR URBAN CREEP = 10.2 x 1.1 = 11.22 ha (APPROX.)

IMPERMEABLE AREA THAT DRAINS TOWARDS KNOWSLEY LANE PER WATERSHED ANALYSIS (DRAINAGE AREA 1) = 17.8 ha x 0.5 = 8.9 ha

PROPOSED SURFACE WATER DISCHARGE RATE FOR 8.9 ha = 60.3 l/s

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT WEETWOOD DRAWINGS. ANY DISCREPANCIES, ERRORS OR OMISSIONS TO BE BROUGHT TO THE ATTENTION OF WEETWOOD.
2. ANNUAL EXCEEDANCE PROBABILITY RAINFALL EVENTS:
   - 100.0% (1:1) AEP RAINFALL EVENT
   - 50.0% (2:2) AEP RAINFALL EVENT
   - 43.5% (QBAR) AEP RAINFALL EVENT
   - 3.3% (1:30) AEP RAINFALL EVENT
   - 1.0% (1:100) AEP RAINFALL EVENT
3. PROPOSED SITE LAYOUT TAKEN FROM STANTEC 'ILLUSTRATIVE FRAMEWORK PLAN' DRAWING (REF: 333102382_0112, AUG 2026).
4. EXISTING LEVEL INFORMATION TAKEN FROM POWERS AND TILTMAN LTD 'TOPOGRAPHIC SURVEY' (REF: 7935, OCT 2017).
5. EXISTING DRAINAGE LOCATION TAKEN FROM SURVEY UNDERTAKEN BY INVEX SURVEYS (REF: 2370, APR 2025) AND FROM UNITED UTILITES RECORD DRAWING (MAR 2022).

DRAINAGE KEY

- EXISTING COMBINED SEWER
- EXISTING FOUL WATER SEWER
- EXISTING SURFACE WATER SEWER
- EXISTING WATERCOURSE
- SEWER EASEMENT
- PROPOSED INDICATIVE SURFACE WATER SEWER
- PROPOSED INDICATIVE FOUL WATER SEWER
- PROPOSED INDICATIVE FOUL RISING MAIN ROUTE
- PROPOSED ATTENUATION BASIN
- SITE BOUNDARY
- DEVELOPMENT AREA 1 (17.8 ha APPROX.)
- DEVELOPMENT AREA 2 (2.6 ha APPROX.)

REV	DATE	DESCRIPTION	DRAWN BY	CHECK BY
P4	04.08.26	RUNOFF RATE CORRECTED TO 60.3 l/s IN TEXT BOX	DSH	JA
P3	07.08.25	BASIN LOCATION AMENDED	DSH	JA
P2	21.05.25	BASIN LOCATION AMENDED	DSH	TB
P1	13.02.25	INITIAL ISSUE	DSH	TB

Weetwood
Development • Planning • Environment
Park House, Fforddd Bynnwr Gwair, Mold CH7 1FQ
Tel 01352 700045
info@weetwood.net
www.weetwood.net

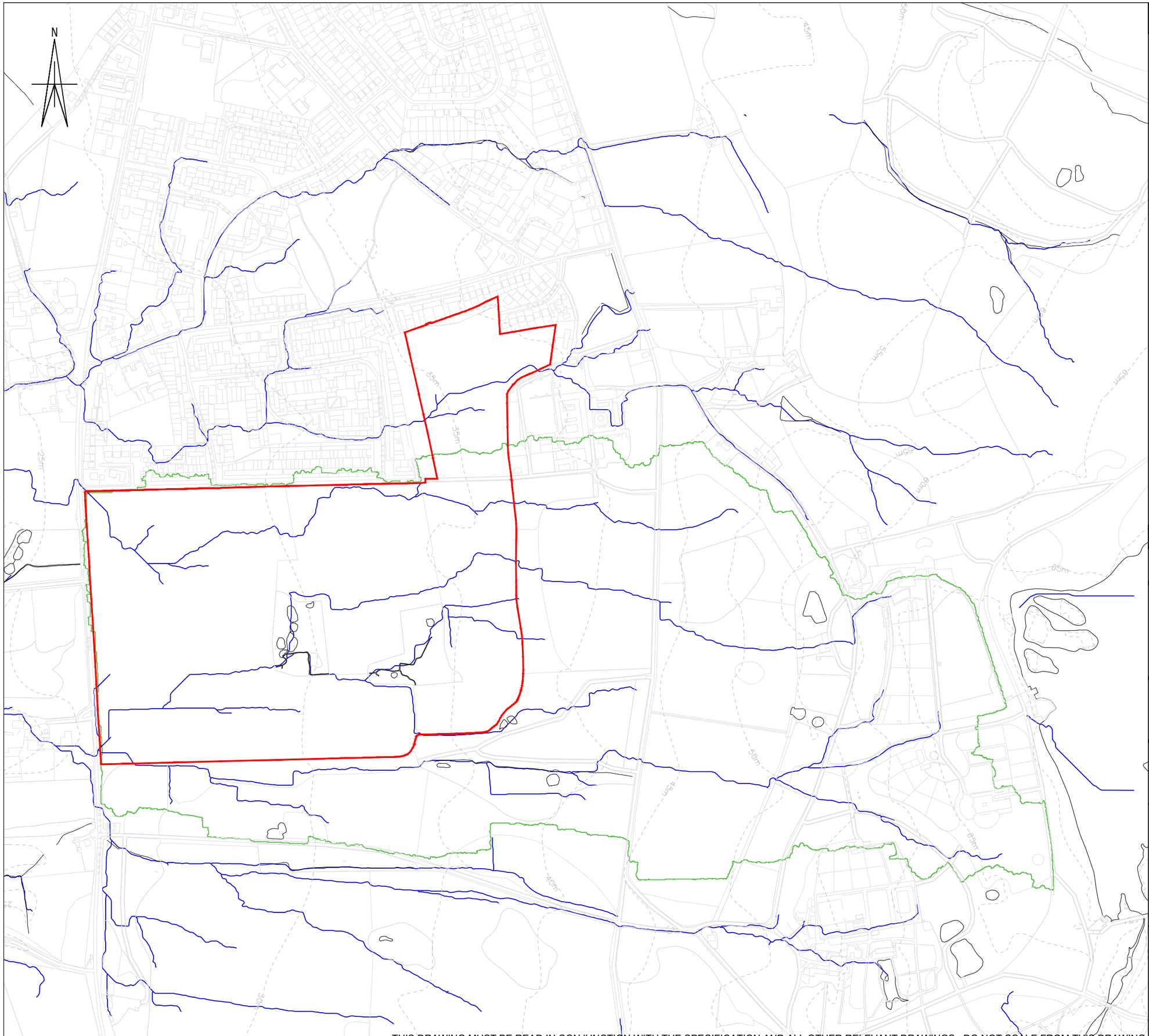
Client: HALLAM LAND

Drawing Status: PLANNING
Date: FEB 2025
Scale (A0): 1:1000
Project: HOME FARM ROAD, KNOWLSEY
Drawn by: DSH
Check by: TB
Drawing Number: 6464-WTWD-00-XX-DR-D-1101
Revision: P4
Drawing Title: INDICATIVE DRAINAGE LAYOUT

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.

APPENDIX H

Watershed Analysis



NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT WEETWOOD DRAWINGS.

KEY

- SITE BOUNDARY
- INDICATIVE WATERSHED
- KNOWSLEY LANE CATCHMENT BOUNDARY
- CONTOURS

REV	DATE	DESCRIPTION	DRAWN	CHECK
P1	06.08.25	INITIAL ISSUE	DSH	JA

Weetwood
Development • Planning • Environment

Park House, Ffordd
Byrnwr Gwair, Mold
CH7 1FQ
Tel 01352 700045
info@weetwood.net
www.weetwood.net

Client
HALLAM LAND

Drawing Status
PLANNING

Date
AUG 2025

Scale (A3)
N.T.S

Project
HOME FARM ROAD, KNOWSLEY

Drawn
DSH

Checked
JA

Project No
6464

Title
KNOWSLEY LANE WATERSHED ANALYSIS

Drawing No
SK01

Revision
P1

THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SPECIFICATION AND ALL OTHER RELEVANT DRAWINGS. DO NOT SCALE FROM THIS DRAWING.

APPENDIX I

Greenfield Runoff Calculations

UK Design Flood Estimation

Generated on Thursday, August 07, 2025 8:23:49 AM by ModellingMold
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: E20A-BC83

Site name: FEH_Point_Descriptors_343714_394703_v5_0_1
Easting: 343714
Northing: 394703
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.089
Using plot scale calculations: Yes
Model: 2.3
Site description: None

Model run: 1 year

Summary of results

Rainfall - FEH22 (mm):	13.63	Total runoff (ML):	0.34
Total Rainfall (mm):	8.97	Total flow (ML):	0.80
		Peak flow (m³/s):	0.0535
Peak Rainfall (mm):	1.22		

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	01:54:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.67	No
ARF (Areal reduction factor)	0.99	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	118.96	No
Cmax (mm)	291.51	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m³/s)	0	No
BL (hr)	27.82	No
BR	1.36	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m³/s)	0	No
Exporting drained area (km²)	0	No
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

UK Design Flood Estimation

Generated on Thursday, August 07, 2025 8:24:22 AM by ModellingMold
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: E20A-BC83

Site name: FEH_Point_Descriptors_343714_394703_v5_0_1
Easting: 343714
Northing: 394703
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.089
Using plot scale calculations: Yes
Model: 2.3
Site description: None

Model run: 2 year

Summary of results

Rainfall - FEH22 (mm):	15.42	Total runoff (ML):	0.38
Total Rainfall (mm):	10.14	Total flow (ML):	0.90
		Peak flow (m³/s):	0.0603
Peak Rainfall (mm):	1.38		

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	01:54:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.67	No
ARF (Areal reduction factor)	0.99	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	118.96	No
Cmax (mm)	291.51	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m³/s)	0	No
BL (hr)	27.82	No
BR	1.35	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m³/s)	0	No
Exporting drained area (km²)	0	No
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

UK Design Flood Estimation

Generated on Thursday, August 07, 2025 8:24:35 AM by ModellingMold
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: E20A-BC83

Site name: FEH_Point_Descriptors_343714_394703_v5_0_1
Easting: 343714
Northing: 394703
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.089
Using plot scale calculations: Yes
Model: 2.3
Site description: None

Model run: 30 year

Summary of results

Rainfall - FEH22 (mm):	31.85	Total runoff (ML):	0.83
Total Rainfall (mm):	20.95	Total flow (ML):	1.86
		Peak flow (m³/s):	0.1251
Peak Rainfall (mm):	2.86		

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	01:54:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.67	No
ARF (Areal reduction factor)	0.99	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	118.96	No
Cmax (mm)	291.51	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m³/s)	0	No
BL (hr)	27.82	No
BR	1.25	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m³/s)	0	No
Exporting drained area (km²)	0	No
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

UK Design Flood Estimation

Generated on Thursday, August 07, 2025 8:24:48 AM by ModellingMold
Printed from the ReFH2 Flood Modelling software package, version 4.0.8560.23190

Summary of estimate using the Flood Estimation Handbook revitalised flood hydrograph method (ReFH2)

Site details Checksum: E20A-BC83

Site name: FEH_Point_Descriptors_343714_394703_v5_0_1
Easting: 343714
Northing: 394703
Country: England, Wales or Northern Ireland
Catchment Area (km²): 0.089
Using plot scale calculations: Yes
Model: 2.3
Site description: None

Model run: 100 year

Summary of results

Rainfall - FEH22 (mm):	39.55	Total runoff (ML):	1.05
Total Rainfall (mm):	26.01	Total flow (ML):	2.31
		Peak flow (m³/s):	0.1572
Peak Rainfall (mm):	3.55		

Parameters

Where the user has overriden a system-generated value, this original value is shown in square brackets after the value used.
** Indicates that the user locked the duration/timestep*

Rainfall parameters (Rainfall - FEH22)

Name	Value	User-defined?
Duration (hh:mm:ss)	01:54:00	No
Timestep (hh:mm:ss)	00:06:00	No
SCF (Seasonal correction factor)	0.67	No
ARF (Areal reduction factor)	0.99	No
Seasonality	Winter	No

Loss model parameters

Name	Value	User-defined?
Cini (mm)	118.96	No
Cmax (mm)	291.51	No
Use alpha correction factor	No	No
Alpha correction factor	n/a	No

Routing model parameters

Name	Value	User-defined?
Tp (hr)	1	No
Up	0.65	No
Uk	0.8	No

Baseflow model parameters

Name	Value	User-defined?
BF0 (m³/s)	0	No
BL (hr)	27.82	No
BR	1.21	No

Urbanisation parameters

Name	Value	User-defined?
Sewer capacity (m³/s)	0	No
Exporting drained area (km²)	0	No
Urban area (km²)	0	No
Urbext 2000	0	No
Impervious runoff factor	0.7	No
Imperviousness factor	0.4	No
Tp scaling factor	0.75	No
Depression storage depth (mm)	0.5	No

APPENDIX J

Surface Water Attenuation - Storage Volume Calculations

Design Settings

Rainfall Methodology	FEH-22	Maximum Time of Concentration (mins)	30.00	Preferred Cover Depth (m)	1.200
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0	Include Intermediate Ground	✓
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00	Enforce best practice design rules	x
CV	0.750	Connection Type	Level Soffits		
Time of Entry (mins)	5.00	Minimum Backdrop Height (m)	0.200		

Nodes

	Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
✓	1	5.100	10.00	29.000	Manhole	Adoptable	3300	121.026	52.268	1.900
✓	BASIN 1			28.500	Manhole	Adoptable	3300	69.164	52.034	1.500
✓	FC1			28.500	Manhole	Adoptable	2100	58.486	51.525	1.600
✓	2	5.100	10.00	27.100	Manhole	Adoptable	3300	105.097	78.050	1.900
✓	BASIN 2			26.600	Manhole	Adoptable	3300	40.859	77.627	1.500
✓	FC2			26.600	Manhole	Adoptable	3000	17.808	51.356	1.700
✓	OUTFALL			26.400	Manhole	Adoptable	1350	4.927	51.695	1.800

Links

	Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
?	1.000	1	BASIN 1	51.863	0.600	Colebrook-White	27.100	27.000	0.100	518.6	1200	Double	10.53	27.0
?	1.001	BASIN 1	FC1	10.690	0.600	Colebrook-White	27.000	26.900	0.100	106.9	1200	Double	10.58	27.0
?	1.002	FC1	FC2	40.678	0.600	Colebrook-White	26.900	24.900	2.000	20.3	1200	Double	10.66	26.8
?	2.000	2	BASIN 2	64.239	0.600	Colebrook-White	25.200	25.100	0.100	642.4	1200	Double	10.73	26.7

Name	US Node	DS Node	Vel (m/s)	Flow (l/s)	Σ Area (ha)
1.000	1	BASIN 1	1.635	373.7	5.100
1.001	BASIN 1	FC1	3.618	372.7	5.100
1.002	FC1	FC2	8.311	371.1	5.100
2.000	2	BASIN 2	1.468	369.7	5.100

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Links

	Name	US Node	DS Node	Length (m)	ks (mm) / n	Velocity Equation	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	Link Type	T of C (mins)	Rain (mm/hr)
?	2.001	BASIN 2	FC2	34.950	0.600	Colebrook-White	25.100	25.000	0.100	349.5	1200	Double	11.02	26.3
?	1.003	FC2	OUTFALL	12.885	0.600	Colebrook-White	25.000	24.600	0.400	32.2	375	Circular	11.09	26.3

Name	US Node	DS Node	Vel (m/s)	Flow (l/s)	Σ Area (ha)
2.001	BASIN 2	FC2	1.995	364.1	5.100
1.003	FC2	OUTFALL	3.202	725.8	10.200

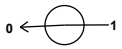
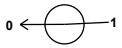
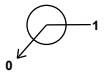
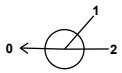
Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	51.863	518.6	1200	Double	29.000	27.100	0.700	28.500	27.000	0.300
1.001	10.690	106.9	1200	Double	28.500	27.000	0.300	28.500	26.900	0.400
1.002	40.678	20.3	1200	Double	28.500	26.900	0.400	26.600	24.900	0.500
2.000	64.239	642.4	1200	Double	27.100	25.200	0.700	26.600	25.100	0.300
2.001	34.950	349.5	1200	Double	26.600	25.100	0.300	26.600	25.000	0.400
1.003	12.885	32.2	375	Circular	26.600	25.000	1.225	26.400	24.600	1.425

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1	3300	Manhole	Adoptable	BASIN 1	3300	Manhole	Adoptable
1.001	BASIN 1	3300	Manhole	Adoptable	FC1	2100	Manhole	Adoptable
1.002	FC1	2100	Manhole	Adoptable	FC2	3000	Manhole	Adoptable
2.000	2	3300	Manhole	Adoptable	BASIN 2	3300	Manhole	Adoptable
2.001	BASIN 2	3300	Manhole	Adoptable	FC2	3000	Manhole	Adoptable
1.003	FC2	3000	Manhole	Adoptable	OUTFALL	1350	Manhole	Adoptable

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Node Type	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
1	121.026	52.268	29.000	1.900	3300	Manhole	Adoptable		0	1.000	27.100	1200	Double
BASIN 1	69.164	52.034	28.500	1.500	3300	Manhole	Adoptable		1	1.000	27.000	1200	Double
									0	1.001	27.000	1200	Double
FC1	58.486	51.525	28.500	1.600	2100	Manhole	Adoptable		1	1.001	26.900	1200	Double
									0	1.002	26.900	1200	Double
2	105.097	78.050	27.100	1.900	3300	Manhole	Adoptable		0	2.000	25.200	1200	Double
BASIN 2	40.859	77.627	26.600	1.500	3300	Manhole	Adoptable		1	2.000	25.100	1200	Double
									0	2.001	25.100	1200	Double
FC2	17.808	51.356	26.600	1.700	3000	Manhole	Adoptable		1	2.001	25.000	1200	Double
									2	1.002	24.900	1200	Double
									0	1.003	25.000	375	Circular
OUTFALL	4.927	51.695	26.400	1.800	1350	Manhole	Adoptable		1	1.003	24.600	375	Circular

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Simulation Settings

Rainfall Methodology	FEH-22	Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Rate(s)	x
Rainfall Events	Singular	Analysis Speed	Detailed	Additional Storage (m³/ha)	20.0	Check Discharge Volume	x
Summer CV	0.750	Skip Steady State	x	Starting Level (m)			

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	10	0	30	0	10	0
2	0	10	0	100	45	10	0

Node FC2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	25.000	Product Number	CTL-SHE-0316-6030-1200-6030
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.375
Design Flow (l/s)	60.3	Min Node Diameter (mm)	2100

Node FC1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	26.900	Product Number	CTL-SHE-0196-2000-1200-2000
Design Depth (m)	1.200	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	20.0	Min Node Diameter (mm)	1500

Node BASIN 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	27.000
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

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Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2124.0	2124.0	1.500	4040.0	4062.1

Node BASIN 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	25.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	2015.0	2015.0	1.500	3414.0	3440.7

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Results for 1 year +10% A Critical Storm Duration. Lowest mass balance: 99.63%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	12	27.700	0.600	381.4	40.5851	0.0000	OK
600 minute winter	BASIN 1	450	27.259	0.259	103.0	595.4283	0.0000	OK
600 minute winter	FC1	450	27.295	0.395	103.5	1.3697	0.0000	OK
15 minute winter	2	12	25.790	0.590	381.4	39.8605	0.0000	OK
600 minute winter	BASIN 2	420	25.377	0.277	73.4	596.2858	0.0000	OK
600 minute winter	FC2	420	25.377	0.477	50.9	3.3712	0.0000	SURCHARGED
600 minute winter	OUTFALL	420	24.695	0.095	50.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	BASIN 1	730.0	2.409	0.197	29.4884	
600 minute winter	BASIN 1	1.001	FC1	103.5	0.355	0.013	5.3654	
600 minute winter	FC1	1.002	FC2	19.9	0.110	0.001	17.2525	
15 minute winter	2	2.000	BASIN 2	751.6	2.388	0.226	35.6802	
600 minute winter	BASIN 2	2.001	FC2	31.0	0.144	0.007	17.4423	
600 minute winter	FC2	1.003	OUTFALL	50.8	2.172	0.144	0.3015	1491.1

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Results for 2 year +10% A Critical Storm Duration. Lowest mass balance: 99.70%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	11	27.806	0.706	525.4	47.7283	0.0000	OK
600 minute winter	BASIN 1	465	27.322	0.322	155.1	752.0173	0.0000	OK
600 minute winter	FC1	495	27.351	0.451	109.7	1.5639	0.0000	OK
15 minute winter	2	11	25.884	0.684	525.4	46.2355	0.0000	OK
480 minute winter	BASIN 2	344	25.420	0.320	101.0	694.7592	0.0000	OK
480 minute winter	FC2	344	25.420	0.520	57.8	3.6736	0.0000	SURCHARGED
480 minute winter	OUTFALL	344	24.701	0.101	57.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	BASIN 1	1028.3	2.678	0.278	36.0101	
600 minute winter	BASIN 1	1.001	FC1	109.7	0.356	0.013	6.7189	
600 minute winter	FC1	1.002	FC2	20.0	0.109	0.001	19.2712	
15 minute winter	2	2.000	BASIN 2	1041.9	2.661	0.314	42.9074	
480 minute winter	BASIN 2	2.001	FC2	37.8	0.365	0.008	20.6743	
480 minute winter	FC2	1.003	OUTFALL	57.6	2.242	0.163	0.3313	1489.8

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Results for 30 year +10% A Critical Storm Duration. Lowest mass balance: 99.86%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	10	28.039	0.939	1047.0	63.4490	0.0000	OK
600 minute winter	BASIN 1	585	27.614	0.614	211.3	1550.3560	0.0000	OK
600 minute winter	FC1	570	27.633	0.733	117.7	2.5381	0.0000	OK
15 minute summer	2	10	26.128	0.928	1047.0	62.7646	0.0000	OK
360 minute winter	BASIN 2	304	25.663	0.563	217.6	1286.7740	0.0000	OK
360 minute winter	FC2	304	25.663	0.763	65.9	5.3925	0.0000	SURCHARGED
120 minute winter	OUTFALL	98	24.704	0.104	60.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	BASIN 1	1624.2	3.282	0.439	49.6599	
600 minute winter	BASIN 1	1.001	FC1	117.7	0.317	0.014	13.9024	
600 minute winter	FC1	1.002	FC2	20.0	0.175	0.001	30.7417	
15 minute summer	2	2.000	BASIN 2	1738.0	3.224	0.523	60.8017	
360 minute winter	BASIN 2	2.001	FC2	46.0	0.374	0.010	40.4545	
360 minute winter	FC2	1.003	OUTFALL	60.3	2.267	0.170	0.3428	1703.7

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Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 99.92%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	9	28.227	1.127	1879.5	76.2115	0.0000	OK
1440 minute winter	BASIN 1	1380	28.144	1.144	185.4	3274.7350	0.0000	OK
1440 minute winter	FC1	1350	28.150	1.250	113.9	4.3289	0.0000	SURCHARGED
15 minute summer	2	9	26.329	1.129	1879.5	76.3447	0.0000	OK
600 minute winter	BASIN 2	570	26.154	1.054	261.3	2651.7160	0.0000	OK
600 minute winter	FC2	570	26.154	1.254	67.6	8.8664	0.0000	SURCHARGED
15 minute winter	OUTFALL	50	24.704	0.104	60.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	BASIN 1	2407.1	3.708	0.651	57.9729	
1440 minute winter	BASIN 1	1.001	FC1	113.9	0.338	0.014	23.8883	
1440 minute winter	FC1	1.002	FC2	20.1	0.140	0.001	46.0992	
15 minute summer	2	2.000	BASIN 2	2576.5	3.667	0.776	71.7603	
600 minute winter	BASIN 2	2.001	FC2	48.3	0.391	0.011	75.5716	
600 minute winter	FC2	1.003	OUTFALL	60.3	2.267	0.170	0.3427	2330.2

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APPENDIX K

Knowsley Council SuDS Pro-forma

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

This pro-forma is a requirement of the Planning Validation Checklist. You **must complete all white boxes in full** and submit this pro-forma along with your supporting evidence to the Local Planning Authority for any application which seeks planning permission for major development (as defined in section 2 of Statutory Instrument 2015 No. 595).

This pro-forma supports developers and regulators in **summarising and confirming** how surface water from a development will be managed sustainably under current and future conditions. It should be completed in conjunction with the Council's 'Completing your Pro Forma' document and your sustainable drainage system should be designed in accordance with CIRIA The SuDS Manual C753.

The pro-forma follows Policy CS24 of Knowsley MBC's Local Plan, National Planning Policy Framework, House of Commons Written Statement (HWSW 161) on SuDS, Planning Practice Guidance and Defra's Non-Statutory Technical Standards for Sustainable Drainage Systems. It is supported by the Defra/EA Guidance on Rainfall Runoff Management and can be completed using freely available tools such as Tools for Sustainable Drainage Systems or approved Industry Standard surface water management design software. The Council's Sustainable Drainage & Surface Water Management Technical Guidance document also provides further information.

Section 1: Development Details

Development Name					
Development Address ***(including postcode)***			**Planning Application Reference** *(if available)*		
Development Grid Reference	**Northings**		**Expected lifetime of development** *(years)*		
	Eastings		**Have you submitted a Flood Risk Assessment?**		Yes ☐ No ☐
Total Development Site Area (Ha)			**Type of Planning Application (✓)**	**Outline**	☐
Site area served by proposed drainage system (excluding open space) (Ha)*				**Full**	☐
Is your surface water drainage system designed to a *(tick all that apply)***:**				**Hybrid**	☐
Greenfield Standard • *Site is undeveloped and a new drainage system will be installed; OR* • *Site is already developed and a new surface water drainage system will be installed to serve the new development.*		☐		**Reserved Matters**	☐
Previously Developed Standard • *Site is already developed and the entirety of the existing surface water drainage system will be used to serve the new development.*		☐			

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 2: Impermeable Area and Existing Drainage For outline or reserved matters applications, go to Section 3

	Existing (E)	Proposed (P)	Difference (P – E)		Evidence Checklist
Impermeable Area (Ha)				☐	Plans showing development layout of site with existing and proposed impermeable areas.
State Drainage Method			N/A	☐	Plans showing current and proposed locations of sustainable drainage system.
Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?			Yes ☐ No ☐	☐	Plans showing existing layout to include: • Watercourses, open or culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes • Soakaways, filter drains

Section 3: Surface Water Discharge Hierarchy – Planning Practice Guidance

Surface Water Discharge Method	Proposed?	If YES - Evidence Checklist		If NO - Evidence Checklist	
1. Infiltration to ground	Yes ☐ No ☐		Completed Infiltration Checklist from CIRIA The SuDS Manual C753 Appendix B *An editable version of this form is available on SusDrain website.*		Geotechnical Survey, including Soil Permeability Testing stating Percolation Coefficient, in accordance with BRE 365 **AND** Statement providing justification in your Sustainable Drainage Strategy
2. Discharge to watercourse or surface water body *(Main River or Ordinary)*	Yes ☐ No ☐		Watercourse and/or Water Body Survey Report		Plan showing nearby watercourses and water bodies **AND** Statement providing justification in your Sustainable Drainage Strategy
3. Discharge to surface water sewer	Yes ☐ No ☐		Water and Sewerage Company written agreement for the Right to Connect.		Plan showing nearby sewers **AND** Statement providing justification in your Sustainable Drainage Strategy
4. Discharge to combined sewer	Yes ☐ No ☐				

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 4: Calculate Peak Discharge Rates – Technical Standards S2 and S3 (unless S1 applies)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) *Brownfield sites must reduce discharge rates by 50%*	Evidence Checklist	
Qbar					MicroDrainage (or equivalent) calculations
1:1 Year Event					
1:30 Year Event					
1:100 Year Event					

Section 5: Calculate Discharge Volume – Technical Standards S4 and S6 (unless S1 applies)

Rainfall Event	Existing Volume (m^3)	Greenfield Volume (m^3)	Proposed Volume (m^3)	Evidence Checklist	
1:100 Year 6 Hour Event				☐	MicroDrainage (or equivalent) calculations

Section 6: Infiltration

Site Information	✓	Evidence Checklist	
Do your sustainable drainage proposals include any infiltration?	Yes ☐ No ☐ *If NO, please move on to Section 7*		Proposed sustainable drainage plans
You should submit an alternative 'Plan B' sustainable drainage design utilising an alternative discharge method if site specific ground conditions are unknown at this stage. This will become the default design in the event infiltration proposals are not feasible upon site specific ground investigation. **Have you submitted an alternative 'Plan B' sustainable drainage design?**	Yes ☐ No ☐		'Plan B' conceptual sustainable drainage plans and statement of approach

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 7: Storage – Technical Standards S7, S8 and S9

Storage Details	Details	Evidence Checklist	
State climate change allowance used (%)		☐	State / use in MicroDrainage
State storage volume provided (m^3) *(excluding non-void spaces)* *Must include an allowance for climate change and urban creep.*			Drainage plans showing location of attenuation and all flow control devices and any supporting calculations
Summarise how storage will be provided for 1:30 year event on site. *Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas **and** no flooding occurs offsite in a 1 in 100 year (+ climate change allowance) event.*			Plans showing size and location of storage and supporting calculations
Summarise how storage will be provided for 1:100 year (+ climate change) 6 hour event on site. *Where storage above the 1:30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by MicroDrainage (or equivalent) calculations.*			Plans showing size and location of storage and supporting calculations

Section 8: Operation and Maintenance – Technical Standard S12 and HCWS161

Consideration	Select ALL that apply (✓)		Evidence Checklist	
State how ALL components of the sustainable drainage system will be maintained for the design life of the development.	**Sustainable drainage features are at property level**	☐		Statement provided within your Sustainable Drainage Strategy
	Sustainable drainage system to be adopted by Water and Sewerage Company through a Section 104 agreement *(Water Industry Act 1991)*	☐		
	Applicant to secure maintenance of sustainable drainage features by entering into a Section 106 agreement *(Town and Country Planning Act 1990)*	☐		

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Declaration and Submission

This pro-forma has been completed using evidence from information which has been submitted with my planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details			
Form completed by		**Email Address**	
		Daytime Telephone	
Form signed off by		**Accreditation(s) and/or Qualification(s) of Signatory**	
Date *(dd/mm/yyyy)*		**Company**	
Client Details			
Name		**Company**	

Knowsley Council

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