LINDEN HILL - CAPITAL ASSETS – ALX LIMITED

35 WILSON ROAD

HUYTON BUSINESS PARK

LIVERPOOL

L36 6AE

FLOOD RISK ASSESSMENT

APRIL 2022

FW2197_FRA_001 V1

REVISION HISTORY

Revision	Reason for Issue	Author	Checker	Approved	Date
V1	First Issue	JD			26.04.2022

EXECUTIVE SUMMARY

1. The site is at NO quantifiable risk of flooding from tidal events.

2. The property is identified within the Environment Agency Flood Risk mapping as being at Low risk of flooding from Rivers and Seas.

3. The site is identified by the Environment Agency as having a Low chance of flooding from overland Surface Water.

4. The site is considered to be at a Low quantifiable risk of flooding from groundwater sources.

5. The site is identified by the Environment Agency as being at NO quantifiable risk of flooding from manmade lakes within the topographical catchment of the site.

6. The site is at a negligible risk of flooding from the existing sewerage network in the vicinity of the site.

7. The site is at a negligible risk of flooding from its own private drainage connections however this can be mitigated by regular maintenance to ensure the ongoing performance of the system.

8. We therefore conclude that the proposed industrial unit is above the modelled flood level of the local watercourses and sits within Flood Zone 1 as defined in the National Planning Policy Framework July 2021 Table 1.

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1.0 INTRODUCTION

1.1.1 Farrow Walsh Consulting has been engaged by the applicant Linden Hill – Capital Assets – ALX Limited to produce a Flood Risk Assessment to accompany the planning application for a proposed employment use development at 35 Wilson Road, Huyton Business Park, Liverpool.

1.1.2 The development proposals comprise the provision of 19,116sqm of B8 floor area which will also be accompanied by 190 car parking spaces, 45 trailer spaces and 32 cycle parking spaces. A site location plan is included within Appendix A and the development proposals can be found within Appendix B.

1.1.3 This report considers the flood risk associated with a development proposal of this type and considers mitigation measures to ensure user safety.

1.1.4 The Flood Risk Assessment (FRA) report has been informed by the guidance contained within The National Planning Framework (July 2021, Department for Communities and Local Government) (NPPF).

1.1.5 Reference has been made to basic flood maps contained within the Environment Agency websites and the Environment Agency Standing Advice for Local Planning Authorities.

1.1.6 In consulting the Environment Agency website this report examines the following:

- Assessment of Flood risk and the likely sources of flooding
- Managing Residual Flood Risk
- Managing surface water
- Remedial Measures

1.1.7 This FRA examines the flood implications of the proposed development based on the following objectives, set out within the NPPF.

- Appraising risk
- Managing risk
- Reducing risk
- A partnership approach.

1.1.8 This report has been prepared using the following policy and guidance documentation:

- National Planning Policy Guidance (NPPG)
- Ciria C753 – The SUDs Manual
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities (EA - February 2016)
- Non-Statutory Technical Standards 2015
- Written Ministerial Statement regarding Sustainable Drainage (HCWS161) 2014
- The Water Framework Directive (2000)
- Building Regulations Part H 2015
- Knowsley Metropolitan Borough Council Level 2 Strategic Flood Risk Assessment - October 2012 Capita Symonds

1.1.9 In consulting with key stakeholders and policies this report aims to assess the risk of flooding both to the site and the impact of any development on the downstream network.

1.1.10 The flood management strategy, including consideration of safe access / egress to and from the site and flood resilience measures, is based on relevant British Standards (BS8533), the standing advice provided by the Environment Agency and on best engineering judgement. The approach for the FRA is based on the requirements of the Environment Agency and Knowsley Council.

1.1.11 The EA have been consulted in the preparation of this FRA and the correspondence can be found within Appendix G.

1.1.12 Any comments and opinions expressed in this report, including any conclusions are based on the information available to Farrow Walsh Consulting Ltd at the time of writing. The conclusions therefore could differ if the information is found to be inaccurate, incomplete or misleading. Farrow Walsh Consulting Ltd. accepts no liability should this be proven to be the case, or, if additional information is made available with respect to this site.

2.0 SITE DETAILS

2.1 SITE LOCATION

2.1.1 The proposed development site is located to the south area of the Huyton Town Centre at the site currently occupied by John Mason International within Huyton Business Park.

2.1.2 The site falls within the planning and LLFA authority area of Knowsley Metropolitan Borough Council (KMBC).

2.1.3 The site location is bounded by the adopted highway Wilson Road to the west and Logwood Mill Brook to the east. The northern and southern boundaries are formed from existing B8 industrial units.

2.1.4 A site location plan can be found within Appendix A.

2.2 SITE DESCRIPTION

2.2.1 The application site is irregular in shape and covers a total area of 4.368 hectares.

2.2.2 The site is currently classified as brownfield land and contains an existing unit with circa 9,863m² of B8 floorspace. The remaining area is wholly covered in hardstanding areas currently serving as parking and storage for the development.

2.2.3 Access to the sites is directly from the adopted highway Wilson Road to the western boundary, with existing access points already in place.

2.3 TOPOGRAPHY

2.3.1 A topographical survey of the site has been undertaken, which indicates that the ground levels on the site as between 27.56 to 26.21mAOD and the site generally slopes in north-west to south-east direction towards Logwood Mill Brook.

2.3.2 The topographical survey for the area can be found within Appendix C.

2.4 HYDROLOGICAL CONTEXT

2.4.1 The topographical survey indicates that there are no watercourses located within the boundaries of the site.

2.4.2 The nearest watercourse to the site is the Logwood Mill Brook, classified as a main river by the Environment Agency, which lies adjacent to the eastern boundary of the site. The Logwood Mill Brook drains south and is culverted below the Stretton Road 220m downstream of the site and again below the M57 430m south east of the site.

2.4.3 Logwood Mill Brook becomes Chapel Brook 220 downstream of the development site before becoming Ochre Brook 840m downstream of the site upon passing below the M62. The brook changes names on multiple occasions but ultimately the watercourse is a tributary of the River Mersey and discharges into the river at a point located 7.0km south of the development site.

2.4.4 The site lies within the operation catchment of the Ditton and the overall catchment of the North West River Basin District.

2.4.5 The site lies within upper reaches of the overall Ditton operational catchment area.

2.5 GEOLOGICAL CONTEXT

2.5.1 A Phase 1 Desk Study has been undertaken as part of the application.

2.5.2 The British Geological Society (BGS) online mapping indicates that the site geology comprises of superficial Devensian Till (diamicton) across the entire development area. These superficial deposits predominantly overlie solid deposits of Pennine Lower Coal Measures Formation in the west of site.

2.5.3 The bedrock is identified by the British Geological Society as the Etruria Formation comprising of mudstone.

2.5.4 The desk study assesses the historic borehole data with the findings summarised as follows:

'The ground conditions comprised Made Ground 1.30m to 3.05m thick. This was underlain by sandy gravelly clay with wood fragments and plant remains (referred to as "alluvial deposits") within TP1 and TP2 to 3.60m and 3.30m bgl respectively. In TP3-10 the Made Ground was underlain by "weathered mudstone" generally comprising grey orange and red silty sandy clay with medium fine gravel of mudstone to the base of trial pits between 2.90m and 3.10m bgl.

Groundwater seepage was reported in TP1, TP2 and TP4 at depths of 3.2m, 2.8m and 2.6m bgl respectively.'

2.5.5 The groundwater is understood to flow towards the Logwood Mill Brook to the eastern boundary of the site.

2.5.6 An extract from the Phase 1 Desk Study is included within Appendix D.

2.6 GROUNDWATER VULNERABILITY

2.6.1 The bedrock stratum below the site is classified by the Environment Agency as a Secondary A aquifer by the Environment Agency while the superficial deposits are classified as a Secondary undifferentiated aquifer.

2.6.2 In terms of vulnerability, the ground is classified as Medium.

2.6.3 The site does not lie within a Source Protection Zone.

2.7 EXISTING DRAINAGE

2.7.1 United Utilities are responsible for maintaining the public sewers within the area of Huyton and the sewer records have been obtained and can be found within Appendix E.

2.7.2 The sewer records confirm existing 600mm diameter combined sewer running along the northern boundary before increasing in size as it enters Wilson Road and becoming a 825mm diameter sewer.

2.7.3 To the western boundary within Wilson Road is an existing 225mm dimeter surface water sewer which meets a 750mm diameter sewer at the south west corner of the site. The United Utilities records does not show an outfall which likely means this is either undocumented or has never been surveyed. STW have confirmed this sewer carries a 3m easement to both sides of the sewer.

2.7.4 A 1200mm diameter surface water sewers is located within the site extents to the northern boundary. The sewer drains the industrial estate and highway from the north east and cross the site in an east to west directions before discharging via an existing headwall into Longwood Mill Brook.

2.7.5 A number of manholes are indicated on the topographical survey, which would indicate the presence of an existing private drainage system on site.

2.8 ARTIFICIAL WATER BODIES

2.8.1 There are no reservoirs located within 5km of the site.

2.8.2 The nearest water body is the Thrushingham's Lake and is located 275m north east of the development site. The lake is separated by Longwood Mill Brook.

3.0 ASSESSMENT OF FLOOD RISK

3.1 FLUVIAL

3.1.1 The site lies in the immediate Logwood Mill Brook catchment classified as a main river and falls under the administrative jurisdiction of the Environment Agency.

3.1.2 The Environment Agency have derived flood maps of England from which it is possible to initially identify whether a site is located within an area that is at risk of fluvial flooding. The maps, which are available on the Environment Agency's website, categorise land as being within Flood Zone 1, Flood Zone 2 or Flood Zone 3, with Flood Zone 1 being all land falling outside of the flood plain and Flood Zones 2 and 3 being all land within the floodplain. Flood Zone 3 is split into two further categories, namely Flood Zone 3a and Flood Zone 3b with Flood Zone 3b considered to be the functional floodplain.

3.1.3 The definitions of the Flood Zones extracted from the National Planning Policy Framework (NPPF) are described below:

- Flood Zone 1 – low probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding (<0.1%).
- Flood Zone 2 – medium probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (15 – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1%) in any year.
- Flood Zone 3a – high probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
- Flood Zone 3b – the functional floodplain. This zone comprises land where water has to flow or be stored in times of flood. Typically, land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood.

3.1.4 The extent of flooding on main rivers is indicated on the Environment Agency web site and an extract from the indicative flood maps can be seen in Figure 1. The areas of dark blue identify flooding probability of 1 percent (1 in 100 year) and the light blue areas are areas of extreme flood between the 1 percent and 0.1 percent (1 in 1000 year) probability.



Figure 1 Extract from EA Flood Map for Planning (April 2022)

3.1.5 Given the proximity of the site to the predicted flood outline, it is identified on the EA indicative planning flood mapping that the development lies mainly within Flood Zone 1. There are small areas along the western boundary, immediately adjacent to the Logwood Mill Brook, observed to be within Flood Zone 3.

3.1.6 Based on Table 1 of the NPPF the site has a less than very low probability of flooding due to main rivers within the extents outlined within Figure 1.

3.1.7 The information received from the Environment Agency includes a set of predicted fluvial and tidal flood levels for various Annual Event Probabilities (AEP) for the surrounding area. The nearest node points to the site are references ea013_0168_Logwood_059, ea013_0168_Logwood_063 and ea013_0168_Logwood_067 and are located at points along the Logwood Mill Brook. Node WBS01_1801 is located immediately adjacent to the development site.

3.1.8 The Environment Agency flood maps and level data can be found within Appendix G.

3.1.9 The flood levels provided by the EA indicate that the even the 1 in 100 year +70% climate change storm vent does not breach the existing embankment levels on the eastern boundary. The lowest topographical level on the site being 26.21mAOD adjacent to the brook in the south east corner of the site.

Flood Event (years)	Modelled Flood Level (mAOD)		
	ea013_0168_ Logwood_059	ea013_0168_ Logwood_063	ea013_0168_ Logwood_067
1 in 10 (10%)	24.87	23.54	21.37
1 in 25 (4%)	25.02	23.61	21.54
1 in 75 (1.3%)	25.25	23.72	21.78
1 in 100 (1%)	25.32	23.76	21.86
1 in 100 (1%) + 30% CC	25.54	23.93	22.15
1 in 100 (1%) + 35% CC	25.58	23.95	22.20
1 in 100 (1%) + 70% CC	25.75	24.12	22.57
1 in 200 (0.5%)	25.46	23.87	22.04
1 in 1000 (0.1%)	25.79	24.17	22.61

Table 1 EA Modelled Fluvial Flood Heights

3.2 TIDAL OR COASTAL

3.2.1 The site has an anticipated elevational range of 30.00 to 27.00 metres above sea level as shown within the Ordnance Survey mapping extract within Appendix C.

3.2.2 The site is geographically remote from any coastline. The site lies within the North West river basin and the catchment of the Logwood Mill Brook, classified by the Environment Agency as a main river, a tributary of the River Mersey.

3.2.3 The site is indicated by mapping as being remote from the areas at risk of tidal flooding with the existing coastal defences intact or removed.

3.2.4 The site is therefore considered comprehensively free from risk from tidal or coastal flooding effects, being horizontally and vertically remote from such influences at present, and after consideration of climate change effects.

3.3 GROUNDWATER FLOODING

3.3.1 Groundwater flooding occurs as a result of rising water from underlying aquifers or from water flowing from abnormal springs. This tends to occur after long periods of sustained high rainfall, and the areas at most risk are often low-lying where the water table is more likely to be at a shallow depth. Groundwater flooding is known to occur in areas underlain by major aquifers, although it is increasingly being associated with localised floodplain sand and gravels.

3.3.2 The KBMC SFRA does not classify the site as at risk of groundwater flooding.

3.3.3 The Phase 1 ground investigation data indicates the resting ground water level of the site is considered to be 2.8m below existing ground level. Therefore it is considered that the site is at low to medium risk of flooding from groundwater sources.

3.4 ARTIFICIAL WATER BODIES FLOODING

3.4.1 There are no reservoirs within the vicinity of the site.

3.4.2 The nearest water body is the Thrushingham's Lake and is located 275m north east of the development site.

3.4.3 The EA online mapping and SFRA indicates that there are no areas within the vicinity of the site at risk of flooding from reservoirs.

3.4.4 The failure of the water mains running along the Western boundary of the development site is considered statistically remote.

3.4.5 We conclude that the risk of failure of the water main is remote. It must however be noted that for a failure adjacent to the site the nature of the escape and probable pressurized column of water could itself cause some local flood damage, but this is beyond practical mitigation.

3.4.6 The SFRA indicates there have been no recorded historic incidents of flooding due to artificial sources.

3.5 SURFACE WATER FLOODING

3.5.1 Surface water flooding occurs when natural and engineered systems drainage network capacity is exceeded and thus cannot accommodate the volume of rainfall / runoff. Surface water flooding occurs often in urban areas during extreme, high intensity, low duration rainfall events which overwhelm the local surface water drainage systems. In rural areas this type of flooding can occur during medium intensity, long duration events where saturated ground conditions prevent natural infiltration into the subsoils below the surface. Flood water arising from such events is then conveyed above ground following the topography of the surrounding land.

3.5.2 The site is located within the upper reaches of the overall catchment as on the Environment Agency catchment website. The local catchment tends North west to South east towards to the Longwood Mill Brook.

3.5.3 The Environment Agency have modelled locations along critical flow paths and area situated in topographic depressions, which could flood following an extreme rainfall event when drainage capacity has been exceeded. Figure 2 indicates the predicted surface water flood risk map taken from the Environment Agency's website.

3.5.4 SFRA mapping indicates that the site is partially considered to be at risk from the 1 in 200 year storm event. The SFRA mapping can be found within Appendix F.

3.5.5 The majority of the site is considered to be at low risk or very low risk from overland flows by the EA with an area to the eastern boundary, adjacent to the Logwood Mill Brook noted to be medium to high risk.



Figure 2 - Extract from EA Mapping Risk of Surface Water Flooding (April 2022)

3.6 EXISTING SEWER FLOODING

3.6.1 The sewer network surrounding the development is owned and maintained by United Utilities. A copy of the sewer records for the area can be found within Appendix E.

3.6.2 Generally, due to the site levels and those of the surrounding areas it is considered that any breach of the sewers would follow the natural topography of the site and drain towards the Longwood Mill Brook to the eastern boundary. In the event the sewers breached it is anticipated that flows would drain around the building and follow the natural topography towards the Longwood Mill Brook.

3.6.3 The site is recorded as a critical drainage area by the SFRA.

3.6.4 No historic flooding within the vicinity of the site was recorded in the Joint SFRA. It should be noted that the sewerage systems are design to accommodate the 1 in 30 year storm events and thus for storm events above this probability flooding from sewers will occur.

4.0 PROPOSED DEVELOPMENT

4.1 DEVELOPMENT PROPOSALS

4.1.1 The development proposal includes for the construction of 19,116sqm of B8 floor area which will also be accompanied by 190 car parking spaces, 45 trailer spaces and 32 cycle parking spaces. A site location plan is included within Appendix A and the development proposals can be found within Appendix B.

4.1.2 The development site is considered to be within Flood Zone 1.

4.1.3 In line with current guidelines, the finished floor levels for each plot will be set at a minimum of 300m above the existing ground levels.

4.1.4 Due to the nature of the building unit the FFL will be level with the external yard however, to prevent flows from entering the property the levels immediately around the building shall be laid to ensure flow are directed away from the building to ensure that overland flows do not enter the unit.

4.1.5 The current use of the application site is classed as brownfield use, with an impermeable area of 4.368ha (100%) which is currently believed to drain into the Logwood Mill Brook via private drainage headwalls and overland flows.

4.1.6 In accordance with Table 3 of NPPG (2019), a residential land use has a flood vulnerability classification of 'less vulnerable'.

5.0 SURFACE WATER MANAGEMENT

5.1 FLOOD RISK FROM THE DEVELOPMENT

5.1.1 In accordance with NPPG site specific flood risk assessments should consider and assess how runoff from the development will be managed and whether it will increase flood risk elsewhere.

5.1.2 The primary flood risk generated by the new development is likely to be the risk posed by overland surface water flooding due to exceedance of the existing drainage network.

5.2 EXISTING SURFACE WATER DISCHARGE

5.2.1 The existing on site drainage network has not yet been mapped however it is understood that all surface water drainage flows . All existing United Utilities Sewers can be seen in Appendix E.

5.2.2 The existing site is classified as brownfield.

5.2.3 Existing brownfield runoff rates have been calculated for the overall impermeable area of 4.368ha and are also shown below.

- $Q_{1,BR}$ = 607.1 l/s [2.78 x 4.368ha x 50mm/hr]

5.3 CLIMATE CHANGE

5.3.1 National Planning Policy Guidance requires that climate change be incorporated within the surface water drainage design in accordance with The Environment Agency's 'Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities' February 2016 when assessing flood risk for a development.

5.3.2 The design life of the development is beyond 2070, therefore in accordance with the Environment Agency guidance the development should make allowances for an increase in extreme rainfall intensity of an additional 40% when compared to the 1961-1990 baseline.

5.4 PROPOSED SURFACE WATER DRAINAGE STRATEGY

5.4.1 Surface Water runoff from the proposed development should mimic, as far as possible, the surface flows from an undeveloped greenfield site.

5.4.2 Building Regulations 2010 Part H guidance for disposal of surface water is as follows:

- A soakaway or infiltration system, or where not reasonably practical;
- A surface water ditch or watercourse, or where not reasonably practical;
- A below ground sewer

5.4.3 The Phase 1 ground investigation undertaken on the site has confirmed the site to be underlain by alluvium and mudstone. The SFRA data indicates that the site is unlikely to be suitable for use fo SUDS on the site and the groundwater is anticipated to be circa 3.0m below the existing surface levels. Therefore, this report assumes that infiltration would not be suitable for disposal of surface water on the site. However, it is recommended that infiltration testing is undertaken, in accordance with BRE365, to confirm the suitable for shallow infiltration on the site.

5.4.4 The nearest watercourse to the site is the Logwood Mill Brook, which lies to the eastern boundary of the site. A connection to the watercourse would be feasible given the topographical level recorded on the site.

5.4.5 The United Utilities mapping indicates that there nearest surface water sewer is the Ø1200 sewer located within the site extents to the north which outfalls into the Logwood Mill Brook immediately east of the site. The site also contains existing private drainage and headwall which currently outfall into the Logwood Mill Brook. The ownership of these drains will be the land owners and therefore both the private drains and sewers present an opportunity to connect to the watercourse without the disruptive works to the Logwood Mill Brook which would be involved with the construction of another headwall. However, if an new headwall is required consultation with the EA should be undertaken at an early stage.

5.4.6 Therefore, surface water disposal by the means of treatment and detention prior to controlled release into the sewers and private drainage network immediately upstream of the outfall into the Logwood Mill Brook is deemed the most appropriate solution.

5.4.7 Existing greenfield runoff rates have been calculated for the development area and can be found within Appendix G and are also shown below.

Storm Event	(l/s)
$Q_{BAR,GR}$	26.54
$Q_{1,GR}$	23.09
$Q_{30,GR}$	45.12
$Q_{100,GR}$	55.20

Table 2 Greenfield Runoff Rates

5.4.8 The development area of the site is 4.368 hectares, and it is proposed that 100% of the development will be impermeable and require collecting and attenuating prior to discharge. The above areas are based on the current site layout available contained within Appendix B.

5.4.9 It is currently proposed that the drains within the site will remain under private ownership.

5.4.10 It is proposed that the surface water from the development will be controlled using a flow control prior to discharge into the existing drainage within the site, and ultimately into the Logwood Mill Brook. At this stage it is envisaged that two discharge points will be utilised. The first will be for the building and hardstanding associated with the yard, the second will be to the south eastern corner of the site and will be associated with part of the building and the staff car parking area.

5.4.11 A copy of the Drainage Strategy can be found within Appendix I.

5.5 PROPOSED SURFACE WATER DISCHARGE

5.5.1 Surface water drainage will be provided in a new below ground gravity drains constructed around the unit and in the hardstanding areas mirroring the existing runoff arrangement with surplus flows being attenuated using both voided stone tanks below permeable paving and cellular attenuation crates to the staff car parking area. The external yard shall be treated via a petrol interceptor and attenuated using cellular crates prior to discharge via a flow control. All cellular tanks shall incorporate a clean stone treatment trench to polish all runoff through the attenuation tanks.

5.5.2 The proposed surface water runoff rates for each parcel will match the existing greenfield runoff rates and are shown below.

Storm Event	(l/s)
$Q_{1,PR}$	26.54
$Q_{30,PR}$	26.54
$Q_{100+40\%cc,PR}$	26.54

5.5.3 This rate has been set at the existing QBAR greenfield runoff rates to mimic the natural undeveloped state and represents a 96% reduction in runoff rate when compared the current on site arrangement. This rate is subject to approval from the LLFA / EA.

5.5.4 By controlling the discharge rate from the site for a 1in100 year + 40% storm event greenfield runoff rates the site is offering a betterment to the downstream network by utilising on site flood storage at an earlier stage in the overall river catchment potentially reducing flooding downstream.

5.5.5 All sewers and drainage are to be constructed in accordance with all relevant industry standards, including but not limited to:

- Building Regulations Approved Document Part H 2010
- Sector Guidance in relation to the adoption of sewerage assets by sewerage companies in England

5.5.6 The drawings & schedules of the as-built site drainage system are to be made available to the building occupier to enable drainage maintenance and future works to be undertaken.

5.6 CONSIDERATION OF SUDS

5.6.1 With reference to CIRIA 753 and the surface water treatment process, the provision of permeable block paving in conjunction with the voided stone will aid in the removal of sediment, hydrocarbons and heavy metals. All runoff from roofs and hardstand will be drained into voided stone treatment trench below the cellular attenuation and catch pits prior to connection into the Longwood Mill Brook. Permeable paved parking bays to the staff car parking will provide additional treatment to vehicle areas.

5.6.2 Both the Environment Agency and Leicestershire County Council require Sustainable Drainage (SuDS) techniques to be incorporated within new developments where possible.

5.6.3 Consideration should therefore be given to the use of the Sustainable Urban Drainage Systems. Table 2 below gives commentary in relation to the suitability of SuDS techniques for the proposed development.

SUDS Technique	Commentary	Suitability
Green Roof	Due to the large roof size and pitched nature of roofs within the development, the option of incorporating green roofs into the development is not suitable for this site.	No
Infiltration by Soakaway	Historic borehole logs have been provided but no current ground investigation has been made available, it is anticipated that groundwater exists 3.0m below existing ground level, therefore it is assumed that soakaways are not a suitable method for disposal of runoff	No
Water Butt	Storage of roof runoff via the use of water butts does not have the potential to be utilised due to the large roof area compared to the re-use opportunity	No
Filter Strip	The is no potential, due to the limited site area	No
Infiltration Trench/Filter Trench	There is no suitable area within the site for infiltration trenches/filter trenches	No
Swale	The is no potential, due to the limited site area	No
Bio-retention	There is limited areas for this to be sited, and concerns over maintenance by the owners.	No
Permeable Paving	Permeable paving has been used across within staff parking areas provide both treatment of hydrocarbons and storage.	Yes
Geocellular/modular system	Geocellular system is required in conjunction with permeable paving with voided stone below.	Yes
Infiltration Basin	It cannot be confirmed as to whether this is viable due to no infiltration testing having yet been undertaken	No
Detention Basin	It is not viable or practical to accommodate detention basins on site as there are no extensive large open soft landscaped areas to accommodate these.	No
Pond	Similarly to detention basins, there is no feasible position for such a feature	No
Stormwater Wetland	It is not viable or practical to accommodate stormwater wetland on site as there are no extensive large open soft landscaped area to accommodate this.	No

Table 3 - SuDS Consideration Table

5.6.4 The table above identifies that due to site constraints, the most feasible method for providing SuDS is to utilise lined permeable paving and a cellular tank.

5.6.5 Staff vehicle parking bays areas will be formed in Type 3 permeable paving before collection within cellular attenuation tanks and controlled discharge into the private drainage network. The discharge from these parking bays will be controlled using orifice plate manholes. Each aperture will have a wire mesh fitting to prevent blockage of the openings.

5.6.6 Permeable paved areas will be drained via catchpits and filter drains within the voided stone sub base. This will allow the first 5mm of rainfall is proposed to be held within the proposed catch pits of the development along with wetting of materials. The permeable paving filter drains will also allow water to collect within the stone surround of the pipe to ensure the first 5mm is retained on site and lost through infiltration or evapotranspiration.

5.6.7 The site utilises treatment trenches below cellular crates and Type C permeable paving to achieve water quality improvements through the use of SuDS. A basin is not considered appropriate on this site due proximity of the watercourse and also the depth of existing groundwater observed on site. Green roofs have also been considered however to due to pitched nature of the roof proposed are not considered appropriate for this site.

5.7 ATTENUATION PROPOSALS

5.7.1 In accordance with current design guidelines the attenuation volume for a site should be calculated based on a 1 in 100 year + climate change allowance.

5.7.2 It is proposed that roof areas are to be collected and drained through below ground drains into cellular attenuation crates prior to being attenuated within cellular attenuation before being discharged into the Longwood Mill Brook.

5.7.3 The external yard shall be drained via below ground drains, and a petrol interceptor into ceulluar crates prior to controlled discharge into the brook.

5.7.4 Hydraulic modelling of the drainage network has been undertaken using industry recognised software to confirm the drainage design suitability and these calculations can be found within Appendix I.

5.8 MAINTENANCE

5.8.1 At this stage it has been assumed that a management company will maintain the drainage elements as outlined within this report.

5.8.2 Future maintenance schedules for the SuDS features have been provided within Appendix K.

5.8.3 The drawings and schedules of the as built drainage are to be made available to the building owner to enable drainage maintenance and future works to be undertaken.

5.8.4 At this stage, the maintenance company has not yet been appointed and as such the applicant will be responsible until such time as they are appointed. Once appointed the contact details will be provided to the LLFA for records.

5.9 EXCEEDANCE FLOWS

5.9.1 Exceedance flows are to be contained within the site and directed away from buildings towards the areas of hardstanding and landscaping. To limit the uncontrolled runoff into the brook, the external yard area shall have a kerb upstand to ensure that the first 125mm of exceedance flow is contained within the site extents.

5.9.2 The intention is to direct flows away from the building due to the building requirement for level FFL and external yard areas.

5.9.3 Exceedance flow routes can be seen on the drainage strategy drawing within Appendix I.

5.10 CONSTRUCTION SEQUENCING

5.10.1 The drainage and attenuation tanks are to be constructed at the start of the programme to ensure that runoff is controlled from the site throughout the duration of the works. This will minimise the impact of the development at the start of the project potentially lessening the effects of flooding on downstream properties.

5.10.2 Protection is to be provided to the watercourse through the lifetime of the works and the drainage outfalls are to have mesh grillage installed during the construction phase to prevent the entry of construction debris entering the watercourse network. Indicative mitigation measures to the eastern boundary include for the provision of a temporary filter drain or hay bales to prevent construction waste entering the watercourse.

5.11 DRAINAGE SUMMARY

5.11.1 The proposed surface water drainage system can be summarised as follows:

- Surface water runoff from the site will be conveyed by pipes, stored within cellular storage, then discharged into the Longwood Mill Brook at existing greenfield runoff rates.
- The intention is to utilise permeable paving in conjunction with catch pits and voided stone to staff car parking areas, with the intention of trapping, filtering and removing hydrocarbons by biodegradation in line with CIRIA reports C753, C609 & C582 and 'Pollution Prevention Guideline' PPG3 (Environment Agency, 2006) guidance.
- Use of petrol interceptor to the yard hardstanding to trap and filter hydrocarbons and pollutants to prevent them from entering the watercourse
- Use of cellular attenuation to store runoff volumes in extreme storm events up to the 1 in 100 year +40% climate change storm event.

6.0 FOUL WATER DRAINAGE STRATEGY

6.1 FOUL WATER DRAINAGE DESIGN

6.1.1 It is proposed that foul water drainage will be conveyed from the development by below ground private gravity drains prior to connection into the existing United Utilities combined sewers located along the western boundary of the site within Wilson Road.

6.1.2 Where available any existing connections into the sewer shall be utilised.

7.0 FLOOD MITIGATION STRATEGY

7.1 PRINCIPLES FOR MITIGATION STRATEGY

7.1.1 In accordance with Table 3 of NPPG (2019), a industrial land use has a flood vulnerability classification of 'less vulnerable'.

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

Table 4 - Extract from NPPG 2019 (Table 3)

✓ Denotes Development is appropriate

× Development should not be permitted

7.1.2 The findings of the FRA indicate that the site is located within FZ1. Development is to be located within FZ1 and thus deemed appropriate for development in accordance with NPPG.

7.1.3 The findings of the FRA indicate that the development may be susceptible to surface water flooding from the north when considering the impacts of climate change. As such, the following mitigation measures should be introduced to protect the parcel for its lifetime.

- Linear drains are to be provided to all level access points to the building
- Levels are to be set such that a minimum fall away from the building of 1 in 60 is achieved for a distance of at least 5m from the face of the building
- Raised electrical sockets and meters set a minimum of 600mm above the proposed FFL should be implemented along with the use of plastic or stainless-steel fixtures for longevity.

7.1.4 The drainage design should account for any residual risk of flooding from surface water as a result of exceedance events.

7.1.5 The drainage has been designed to accommodate a surcharge outfall such that in extreme storm event the drainage system can accommodate the runoff.

7.2 SEQUENTIAL APPROACH

7.2.1 The site is located within Flood Zone 1 and the building has been positioned where possible outside of the proposed surface water flood extents to ensure a sequential approach is taken by trying to position buildings as far away from the source of flooding as practical.

7.3 FINISHED FLOOR LEVELS

7.3.1 Floor levels should be set such that they are a minimum of 300mm above the existing site levels.

7.4 SAFE ACCESS

7.4.1 In accordance with current guidance and DEFRA FD2320 safe access is to be provided for residents in the event of flooding. Where safe access cannot be provided measures are to be implemented to ensure the residents' safety until the emergency services have been able to reach them.

7.4.2 The EA online mapping indicates that the site access lies within FZ1 have therefore has a low probability of flooding. The access points lie outside the mapped extents of flooding caused by rivers and seas but Wilson Road is identified as a mixture of low to medium risk of flooding due to surface water overland flows. The mapping indicates that the access will encounter a flood depth of up to 300mm with flows less than 0.25m/s. The mapping also indicates this is likely to be retained within the carriageway.

7.4.3 In accordance with DEFRA FD2320 Table 13.1 shown in Figure 3 a flood depth of 300mm with a velocity of 0.25m/s would represent a danger to some, meaning the majority of users would be able to access and egress the site in all storm events with only the more vulnerable required to maintain a stay put approach.

Table 13.1 Danger to people for different combinations of depth and velocity

Velocity (m/s)	Depth of flooding (m)											
	0.05	0.10	0.20	0.30	0.40	0.50	0.60	0.80	1.00	1.50	2.00	2.50
0.00												
0.10												
0.25												
0.50												
1.00												
1.50												
2.00												
2.50												
3.00												
3.50												
4.00												
4.50												
5.00												

Key:
- Danger for some
- Danger for most
- Danger for all

Figure 3 - Extract from DEFRA FD2320 showing Table 13.1

7.4.4 In extreme flood events above the 1 in 1000-year (0.1%) storm event the development would operate a 'stay put' approach in extreme flooding events for residents categorised as more vulnerable. They would be advised to stay within the development and await assistance from emergency services.

7.5 FLOOD WARNING & EVACUATION

7.5.1 Whilst the site is considered to have a low probability of flooding from all sources, and a stay put approach can be adopted, access and egress from the site in storm events above the 1 in 100 year probability will impact on the ability of some users to be able to access / egress the site. Therefore it is important that all users of the development are made aware of the flood warning procedures

7.5.2 By utilising the flood warning systems available it is anticipated that the residents will be able to egress from the site in a safe manner in advance of an extreme (1.0 – 0.1 percent probability) storm event occurring.

7.5.3 Flood warnings are published by the Met Office can be found here:

https://flood-warning-information.service.gov.uk/warnings

7.5.4 The Met Office Flood Forecasting Centre in conjunction with the Environment Agency publishes Flood Guidance Statements containing:

- General overview of the flood risk
- Assessment of the flood risk
- Weather warnings and flood warnings
- Specific area of concern map

7.5.5 The Met Office uses a Flood Risk Matrix (see Figure 4) to assess the likelihood against the potential impact and assigns a risk colour and level.

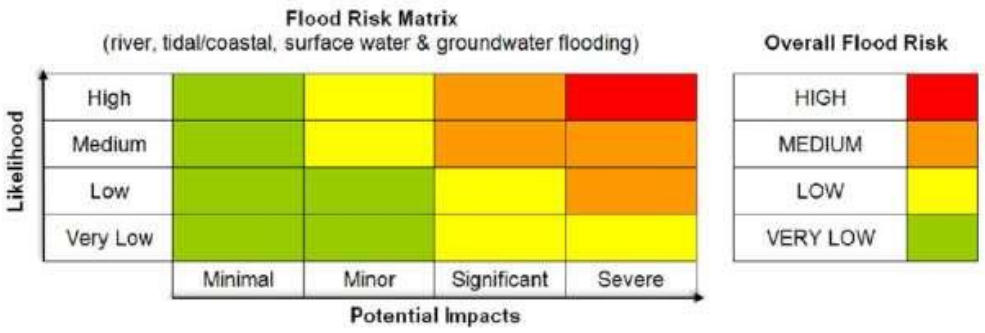


Figure 4 - Flood Risk Matrix

7.5.6 Typical examples of impacts from flooding aligned with the flood risk matrix are shown in Table 4.

Flood Impacts Table			
Minimal Impacts	Minor Impacts	Significant Impacts	Severe Impacts
Generally, no impact, however there may still be Isolated and minor flooding of low-lying land and roads Isolated instances of spray/wave overtopping on coastal promenades Little or no disruption to travel although wet road surfaces could lead to difficult driving conditions	Localised flooding of land and roads – risk of aquaplaning Localised flooding could affect individual properties Individual properties in coastal location affected by spray and/or wave overtopping Localised disruption to key sites identified in flood plans (e.g. Railways, utilities) Local disruption to travel – longer journey times	Flooding affecting properties and parts of communities Damage to buildings/structures is possible Possible danger to life due to fast flowing/deep water/wave overtopping/wave inundation Disruption to key sites identified in flood plains (e.g. railways, utilities, hospitals) Disruption to travel is expected. A number of roads are likely to be closed	Widespread flooding affecting significant numbers of properties and whole communities Collapse of buildings/structures is possible Danger to life due to fat flowing/deep water/wave overtopping/wave inundation Widespread disruption or loss of infrastructure identified in flood plans (e.g. railways, utilities, hospitals) Large scale evacuation of properties may be required Severe disruption to travel. Risk of motorists becoming stranded.

Table 5 - Flood Impact Table

7.5.7 The Environment Agency constantly monitors rainfall, river levels and sea conditions to forecast the possibility of flooding. If necessary, the Environment Agency can be contacted:

Incident hotline 0800 80 70 60 (24hrs)

Floodline 0345 988 1188

7.5.8 The Environment Agency Flood Warning Levels:

Warning type		Meaning	When it is used
	**Flood Alert**	Flooding is possible. Be prepared.	Two hours to two days in advance of flooding
	**Flood Warning**	Flooding is expected. Immediate action required	Half an hour to one day in advance of flooding
	**Severe Flood Warning**	Severe Flooding. Danger to life.	When flooding poses a significant threat to life.

Table 6 - Environment Agency Flood Warning Levels

8.0 SEQUENTIAL AND EXCEPTION TESTS

8.1 SEQUENTIAL TEST

8.1.1 For clarity the aim of the sequential test is to steer new development to areas with the lowest probability of flooding. Furthermore, approval of the Sequential Test lies with the Local Planning Authority.

8.1.2 The NPPF indicates that for a less vulnerable land use within Flood Zone 1, development is appropriate. Environment Agency mapping and the Strategic Flood Risk Assessment both indicate that the majority of the site lies within Flood Zones 1.

8.1.3 The site is in an existing suburban area with prominent industrial class buildings within the vicinity of the site.

8.1.4 In view of the facts as identified the applicant does not own other sites considered to be more suitable for use for residential development in the immediate vicinity.

8.1.5 The above clearly demonstrates that the sequential test would be satisfied provided it can be demonstrated that flood water will not pose excessive risk to the development, safe ingress and egress can be created and the development will not increase risk of flooding elsewhere.

8.1.6 The NPPF defines what type of development is appropriate in an individual location and seeks to guide development generally away from areas of flood risk. It nevertheless accepts implicitly that some development in areas of higher potential risk may be appropriate or indeed essential, and seeks to classify zones of risk, types of development and development suitability.

8.2 EXCEPTION TEST

8.2.1 Table 3 within the NPPF indicates that the site is appropriate for use as a more vulnerable land use due to the site being within Flood Zones 1.

8.2.2 Wider sustainable benefits to the community include:

- Potential for reduced risk of flooding elsewhere by increasing flood storage volume within the site
- Reduction in surface water runoff when compared to the existing situation delaying discharge into the watercourse and potentially providing a betterment downstream
- Better use of existing land within a built-up residential area

The FRA demonstrates safety and flooding sustainability by:

- Maintaining floor levels above the existing site levels to limit the effects of flood water on the properties
- Controlling runoff on site to delay the discharge into the sewer network
- Safe ingress and egress routes for pedestrians being available from the properties to the surrounding highways.

8.2.3 There will be a significant reduction in the level of surface water runoff rate over the current land use.

8.2.4 In view of the above the exception test is deemed to have passed.

9.0 CONCLUSIONS

9.1 CONCLUSIONS

9.1.1 The site proposed for development is free of potential risk of flooding from tidal events.

9.1.2 The site is outside the extents of the mapped flood plain of main river systems while being classified as a very low risk area.

9.1.3 The site is at low risk of flooding from overland flow routing from surface water.

9.1.4 The site is at a low susceptibility of flooding from groundwater sources.

9.1.5 The site is at no risk of flooding from manmade lakes.

9.1.6 The escape flow route from the strategic water mains has also been considered. In the unlikely event of failure of the mains the flows would not reach the properties.

9.1.7 The site is at no risk of flooding from existing sewerage systems for the same reason as the water mains issue.

9.1.8 Adequate levels of treatment to the surface water runoff prior to discharge into the brook thus improving water quality.

The proposed surface water discharge rate matches the undeveloped greenfield runoff rates for the 1in100 year + 40% climate change combined with the use of above ground SUDS will treat and delay runoff entering the watercourse network, thus providing a 96% betterment when compared to the existing runoff arrangement

9.1.9 The site is at a negligible risk of flooding from its own private drainage systems; however, this can be mitigated against by regular maintenance in accordance with the maintenance strategy provided within this report and channelling of flows within the development away from the building.

9.1.10 We therefore conclude the application site lies within Flood Zone 1 as defined in the NPPF Table 1 and less vulnerable development use should be permitted.

APPENDICES

APPENDIX A – SITE LOCATION PLAN

Farrow Walsh Consulting Limited

SITE LOCATION PLAN

FW2197 35 Wilson Rd, Liverpool, L36 6AE

X 345762 Y 389921

Site Location – Aerial Photograph



Site Location – Road Map



APPENDIX B – DEVELOPMENT PROPOSALS

N

0 10 20 30 40 50m

Scale 1:1250



NOTES AEWTP029C

- All dimensions and levels are to be checked on site.
- Any discrepancies are to be reported to the architect before any work commences
- This drawing shall not be scaled to ascertain any dimensions. Work to figured dimensions only.
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- All works are to be undertaken in accordance with Building Regulations and the latest British Standards.
- All proprietary materials and products are to be used strictly in accordance with the manufacturers recommendations.

CDM 2015

Client notified of duties:

Principal Designer:

Unless noted below, all known hazards have been highlighted on the drawing:

DESIGN HAZARD IDENTIFICATION

- No significant Hazards have been identifed in this drawing

NOTES

- HGV circulation subject to tracking analysis

REV	Date	Drawn by: -	Checked by: -
P2	11/04/22	CM	AL
Revised issue indicating pedestrain route			
P1	24/03/22	CM	AL
Initial Issue			

Status: S2 — Purpose of Issue: For Comment

drawing stage: **Feasibility**

client: **Linden Hill Capital Management**

project: **35 Wilson Road Huyton**

drawing title: **Feasibility Site Plan Option 5 Alternative Single Unit**

date 24/03/22 drawn CM

scale@A3 1:1250 checked AL

Rev **P2**

Job No **12156-AEW-XX-XX-DR-A-0006**

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APPENDIX C – TOPOGRAPHICAL SURVEY

NOTES

GENERAL NOTES :-

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GRID COORDINATES ARE ORDNANCE SURVEY NATIONAL GRID DERIVED FROM GPS TRANSFORMATION.
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TREE SPECIES SHOULD BE CONFIRMED BY TREE SPECIALIST IF CRITICAL.

OVERHEAD CABLES ARE INDICATED USING REMOTE SURVEY METHODS AND ARE SUBJECT TO SEASONAL VARIATION, AND SHOULD BE TREATED AS APPROXIMATE

SERVICE COVERS LOCATED UNDER PARKED VEHICLES/MOBILE STRUCTURES MAYBE OMITTED.

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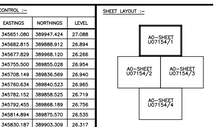
TOPOGRAPHICAL SURVEY/UTILITY KEY :-

(Ht) – height
⊕ – bollard
⊕ – gas trap
a/g – above ground
a/r – assumed route
av – air valve
bc – beacon – beacon
bd – back drop
bl – bed level
bld – bollard
bo – bottom of shaft
brz – breeze
c/b fence – closeboard fence
c/box – control box
c/wire – cable television
cl – cover level
con. – conifer
cot – cottage
cwr – combined water sewer
d/chan – drainage channel
ejb – electric junction box
elec – electric
f/pole – flagpole brace
ep – electric pole
er – earth rod
f/bed – flower bed
fh – fire hydrant
fl – flow level
fs – fire switch
fwc – foul water sewer
gl – gully
g/run – gully run
gr – gas riser
h/chestnut – horse chestnut
h/thorn – hawthorn
ic – inspection cover
il – invert level
ill – illuminated
lamp – lamp post
lp – lamp post
mh – manhole cover
mkr – marker
o/h – over head
ol – off lot
os – survey area
OSBM – ordnance survey bench mark
p & r fence – post & rail fence
pit – pit depth
pr – pipe riser
ptg – pipe to ground
pts – pipe to surface
re – rodding eye
rw – retaining wall
rs – road sign
rwp – rain water pipe
s/birch – silver birch
s/p – safety paving
sb – set back
sec fence – security fence
sfc – soil filled chamber
sl – sump level
sp – soil pipe
st – stop tap
sv – stop valve
svp – soil vent pipe
sws – storm water sewer
TBM – temporary bench mark
tfr – token from records
tl – tree level
toc – top of cap
top – top of pipe
tos – top of slab
tp – telecom pole
ts – traffic signal
t/a – trench scar
u/s – underside
ug – under ground
utr – unable to rod
uts – unable to survey
utt – unable to trace
vp – vent pipe
wfc – water filled chamber
wl – water level
wm – water meter
wp – waste pipe
wr – water riser

SURVEY CONTROL :-

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	345651.080	389947.424	27.088
ST02	345682.815	389888.912	26.894
ST03	345677.829	389868.120	26.266
ST04	345755.500	389855.028	26.954
ST05	345708.149	389836.569	26.940
ST06	345760.634	389840.523	26.985
ST07	345782.152	389858.525	26.719
ST08	345792.455	389868.189	26.756
ST09	345814.894	389875.370	26.535
ST10	345830.187	389903.309	26.317
ST11	345819.768	389940.519	26.319
ST12	345805.117	389915.958	26.468
ST13	345810.982	389906.520	26.456
ST14	345792.903	389948.825	26.433
ST15	345779.743	389987.837	26.397
ST16	345843.763	389968.071	26.581
ST17	345842.387	389994.338	26.888
ST18	345835.704	390011.482	27.135
ST19	345820.317	390025.488	27.303
ST20	345810.053	390039.536	27.469
ST21	345736.731	389987.601	26.244
ST22	345738.261	390034.804	26.493
ST23	345767.437	390068.134	27.157
ST24	345709.044	390035.761	26.009
ST25	345784.572	390119.209	27.119
ST26	345689.309	389933.035	26.060
ST27	345713.100	389986.747	26.150

SHEET LAYOUT :-



UTILITY SURVEY KEY :-

HATCHED AREA
BOREHOLE
CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

ELECTRIC CABLE
WATER PIPE
FOUL SEWER
STORM SEWER
COMBINED SEWER
DUCTS
UNKNOWN TELEVISION
DATA CABLE
TELECOM CABLE
GAS PIPE
UNIDENTIFIED SERVICE
OTHER
CCTV
TRAFFIC LIGHT
OFFSET FILL
VENT
SOIL PIPE
GAUGE LINES
PIPE
ASSUMED ROUTE
TAKEN FROM RECORDS

DISCLAIMER :-

Electromagnetic techniques have been used in the location of underground services. The results are not infallible and trial excavations should be carried out to confirm service identification, positions and particularly depths, where these are critical. The completeness of the underground services information cannot be guaranteed.

This method of survey does not differentiate between live and dead services, and as such all services should be treated as live. This drawing may not include the location of all public services that may cross the site, therefore the relevant service drawings must be obtained from the appropriate utility company and used in conjunction with this drawing.

Private service pipes and cables in highways are not shown, but there presence should be anticipated.

Additional below ground structures or obstructions not shown on this drawing may be present. Reference should be made to historical plans and as-built drawings. Excavations in the vicinity of services should be carried out with due diligence ref: HSG47 document avoiding dangers from underground services

Please note that factors such as ground conditions, proximity of other utilities, material and method of construction have an influence on the quality of the data collected on site.

TSA Standards – "Even an appropriate and professionally executed survey may not be able to achieve a 100% detection rate."

UTILITY NOTES

NORTH



0 2 4 8 12 16 20

MIDLAND SURVEY LTD

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www.midlandsurvey.co.uk

Client	JOMAS ASSOCIATES
Project	INTERNATIONAL HOUSE, 35 WILSON ROAD, HUYTON BUSINESS PARK, LIVERPOOL
Title	TOPOGRAPHICAL SURVEY
Date	FEBRUARY 2022
Scale	1:200@A0
Dwg No	U07154/1
Surveyor	T.J.
Checked	J.C.

Revisions

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING

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NOTES

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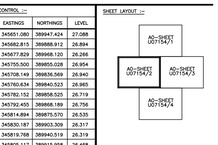
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bd = back drop
bl = bed level
bot = bottom
bs = bottom of shaft
btr = betula
c/b fence = closeboard fence
c/box = control box
cl = centre line of television
cl = cover level
con. = conifer
cov = covered
cwv = concreted water sewer
d/chan = drainage channel
ejb = electric junction box
elec = electric
f/p = flower pot brace
ep = electric pole
er = earth rod
f/bed = flower bed
fh = fire hydrant
fl = floor level
fs = fire switch
fws = foul water sewer
g = gully
g/run = gully run
gr = gas riser
h/chestnut = horse chestnut
h/thorn = hawthorn
ic = inspection cover
il = invert level
ill = illuminated
lamp = lamp post
lp = lamp post
mh = manhole cover
mkr = marker
o/h = over head
ol = off let
OSGB = ordnance survey
OSBM = ordnance survey bench mark
p & r fence = post & rail fence
pit = pit depth
pr = pipe riser
pts = pipe to ground
pts = pipe to surface
re = rodding eye
rw = retaining wall
rs = road sign
rwp = rain water pipe
s/birch = silver birch
s/p = safety paving
sb = stop block
sec fence = security fence
sfc = soil filled chamber
sl = sign light
sp = soil pipe
st = stop tap
sv = stop valve
svp = soil vent pipe
sws = storm water sewer
TBM = temporary bench mark
tfr = token from records
tl = traffic light
toc = top of cap
top = top of pipe
tos = top of slab
tp = telecom pole
ts = traffic signal
t/a = trench scar
u/s = underside
u/g = under ground
utr = unable to rod
uts = unable to survey
utt = unable to trace
vp = vent pipe
wfc = water filled chamber
wl = water level
wm = water meter
wp = waste pipe
wr = water riser

SURVEY CONTROL :-

STATION	EASTINGS	NORTHINGS	LEVEL
ST01	345651.080	389947.424	27.088
ST02	345682.815	389888.912	26.894
ST03	345677.829	389848.120	26.266
ST04	345755.500	389855.028	26.954
ST05	345708.149	389836.569	26.940
ST06	345760.634	389840.523	26.985
ST07	345782.152	389858.525	26.719
ST08	345792.455	389868.189	26.756
ST09	345814.894	389875.370	26.535
ST10	345830.187	389903.309	26.317
ST11	345819.768	389940.519	26.319
ST12	345805.117	389915.958	26.468
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ST22	345738.261	390034.804	26.493
ST23	345767.437	390068.134	27.157
ST24	345709.044	390035.761	26.009
ST25	345784.572	390119.209	27.119
ST26	345689.309	389933.035	26.060
ST27	345713.100	389986.747	26.150

SHEET LAYOUT :-



UTILITY SURVEY KEY :-

HATCHED AREA
BOREHOLE
CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

ELECTRIC CABLE
WATER PIPE
FOUL SEWER
STORM SEWER
COMBINED SEWER
DUCTS
TELEVISION
DATA CABLE
TELECOM CABLE
GAS PIPE
UNIDENTIFIED SERVICE
OTHER
CCTV
TRAFFIC LIGHT
OFFSET FILL
VENT
FUEL PIPE
GAUGE LINES
PIPE
ASSUMED ROUTE
TAKEN FROM RECORDS

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This method of survey does not differentiate between live and dead services, and as such all services should be treated as live. This drawing may not include the location of all services in the area and the use of a cable locating device is recommended. It should be utilized from the appropriate utility company and used in conjunction with this drawing.

Private service pipes and cables in highways are not shown, but there presence should be anticipated.

Additional below ground structures or obstructions not shown on this drawing may be present. Reference should be made to historical plans and as-built drawings. Authorities should be consulted and the relevant clauses of the HSG47 Avoidance net: HSG47 document avoiding dangers from underground services

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UTILITY NOTES

NORTH

0 2 4 8 12 16 20

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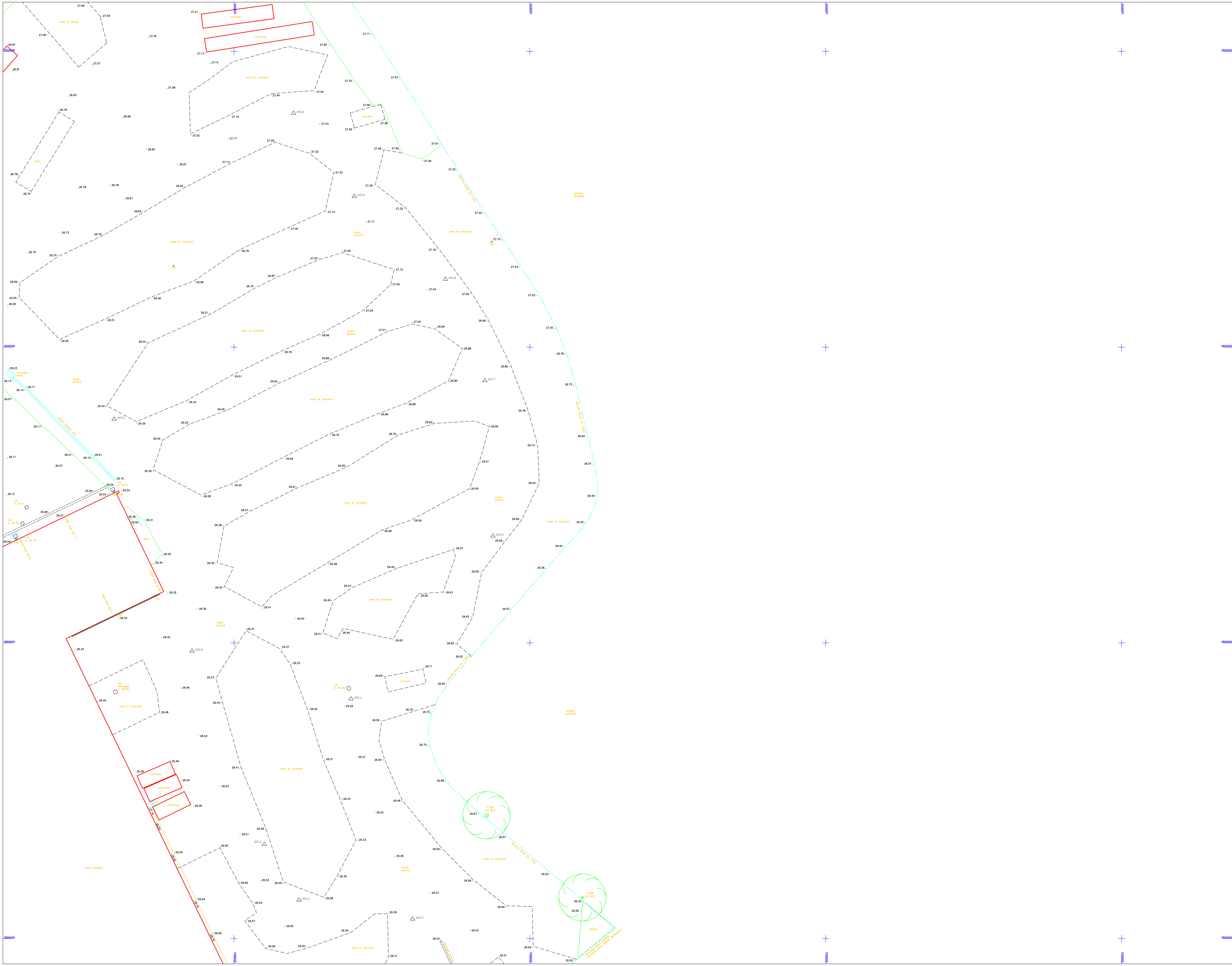
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Tel: 01926 810811 Fax 01926 810812
E-Mail: mail@midlandsurvey.co.uk
www.midlandsurvey.co.uk

Client	JONAS ASSOCIATES
Project	INTERNATIONAL HOUSE, 35 WILSON ROAD, HUYTON BUSINESS PARK, LIVERPOOL
Title	TOPOGRAPHICAL SURVEY
Date	FEBRUARY 2022
Scale	1:200@A0
Dwg No	U07154/2
Surveyor	T.J.
Checked	J.C.

Revisions

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING

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NOTES

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SERVICE COVERS INDICATED WHERE VISIBLE. PIPE INVERTS / DETAILS SURVEYED FROM SURFACE INSPECTION ONLY. GENERALLY DAMAGED COVERS AND COVERS WITHIN HIGHWAYS WILL NOT BE LIFTED

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(ht) – height
ø – diameter
● – pea trap
a/g – above ground
a/r – assumed route
av – air valve
bb – belisha beacon
bd – back drop
bl – bed level
boll – bollard
bos – bottom of shaft
bt – telecom
c/b fence – closeboard fence
c/box – control box
catv – cable television
cl – cover level
con – conifer
cr – cable riser
cws – combined water sewer
d/chan – drainage channel
ejb – electric junction box
elec – electric
eot – end of trace
ep – electric pole
er – earth rod
f/bed – flower bed
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fws – foul water sewer
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gr – gas riser
h/chestnut – horse chestnut
h/thorn – hawthorn
ic – inspection cover
il – invert level
ill – illuminated
int – interceptor
lp – lamp post
mh – manhole cover
mkr – marker
o/h – over head
ol – off let
osa – off survey area
OSBM – ordnance survey bench mark
p & r fence – post & rail fence
pd – pit depth
pr – pipe riser
ptg – pipe to ground
pts – pipe to surface
re – rodding eye
ret wall – retaining wall
rs – road sign
rwp – rain water pipe
s/birch – silver birch
s/p – safety paving
sap – sapling
sec fence – security fence
sfc – soil filled chamber
sl – spot light
sp – soil pipe
st – stop tap
sv – stop valve
svp – soil vent pipe
sws – storm water sewer
TBM – temporary bench mark
tfr – taken from records
tl – threshold level
toc – top of cap
top – top of pipe
tot – top of tank
tp – telecom pole
ts – traffic signal
t/s – trench scar
u/s – underside
utl – unable to lift
utr – unable to rod
uts – unable to survey
utt – unable to trace
vp – vent pipe
wfc – water filled chamber
wl – water level
wm – water meter
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SURVEY CONTROL :–

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ST26	345689.309	389933.035	26.060
ST27	345713.100	389986.747	26.150

SHEET LAYOUT :–

A0–SHEET U07154/1
A0–SHEET U07154/2
A0–SHEET U07154/3
A0–SHEET U07154/4

UTILITY SURVEY KEY :–

HATCHED AREA
BOREHOLE
CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

ELECTRIC CABLE
WATER PIPE
FOUL SEWER
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UTILITY NOTES

NORTH

0 2 4 8 12 16 20

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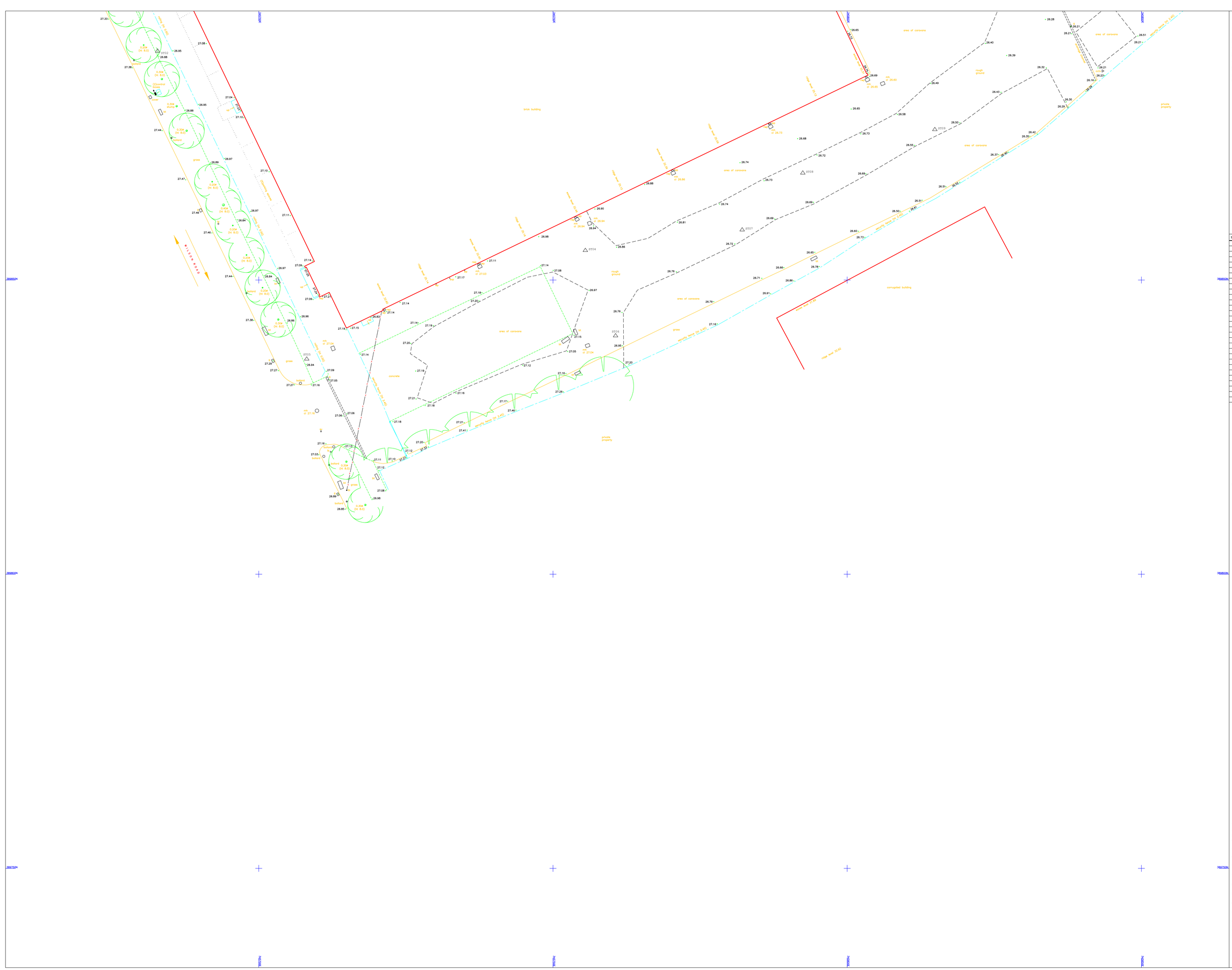
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Tel: 01926 810811 Fax 01926 810812
E–Mail: mail@midlandsurvey.co.uk
www.midlandsurvey.co.uk

Client	JOMAS ASSOCIATES
Project	INTERNATIONAL HOUSE, 35 WILSON ROAD, HUYTON BUSINESS PARK, LIVERPOOL
Title	TOPOGRAPHICAL SURVEY
Date	FEBRUARY 2022
Scale	1:200@A0
Dwg No	U07154/3
Surveyor	T.J.
Checked	J.C.

Revisions

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING

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cl – cover level
con. – conifer
cov – covered
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d/chan – drainage channel
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ST27	345713.100	389986.747	26.150

SHEET LAYOUT :–

AO–SHEET U07154/1
AO–SHEET U07154/2
AO–SHEET U07154/3
AO–SHEET U07154/4

UTILITY SURVEY KEY :–

HATCHED AREA
BOREHOLE
CPT
TRIAL PIT
HAND PIT
WINDOW SAMPLE

ELECTRIC CABLE
WATER PIPE
FOUL SEWER
STORM SEWER
COMBINED SEWER
DUCTS
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UTILITY NOTES

NORTH

0 2 4 8 12 16 20

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Client	JONAS ASSOCIATES
Project	INTERNATIONAL HOUSE, 35 WILSON ROAD, HUYTON BUSINESS PARK, LIVERPOOL
Title	TOPOGRAPHICAL SURVEY
Date	FEBRUARY 2022
Scale	1:200@AO
Dwg No	U07154/4
Surveyor	T.J.
Checked	J.C.

Revisions

TOPOGRAPHICAL (LAND) SURVEYORS / UTILITY SURVEYORS
BUILDING MEASUREMENT SURVEYORS / 3D LASER SCANNING

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APPENDIX D – GROUND INVESTIGATION EXTRACT

JOMAS ENGINEERING ENVIRONMENTAL

WE LISTEN, WE PLAN, WE DELIVER

Geotechnical Engineering and Environmental Services across the UK.

DESK STUDY/PRELIMINARY RISK ASSESSMENT AND COAL MINING RISK ASSESSMENT REPORT

35 Wilson Road
Huyton
Liverpool
L36 6AE



JOMAS ASSOCIATES LTD
6-9 The Square, Stockley Park, Uxbridge, UB11 1FW
www.jomasassociates.com 0843-289-2187 info@jomasassociates.com

Report Title: **Desk Study/Preliminary Risk Assessment and Coal Mining Risk Assessment Report for 35 Wilson Road, Huyton, Liverpool, L36 6AE**

Report Status: **Final**

Job No: **P4131J2476/SC**

Date: **18 February 2022**

Quality Control: Revisions

Version	Date	Issued By

Prepared by: JOMAS ASSOCIATES LTD **For:** LINDEN HILL CAPITAL MANAGEMENT

Prepared by	Reviewed by	Approved by
Shaw Carter BSc (Hons), FGS	Derek Grange BSc (Hons), MSc, CGeol, FGS, RoGEP - Specialist	James Field BSc (Hons), CGeol, FGS, RoGEP - Professional
Geotechnical Engineer	Principal Geotechnical Engineer	Principal Engineer
.....	.....	.....

Should you have any queries relating to this report, please contact

JOMAS ASSOCIATES LTD

www.jomasassociates.com

0843 289 2187

info@jomasassociates.com

EXECUTIVE SUMMARY

Linden Hill Capital Management ('The client') commissioned Jomas Associates Ltd to undertake a desk study and preliminary risk assessment at 35 Wilson Road, Huyton, Liverpool, L36 6AE. The principal objectives of the study were as follows:

- To determine the nature and where possible the extent of contaminants potentially present at the site;
- To establish the presence of significant contaminant linkages, in accordance with the procedures set out within the Environment Agency (EA) report R&D CLR11 and relevant guidance within the National Planning Policy Framework (NPPF);
- To assess whether the site is safe and suitable for the purpose for which it is intended, or can be made so by remedial action;
  And;
- Present a desk-based review of readily available information on potential coal mining issues which are relevant to the site;
- Use that information to identify and assess risks to the proposed development from the coal mining legacy, including the cumulative impact of issues.

It should be noted that the table below is an executive summary of the findings of this report and is for briefing purposes only. Reference should be made to the main report for detailed information and analysis.

Desk Study	
Current Site Use	Large warehouse unit adjoined with 2-storey offices. The remainder of site is used to store vehicles including caravans, cars and trailers.
Proposed Site Use	Demolition of existing structures and the construction of new light industrial/commercial units
Site History	A review of earliest available (1850) historical maps indicates that the site was comprised of farm structures in the centre of the site, including a corn mill and agricultural land and a watercourse (Logwood Mill Brook) running through the site. By 1891, the brook is shown to have been diverted to along the eastern boundary of site. There are no significant changes to the site until 1960s where a tank is shown by the western boundary of the site whilst also having a couple of the structures in the centre of site be removed. A new water course is also shown traversing through the centre of site. By the maps dated late 1970s, the site appears to have been completely redeveloped for industrial use and has had a warehouse structure constructed and 2No. smaller structures in the northwest, including a canning factory. The site then stays the same until the most recent map dated 2022, where it is recorded that the 2 structures in the northwest have been demolished and the tanks are no longer shown. However, during Jomas' site walkover in January 2022, an above ground fuel tank was noted to be present in the central northern area of site. From the earliest available map (1850), the surrounding area was mostly agricultural land with numerous mining operations including collieries, coal pits and shafts within

Desk Study	
	1km of site, but primarily focussed >400m north of site. These mining features generally become "old" and "disused" by the early 20th century. From the maps dated 1925-1927 a sewage works had been constructed directly adjacent to the east boundary of site. The town to the west had continued developing and its industrial area hasdgrown to include more works such as the electric lamp works. There was no more significant change until the mid-20th century, except for small residential expansion roughly 1km to the Northeast in the map dated 1937. From 1955 the industrial district in the western town saw more development and spread to the within 200m northwest of site. The town to the northeast also saw industrial development. The map dated 1975 showed that the industrial district of the western town had expanded and surrounded the site boundary on all sides, with several factories, warehouses and works, whilst a motorway and motorway intersection (M57 and A5080) had been constructed to the east of the site. From then there were no significant changes around site other than some redevelopment of properties in the town around the site as well as a new road coming out of the motorway intersection.
Geological Setting and Coal Mining History	The British Geological Survey indicates that the site is directly underlain by superficial deposits of Devensian Till. In the west of site, these superficial deposits are underlain by solid deposits of the Pennine Lower Coal Measures Formation in the west of site. A geological fault traverses north-south approximately though the centre-east of site, with the downthrow side to the west. East of the fault are solid deposits of the Etruria Formation. Although artificial deposits are not reported within the site boundary, given the identified site history a thickness of Made Ground should be expected. Trial pit records from on-site indicate 1.30-3.05m thickness of Made Ground overlying some possible alluvial deposits and weathered mudstone (clay) to the base of trial pits between 2.90m and 3.10m bgl. Whilst no evidence of old mine working was explicitly mentioned in these records, it is noted that "rotting wood" and "concrete blocks" were recovered from TP7 at depths of 2.5m and 2.9m bgl respectively. 2No. borehole records were located approximately 226m north-east of site, from a ground investigation by Geotechnical Engineering Ltd in June 1993. BGS maps indicate these were drilled in a location underlain by Pennine Middle Coal Measures Formation. Ground conditions generally comprised interbedded sandstone, mudstone and siltstone, weathered to a very stiff clay near the surface. Bedding planes were generally noted to be sub-horizontal; within borehole ref SJ49SE231, mudstone at 7.60-11.46m was reported to be dipping at moderate angles of 15°-30°. Within one borehole, a coal seam was reported at 11.46-12.95m bgl; in the other borehole a coal seam was reported at 15.77-16.00m bgl. Historical Ordnance Survey maps revealed no obvious evidence of mining activity taking place on site; the site is shown to have comprised mainly agricultural land and farm

Desk Study	
	buildings, until the site was developed into the existing industrial estate during the late-1980s and early-1990s. However, on the map dated 1850, coal pits are shown within proximity to site, the nearest being ~100m west of site and several collieries are shown >400m north/north-east of site. Shafts and old shafts (presumed to be coal) are also shown on historic OS maps; the nearest of which is shown approximately 350m north-east of site, associated with an old unnamed colliery. By the map dated 1906, all collieries are labelled as old/disused.
Environmental Setting	The superficial deposits (Till) underlying the site are identified as a Secondary Undifferentiated Aquifer with the underlying solid deposits both identified as Secondary A Aquifers. The site is not located within a source protection zone. A SPZ3 is located 226m south-east of site. There are no active groundwater, surface water or potable water abstractions reported within 1.3km of the site. A watercourse (Logwood Mill Brook) runs along the eastern site boundary. This means that the eastern edge of the site falls within an EA Flood Zone 3.
Potential Sources	• Potential for contaminated ground associated with previous/existing site uses (S1): ○ Corn Mill ○ Canning Factory ○ Warehouse • Potential for Made Ground associated with previous development operations – on site (S2) • Historic tank on western boundary (1960s-2000s) (S3) • Historic tank on north-east of warehouse building (1970s-1980s) (S4) • Current above ground fuel tank in central northern area of the site (S5) • Electricity sub-station in west of site (dating from 1970s) (S6) • Current and previous industrial uses – off site (S7): ○ Sewage works 5m east (1920s-1960) ○ Various warehouses, depots, factories and works (1960s-present) • Potential asbestos containing materials within existing buildings – on site (S8) • Potential asbestos impacted soils from demolition of previous buildings – on site (S9) • Potential ground gas generation from coal deposits/workings, refuse heap 300-400m north (S10)
Potential Receptors	• Construction workers (R1) • Maintenance workers (R2) • Neighbouring site users (R3) • Future site users (R4) • Building foundations and on site buried services (water mains, electricity and sewer) (R5) • Controlled waters (R6): ○ Secondary Undifferentiated Aquifer within superficial deposits of Till ○ Secondary A Aquifer within solid deposits of Pennine Lower Coal Measures Formation ○ Logwood Mill Brook along eastern boundary of site

Desk Study	
Preliminary Risk Assessment	The risk estimation matrix indicates a moderate risk. Due to the potential presence of asbestos containing materials, an asbestos survey should be undertaken, with any asbestos containing materials found, removed under suitably controlled conditions. There should be no risk to end users from asbestos if the potential asbestos containing materials are removed by suitably qualified and experienced specialists under controlled conditions. It is recommended that an intrusive investigation is undertaken to clarify potential risks to the identified receptors, and assess the extent of made ground soils present at the site. A preliminary investigation may comprise a series of window sampler holes or trial pits. Soil gas monitoring should be undertaken due to potential ground gas generation from coal deposits/workings; an historic refuse heap 300-400m north, and the potential for hydrocarbon contamination associated with the historic/current industrial land use of the surrounding area. This should be undertaken in accordance with CIRIA C665
Preliminary Coal Mining Risk Assessment	There is no direct evidence of shallow workings being present on site, however, the site is within a Coal Authority "Development High Risk Area" and given that coal reportedly subcrops on site (Tenlands, Ravenhead Main Delf [Wigan Four Feet]) and close to site (Bastions Mine [Trencherbone]), it is considered possible that unrecorded shallow workings, surface workings and/or mine entries could be present at the site. It is recommended that a programme of rotary boreholes, trial pits and trial trenches are undertaken to evaluate the potential risks identified. Prior written permission from the Coal Authority is required for any intrusive activities which will disturb or enter any coal seams, coal workings or coal mine entries. Subject to the outcome of the investigation, it is likely that the site could be made safe and stable for redevelopment by measures potentially including grouting of shallow underground workings, spanning/designing around surface workings, capping of identified shafts/bell pits and incorporation of gas protection measures into buildings, if necessary.

APPENDIX E – UNITED UTILITIES WATER SEWER RECORDS

United Utilities
Water for the North West

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Farrow Walsh Consulting Ltd

62
Highcross Street,
Leicester, Leicestershire
LE1 4NN

FAO:

Your Ref: FW2197
Our Ref: UUPS-ORD-376315
Date: 16/03/2022

Dear Sirs

Location: HORIZON DISTRIBUTION 35 WILSON ROAD, LIVERPOOL, L36 6AE

I acknowledge with thanks your request dated 15/03/2022 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

Water for the North West

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

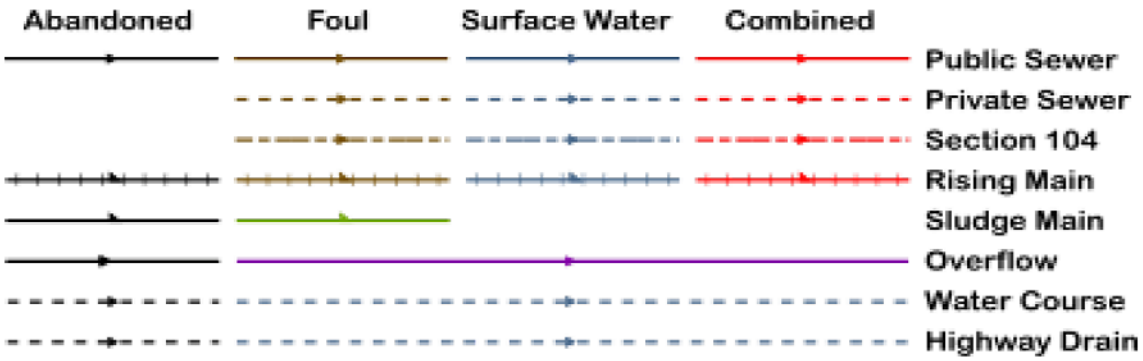
TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

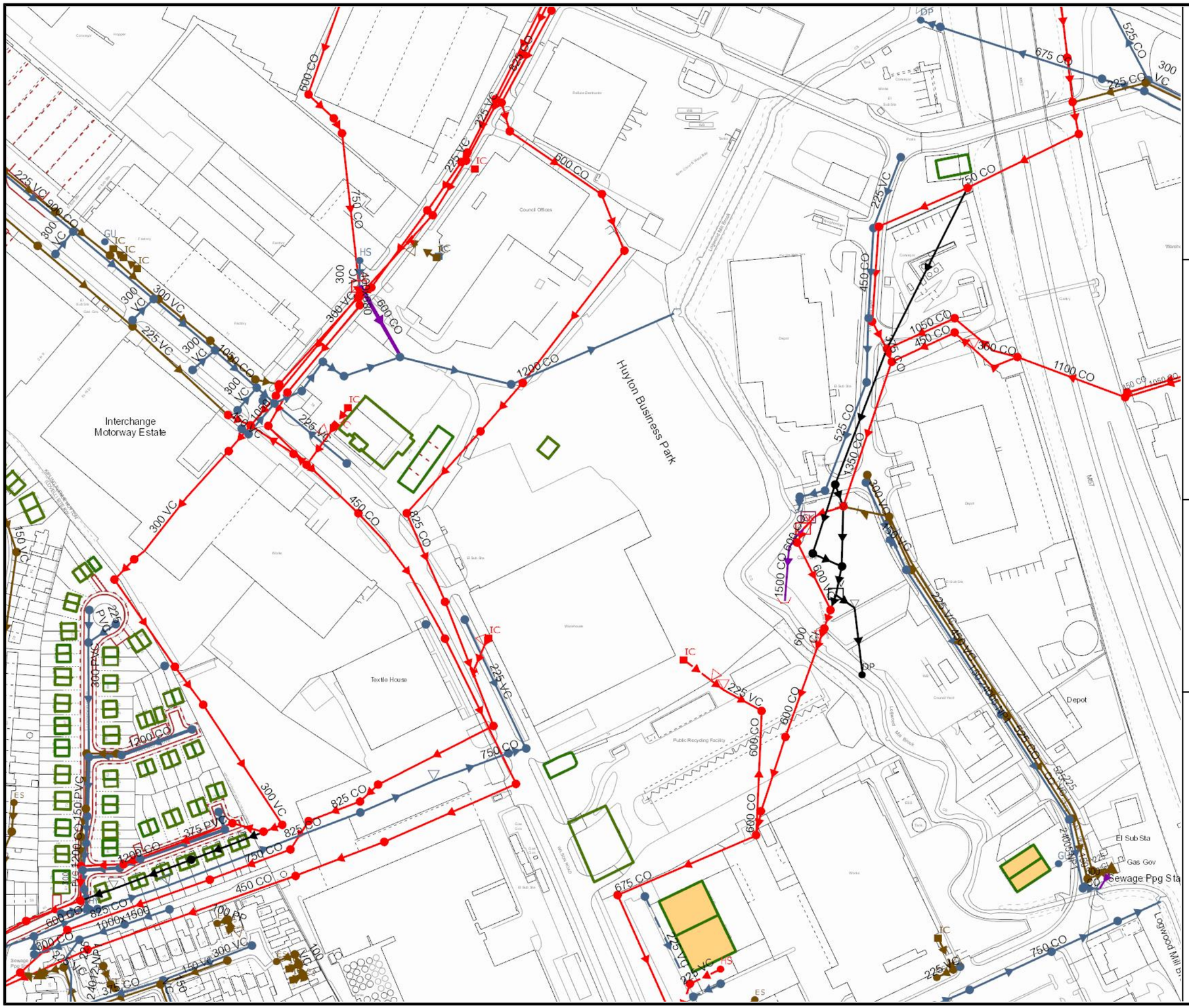
United Utilities
Water for the North West

Wastewater Symbology



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

- Manhole
- 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
- Side Entry Manhole
- Outfall
- Screen Chamber
- IC Inspection Chamber
- Bifurcation Chamber
- LH Lamp Hole
- T Junction / Saddle
- CA Catchpit
- VC Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- T Network Storage Tank
- V Sewer Overflow
- WwTW Ww Treatment Works
- Ww Pumping Station
- ST Septic Tank
- CK Control Kiosk
- Change of Characteristic



United Utilities

Water for the North West

SEWER RECORDS

Address or Site Reference

HORIZON DISTRIBUTION 35
WILSON ROAD,
LIVERPOOL,
L36 6AE

Scale: 1:2500
Date: 16/03/2022

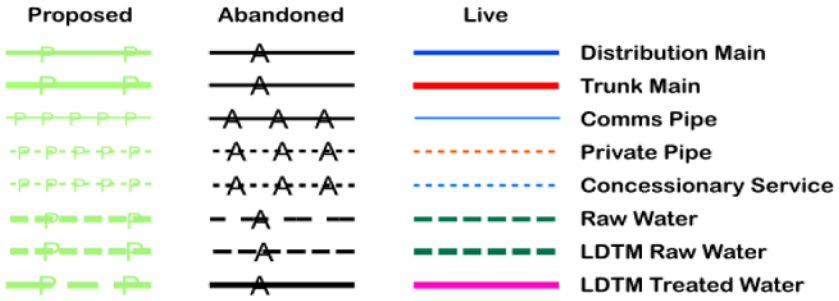
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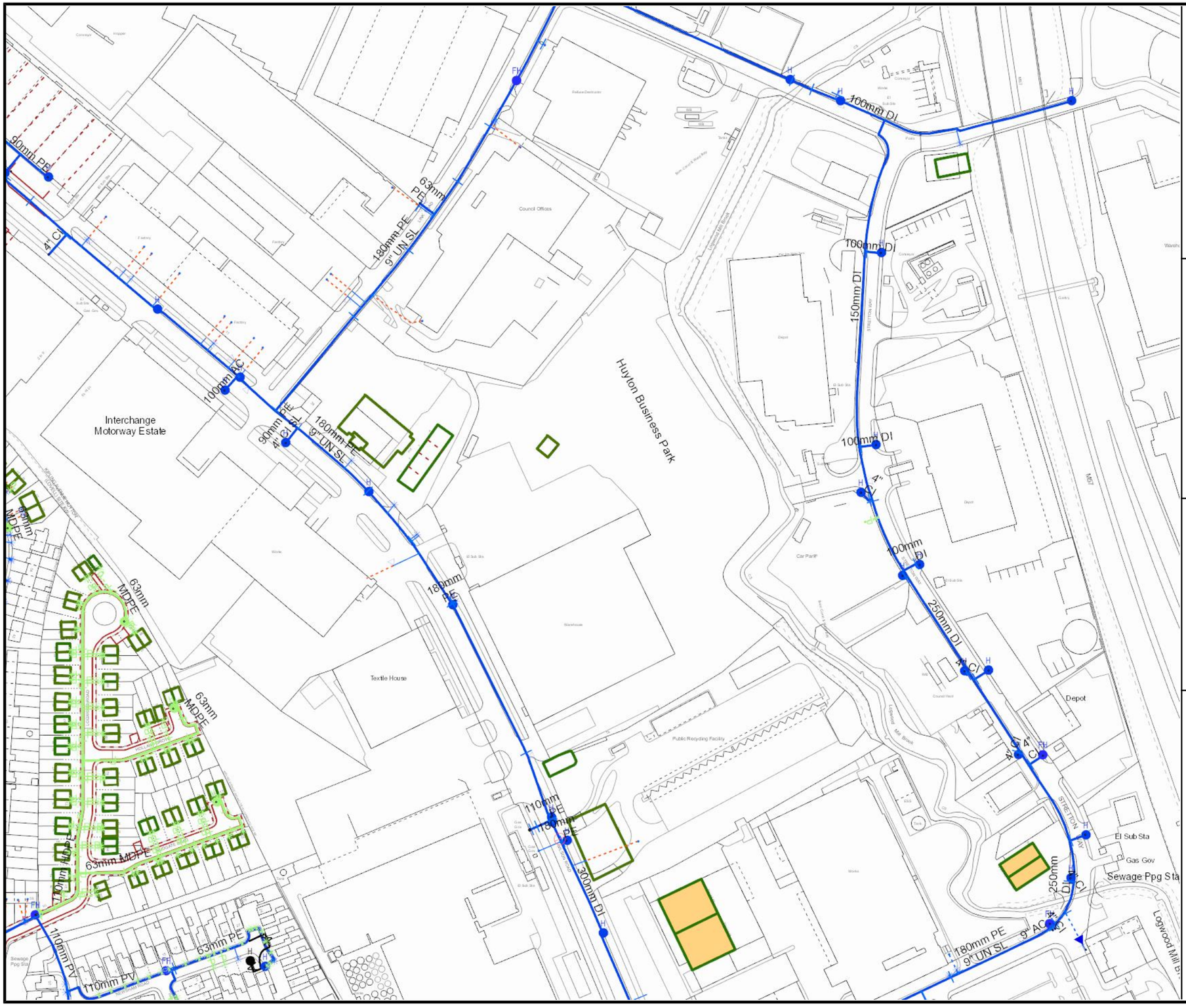
United Utilities
Water for the North West

Clean Water Symbology





Symbology for proposed assets is the same as above, but shown in green
Symbology for abandoned assets is the same as above, but shown in black



United Utilities

Water for the North West

WATER MAIN RECORDS

Address or Site Reference

HORIZON DISTRIBUTION 35
WILSON ROAD,
LIVERPOOL,
L36 6AE

Scale: 1:2500
Date: 16/03/2022

Printed by: Property Searches

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Jon Davey

From: Perry, Graham <Graham.Perry@uuplc.co.uk>
Sent: 15 March 2022 11:24
To: Jon Davey
Cc: Wastewater Developer Services
Subject: Pre Development Enquiry for :35 Wilson Road, Liverpool L36 6AE UU reference Number : 4200047729 [Filed 15 Mar 2022 13:07]

Pre Development Enquiry for: 35 Wilson Road, Liverpool L36 6AE UU reference Number : 4200047729

For future reference we now have a new wastewater pre-development enquiry form designed to be easier and more user friendly which is available on our website via the following link:

https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/wastewater-pre-dev/

We have carried out an assessment of your application which is based on the information provided. This pre-development advice on your drainage strategy will be valid for 12 months. Your drainage strategy will need to be reviewed by other competent authorities as part of the planning process, and we advise that you carry out the necessary site investigations to confirm the viability of your proposals.

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 6723 723 or refer to the link below:

https://www.unitedutilities.com/builders-developers/working-near-our-assets/

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 825mm diameter public combined sewer located with your proposed development at an unrestricted rate.

If you are able to identify an alternative, more suitable point of discharge, we request that you contact us at your earliest convenience so that we can assess suitability.

Surface Water

All surface water flow from the proposed development should drain in-line with the drainage hierarchy, as outlined in Paragraph 80, (Reference ID: 7-080-20150323), of the National Planning Practice Guidance. We also recommend you prioritise the use of multi-functional sustainable drainage systems for the management of surface water in accordance with national planning policy.

Generally, the aim should be to discharge surface run off as high up the following hierarchy of drainage options as reasonably practicable.
This is outlined as follows, in order of priority:

1. **into the ground (infiltration);**
2. **to a surface waterbody;**

3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

For guidance, The **North West SuDS Pro-Forma** provides information on the appropriate evidence required at each stage of the hierarchy, to demonstrate how each level has been discounted.

The Lead Local Flood Authority has responsibility for all surface water drainage concerns and their input to your proposal is critical. You should also consider whether it is necessary to discuss your proposal with the Environment Agency, or Internal Drainage Board (if operating in your area).

The Local Planning Authority are the determining authority for any application for planning permission and the appropriate authority for determining cost viability of a proposed drainage scheme, such assessments are outside of the jurisdiction of United Utilities.

Infiltration

Surface water runoff generated from this development should discharge to the ground via infiltration system where feasible.

A detailed evidence based feasibility assessment must be carried out in line with Chapter 25 of the CIRIA SuDS Manual 2015 to determine whether infiltration is a suitable method of surface water disposal.

Particular attention must be paid to Ground Water Source Protection Zones to ensure that the risk of pollution to these valuable resources is not compromised. Details can be obtained from the government website:

https://www.gov.uk/guidance/groundwater-source-protection-zones-spzs#find-groundwater-spzs

If your site is in a Groundwater Source Protection Zone, you should have regard to the Environment Agency's approach to Groundwater Protection. Information on this is available via the link below:

https://www.gov.uk/government/publications/groundwater-protection-position-statements

Please note that such a location could have implications for the principle of your development and the need for additional mitigating measures to protect the groundwater environment and public water supply in the detailed design of your site.

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 adjacent watercourse located east of the proposed site.

We would encourage you to identify and 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.

Highway Drainage

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you investigate the possibility of draining surface water to the highway drain where this ultimately discharges to a watercourse, by contacting the relevant Highway Authority.

Public Sewer

In accordance with the hierarchy of drainage options within the National Planning Practice Guidance, both discharge to ground via infiltration and discharge to a waterbody should be discounted prior to consideration of discharging surface water to the public sewer system. Evidence should be provided to demonstrate how these have been discounted, as outlined in the North West SuDS pro-forma.

Once evidence is provided as outlined above, United Utilities will consider a connection to the 1200mm diameter public surface water sewer crossing the proposed site at a pass forward flow to be agreed by the Lead Local Flood Authority. United Utilities request that any agreed rate does not exceed 24l/s.

I have measured the area of the site and found it to be just below 4.0Ha in size. It is not the 10.68 HA suggested in your application and greenfield calculations . Therefore I have pro rated the Qbar figure to achieve the 24 l/s (approx. 6 l/s/Ha)

As a Water Company, we have no obligation to accept highway drainage into our public sewer network. However, should your proposals include runoff from highways, we would request that consideration is given to SuDS components that deliver source control are incorporated within the design of the scheme to reduce the volume and frequency of discharges of these flows to the public sewer.

Levels

For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist, we recommend that you contact us to discuss further. It could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.

Land drainage / Overland flows / track drainage

United Utilities have no obligation, and furthermore we do not accept land drainage, overland flows or track drainage into the pubic sewerage network under any circumstances

Existing Wastewater Assets Crossing the Site

We have significant assets crossing this site that cannot realistically be diverted due to the significant cost involved. We would ask that you obtain a copy of our asset data records from your provider and plan your development around them ensuring that all legal easements are observed. If any work is required that may impart vibration into the ground we would ask that you contact us for further advice.

I can see an interference with the sewer and expected easement with the current layout and we would not allow build over. Could I suggest that you identify the exact line of the sewers on the site and then leave an offset of 5m either side of the two sewers crossing the site. From that you will be able to establish the developable area.

Please be aware that any proposed diversion may require modelling. This process may take up to 6 months in order to reach an acceptable design.

Please refer to the link below to obtain full details of the processes involved with sewer diversions:

https://www.unitedutilities.com/builders-developers/larger-developments/wastewater/sewer-diversions/

Existing Water Assets Crossing the Site

It is the developer responsibility to identify utilities on-site. Where clean water assets are shown on our records, we recommend that you contact our Water Pre-Development Team, via the following email address: DeveloperServicesWater@uuplc.co.uk. Further information for this service can be found on our website via the link below:

https://www.unitedutilities.com/builders-developers/larger-developments/pre-development/water-pre-dev/

Connection Application

Although we may discuss and agree discharge points and rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below:

https://www.unitedutilities.com/builders-developers/wastewater-services/sewer-connections/sewer-connection/

We recommend that the detailed design should confirm the locations of all utilities in the area and ensure that any proposed drainage solution considers routing and clash checks where required.

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,

Graham Perry

Graham Perry
Development Engineer
Developer Services
M: 07557 577548
T: 01925 679405
unitedutilities.com

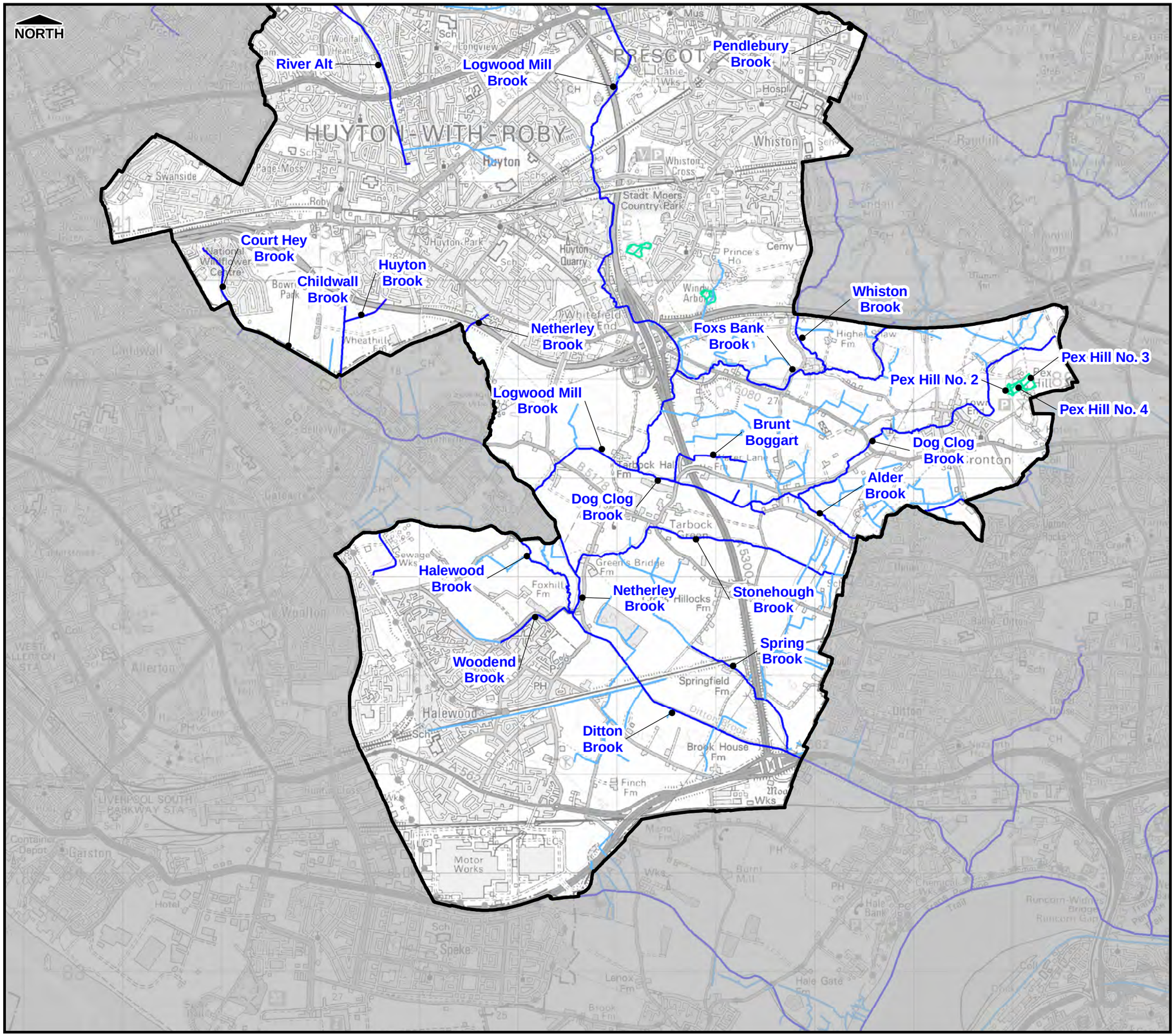
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APPENDIX F – JOINT SFRA MAPPING [EXTRACTED APRIL 2022]



Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse
- Lakes/Reservoirs

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FLOOD ZONE DATA PROVIDED BY THE ENVIRONMENT AGENCY 2012. ALL RIGHTS RESERVED (REF: 100023680).

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DRAWN BY	DATE	CHECKED BY	PASSED BY
S.Turnbull	30/05/2012	L.Tattersall	P.Raynor

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

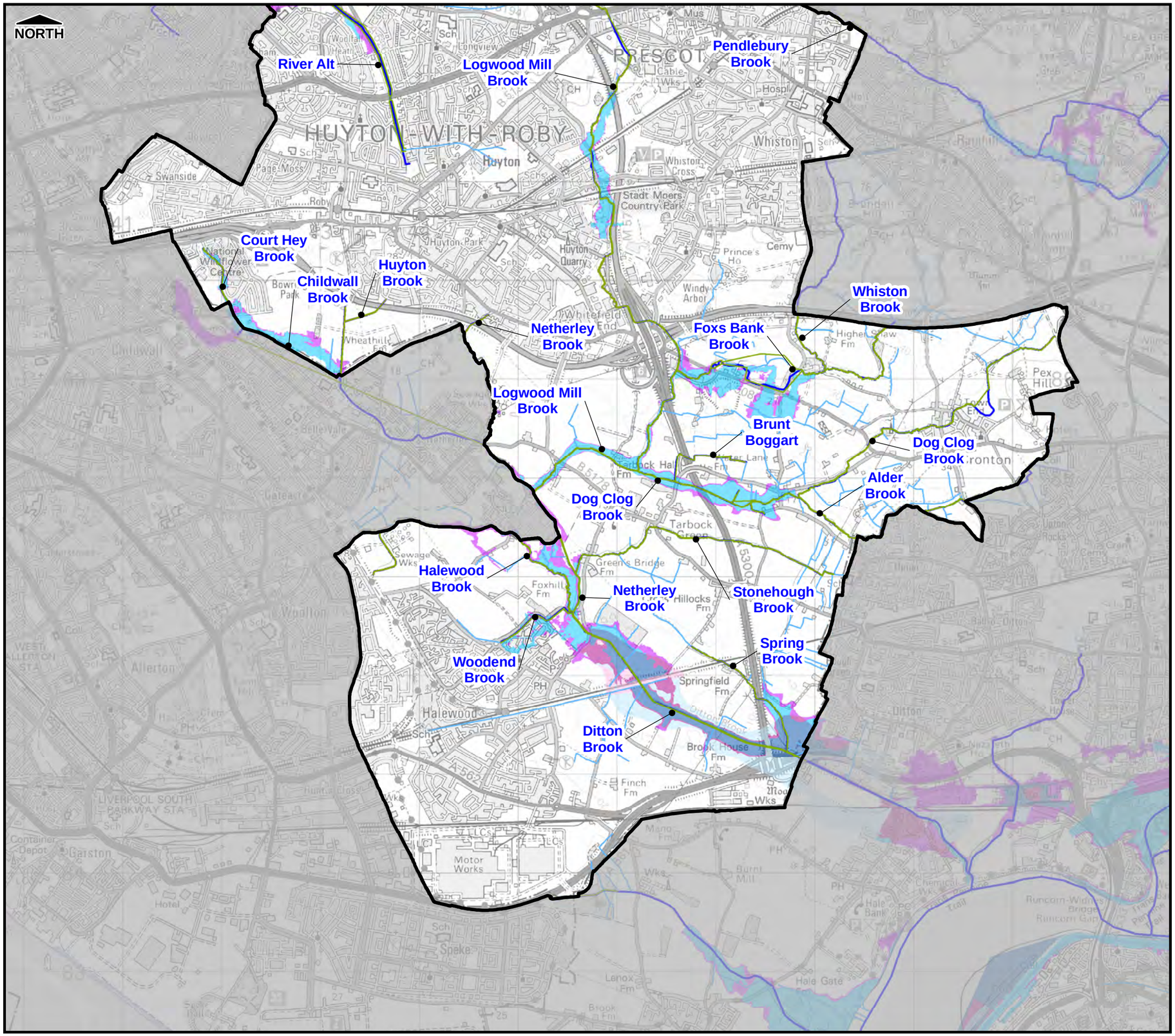
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B1-1-2
Catchment Overview

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B1-1-2	-



Legend

- Borough Administrative Boundary
- Defences
- Main River
- Ordinary Watercourse
- Flood Zone 2 Fluvial and Tidal
- Flood Zone 2 Tidal
- Flood Zone 3a Fluvial and Tidal
- Flood Zone 3a Tidal
- Flood Zone 2 Fluvial
- Flood Zone 3a Fluvial

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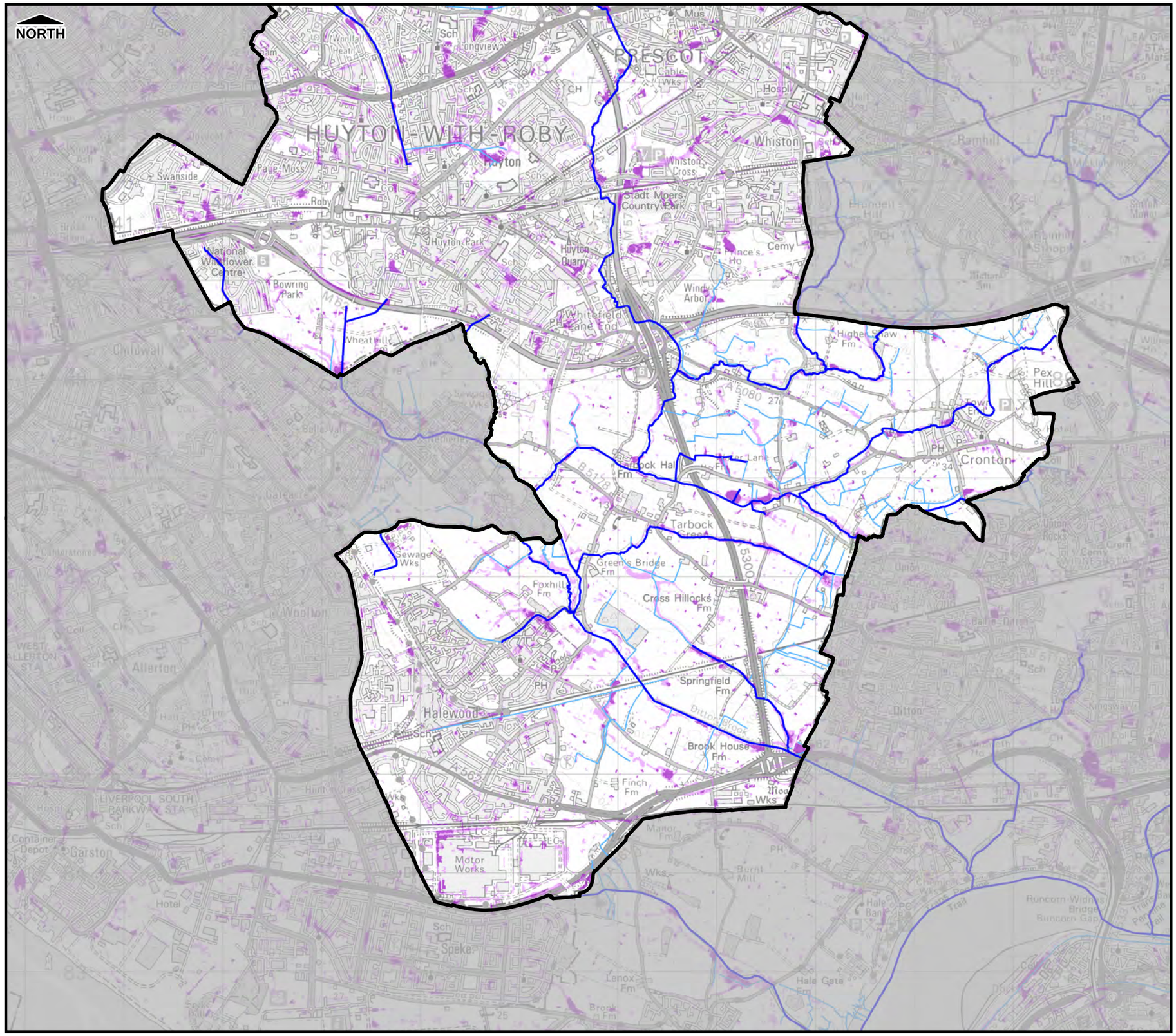
KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B2-2
Environment Agency Flood Zones

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B2-2	-



Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse
- 200yr Surface Water Event (Deep)
- 200yr Surface Water Event (Shallow)

DISCLAIMER:

This map gives an indication of the broad areas likely to be at risk of surface water flooding. It is not suitable for use at an individual property scale due to the method used.

NOTES:

The outputs are from the Environment Agency Flood Map for Surface Water Data Set (2010).

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DRAWN BY	DATE	CHECKED BY	PASSED BY
S.Turnbull	30/05/2012	L.Tattersall	P.Raynor

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

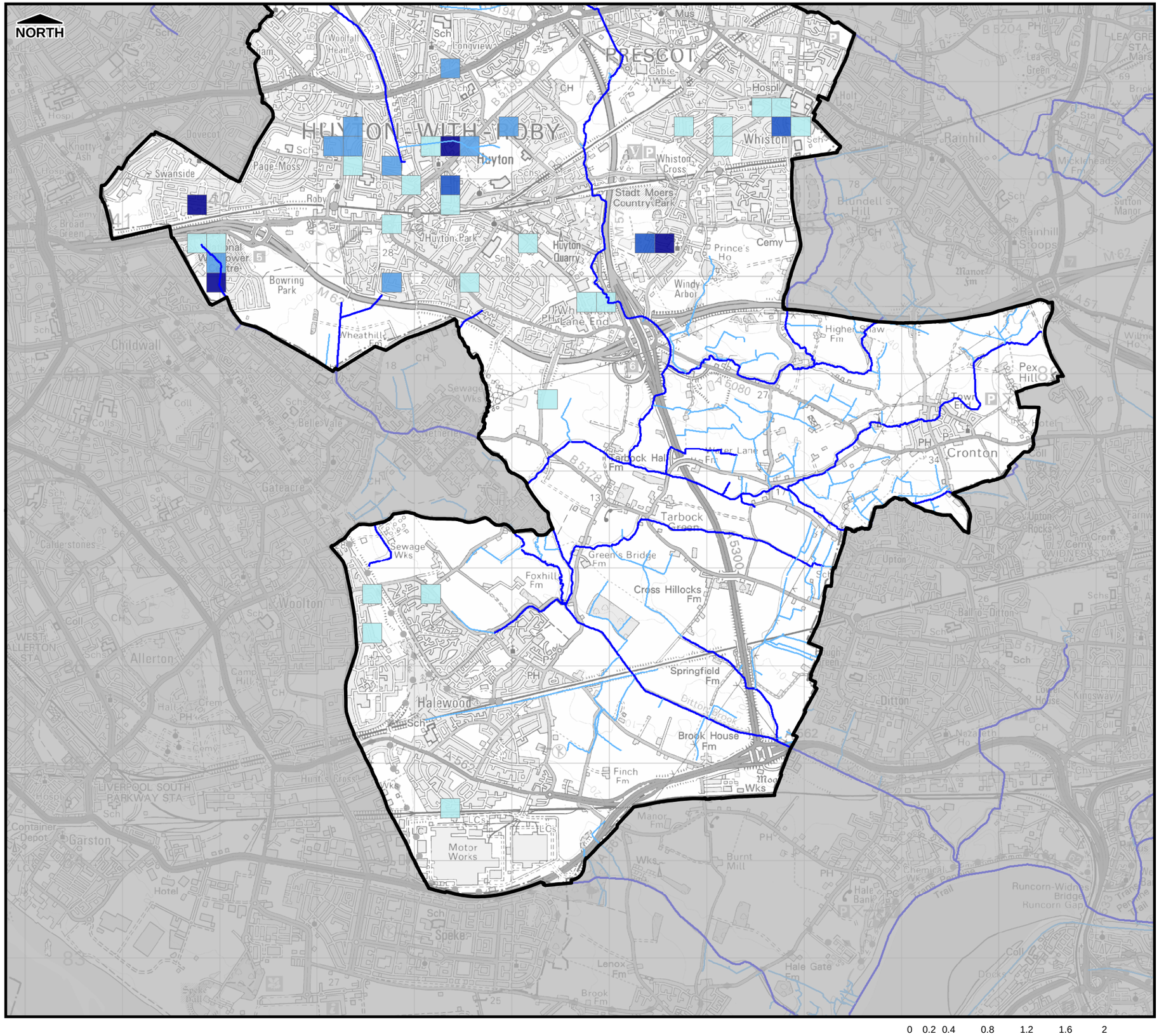
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B5-2
Environment Agency Flood Map for Surface Water

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B5-2	-



Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse

Flooding incidents from 1st April 2008 - 3rd May 2012:

- 1 - 2
- 3 - 5
- 6 - 9
- > 10

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DRAWN BY	DATE	CHECKED BY	PASSED BY
S.Turnbull	30/05/2012	L.Tattersall	P.Raynor

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

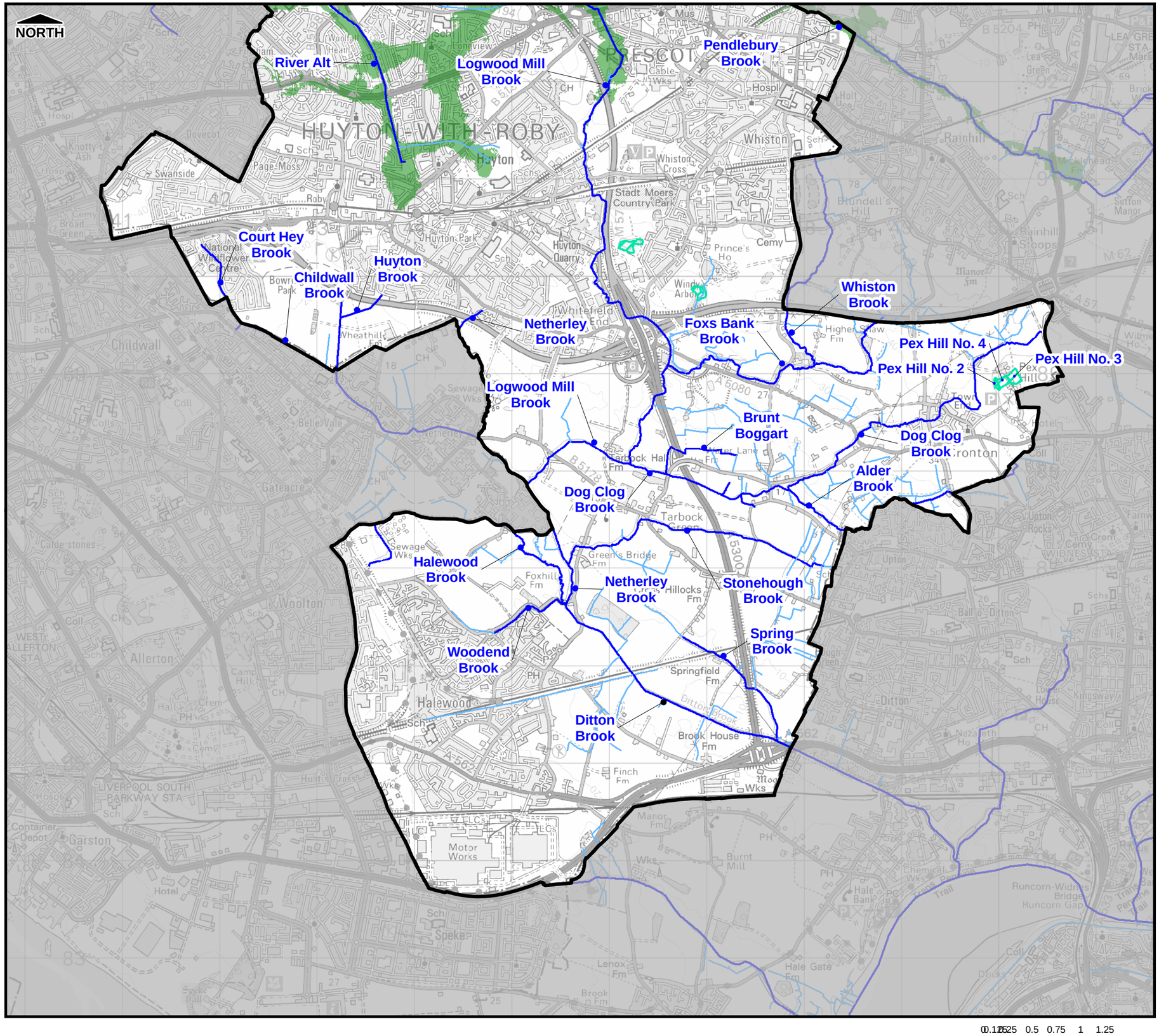
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B6-2
Number of Sewer Related Surface Water Flooding Incidents

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B6-2	-



Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse
- Lakes/Reservoirs
- Maximum Extent of Resevoir Flooding

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SCALE @ A3	ISSUING OFFICE
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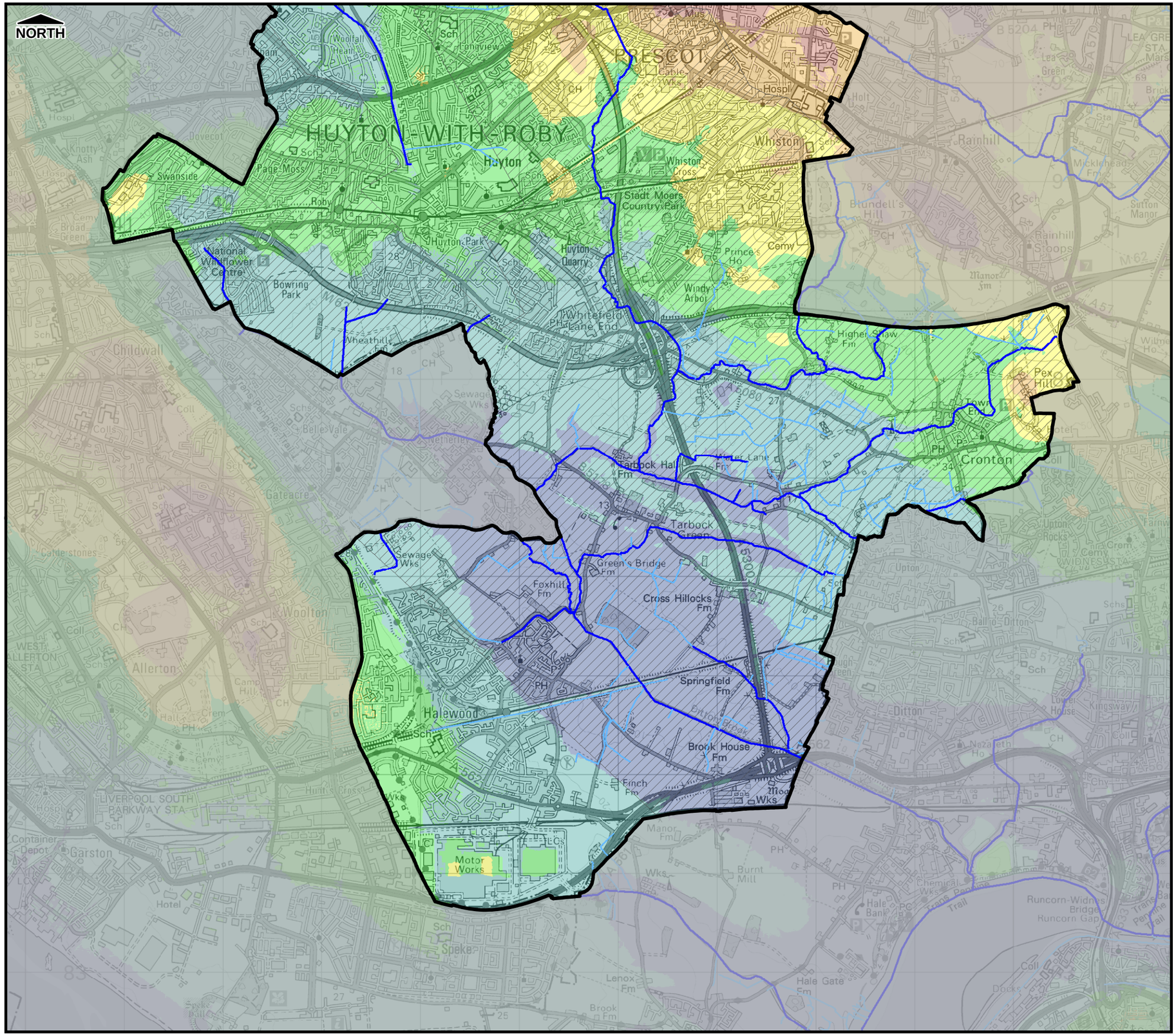
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B7-2
Reservoir Flooding

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B7-2	-



Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse
- LiDAR Coverage (remainder SAR data)

Terrain Height (mAOD)

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 75
- >75

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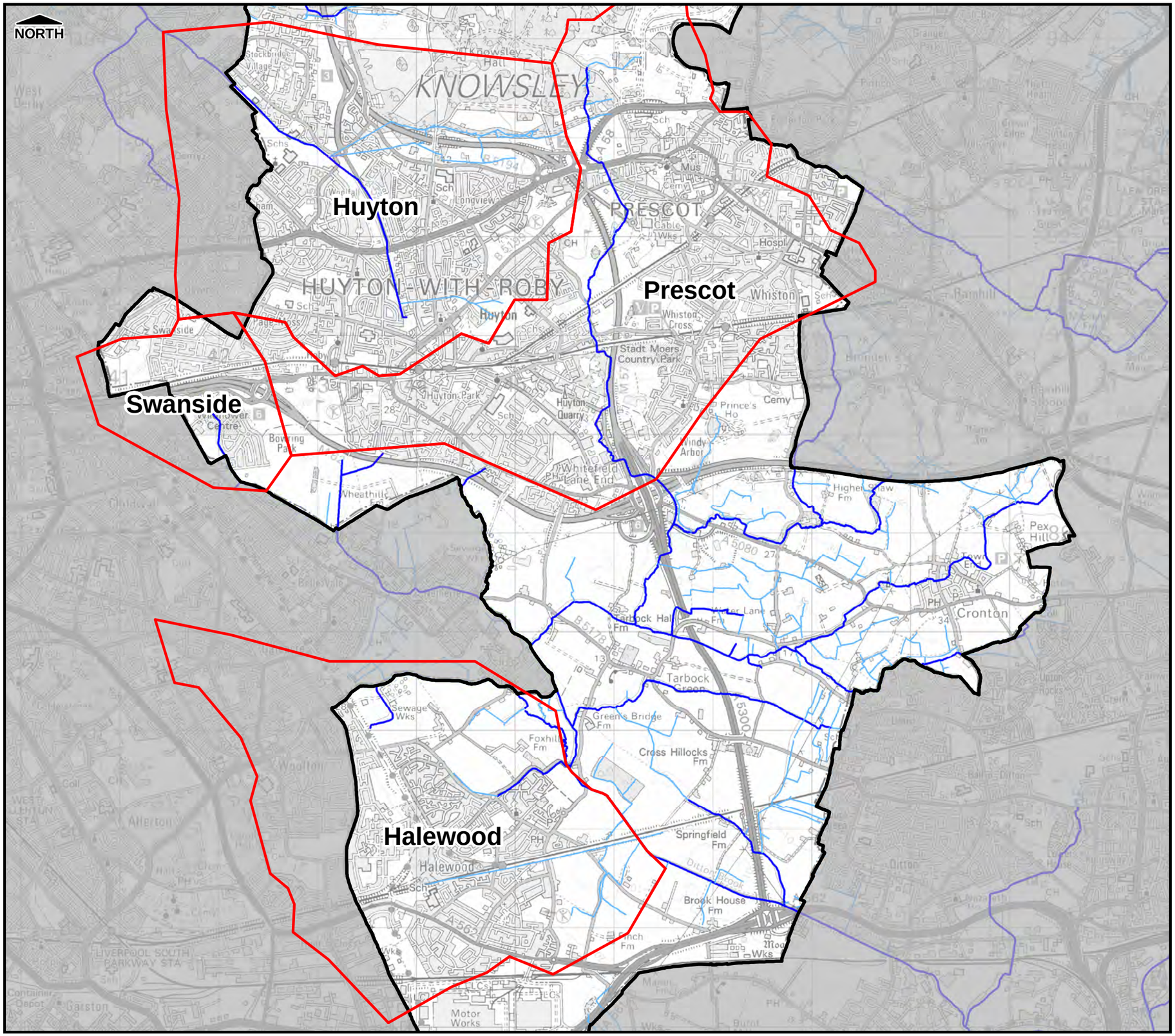
KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B8-2
LiDAR

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B8-2	-



Legend

- Critical Drainage Areas
- Borough Administrative Boundary
- Main River
- Ordinary Watercourse

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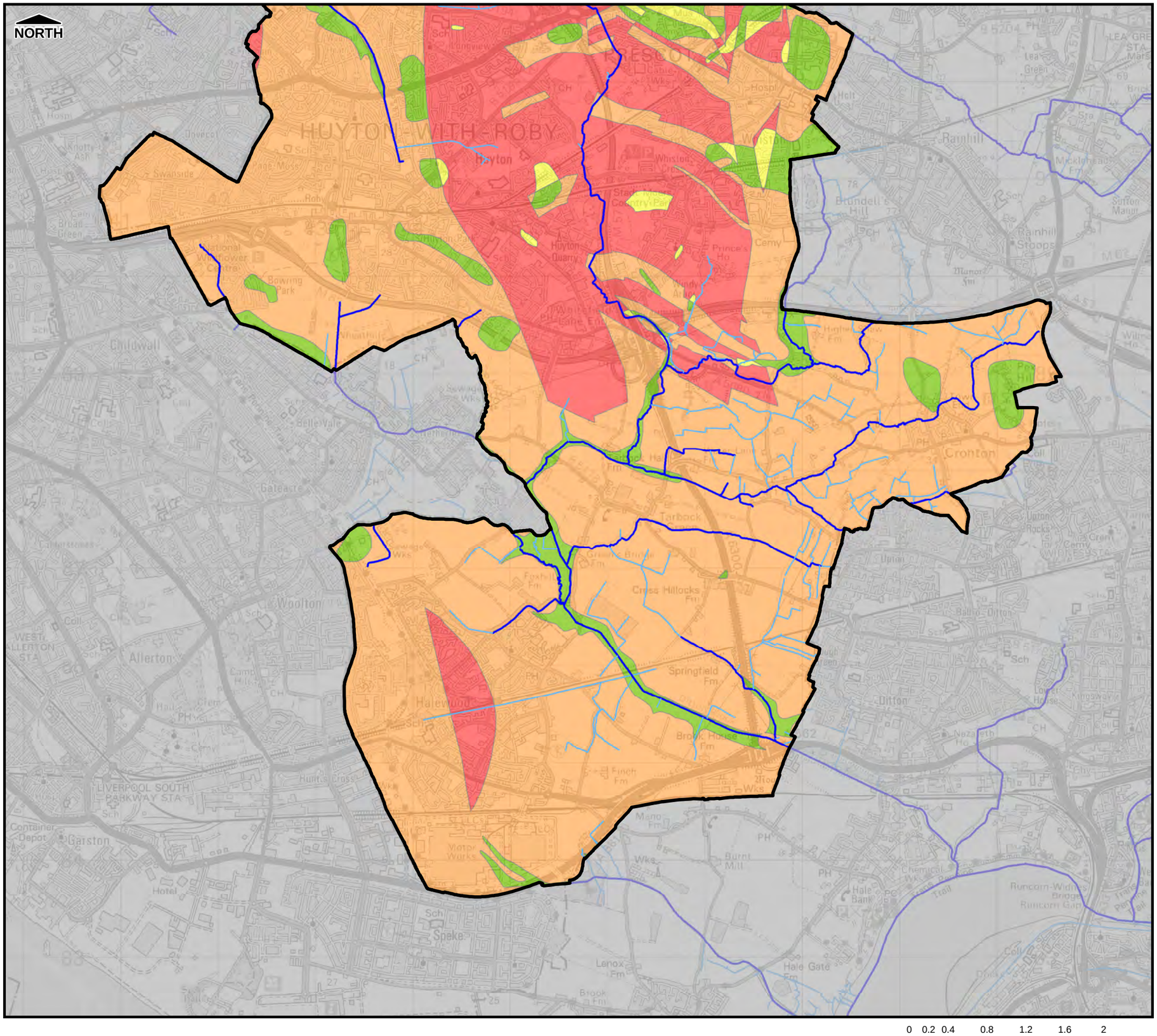
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B10-2
Critical Drainage Areas

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B10-2	-



Legend

- Borough Administrative Boundary
- Main River
- Ordinary Watercourse

Potential Suitability for SuDS

- High
- Medium 1
- Medium 2
- Low

Notes

Areas identified as High Probability are those that combine a permeable drjft (or no drift) above a Sandstone solid geology. The Medium Probability (1) class consists of those that are permeable drift above Coal Measures, whilst the Medium Probability Class (2) consists of impermeable/other types of drift above Sandstone solid geology. The Low Probability Class consists of impermeable/other types of drift above Coal Measures.

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KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B11-2
Potential Suitability for SuDS

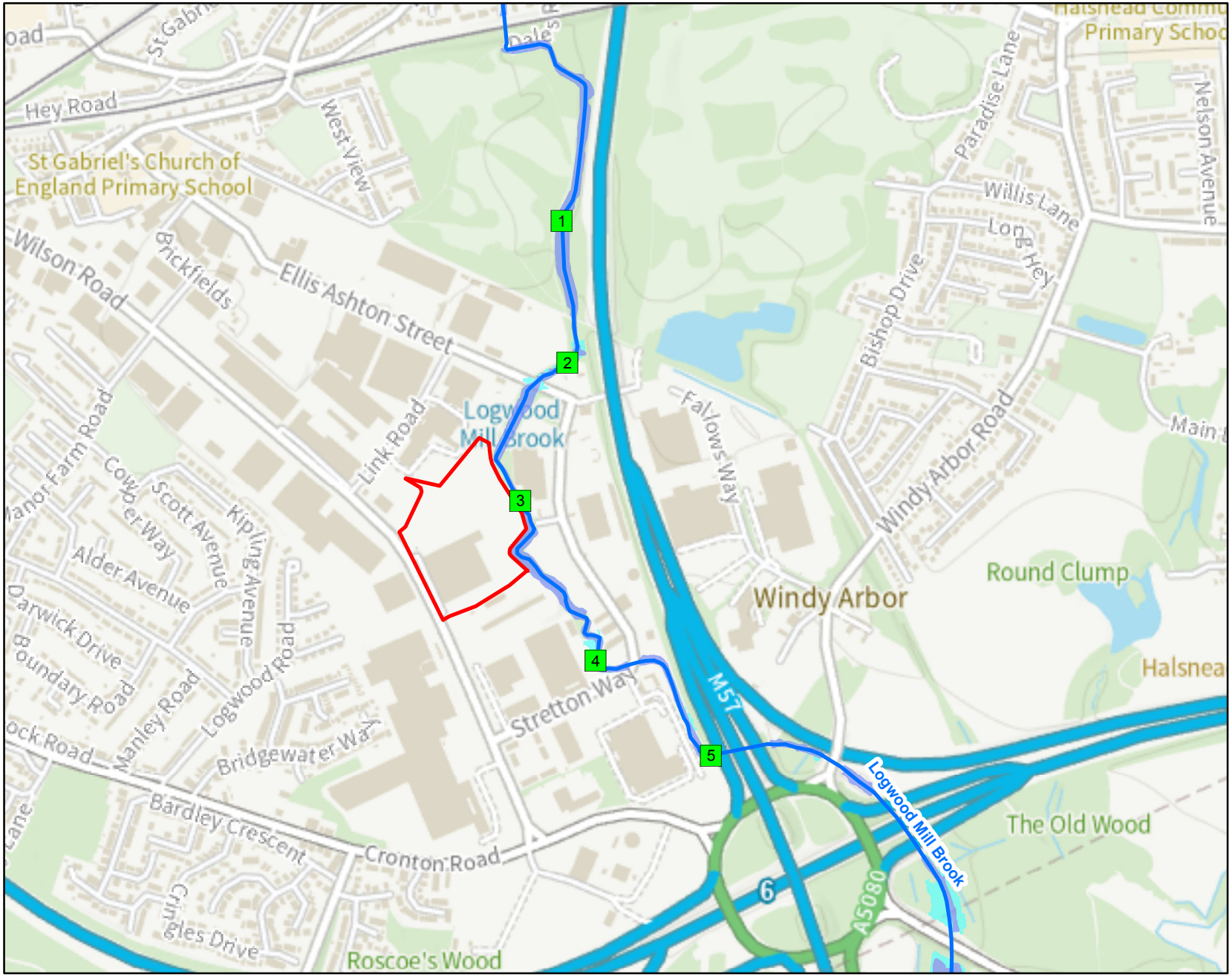
Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B11-2	-

APPENDIX G – EA FLOOD DATA

Detailed Flood Map centred on Wilson Road, Liverpool, L36 6AE. Created on 21/03/2022 [GMMC254076SPW]



Environment Agency

1:10,001

N

Legend

- Site Location
- Model Measurements
- Main River
- Flood Zone 3
- Flood Zone 2

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					Undefended								
Map Reference	Model Node Reference	Easting	Northing	Data	10 % AEP (1 in 10 year)	4 % AEP (1 in 25 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 30% increase in flow	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)
1	ea013_0168_Logwood_053	345926	390523	Modelled Water Level (m aodN)	25.92	26.05	26.20	26.23	26.37	26.39	26.51	26.31	26.52
				Modelled Flow (cumecs)	3.00	3.68	4.67	4.90	5.97	6.15	7.06	5.54	7.35
2	ea013_0168_Logwood_059	345935	390271	Modelled Water Level (m aodN)	24.87	25.02	25.25	25.32	25.54	25.58	25.75	25.46	25.79
				Modelled Flow (cumecs)	3.15	3.87	4.94	5.18	6.33	6.52	7.57	5.86	7.70
3	ea013_0168_Logwood_063	345852	390024	Modelled Water Level (m aodN)	23.54	23.61	23.72	23.76	23.93	23.95	24.12	23.87	24.17
				Modelled Flow (cumecs)	4.87	5.88	7.53	8.05	10.52	10.95	13.79	9.62	14.67
4	ea013_0168_Logwood_067	345987	389740	Modelled Water Level (m aodN)	21.37	21.54	21.78	21.86	22.15	22.20	22.57	22.04	22.61
				Modelled Flow (cumecs)	5.62	6.81	8.66	9.29	11.85	12.26	15.10	10.87	16.32
5	ea013_0168_Logwood_072	346192	389572	Modelled Water Level (m aodN)	19.85	20.00	20.22	20.30	20.60	20.65	21.04	20.48	21.28
				Modelled Flow (cumecs)	6.24	7.54	9.58	10.29	13.14	13.61	16.79	12.02	17.55

Model data taken from Logwood Mill Brook 2012 Study

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

Notes:

Climate Change Scenario - 30%, 35% and 70% increases in flow calculated for the 2080's (2070 - 2115). Please see https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances for more information regarding the new climate change guidance. The location of the site and the type (vulnerability) of development determine the climate change allowances to consider in any flood risk assessment.

APPENDIX H – GREENFIELD RUNOFF RATE CALCULATIONS

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Peter Underhill
Site name:	FW2197
Site location:	35 Wilson Road, Liverpool

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	53.40366° N
Longitude:	2.81737° W
Reference:	1905325927
Date:	Apr 21 2022 16:59

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 4.368

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics	Default	Edited
SAAR (mm):	852	852
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	26.54	26.54
1 in 1 year (l/s):	23.09	23.09
1 in 30 years (l/s):	45.12	45.12
1 in 100 year (l/s):	55.2	55.2
1 in 200 years (l/s):	62.9	62.9

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX I – DRAINAGE STRATEGY

Site Details

43,675m² / 4.368ha : Development area

43,675m² / 4.368ha : Existing impermeable area

35,161m² / 3.516ha : Proposed impermeable area (not including 10% Urban Creep)

26.54 l/s : Existing Qbar storm discharge rate

45.12 l/s : Existing Q30 storm discharge rate

55.20 l/s : Existing Q100 storm discharge rate

26.54 l/s : Proposed Q100+40% climate change (+10% urban creep) storm discharge rate to existing sewer to be agreed with LLFA / United Utilities.

Development impermeable areas to be drained into the storm drain through cellular tanks with minimum SUDs treatment to Ciria753, via gravity sewers.

Minimum pipe cover to soffits to be as per The Building Regulations 2010 Part H for thermoplastic pipes:
- **0.6m in pedestrian or landscaped areas**
- **0.9m in vehicle accessible areas**

Any pipes with cover to soffit less than those stated above are to have a Class Z concrete pipe bed & surround

Internal foul drain pipe minimum gradients:
- **1:80 from SVP & WC to IC**
- **1:40 from Basin & Sink to IC**

Refer to Archiect's/M&E drawings for pipe sizes and setting-out information.

All drainage to be constructed in accordance with latest sewerage guidance and Building Regulations Part H.

A CCTV survey of the as-built drainage is to be undertaken by the Contractor and provided to the Engineer for final approval

Sewer details shown have been taken from UU sewer records and are to be confirmed by Contractor prior to commencement of the works.

Note: All pipe lengths, slopes and gradient percentages are based on centre of chamber to centre of chamber. Drainage contractor is responsible to check this information for construction purposes prior to any works

SAFETY, HEALTH AND ENVIRONMENTAL HAZARD INFORMATION BOX

THE HAZARDS NOTED BELOW ARE IN ADDITION TO THE NORMAL HAZARDS AND RISKS FACED BY A COMPETENT CONTRACTOR WHEN DEALING WITH THE TYPES OF WORKS DETAILED ON THIS DRAWING.

CONSTRUCTION RISKS

LIVE EXISTING ON SITE DRAINAGE
LIVE EXISTING HIGHWAY
EXISTING OPEN WATERCOURSE

MAINTENANCE / CLEANING RISKS

NONE RELEVANT TO THIS DRAWING.

DEMOLITION RISKS

NONE RELEVANT TO THIS DRAWING.

Existing services TBC, Contractor to undertake GPR survey to establish existing services depth and location

Connection into existing sewers subject to S106 agreement with United Utilities.

NOTES

1. **Proposed S106 Connection**
New surface water connection into existing sewer subject to S106 application approval by United Utilites.

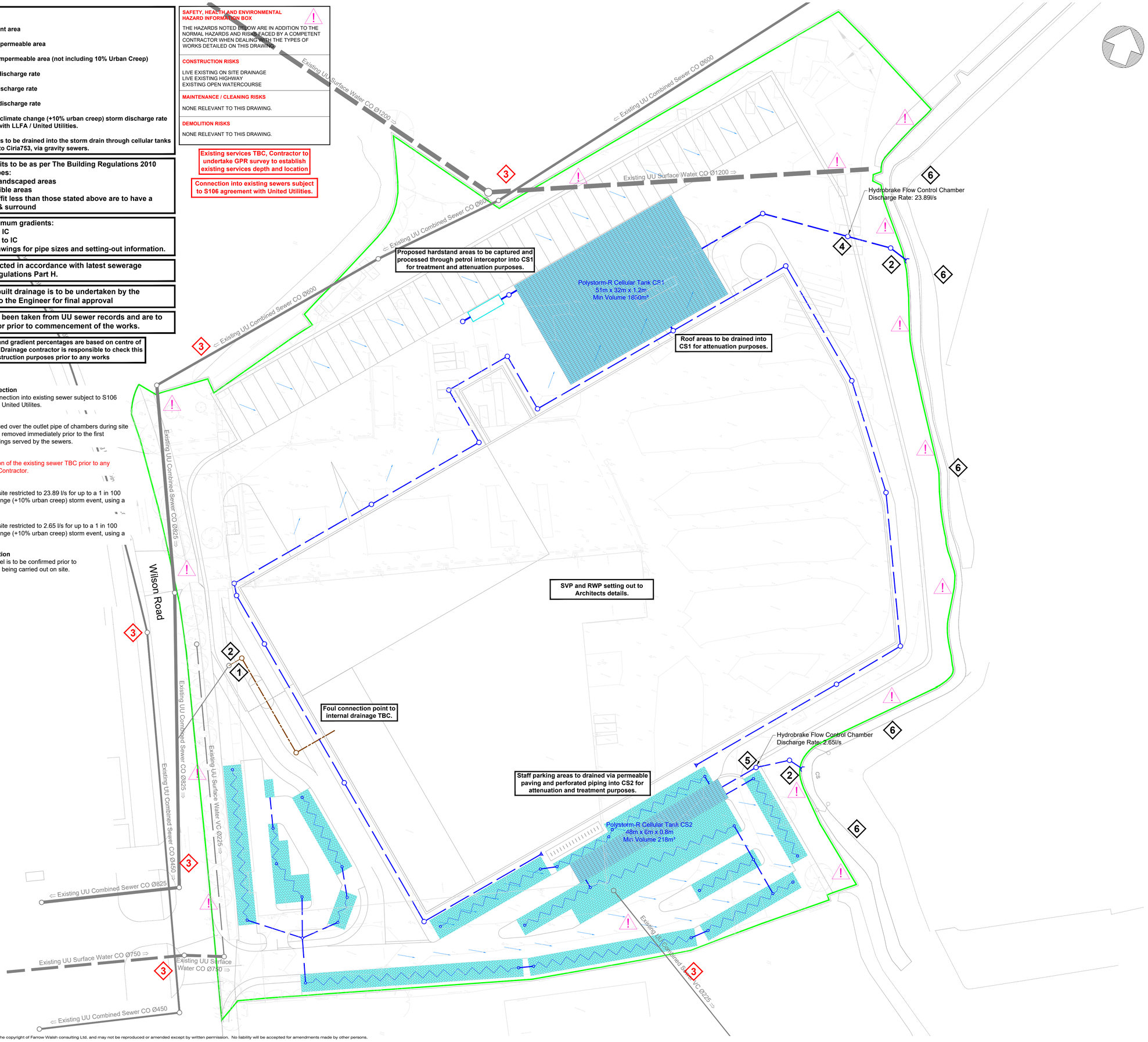
2. **Mesh Screening**
Mesh screen to be placed over the outlet pipe of chambers during site construction works and removed immediately prior to the first occupancy of the dwellings served by the sewers.

3. **Existing Sewer**
Invert levels and location of the existing sewer TBC prior to any construction works by Contractor.

4. **Discharge Rate 1**
Storm discharge from site restricted to 23.89 l/s for up to a 1 in 100 year +40% climate change (+10% urban creep) storm event, using a flow control chamber.

5. **Discharge Rate 2**
Storm discharge from site restricted to 2.65 l/s for up to a 1 in 100 year +40% climate change (+10% urban creep) storm event, using a flow control chamber.

6. **Ditch Level Confirmation**
Existing ditch invert level is to be confirmed prior to any construction works being carried out on site.



General Notes

1. DO NOT SCALE.
2. This drawing is to be read in conjunction with all other relevant drawings and details.
3. Should there be any conflict between the details indicated on this drawing and those on other drawings the Engineer should be informed PRIOR to construction on site.
4. Until technical approval has been obtained from the relevant Authority, it should be understood that all drawings issued are Preliminary and NOT for construction. Should the Contractor commence site work prior to such approval being given it is entirely at their own risk.
5. Sketch proposals are for illustrative purposes only and as such are subject to detailed site investigation including ground conditions / contaminants, drainage, design and planning / density negotiations.
6. All dimensions are in millimetres unless otherwise stated.
7. The Farrow Walsh Consulting Designers Risk Assessments for this project must be reviewed PRIOR to the commencement of any works on site.

NOTES

1. This drawing to be read in conjunction with all other relevant Engineers and Architect's details.
2. All work is to be carried out in accordance with the current British Standards, codes of practice and building regulations.
3. The design of any temporary works required shall be the responsibility of the Contractor.
4. Do not scale this drawing. All dimensions are in millimetres unless noted otherwise. Any discrepancies are to be recorded and reported to the Engineers immediately.
5. All work is to be to the satisfaction of the Engineer.
6. The Contractor is responsible for and must take all necessary precautions to ensure the stability of the works at all times during construction.
7. All workmanship and materials are to be to current British A15s.
8. All services are to be located and protected as necessary by the Contractor prior to the commencement of the works.
9. Any existing details which are shown on this drawing are for guidance only and are to be checked on site by the Contractor. Any variations are to be recorded and reported to the Engineer immediately.

LEGEND

- Development Boundary
- Private Surface Water
- Private Foul Water
- Perforated Pipe
- Catchpits
- Rodding Eye (Storm Only)
- Existing Surface Water Drainage
- Existing Combined Drainage
- Cellular Attenuation Tank (Size Specified on Drawing)
- Petrol Interceptor
- Permeable Paving - Non Storage

Rev	Description of updates	Drawn	Check'd	App'd	Date
A1	Issued for Approval.	PU	JD	OP	27/04/22

Revision Schedule

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321 Bradford Street, Birmingham B5 6ET
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www.farrowwalsh.com

FOR APPROVAL

Client: Linden Hill Capital Management

Project: 35 Wilson Road, Liverpool

Title: Drainage Strategy

Drawn:	Checked:	Approved:	Date:	Scale:
PU	JD	OP	April 2022	1:500 @ A1

Drawing No. **FW2197-D-400** Revision: **A1**

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APPENDIX J – SURFACE WATER DRAINAGE CALCULATIONS

FW2197 Wilsons Road, Liverpool SUDS Storage Calculations

Total Site Impermeable Area – 3.516ha

April 2022

****

Global Variables

****

Location = L36 6AE

SAAR = 893 mm/yr

WRAP = 4

M5-60 = 20.00 mm

r Ratio = 0.40

Soil index = 0.45

****

Input Data

****

Contributing area = 3.5161 ha

Allowable discharge = 26.54 lps

Maximum possible storm duration = 1440 min

Storm duration time step = 15 min

Storm return period = 100 years

****

Calculated Data

****

Time to max. storage = 255 mins

Rainfall at max. storage = 13.7 mm/hr

Storage volume = 1534.254 m³

****

Adjustments to Result for Climate Change

****

Volume + 10% for normal discharge (W5-074) : Storage volume = 1687.680 m³

Volume + 20% for discharge into river flows (DEFRA): Storage volume = 1841.105 m³

Volume + 40% for EA residential requirements : Storage volume = 2147.956 m³

Volume + 50% for other residential requirements : Storage volume = 2301.382 m³

FW2197 Wilsons Road, Liverpool SUDS Storage Calculations

Total Site Impermeable Area – 3.516ha

April 2022

****

Output Data

****

Time	Rainfall Intensity	Inflow	Outflow	Balance	
mins	mm/hr	m³	m³	m³	
15.0	98.68	824.058	23.886	800.172	
30.0	64.79	1082.076	47.772	1034.304	
45.0	49.47	1239.220	71.658	1167.562	
60.0	40.51	1353.138	95.544	1257.594	
75.0	34.55	1442.748	119.430	1323.318	
90.0	30.27	1516.653	143.316	1373.337	
105.0	27.02	1579.518	167.202	1412.316	
120.0	24.46	1634.164	191.088	1443.076	
135.0	22.39	1682.435	214.974	1467.461	
150.0	20.66	1725.608	238.860	1486.748	
165.0	19.21	1764.602	262.746	1501.856	
180.0	17.96	1800.104	286.632	1513.472	
195.0	16.88	1832.642	310.518	1522.124	
210.0	15.93	1862.630	334.404	1528.226	
225.0	15.09	1890.399	358.290	1532.109	
240.0	14.34	1916.221	382.176	1534.045	
255.0	13.67	1940.316	406.062	1534.254	Maximum
270.0	13.06	1962.873	429.948	1532.925	
285.0	12.52	1985.844	453.834	1532.010	
300.0	12.02	2007.963	477.720	1530.243	
315.0	11.57	2029.153	501.606	1527.547	
330.0	11.16	2049.494	525.492	1524.002	
345.0	10.77	2069.059	549.378	1519.681	
360.0	10.42	2087.908	573.264	1514.644	
375.0	10.09	2106.097	597.150	1508.947	
390.0	9.78	2123.675	621.036	1502.639	
405.0	9.49	2140.683	644.922	1495.761	

420.0	9.23	2157.162	668.808	1488.354
435.0	8.97	2173.146	692.694	1480.452
450.0	8.74	2188.665	716.580	1472.085
465.0	8.51	2203.750	740.466	1463.284
480.0	8.30	2218.424	764.352	1454.072
495.0	8.10	2232.713	788.238	1444.475
510.0	7.91	2246.637	812.124	1434.513
525.0	7.73	2260.215	836.010	1424.205
540.0	7.56	2273.467	859.896	1413.571
555.0	7.40	2286.409	883.782	1402.627
570.0	7.25	2299.056	907.668	1391.388
585.0	7.10	2311.422	931.554	1379.868
600.0	6.96	2323.521	955.440	1368.081
615.0	6.82	2335.365	979.326	1356.039
630.0	6.69	2346.964	1003.212	1343.752
645.0	6.57	2358.331	1027.098	1331.233
660.0	6.45	2369.475	1050.984	1318.491
675.0	6.33	2380.405	1074.870	1305.535
690.0	6.22	2391.130	1098.756	1292.374
705.0	6.12	2401.658	1122.642	1279.016
720.0	6.02	2411.996	1146.528	1265.468
735.0	5.92	2422.153	1170.414	1251.739
750.0	5.82	2432.135	1194.300	1237.835
765.0	5.73	2441.947	1218.186	1223.761
780.0	5.65	2451.597	1242.072	1209.525
795.0	5.56	2461.090	1265.958	1195.132
810.0	5.48	2470.432	1289.844	1180.588
825.0	5.40	2479.627	1313.730	1165.897
840.0	5.32	2488.681	1337.616	1151.065
855.0	5.25	2497.598	1361.502	1136.096
870.0	5.17	2506.383	1385.388	1120.995
885.0	5.10	2515.039	1409.274	1105.765
900.0	5.04	2523.571	1433.160	1090.411
915.0	4.97	2531.983	1457.046	1074.937
930.0	4.91	2540.277	1480.932	1059.345

FW2197 Wilsons Road, Liverpool SUDS Storage Calculations

Total Site Impermeable Area – 3.516ha

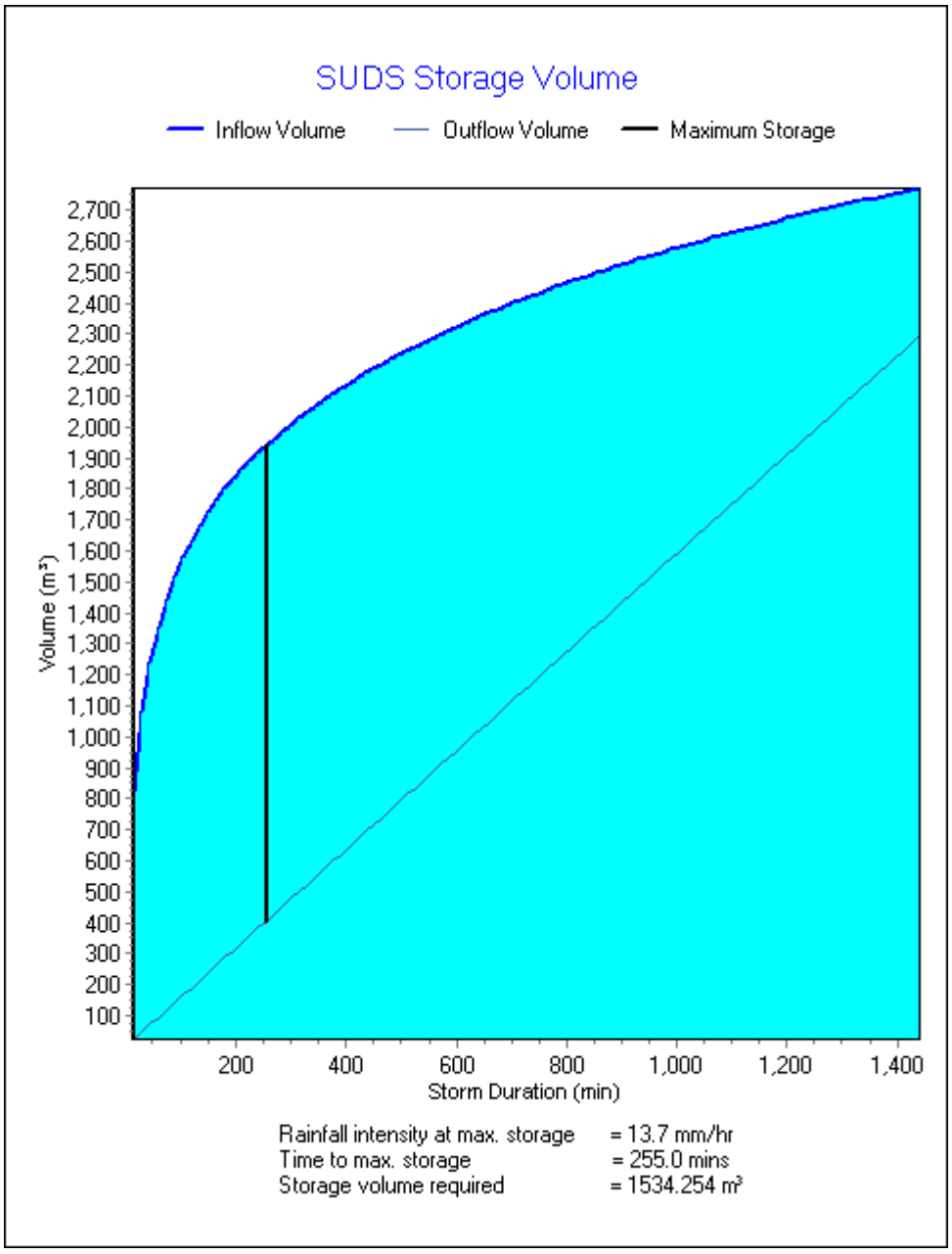
April 2022

945.0	4.84	2548.459	1504.818	1043.641
960.0	4.78	2556.530	1528.704	1027.826
975.0	4.72	2564.495	1552.590	1011.905
990.0	4.67	2572.355	1576.476	995.879
1005.0	4.61	2580.115	1600.362	979.753
1020.0	4.56	2587.776	1624.248	963.528
1035.0	4.50	2595.342	1648.134	947.208
1050.0	4.45	2602.815	1672.020	930.795
1065.0	4.40	2610.197	1695.906	914.291
1080.0	4.35	2617.491	1719.792	897.699
1095.0	4.31	2624.699	1743.678	881.021
1110.0	4.26	2631.823	1767.564	864.259
1125.0	4.21	2638.865	1791.450	847.415
1140.0	4.17	2645.828	1815.336	830.492
1155.0	4.13	2652.713	1839.222	813.491
1170.0	4.08	2659.522	1863.108	796.414
1185.0	4.04	2666.256	1886.994	779.262
1200.0	4.00	2672.918	1910.880	762.038
1215.0	3.96	2679.510	1934.766	744.744
1230.0	3.92	2686.032	1958.652	727.380
1245.0	3.88	2692.487	1982.538	709.949
1260.0	3.85	2698.875	2006.424	692.451
1275.0	3.81	2705.199	2030.310	674.889
1290.0	3.78	2711.459	2054.196	657.263
1305.0	3.74	2717.658	2078.082	639.576
1320.0	3.71	2723.796	2101.968	621.828
1335.0	3.67	2729.874	2125.854	604.020
1350.0	3.64	2735.895	2149.740	586.155
1365.0	3.61	2741.858	2173.626	568.232
1380.0	3.58	2747.766	2197.512	550.254
1395.0	3.55	2753.619	2221.398	532.221
1410.0	3.52	2759.418	2245.284	514.134
1425.0	3.49	2765.165	2269.170	495.995
1440.0	3.46	2770.860	2293.056	477.804

FW2197 Wilsons Road, Liverpool SUDS Storage Calculations

Total Site Impermeable Area – 3.516ha

April 2022



APPENDIX K – DRAINAGE MAINTENANCE SCHEDULE

Drainage Maintenance Schedule - Wilsons Road, Huyton Industrial Estate, Liverpool

Schedule	Feature	Location	Inspection Type	Inspection Frequency	Required Action	Maintenance Works	Maintenance Intervals	Comments
Occasional Maintenance	Foul & Surface Water Chambers	Entire site	Visual	6 Months	Remove silt and leaf build up from gullies, chambers, gutters etc.	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Road & Yard Gullies	Entire site	Visual	6 Months	Mechanical silt removal from sump	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Flow Control Chamber	Upstream of outfall	Visual	6 Months	Mechanical silt removal from sump	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Staff Parking bays	Visual	6 Months	Manual removal of weeds	Weed removal *	6 Months (or as required)	Maintenance interval subject to Visual Inspection findings
	Cellular Tank	Entire Site	Visual	6 Months	Mechanical silt removal from sump	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Carrier Drains	Staff Parking bays	Visual	6 Months	Remove silt and leaf build up from gullies, chambers, gutters etc.	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings
	Catchpit Chambers	Entire Site	Visual	6 Months	Mechanical silt removal from sump	Silt / Debris removal	As required (debris max. 60% of capacity)	Maintenance interval subject to Visual Inspection findings

Remedial Actions	Foul & Surface Water Drainage	Entire site	Visual	12 Months	Remove and dispose of oils or fuel (diesel & petrol) residues using safe standard practices.	Safe removal or contaminant residues	As required.	As required.
	Cellular Tank	Entire Site	Visual	6 Months	Mechanical silt removal from sump	Repair of inlets as required	As required.	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Staff Parking bays	Visual	12 Months	Infiltration surface rehabilitation	Replace broken or cracked pavious **	As required or following poor performance.	Maintenance interval subject to Visual Inspection findings
	Permeable Paving	Staff Parking bays	Visual	12 Months	Infiltration surface rehabilitation	Relay any areas of settlement	As required or following poor performance.	Maintenance interval subject to Visual Inspection findings
Monitoring	Foul & Surface Water Drainage	Entire site	Visual	12 Months	Walk over inspection for condition (breaks, lifting & missing) of chamber covers and grates.	Replace broken or cracked inspection chamber covers	As required.	Maintenance interval subject to Visual Inspection findings
	Bypass Seperator	External Yard	Visual	12 Months	Initial inspection to ensure performance	Repair and mechancial aprt, desludge as required	As required or following poor performance.	Maintenance Inspections subject to confirmaiton by chosen manufacturer
	Permeable Paving	Staff Parking bays	Visual	Monthly for first 3 Months	Initial inspection to ensure performance	Top up grit between paviours	As required.	Maintenance interval subject to Visual Inspection findings
	Cellular Tank	Entire Site	Visual	12 Months	Survey inside of tank for sediment build-up and remove if necessary	Remove sediment ro replace tank as required	5 Years or as required.	Maintenance interval subject to Visual Inspection findings

* If weeds are persitent, weed killer may be used to reduce the requirement for manual weed removal.

** Any block which is to be replaced should be bedded on anew layer of grit / sand.

*** If re-construction is necessary, the following procedure should be followed: 1. Lift surface layer and laying course, 2. Remove and geotextile filter layer, 3. inspect sub-base and wash/replace if required, 4. Renew any geotextile layer as required, 5. Renew laying course, jointing material and block paviours. Note: this is deemed unlikely to occur and thus unlikely to be implemented

Maintenance procedures to be undertaken in accordance with Ciria 753. This schedule should be read in conjunction with all engineering drawings