BETTS HYDRO
CONSULTING ENGINEERS

# KIRKBY VALLEY GOLF CLUB
# KIRKBY

# FLOOD RISK ASSESSMENT AND DRAINAGE MANAGEMENT STRATEGY



For

Green Circle
Allerton Manor Golf Club
Allerton Road
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Greencircle

JUNE 2023

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KIRKBY VALLEY GOLF CLUB
KIRKBY

# FLOOD RISK ASSESSMENT AND DRAINAGE MANAGEMENT STRATEGY

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# EXECUTIVE SUMMARY

This Flood Risk Assessment and Drainage Management Strategy was commissioned by Green Circles Ltd. referred to hereafter as 'the client'. This report has been prepared to support a planning application for mixed-use development at Kirkby Valley Golf Club in Kirkby. The total site covers over 80ha, however, the main development area covers a smaller 2.970ha.

*Flood Risk*

The wider site is located within Flood Zone 1, Flood Zone 2 and Flood Zone 3 based on the Environment Agency Flood Zone Map for Planning. The proposals are 'recreational' in nature and as such is classified as mostly 'less vulnerable' in Table 2: Flood Risk Vulnerability Classification, within the Planning Practice Guidance. The Planning Practice Guidance confirms that this type of land-use is appropriate in this case providing there is no increase in flood risk elsewhere due to the proposals.

This report has reviewed all sources of flood risk both to and resulting from the proposed development site. Despite the flood zoning over the wider site, the main development areas are at 'very low' to 'low' risk from most flood sources considered including fluvial, tidal, surface water and sewer flooding. Consultations with the Environment Agency, United Utilities, and Knowsley Metropolitan Borough Council have been undertaken and have not identified any historical incidents of flooding directly to the site.

The nearest Main River is the River Alt, which flows through the site and splits the development area into an eastern and western parcel. The Environment Agency were able to provide in-channel top water levels for the key design events to determine the potential flood risk. In summary, based on the modelling completed by the Environment Agency and the existing ground levels onsite, the main development area remains flood free.

The existing Environment Agency modelling data has been refined and a detailed understanding of the potential flood risks to both the existing site, and the proposed development has been gained through a detailed hydraulic modelling assessment undertaken in 2019 by Betts Hydro. This modelling focuses on the effects of climate change and the effects on flood risk associated with the proposed bridge crossing. This modelling shows that the development area remains flood free in all the key design return period events including during the proposed modelled scenarios.

Surface water flood risks have also been considered and as the development proposals have the potential to increase the volumes of surface water run-off generated on the site, appropriate mitigation has been considered. The risk associated with surface water run-off will be managed and reduced as part of the proposals through implementation of mitigation proposals, including a sustainable surface water regime, appropriate levels design and permeable surfacing where feasible.

*Drainage Strategy*

The principle focus of this assessment is on sustainable management of surface water run-off to ensure surface water flood risk does not increase because of the proposals. The surface water discharge options have been assessed in accordance with the sustainable drainage hierarchy.

Based on the ground conditions noted online infiltration is considered to offer a possible means of dealing with surface water run-off, although the upper soil strata appear to be less favourable towards an infiltration based solution onsite. Soakaway Testing has been commissioned by the client, to be undertaken on the site, in key locations where infiltration methods would likely be used (proposed car parking areas).

The proposals will therefore be to manage surface water run-off generated onsite by discharging to ground via an appropriately designed infiltration-based Sustainable Drainage System. The proposals are to utilise permeable surfacing where at all feasible for external hardstanding areas including parking bays, footways, and patio areas. Where access roads are being proposed for adoption permeable surfacing is not typically accepted for adoption by the Lead Local Flood Authority and in these cases an alternative management regime would be required to be secured or an alternative surfacing material would need to be incorporated for these areas.

Should infiltration not provide a full drainage solution then the proposals will be to form a new formal connection to the River Alt, subject to formal consents and agreements from the Environment Agency. Detailed design would be required to confirm whether a gravity system can be achieved, although given the existing levels a gravity connection is anticipated.

In accordance with the SuDS Manual (CIRIA 753) and the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015), the proposals will be to restrict surface water run-off to mimic a pre-development greenfield situation. The pre-development rate (QBar) for those areas of site being considered as part of this drainage assessment (2.970ha) is 6.3l/s, using the FEH Statistical Method (based on 2.8l/s/ha).

Restricting the rate of discharge would however generate a stormwater storage requirement onsite during the extreme storm events. It would be beneficial to implement SuDS features such as a pond or swales, near to the proposed outfall location. If designed appropriately the SuDS features such as ponds/swales can aid in the attenuation and provide added benefits in terms of water quality. In terms of design, the proposed drainage system onsite will be sized to ensure that exceedance up to and including the 1 in 100 year return period event with allowance for climate change is contained within site.

The Flood Risk Assessment and Drainage Management Strategy has been prepared in consultation with the relevant interested parties and incorporates their comments where possible. The report is commensurate with the scale and nature of the development proposals and in summary, the development can be considered appropriate in accordance with the Planning Practice Guidance.

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## Specialist Software

- MicroDrainage WinDES (v.2020.1.3) – Calculation of Greenfield run-off volumes, rates of rainfall and stormwater storage estimates.

## Abbreviations & Acronyms

| | |
|---|---|
| AEP | Annual Exceedance Probability |
| BGS | British Geological Survey |
| CC | Climate Change |
| EA | Environment Agency |
| FEH | Flood Estimation Handbook |
| FRA | Flood Risk Assessment |
| FZ | Flood Zone |
| KMBC | Knowsley Metropolitan Borough Council |
| LLFA | Lead Local Flood Authority |
| LPA | Local Planning Authority |
| mAOD | Metres Above Ordnance Datum |
| NGR | National Grid Reference |

| | |
|---|---|
| NPPF | National Planning Policy Framework |
| OS | Ordnance Survey |
| PFRA | Preliminary Flood Risk Assessment |
| PPG | Planning Practice Guidance |
| QSE | Quick Storage Estimate |
| QBAR | Mean Annual Flood |
| SFRA | Strategic Flood Risk Assessment |
| SuDS | Sustainable Drainage Systems |
| UU | United Utilities |

# 1.0 INTRODUCTION

## 1.1 Planning Policy Context

1.1.1 All forms of flooding and their impact on the natural and built environment are material planning considerations. The revised National Planning Policy Framework (NPPF) sets out the Government's objectives for the planning system, and how planning should facilitate and promote sustainable patterns of development, avoiding flood risk and accommodating the impacts of climate change. Government policy with respect to development in flood risk areas is contained within the revised NPPF and the supporting Planning Practice Guidance (PPG) (refer to extracts in Appendix A).

1.1.2 A Flood Risk Assessment and Drainage Management Strategy (FRA&DMS) has been completed in accordance with the revised NPPF and the PPG to review all sources of flood risk both to and from the proposed development. The report also considers the most appropriate drainage management options including the implementation of Sustainable Drainage Systems (SuDS) in line with national policy.

1.1.3 The proposals are recreational in nature and classified as 'less vulnerable' in Table 2: Flood Risk Vulnerability Classification, within the Planning Practice Guidance. The PPG confirms that this type of land-use is appropriate within this location in terms of flood risk providing there is no increase in flood risk elsewhere due to the proposals.

## 1.2 Site Context

1.2.1 This FRA&DMS has been prepared to support a full planning application for enhancement, re-development and improvement works to the existing Kirkby Valley Golf Club. The proposals include a new club house, golf academy, maintenance yard and driving range with associated car parking. In terms of the other proposed works, this includes alterations to the existing golf course.

## 1.3 Consultation

1.3.1 The NPPF advises that Knowsley Metropolitan Borough Council as the Local Planning Authority (LPA) should consult with the EA who will provide advice and guidance on flood issues at a strategic level and in relation to planning applications.

1.3.2 The preparation of this report has been undertaken in consultations with the Environment Agency (EA), United Utilities (UU) and Knowsley Metropolitan Borough Council (KMBC). Consultation responses can be seen in Appendix B, C and D respectively.

# 2.0 EXISTING SITE LOCATION

## 2.1 Location

2.1.1 The site is located to the west of Kirkby. The Ordnance Survey National Grid Reference (OS NGR) for the site is E: 339329, N: 397949 and the nearest postcode is L10 8LQ. The total site covers 80.29ha, although the development area covers a smaller 2.970ha and is edged in red in **Figure 1** (see location plan in **Appendix E**).

2.1.2 In terms of the surrounding land-use, the overall site is bounded to the north by the Wigan to Liverpool Railway and to the east by the M57, Ingoe Lane and some undeveloped land. To the south of the site is the A506 and a residential estate beyond. To the west the site is bounded by Aintree Lane with undeveloped land beyond.




*Figure 1: Aerial Photograph of Site (Google Maps, 2023)*

## 2.2 Existing and Historical Land Use

2.2.1 The wider site mostly comprises of the Kirkby Valley 18-hole golf course, which includes existing tees and greens, access tracks and pedestrian access, land drainage ditches and the existing clubhouse which is located to the east of the River Alt. As illustrated in **Figure 1**, the River Alt flows through the wider site, however the development proposals being considered as part of this assessment do not include the entire site and will focus on a much smaller area referred to as the development area within this assessment.

2.2.2 The development area is split into two parcels by the River Alt and to the west is mostly unused undeveloped land considered to be 100% permeable. The eastern parcel

consists of the existing clubhouse, managers accommodation, shop and car park, the rest of this parcel is green or permeably surfaced. There are currently 3no. bridge crossings over the River Alt within the extents of the wider site. No other historical uses onsite have been determined as part of this assessment.

## 2.3 Topography

2.3.1 Topographically the site varies due to the existing land use, the levels within the wider site gently slope towards the River Alt directly or to the existing land drainage features located within the golf course which ultimately discharge into the River Alt. Figure 1 illustrates the general falls across the wider site.

2.3.2 Ground levels at the western and eastern boundaries are at approximately 16mAOD, falling to approximately 10mAOD towards the banks of the River Alt. The existing car park and club house are at a level of around 13mAOD. A full topographical survey has been provided and is included in Appendix F; an extract is shown in Figure 2.

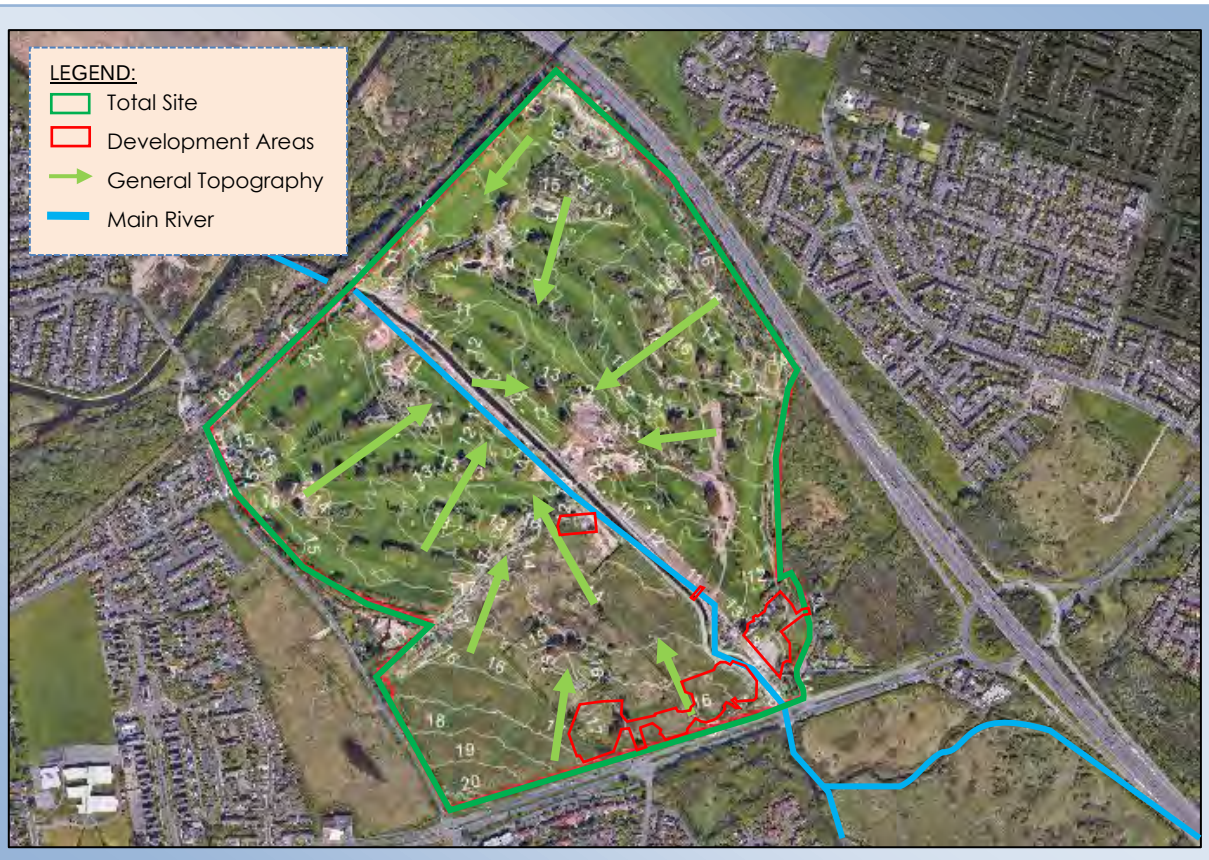



*Figure 2: Contour Plan based on the Detailed Topographic Survey (Betts Hydro, 2023)*

# 3.0 DEVELOPMENT PROPOSALS

## 3.1 Nature of the Development

3.1.1 This assessment is to support a mixed-use planning application at Kirkby Valley Golf Club for various works as outlined in the masterplan, shown below in **Figure 3.** The main aspects can be divided into two principle areas; new development frontage along the A506 (Valley Road) and new landscaping/golf tee works. The focus of these proposals is to look at improving and enhancing the existing facilities and adding new golf related facilities.




*Figure 3: Proposed Planning Layout (Brock Carmichael, 2023)*

3.1.2 The new hardstanding and buildings proposed as part of the main development at the site will include car parking, a new golf clubhouse/pavilion and a new driving range with associated building. A new greenskeepers maintenance compound is also shown in the western development parcel, as illustrated in the full masterplan (**Appendix G**).

3.1.3 A new bridge crossing over the River Alt is also proposed and this will allow users to access the starting and finish tees in relation to the clubhouse with more ease. The

bridge is located 140m north of the new clubhouse. Two new lakes are also proposed for irrigation purposes and to assist with land and golf course drainage.

3.1.4 Within the development parcel to the east of the River Alt, the existing clubhouse will remain and will be converted into a golf training academy. This existing building footprint will remain the same as the current building, but internal alterations will take place.

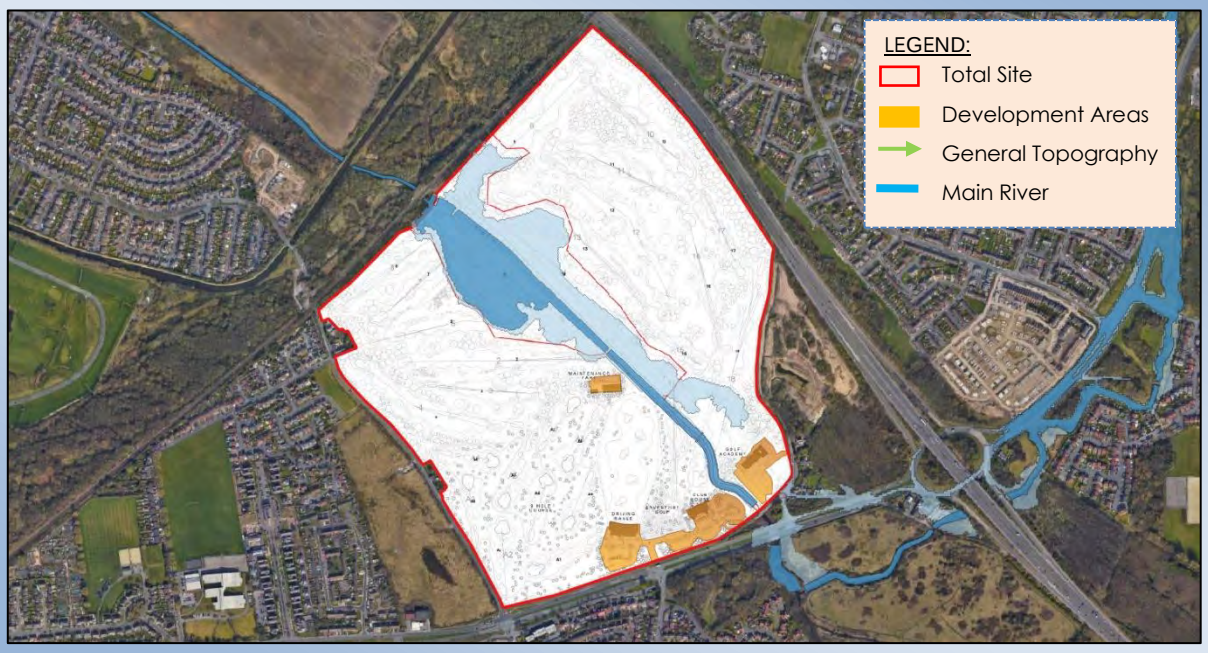



*Figure 4: Development Areas and Flood Zone Overlay (Betts Hydro, 2023)*

3.1.5 Review of the Flood Zone Maps indicates that most of the proposed development will be located within Flood Zone 1 and outside of the predicted Flood Zone 2 and Flood Zone 3 extents. The Flood Zone extents are mostly contained within the Main River channel, although Flood Zone 2 is shown to encroach out of channel and into the eastern development parcel (Figure 4), the development proposed within this area is golf course improvements to the tee at Hole 18 and a new ornamental lake, which is considered as water compatible development. Any reprofiling associated with the lake will be minimised where practical, although levels changing within Flood Zone 2 does not require the provision of compensatory flood storage.

3.1.6 As the River Alt is designated as a Main River by the EA, there will be a requirement to provide an 8m offset from the top of bank, into each development parcel to allow for any future maintenance requirements by the EA. The developer has confirmed that this 8m offset will be maintained is within 8m of the top of bank, however the proposals are to only resurface this car park where it is located close to the watercourse and the extents will not encroach closer than they currently exist.

3.1.7 The new proposed bridge crossing will technically be within an area shown to be within Flood Zone 2 and 3 however the structure will be designed to standard guidance and practice to minimise the potential for floodplain displacement. It is understood that

open deck structure will be proposed with foundations on either side of the River Alt that span safely outside of the predicted floodplain extents.

3.1.8 Formal design work has not been completed yet, but the bridge will be designed to have a soffit level set above the predicted in-channel top water level, at its location, in the design event. The design event will be the 1 in 100yr plus climate change event, given its fluvial nature and a freeboard of 600mm is to be added to safeguard for the residual extreme scenarios. The top water level in channel, during the design event is anticipated to be 12.611mAOD, based on the hydraulic modelling completed in 2019 and as a minimum the soffit level will need to be set at level of 13.211mAOD.

3.1.9 Due to the nature of proposals, the areas of hardstanding onsite will increase compared to the existing hardstanding areas. To minimise the potential increase in surface water run-off generated by the newly proposed development the proposals are to utilise permeable surfacing and Sustainable Drainage Systems where at all possible across the site (including the greenskeepers maintenance compound). Where discharge to ground is not practical a formal surface water management regime will be implemented to ensure no increased flood risk will result from the new development. There will be separate golf course/tee drainage systems implemented to deal with the proposed golf course alterations, landscaping, and tee areas.

# 4.0 SOURCES OF FLOOD RISK

## 4.1 Fluvial Flood Risk

4.1.1 Information relating to flood risk at the site has been obtained from the Environment Agency and from the Gov.uk website. An extract of the EA's Flood Zone Map for Planning is shown in **Figure 5**, which illustrates that the wider site is located within Flood Zones 1, 2 and 3. The development proposals are however located predominantly in Flood Zone 1, except for the proposed bridge which is located within Flood Zone 3.

4.1.2 Flood Zone 1 is an area considered to be at little or no flood risk from fluvial or tidal sources. Flood Zone 2 is an area at fluvial or tidal risk of flooding in the 1 in 1000yr return period (0.1% Annual Exceedance Probability) event. Flood Zone 3 is an area at fluvial risk in the 1 in 100yr return period (1% AEP) event and/or tidal risk the 1 in 200yr return period (0.5% AEP) event.

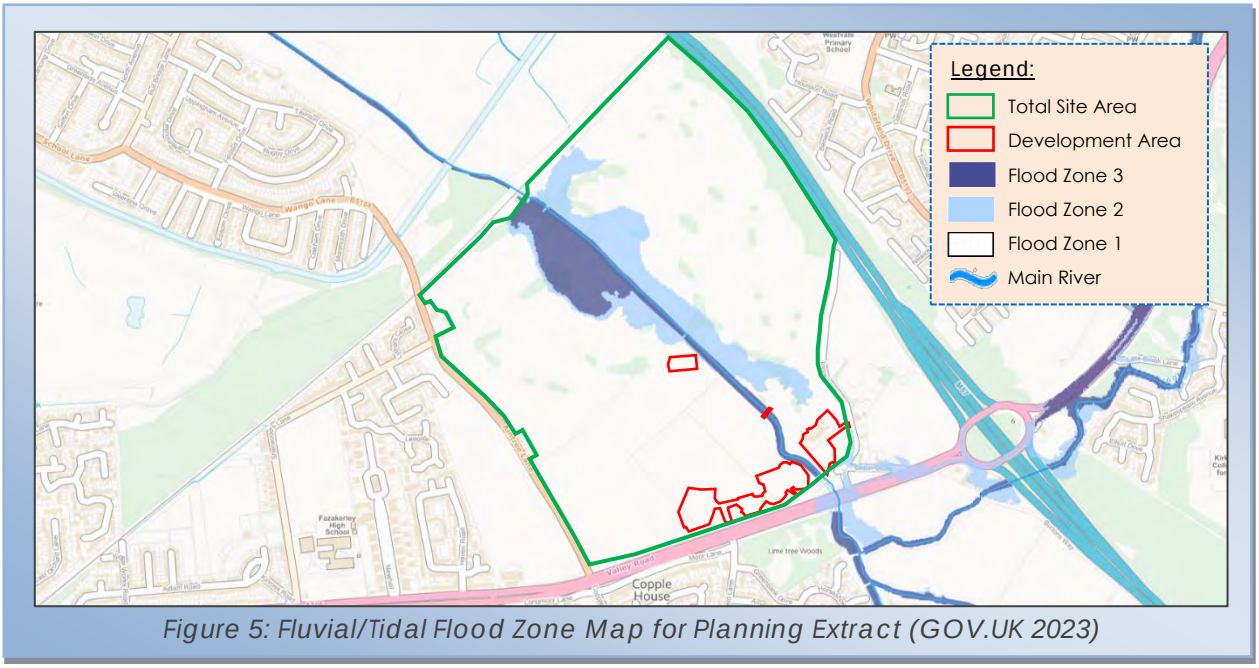



*Figure 5: Fluvial/Tidal Flood Zone Map for Planning Extract (GOV.UK 2023)*

4.1.3 The nearest Main River to the site is the River Alt, which flows through the wider site and divides the development area into an eastern and western parcel. The River Alt flows in a northerly direction from the south via an existing stone bridge crossing under Valley Road. A second bridge crossing is present within the site extents, this is a brick arch culvert and was historically used for vehicles to cross the river and access the development area to the west of the river (see photographs in **Appendix H**).

4.1.4 The River Alt is then crossed by two other bridges within the wider site, located in the centre of the site and near the northern boundary. Upstream of the development area (to the south) two other Main Rivers, known as Kirkby Brook and Knowsley Brook both outfall into the River Alt.

4.1.5 The online mapping shows that there are Ordinary Watercourses located in proximity of the development site. Furthermore, there are existing onsite land drainage ditches present to drain the existing golf course. Due to the scale and nature of these features, the potential flood risks associated would be minimal. Given the sites location and

nearby Main River, the primary flood risks to the development are understood to relate to fluvial flood sources; specifically, the River Alt and its tributaries.

### *Flood Modelling Data Review*

4.1.6 Consultations with the EA have been undertaken to determine the potential flood risks associated with the Main River network. We have requested the EA's flood modelling to review against the onsite ground levels to determine whether any specific mitigation measures will need to be implemented to safeguard the proposed buildings for their design lives in the extreme and/or residual return period events.

4.1.7 The Environment Agency have provided the model outputs for both undefended and defended fluvial scenarios based on the Upper Alt Study from 2013 (full details included within Appendix B). Figure 6 indicates the locations of the in-channel nodes and the peak flood levels at the most relevant node locations are shown in Table 1. The Environment Agency have also provided model outputs for all the events noted in Table 1, these are appended, and the key scenarios discussed subsequently.

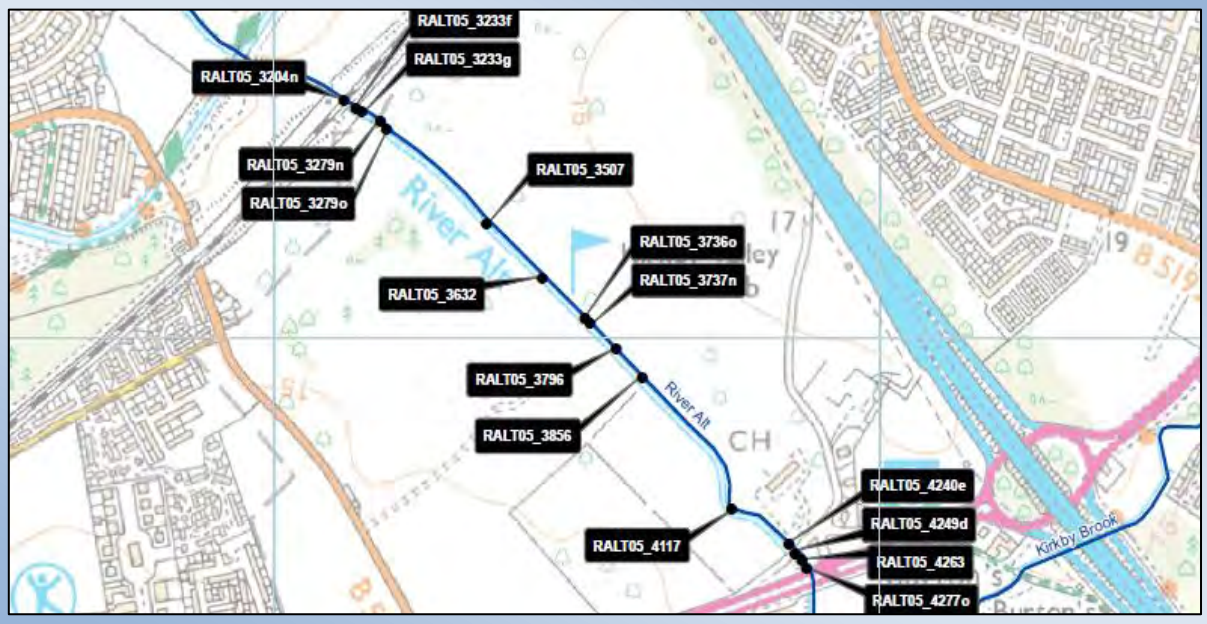



*Figure 6: Modelled In-Channel Node Locations in the River Irwell (EA, 2019)*

| MODELLED NODE LOCATION REF. | TOP WATER LEVEL IN THE KEY RETURN PERIOD EVENTS (mAOD) | | | | | |
|---|---|---|---|---|---|---|
| | Undefended | | | Defended | | |
| | 1 in 100yr | 1 in 100yr + 20%CC | 1 in 1000yr | 1 in 100yr | 1 in 100yr + 20%CC | 1 in 1000yr |
| RALT05_4249d | 12.22 | 12.53 | 12.94 | 12.22 | 12.53 | 12.94 |
| RALT05_4240e | 12.20 | 12.49 | 12.86 | 12.20 | 12.49 | 12.86 |
| RALT05_4117 | 12.08 | 12.38 | 12.76 | 12.08 | 12.38 | 12.76 |
| RALT05_3856 | 11.93 | 12.53 | 12.61 | 11.93 | 12.53 | 12.61 |

*Table 1: Modelled In-Channel Top Water Levels for the River Alt (EA, 2019)*

4.1.8 Review of the site topographic survey has been carried out and this confirms that the ground levels in the western and eastern development parcels generally range from

16mAOD at their highest and fall towards the River Alt, which at its lowest along the top of bank is at 10mAOD. In terms of the main development area, the new proposals will take place to the west of the River Alt where the existing ground levels generally range from 16mAOD to 15.5mAOD.

4.1.9 Where the proposed development is located the ground is approximately 2.97m raised above the top water levels in the 1 in 100yr plus 20% return period event in both the defended and undefended scenarios at node location RALT05_4249d (Table 1). The 1 in 1000yr return period event is also shown to impact the wider development area but not near the proposed buildings or western development parcel itself. The proposed buildings in the western development parcel are generally around 2.56m above the Top Water Level's (TWL) in the 1 in 1000yr plus return period event in both the defended and undefended scenarios (at the nearest node location RALT05_4249d). The proposed development would therefore remain flood free in the key design events.

4.1.10 In summary, based on the modelling completed by the EA and the existing ground levels onsite, the development area remains flood free in both the fluvial undefended and defended scenarios for the 1 in 100yr and 1 in 1000yr return period events, based on the in-channel top water levels.

### *Climate Change*

4.1.11 The data provided by the EA only includes an increase for 20% Climate Change in the 1 in 100yr return period event. The current climate change allowance that should be considered has increased to 25% for the Alt Crossens Management Catchment, the central allowance for 'less vulnerable' development.

*Table 2: Peak Climate Change River Allowances Alt and Crossens Management Catchment (EA, 2022)*

| Year | Central | Higher | Upper |
|---|---|---|---|
| 2020s | 16% | 21% | 31% |
| 2050s | 25% | 33% | 56% |
| 2080s | 44% | 58% | 95% |

4.1.12 The wider site extents are however at risk from flooding in the low-lying areas located directly adjacent to the railway embankment to the north of site which is located outside of the development area. This assessment is based on the current available EA data and additional hydraulic modelling has been undertaken to consider the up-to-date climate change factors and the potential implications of new bridge crossings over the River Alt.

### *Hydraulic Modelling Summary*

4.1.13 A Hydraulic Modelling exercise has therefore been undertaken by Betts Hydro which considers the River Alt where it flows adjacent to the development proposals. A separate report has been produced which details the full methodology and all model outputs. Betts Hydro obtained the EA ISIS-TUFLOW model of the River Alt, produced in 2013 by JBA, which covered a reach of the upper River Alt from Huyton to the railway line embankment just north of Kirkby Valley Golf Course. The model has been run for the 1% AEP, 1% AEP plus 35% climate change and 0.1% AEP fluvial events for the existing

scenarios. Although a climate change allowance of 25% is now appropriate for 'less vulnerable' development the previous allowance utilised was 35% and this is deemed to be a conservative approach.

4.1.14 When climate change is considered, predicted extents of flooding mainly occurs to the north of proposed development areas, although some flooding into the eastern development parcel (where mostly landscaping and the irrigation lake will be constructed).

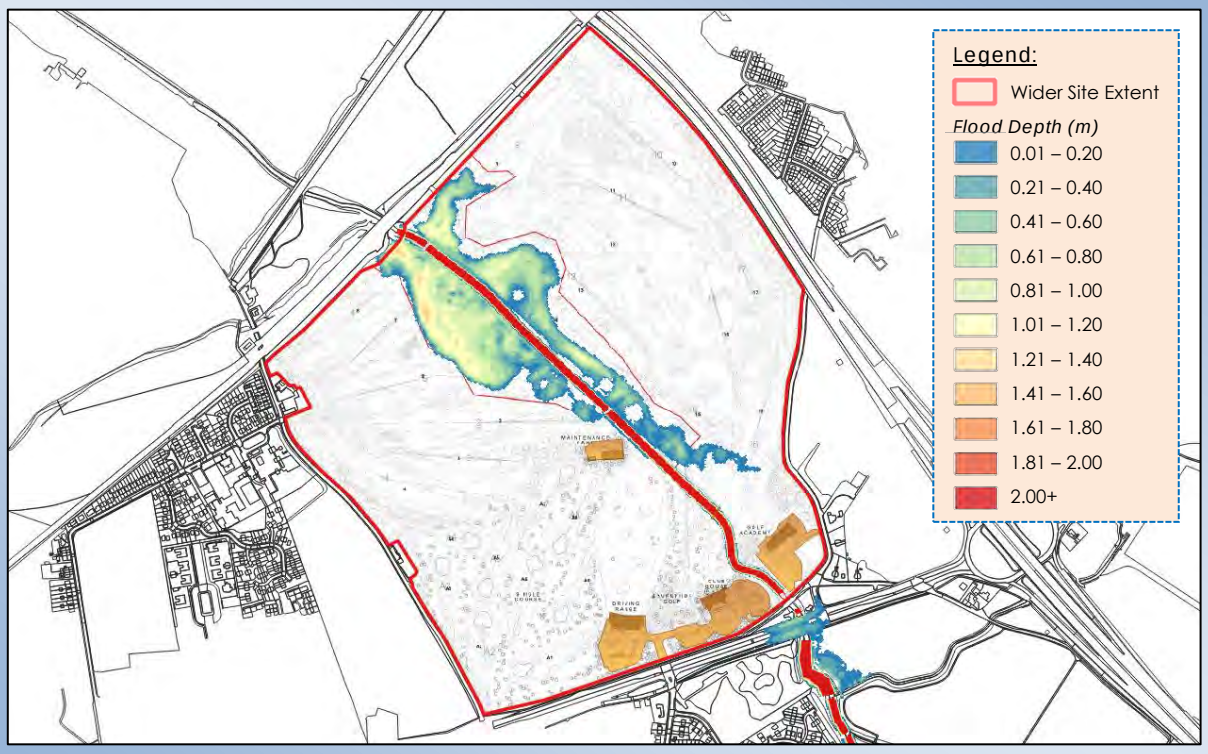



*Figure 7: Proposed Flood Depth Plan for the 1% AEP plus 35% Climate Change (Betts Hydro, 2023)*

4.1.15 The Hydraulic Modelling exercise also considered the proposed scenarios, including the new bridge crossing to link the western and eastern parcels. The proposed bridge was added at the location shown on the planning layout. The soffit of the bridge was based on the minimum required level of 600mm above the in-channel top water level at that location in the 1 in 100 year plus 35% climate change return period event. As this design level (13.211mAOD) was below the existing top of bank level at this location, a level of 13.5mAOD was chosen to be used as the Soffit level in the simulations.

4.1.16 The bridge was represented in the model using an arch bridge unit which was clear span, two new cross sections were interpolated either side of the bridge and a spill unit was added within the 1d domain to represent the functioning structure as there was little risk of overtopping given the levels involved. In these proposed bridge crossing scenarios, the predicted extents of flooding in the 1% AEP event and the 1% AEP plus 35%CC event are similar to the existing scenario.

4.1.17 There is still no out of channel flooding predicted to the main development areas to the west of the River Alt, however the extent of flooding in the eastern parcel is seen to

be more extensive, almost covering the existing car parking areas and former clubhouse/managers accommodation building. To summarise, the existing EA modelling data has been refined and a more detailed understanding of the potential flood risks to both the existing site and the proposals (following the introduction of the new additional bridge crossing) has been provided.

4.1.18 The more detailed hydraulic modelling has shown that the western development parcel and eastern development parcel containing built development is not at flood risk in the existing or the proposed scenarios.

### *Safe Access and Egress*

4.1.19 The proposed access to the new development on the western part of the site will be via the A506 (Valley Road), to the south, which is shown to be located within Flood Zone 1 at the points of access. Safe access and egress will therefore be maintained. Inundation of Valley Road is shown to occur in the extreme scenarios that have been modelled however the potential depth of flooding here is relatively minor (up to 0.6m) and this is considered acceptable given that the site can be closed for operation during a potential extreme flood event.

4.1.20 The access for the former clubhouse/proposed academy and car park will continue to be via Ingoe Lane, which is shown to be in Flood Zones 1 and 2 on the Flood Zone Mapping. The hydraulic modelling work undertaken shows that this section of Ingoe Lane is susceptible to potential flood depths of between 0.01m and 0.40m in the 1 in 1000yr return period event (which delineates the extents of Flood Zone 2). This flood depth is appropriate for the nature of use in this case.

### *Flood Alerts & Warnings*

4.1.21 The Environment Agency provides a flood warning and alert service in those areas that are at medium or high risk of flooding from rivers or the sea. Flood Alerts are provided to geographical areas where it is possible for flooding to occur from rivers sea. Flood Warnings are provided to geographical areas where flooding from rivers or the sea is expected to occur.

4.1.22 A Flood Alert is issued to warn people of the possibility of flooding and encourage them to be alert stay vigilant and make early/low impact preparations for flooding. The purpose of Flood Warnings is to alert people that flooding is expected, and they should take action to protect themselves and their property. Flood Alerts are issued earlier than Warnings to provide advance notice of the possibility of flooding. Flood Warnings are issued when flooding is expected to occur, Severe Flood Warnings are issued to similar areas when there is a danger to life or widespread disruption is expected.

4.1.23 The areas within the wider golf club are shown on the mapping to be located within an Environment Agency Flood Alert Area (as illustrated in Figure 8). The EA will provide alerts for those who sign up to the service when the downstream catchment or river levels are showing signs of capacity. The receipt of information and response to issued flooding warnings is an essential element in preparing for flooding.

4.1.24 Although the main development area is not shown to be covered by the Flood Alert, because it is not predicted to flood in the key events reviewed, it would still be

recommended that the business management sign up to this flood alert service to provide them with the best information prior to a future flood event.

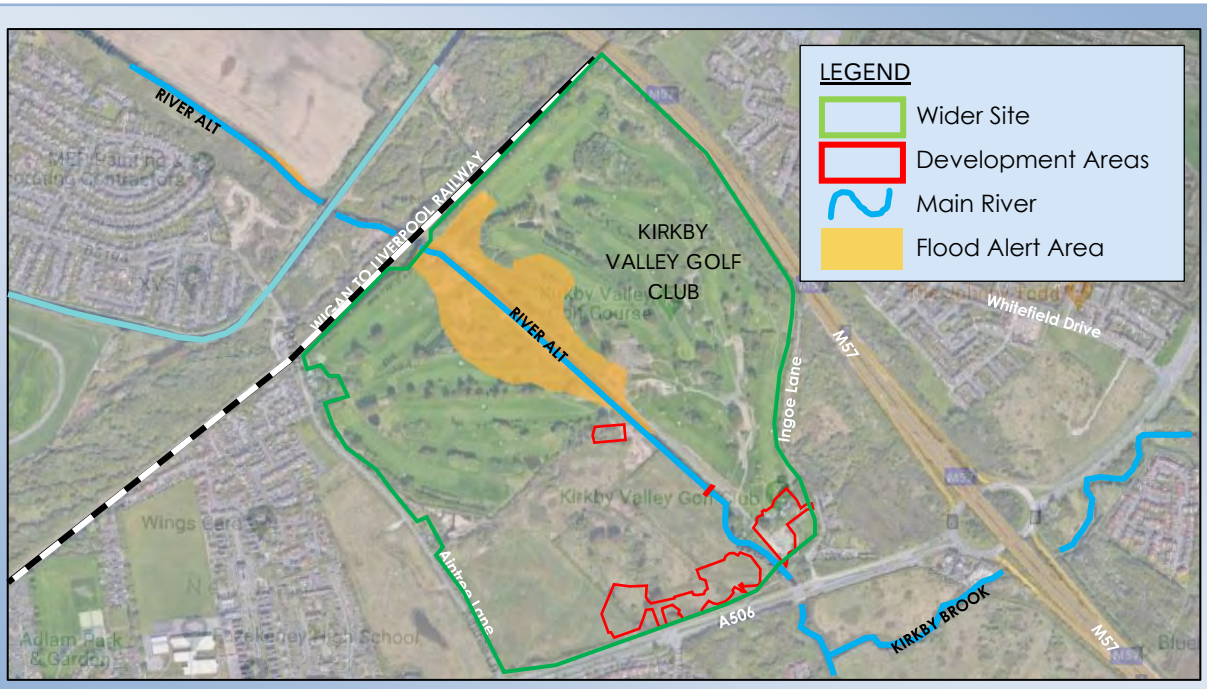



*Figure 8: Flood Alert Extents (Environment Agency, 2023)*

4.1.25 Floodline is a 24hr service which provides constant coverage to the signee and will inform the business management team(s) of any possible upcoming flood event, by phone, email, or text. Further information can be obtained from ***https://www.gov.uk/sign-up-for-flood-warnings***. Those that sign up to the floodline service can generally expect to see the following advice provided, depending on the nature and severity of flood risk anticipated. When each level of alert/warning is issued, there are a range of procedures or actions that are advised to be taken by the business to ensure they are prepared for the upcoming level of event.



FLOOD ALERT: FLOODING IS POSSIBLE
BE PREPARED
Issued when rivers are running full and further rainfall is expected. The alert is issued to advise the public, the emergency services and civil authorities of the increasing chance of flooding, so that they can take appropriate preparatory action.

Time of Issue: Two hours to two days ahead of anticipated flooding

Advised Actions:

- Monitor local news and weather forecasts.
- Be aware of water levels near you
- Be prepared to act on the business flood plan
- Call Floodline for up to date information



FLOOD WARNING: FLOODING IS EXPECTED.
IMMEDIATE ACTION REQUIRED.
Issued when flooding of homes and businesses is expected. Property owners, the public at risk, the emergency services and the civil authority should act to protect life and property.

Time of Issue: Half an hour to one day in advance of flooding

Advised Actions:
- Turn off gas, electricity and water supplies
- Move stock and valuables to safe place
- Be prepared to evacuate customers and staff if safe
- Act on your business flood plan/evacuation plan



SEVERE FLOOD WARNING: SEVERE FLOODING.
DANGER TO LIFE.
Issued when severe flooding is expected and there is extreme danger to life and property. This could relate either to extreme water depths or velocities, or when 100 or more properties are expected to be flooded in a particular flood warning area.

Time of Issue: When flooding poses a significant risk to life.

Advised Actions:
- Monitor social media and local news
- Find refuge in second floor areas
- Avoid electricity sources
- If in danger call 999 immediately
- Listen to emergency services
- Act on your business flood plan

4.1.26 During a large-scale emergency, telecommunications are likely to be disrupted, and telephoning may not therefore be an option. The mobile network may also be closed to give precedence to emergency services. Television, radio, and social media are alternative sources for flood announcements. Every business within proximity of predicted flood extents should have emergency kits available for their management/staff to utilise in the event of a flood impacting the site with little warning and a Business Flood Plan for action on during such a flood event.

### *Business Flood Plan*

4.1.27 Personal perception and preparedness are key factors in reducing risk and in addition to adequate Flood Alerts/Warnings, individual premises should also look to produce a specific Business Flood Plan to act on in an emergency. It may be that a single flood plan is prepared for the entire Golf Club or that individual elements prepare their own depending on the management of the business. There are various templates available online for each premises to create their individual business flood plans.

4.1.28 A Flood Plan ensures that when flood alerts are issued, the management/staff know what actions and procedures to take in what order of importance. It should note key contact information, locations of incoming utilities/off-switches, information on any temporary flood resilience measures to be implemented and identify key items to be included in the Emergency Kit. The key purpose of a Flood Plan is to ensure the staff/management are well informed and know how to prepare the premises for a potential upcoming flood event and how to advise patrons of the potential risks/closure of the premises.

## 4.2 Tidal Flood Risk

4.2.1 The coastline is located approximately 8km east of the site and the Mersey Estuary is located 7km to the south-west of site. Due to the distance from these tidal sources, the associated flood risk is 'very low'. This is supported by the long-term government flood risk mapping which shows the site is mostly at low risk from tidal sources.

## 4.3 Flood Risk Vulnerability Classification and Flood Zone Compatibility

4.3.1 The proposals are recreational in nature and classified as 'less vulnerable' in Table 2: Flood Risk Vulnerability Classification, within the Planning Practice Guidance. The PPG confirms that this type of land-use is appropriate for Flood Zone 1, 2, and 3a providing there is no increase in flood risk elsewhere due to the proposals.

## 4.4 Surface Water Flood Risk

4.4.1 Surface water flooding occurs when rainwater is unable to drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. The risk associated with surface water run-off is indicated by the long-term flood mapping (extract shown in **Figure 9**). The wider site is at varied flood risk from surface water. Those areas at highest flood risk correspond with the existing watercourse route through the site and low-lying parts of the golf course which are more susceptible to ponding in prolonged extreme, rainfall events.

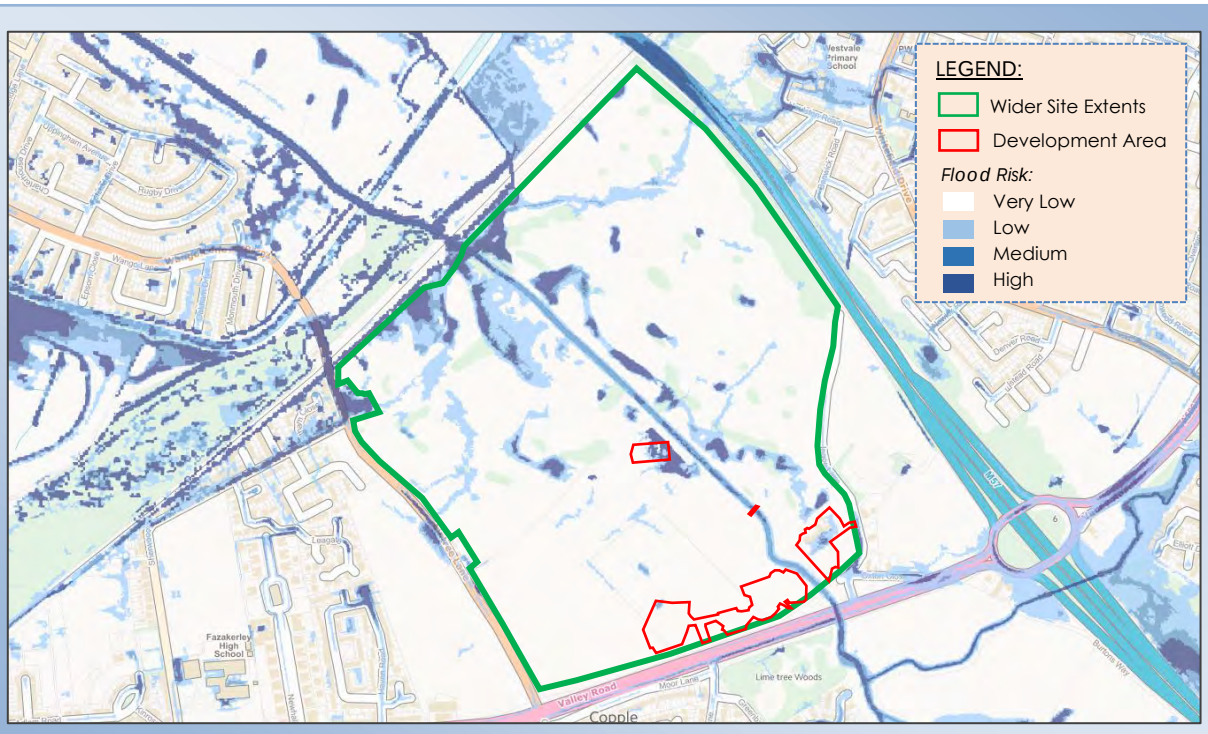



*Figure 9: Surface Water Flood Map Extract (GOV.UK, 2023)*

4.4.2 Based on the long-term government surface water flood mapping most of the development area to the west of the River Alt is at very low or low risk from surface water flooding based on **Figure 9**. The proposed maintenance area is shown to be within an area 'Very Low' to 'High' risk from surface water flooding Those areas at

greater risk are low-lying and near drainage features/waterbodies which account for the level of flood risk here.

4.4.3 In terms of the eastern development parcel, there are more locations here that are shown to be at higher risk from surface water (see **Figure 9**). When compared to the topographic survey for the site, these areas at risk mainly form a natural bowl like feature within the club house car park and would be susceptible to flooding due to ponding water when flow is unable to convey safely away and drains to ground over an extended period. **Figure 10** shows the surface water flood risk extracts overlayed with the development proposals.

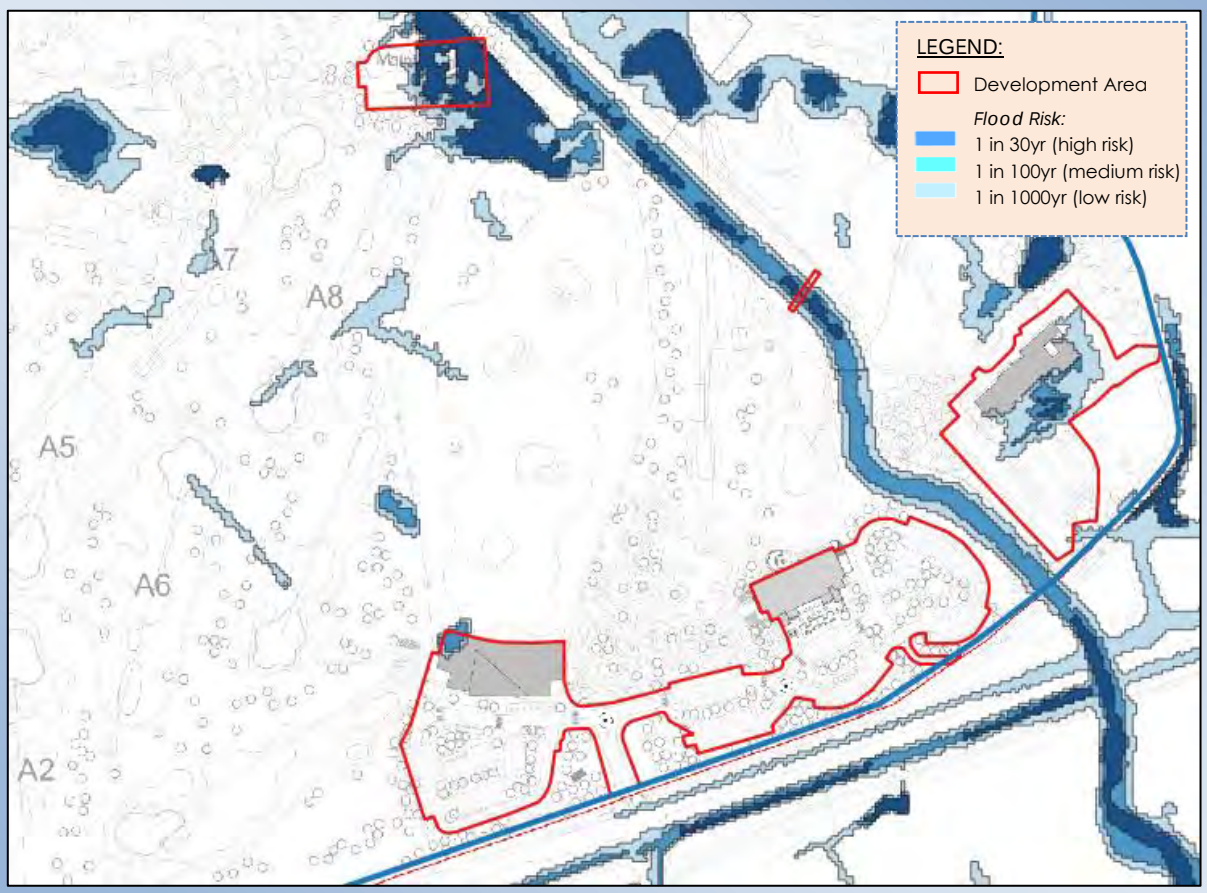



*Figure 10: Surface Water Flood Map Overlay Extract (GOV.UK, 2023)*

4.4.4 The long-term government flood risk mapping also provides indicative flood depths and velocities when looking at potential surface water flood risks. Those areas within the development area to the east of the River Alt, which are shown to be at low risk, are estimated to have depths of flooding below 300mm for the 1 in 30 year 'high risk event', 1 in 100 year 'medium risk' event and the 1 in 1000 'low risk event'. For the proposed maintenance area, the flood depths in all different risk events vary from between 1mm to 900mm with the majority of depths in this location below 300mm.

4.4.5 In terms of velocities of flow for the areas near the clubhouse these are estimated to be generally low (<0.25m/s) for all risk events. For the maintenance area the estimated velocities are also generally low (<0.25m/s).

4.4.6 The risk to the proposals from surface water flooding will be reduced, post-development, through the implementation of mitigation measures proposed within this assessment. The primary means of managing surface water flood risks not only to the proposals but also to others is to ensure the run-off generated by any proposed hardstanding is appropriately managed.

4.4.7 A sustainable drainage regime is therefore proposed to be implemented to cater for the additional surface water run-off generated by the proposed impermeable areas. As with all development, appropriate ground and external levels design and inclusion of permeable surfacing where at all practicable will also be considered. Any proposed or remaining landscaping (golf course tees) will also have a formal means of managing run-off generated in these areas, to ensure there is no increased flood risk elsewhere.

### *Pluvial (Overland run-off) Flood Risk*

4.4.8 Intense rainfall that is unable to soak into the ground or enter drainage systems can run-off land and result in flooding. Local topography and the land use can have a strong influence on the direction and depth of flow. Review of the site topographical survey shows overall there is limited risk from pluvial flows. If the existing highways drainage on the A506 were to surcharge there would be a possibility flows could impact the car park to the east of the River Alt (based on the existing ground levels), although this is considered to be a low risk scenario.

4.4.9 The volume and rate of overland flow from land can be exacerbated if development increases the percentage of impermeable area. Any overland flows generated by the development must be carefully controlled, safe avenues directing overland flow away from adjacent proposed development being advised.

### *Sewer Flood Risk*

4.4.10 In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface and wastewater known as 'combined sewers'. Foul water flooding often occurs in areas prone to overland flow and can result when the sewer is overwhelmed by heavy rainfall and will continue until the water drains away.

4.4.11 UU sewer records identify a 900mm dia. public surface water sewer to cross the northern part of the wider site extent running from Westfield Walk to the east and out falling into the River Alt within the site. Two private surface water sewers (300mm dia.) are understood to cross the site and outfall to the River Alt from Aintree Lane highway drainage and the Haven Road housing estate.

4.4.12 UU have been contacted regarding the possibility of historical sewer flooding and they have confirmed they do have records of sewer flooding in the vicinity of the Golf Course noted on their DG5 register (refer to **Appendix C** for correspondence). Correspondence with KMBC highlighted flooding issues on Aintree Lane but not on the immediate site (refer to **Appendix C** for correspondence).

## 4.5 Groundwater Flood Risk

4.5.1 High groundwater levels are usually the key source of groundwater flooding, which occurs when excess water emerges at the grounds surface (or within manmade

underground structures such as basements). Groundwater flooding is often more insistent than surface water flooding and would typically last for weeks/months rather than days meaning the result to property is often more severe. In general terms groundwater flooding can occur from three main sources:

- If groundwater levels are naturally close to the surface, then this can present a flood risk during times of intense rainfall.
- Seepage and percolation occur where embankments above ground level hold water. In these cases, water travels through the embankment material and emerges on the opposite side of the embankment.
- Groundwater recovery/rebound occurs where the water table has been artificially depressed by abstraction. When the abstraction stops the watertable makes a recovery to its original level. There is the potential for groundwater flooding in low lying areas where groundwater levels have been depressed below their pre-pumping conditions, where these were at or close to ground level.

4.5.2 Review of the Knowsley Metropolitan Borough Council's Strategic Flood Risk Assessment (SFRA) and Preliminary Flood Risk Assessment (PFRA), identify that parts of the wider site are at low risk from flooding associated with groundwater. See SFRA mapping in **Appendix J**. The Preliminary Flood Risk Assessments identifies that the Knowsley area only has a minimal groundwater level rise likelihood (as a result of the cessation of mining, levels), over the next few years.

4.5.3 The EA mapping data for groundwater shows that the site is underlain by a Principal Bedrock Aquifer with Secondary A Superficial Deposits. The site is also located within a High Groundwater Vulnerability Zone to a Minor Aquifer.

4.5.4 No historical groundwater flooding has been identified at the site during consultation with interested parties. Irrespective, it is advised that external levels fall away from the proposed buildings (where feasible) to minimise the flood risk from a variety of sources. By ensuring external levels fall away from any proposed buildings this will provide safe overland flow routes away from buildings in potential exceedance events.

## 4.6 Artificial Sources of Flood Risk

4.6.1 National policy states that an FRA should consider the potential risks from a variety of other flood sources including artificial sources, such as risks from reservoirs and canals.

### *Reservoirs*

4.6.2 The EA recognises reservoirs as bodies of water over 25,000cu.m and the long-term flood mapping is included in **Appendix B**. The mapping shows the potential worst-case extents of flooding associated with a possible breach/failure in a nearby reservoir. Based on this mapping the wider site is shown to be partly at risk in a possible reservoir failure (refer to **Figure 11**).

4.6.3 The nearest identified reservoir is White Man's Dam located approximately 6km south of the development site. The Reservoirs Act 1975 means that the EA ensure reservoirs (over 25,000cu.m) are regularly inspected and safety work is carried out thus meaning a failure or breach in one of these assets is highly unlikely. Although reservoir flooding is

'extremely unlikely', if a failure was to occur there would be little or no warning therefore preparedness is key.

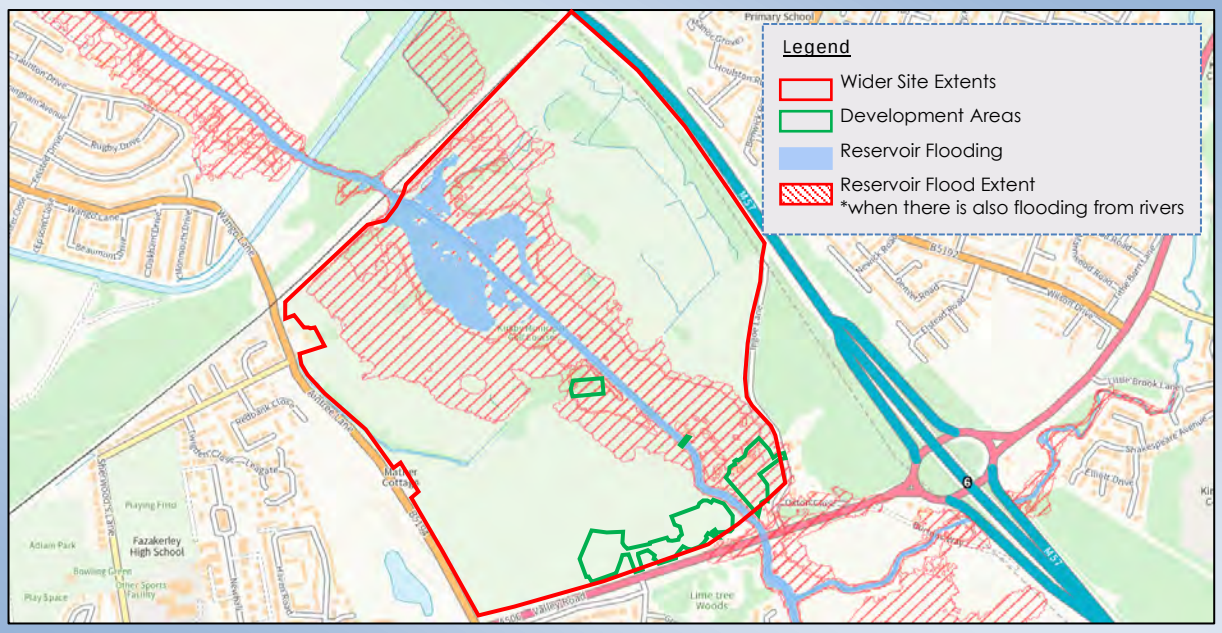



*Figure 11: Reservoir Flood Risk Extent Map Extract (GOV.UK, 2023)*

4.6.4 The potential flood extents associated with reservoir flooding follows the general route of the River Alt through the wider site, as this feature would act as a natural conduit. Those areas at greatest risk from reservoir flooding are located adjacent to the northern boundary of the wider site, adjacent to the adjacent raised railway line. In terms of the proposed development, those proposals to the west of the Main River Alt route would remain mostly flood free during this worst-case exceedance scenario.

4.6.5 The measures proposed to mitigate fluvial flood risk to the site, such as raising the finished floor level of dwellings will also assist in mitigating/reducing the flood risk from a reservoir breach. Additional mitigation from this residual risk will come from early warning and evacuation.

4.6.6 In the case of emergency (reservoir breach or failure), the Lead Local Flood Authority often prepare emergency plans in collaboration with the EA and other stakeholders to assist with improving community resilience. Additionally, it would be recommended that the business management create their own Flood Action Plan which provides information to staff and patrons on what to do in the event of a reservoir breach/failure.

### *Canals*

4.6.7 The nearest canal to the site is the Leeds and Liverpool Canal, located approximately 500m to the north of the site. Due to the local topography, the associated flood risk is 'low', as any flow associated with a future breach would be directed with the natural catchment along the downstream River Alt (away from the sites upstream location).

## 4.7 Historical and Anecdotal Flooding Information

4.7.1 An internet-based search for flooding did not identify any historical flooding to the site area. Review of the Knowsley Metropolitan Borough Council's Strategic Flood Risk Assessment and Preliminary Flood Risk Assessment highlight there is a floodplain associated with the River Alt on the wider site. These Flood Zones are identified to be the same in the undefended scenario as the defended scenario (some mapping is included in Appendix J).

4.7.2 Consultation with various interested parties including the Environment Agency and KMBC also failed to highlight any historical flooding on the site, KMBC did however identify that the nearby Aintree Lane has been susceptible to surface water related flooding historically. Historical sewer flooding has not been identified at the site, following correspondence with UU (correspondence found in Appendix A, B and C).

## 4.8 Flood Risk Mitigation Measures & Residual Risks

4.8.1 The wider site is located within Flood Zones 1, 2 and 3. The proposed development areas however will be located predominantly within Flood Zone 1, with the exception of the proposed bridge crossing which is located within Flood Zone 3.

### *Mitigation Measures*

4.8.2 It is advised that Finished Floor Levels (FFL) of the proposed buildings are set above the external ground levels (where practical). By ensuring the FFLs are raised sufficiently above the external levels (following any re-grade) should mitigate any risk of flooding from a variety of sources, including groundwater and surface water run-off risks.

4.8.3 As the River Alt is designated as a Main River by the EA, there will be a requirement to provide an 8m easement from the top of bank, into each development parcel to allow for any future maintenance requirements by the Environment Agency. The developer has confirmed that this 8m easement will be maintained, the nearest building proposed will be the new clubhouse which is located over 10m from the top of bank.

4.8.4 Formal design work has not been completed yet, but the bridge will be designed to have a soffit level set above the predicted in-channel top water level, at its location, in the design event. The design event will be the 1 in 100yr plus climate change event and a freeboard of 600mm is to be provided above the top water level during the design event. As the in-channel top water level is anticipated to be 12.611mAOD, based on the hydraulic modelling completed, a minimum soffit level of 13.211mAOD should be applied to the new bridge crossing design for the deck.

4.8.5 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings is advised. Any natural conveyance routes through the site at present should be catered for through continued routing in an appropriate manner, this will ensure no increased run-off elsewhere as a result of the proposals.

4.8.6 To minimise the flood risk to the neighbouring properties it is recommended that the surface water run-off generated by the proposals be managed effectively with the peak rates of run-off being restricted to the pre-development greenfield situation. This

assessment has considered a drainage strategy to manage surface water run-off this will be followed by a more detailed assessment at the next stage of design.

4.8.7 The proposed onsite surface water drainage system for the new development will need to be sized to contain storm events up to and including the 1 in 100yr return period storm event with up to a 30% allowance for climate change being contained onsite.

4.8.8 As with any drainage system blockages within either the foul or surface water system have the potential to cause flooding or disruption. It is important that should any drainage systems not be offered for adoption to either United Utilities or Knowsley Metropolitan Borough Council (depending on nature of asset involved) then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

### *Residual Risks*

4.8.9 If an extreme rainfall event exceeds the design criteria for the drainage system it is likely that there will be some overland flows that are unable to enter the system, it is important that these potential overland flows are catered for within the development site in the event that the capacity of the drainage system is exceeded.

# 5.0 SURFACE WATER MANAGEMENT

## 5.1 Pre-Development Surface Water Run-off

5.1.1 The total site covers over 80ha; however, this assessment focuses on the development area (buildings/hardstanding elements only), which equates to 2.970ha. At present the development area is split into two separate parcels by the River Alt. The development parcel to the west of the River Alt is currently undeveloped land. This part of the site is thought to either drain to ground overtime or to the nearby River Alt via overland/pluvial run-off.

5.1.2 The eastern part of the development consists of the existing club house and car park. These existing buildings are understood to have their own formal means of manging run-off generated, although the exact method has not been confirmed at this time. The existing car park, which is also to the east of the river, is mostly made up of impermeable areas surrounded by granular base, so overland run-off would occur to those areas adjacent and drain naturally to ground. As the eastern development is only for refurbishment this area is discounted from the Drainage Areas figures for the purpose of surface water calculations.

5.1.3 The remaining development is either existing impermeable to remain impermeable, proposed to be permeably surfaced, or is landscaping/golf green in nature and will be served by its own land drainage systems. A separate land/tee drainage regime has been prepared by a qualified golf course drainage engineer.

5.1.4 The peak rates and volumes of run-off generated by the Proposed new Drainage Areas (2.163ha) have been calculated for the peak events shown in Table 3 (full details Appendix K). The surface water run-off rates have been calculated using the FEH Statistical Method. The full calculations in Appendix K are based on an area of 1ha and these rates and volumes are calculated pro-rata for the proposed development area of 2.970ha.

| *Drainage Area* | *Run-Off Rates* | | | | *Run-Off Volumes* | |
|---|---|---|---|---|---|---|
| | *1 In 1 Year* | *1 In 30 Year* | *1 In 100 Year* | *QBar* | *1 In 1 Year* | *1 In 100 Year* |
| 2.163ha | 5.3l/s | 10.4l/s | 12.8l/s | 6.1l/s | 157.2cu.m | 442.8cu.m |

*Table 3: Pre-Development Surface Water Run-Off Rates (Betts Hydro, 2023)*

## 5.2 Post Development Surface Water Run-Off

5.2.1 The post-development impermeable area within the new areas of development (to the west of the River Alt) are calculated as 1.789ha. The unrestricted post-development brownfield run-off rates have been detailed in Table 4, based on an impermeable area of 2ha.

| *Area* | *Run-Off Rates* | | | *Run-Off Volumes* | |
|---|---|---|---|---|---|
| | *1 In 1 Year* | *1 In 30 Year* | *1 In 100 Year + CC* | *1 In 1 Year* | *1 In 100 Year* |
| 1.789ha | 82.5l/s | 153.3l/s | 264.9l/s | 375.7cu.m | 1109.2cu.m |

*Table 4: Post-Development Un-Restricted Run-Off Rates (Betts Hydro, 2023)*

5.2.2 In accordance with national and local planning policies it is necessary to restrict surface water run-off rates where at all practical to mimic a pre-development greenfield situation. The proposals will therefore be to discharge surface water run-off from site mimicking the pre-development greenfield situation (Table 3). Further details of proposed drainage strategy can be found in Section 5.6.

## 5.3 Sustainable Drainage Systems (SuDS)

5.3.1 In accordance with national and local planning policy, including the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) and the SuDS Manual (CIRIA 753), peak surface water discharge rates from new development should be appropriately managed and where possible reduced. To manage surface water run-off the preference should always be given to Sustainable Drainage Systems (SuDS) over the traditional methods of buried sewers wherever possible and practical.

5.3.2 SuDS can address the four key sustainability objectives embedded in this policy including providing space for water (water quantity), improving water quality and biodiversity, along with providing valuable amenity/recreational space within new development sites. It would be beneficial to implement wider green space/Public Open Space area(s) in one or more locations within site, where SuDS features could be implemented. Opportunities should also be taken to provide soft landscaping where at all possible on site to assist in minimising surface water run-off.




*Figure 12: SuDS Photographs (SusDrain, 2012)*

5.3.3 Given the indicative layout, there will likely be the opportunity to incorporate SuDS methods such as swales, permeable surfacing and bio-retention to provide a degree of treatment before flows are carried offsite (Figure 12). The proposals will be to incorporate permeable surfacing for external hardstanding areas including the car parking bays, outdoor seating areas, pedestrian areas and internal road links where at all practical. SuDS features can include permeable surfacing such as resin bound surfaces, permeable paving, grasscrete or granular substrate. Tree pits or bioretention can also be considered for external areas near to the proposed buildings to provide added water quality benefits prior to discharge to ground and possibly assist with managing some of the additional run-off.

5.3.4 Promoting SuDS to deal with surface water at source will limit the requirement for hard engineering-based attenuation and conveyance. Using SuDS onsite will reduce the volume of surface water entering the downstream watercourse and sewer network which is the preferred approach. The proposals will be to mimic the existing situation and drain to ground where practical utilising appropriate infiltration-based systems, subject to confirmation of onsite infiltration rates. Detailed design will confirm the technical details of the drainage infrastructure proposed following onsite testing.

## 5.4 Methods of Surface Water Management

5.4.1 At present the development area covers 2.970ha, a large portion of the greater site is proposed for landscaping or golf course development and will therefore remain permeable and catered for by a land drainage regime. The focus of this assessment is to identify the appropriate means of managing surface water run-off generated by the newly proposed buildings and associated areas of hardstanding which cover 2.163ha and are referred to as proposed drainage areas as shown in purple below (see Figure 13).

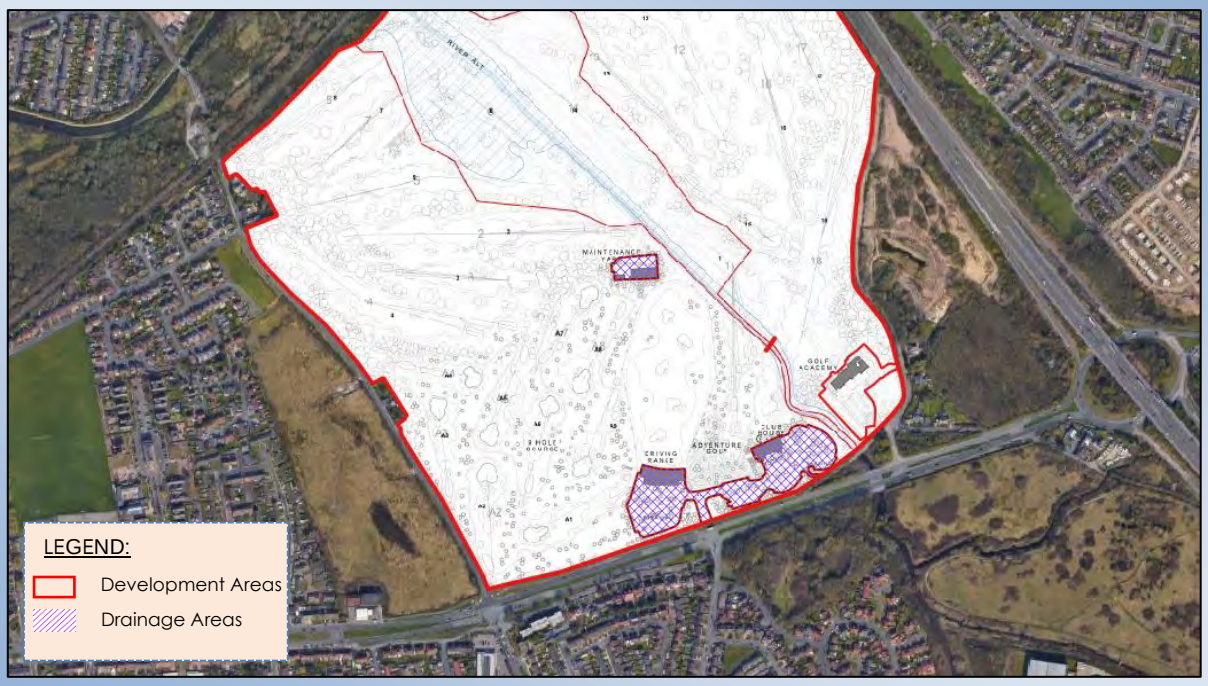



*Figure 13: Surface Water Management Drainage Area (Betts Hydro, 2023)*

5.4.2 When we consider the drainage focus area, this equates to most buildings and carparking areas proposed to the west of the River Alt, as shown above. This area at present is 100% permeable and would increase to 100% impermeable should the development utilise non-permeable surfacing throughout. Although permeable surfacing is to be considered for those car parking areas, internal roads, and footways where practical, for the purpose of this assessment we have considered that the entire area shown by the purple hatch in Figure 13 will be impermeable post-development.

5.4.3 There are three methods that have been reviewed for the management and discharge of surface water generated by the proposed buildings and hardstanding

areas. These may be applied individually or collectively to form a complete strategy and should be applied in the order of priority listed below:

- Discharge via infiltration
- Discharge to watercourse/waterbody
- Discharge to public sewerage system

## 5.5 Discharge via Infiltration

5.5.1 Any impermeable areas that can drain to soakaway or an alternative method of infiltration would significantly improve the sustainability of any surface water systems. The published online datasets have initially been reviewed to consider how favourable the underlying strata is to support a potential infiltration-based solution at the site.

5.5.2 The Cranfield Soil and AgriFood Institute (CSAI), Soilscapes viewer identifies the soil within the site area to be naturally wet, very acid, sandy soils. The British Geology Survey (BGS) mapping data indicates that the bedrock geology composes of Chester Sandstone Formation (Sandstone), with superficial deposits consisting of the Shirdley Hill Sand Formation - Sand.

5.5.3 Based on the ground conditions noted online infiltration is considered to offer a possible means of dealing with surface water run-off, although the upper soil strata appear to be less favourable towards an infiltration based solution, the underlying geology is made up of sands and gravels which are highly permeable and would potentially support formal infiltration methods on the site.

5.5.4 Discussion with the landowner has confirmed the existing car parking, external paved areas within the eastern development parcel drain to ground via overland run-off and infiltration over time. There are no recorded issues with the existing infiltration-based drainage regime on the site and the proposals will be to mimic this approach for the new development via formal drainage mechanisms (such as soakaways) as illustrated in Figure 14.

5.5.5 Although the ground conditions appear favourable based on the online published ground conditions, at this time no onsite formal testing has been carried out to confirm the specific infiltration rates onsite. Onsite Soakaway Testing has therefore been commissioned by the client, to be undertaken on the site, in key locations where infiltration methods would likely be used (proposed car parking areas).

5.5.6 The proposals will therefore be to manage surface water run-off generated onsite by discharging to ground via appropriately designed infiltration-based Sustainable Drainage System. The proposals are to utilise permeable surface where at all feasible for external hardstanding areas including parking bays, footways, and patio areas. Where access roads are being proposed for adoption permeable surfacing is not typically accepted for adoption by the Lead Local Flood Authority and in these cases an alternative management regime would be required to be secured or an alternative surfacing material would need to be incorporated for these areas.

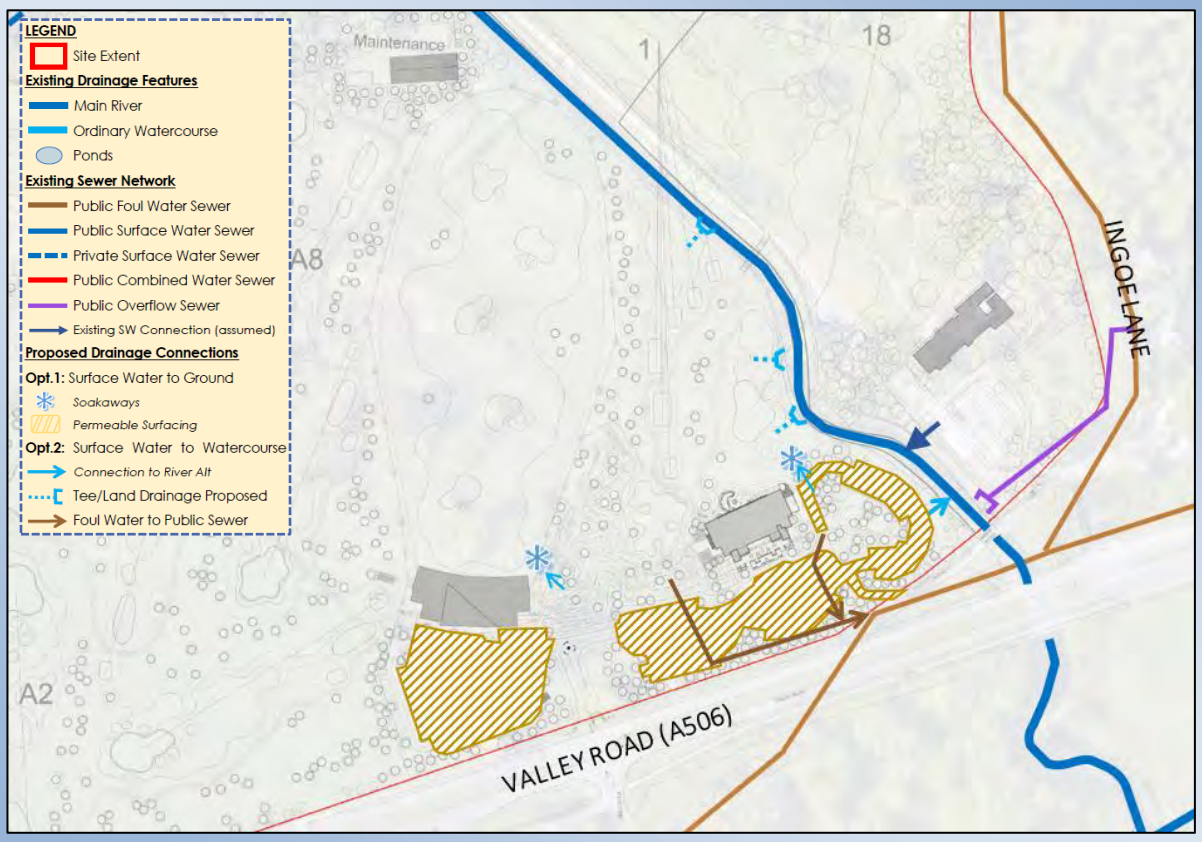



*Figure 14: Preliminary Drainage Strategy Plan Extract (Betts Hydro, 2023)*

5.5.7 There are new buildings proposed to be constructed as part of the development; these are the new clubhouse building, which is nearest the western bank of the River Alt, further west is the newly proposed driving range building. The proposals are to introduce new formal infiltration-based management solutions to cater for the additional surface water run-off generated by these new roof areas.

5.5.8 The specific infiltration-based infrastructure will be confirmed during the detailed design stage although it is likely that soakaways or infiltration trenches will best serve the buildings. There may be some scope to introduce rainwater harvesting into those buildings where shower facilities will be present to help re-use run-off on the site is a sustainable manner.

5.5.9 The proposed infiltration-based drainage solution will need to be sized holistically to ensure that flooding does not occur on any part of the site in the 1 in 30 year event and that events exceeding the 1 in 30 year event is contained within the site without flooding any building or land off site up to and including the 1 in 100 year event plus an allowance for climate change.

5.5.10 For infiltration features to be sized appropriately, onsite soakaway testing will be required to determine the onsite infiltration rates at the proposed infiltration locations. In terms of discharge rates, these will not exceed that of existing onsite infiltration rate (to be determined during onsite testing).

5.5.11 Detailed design will confirm the specific technical details of the drainage features and discussion with the LPA will ensure these are appropriately sized, to meet any local design requirements where adoptions are to be proposed. Where systems are proposed to remain private, the maintenance and funding of these features will be the responsibility of the private maintenance contractors at the golf club. Full details will be provided during detailed design.

## 5.6 Discharge to Watercourse

5.6.1 Should onsite soakaway tests show that rates onsite are not favourable to an infiltration-based surface water solution at the site, then the next approach in the hierarchical approach is to discharge to the nearest watercourse. As previously discussed, the River Alt flows through the wider golf course and would provide the alternative option for draining surface water run-off from the site.

5.6.2 Should infiltration not provide a full drainage solution then the proposals will be to form a new formal connection to the River Alt (see **Figure 14**), subject to formal consents and agreements from the Environment Agency. Detailed design would be required to confirm whether a gravity system can be achieved, although given the levels difference between the ground levels onsite and the existing River Alt bed level (see Photographs in **Figure 15**), a gravity connection is anticipated to be feasible.




*Figure 15: Photographs from the Site Walkover (Betts Hydro, 2019)*

5.6.3 Consent and relevant agreements for works to the Main River will be required from the Environment Agency and the Lead Local Flood Authority. Consent will also be required from the LLFA (Knowsley Metropolitan Borough Council), who will also need to agree to any proposed discharge rates. Early discussion is advised with all parties, to ensure there are no other constraints in terms of points of connection or rates of discharge.

5.6.4 In accordance with the SuDS Manual (CIRIA 753) and the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable.

5.6.5 The proposals would be to therefore restrict surface water run-off to mimic a pre-development greenfield situation. The pre-development greenfield rate (QBar) for those areas of site being considered as part of this drainage assessment (2.163ha) is 6.1l/s, using the FEH Statistical Method (see summary in **Appendix K**). This discharge rate would need to be discussed and agreed with the Lead Local Flood Authority in due course, should infiltration not be viable at the site.

5.6.6 The restricted flow will generate a storage requirement during the extreme storm events. The stormwater storage figures quoted in **Table 5** are estimates only and the detailed drainage design will determine with accuracy the stormwater storage requirements. It would be beneficial to implement SuDS features such as a pond or swales, near to the proposed outfall locations. If designed appropriately the SuDS can aid in the attenuation and provide added benefits in terms of water quality.

| Impermeable Area (1.789ha) | 1 In 1 Year | 1 In 30 Year | 1 In 100 Year + 30% CC |
|---|---|---|---|
| Restricted Run-Off Rate | 6.1l/s | 6.1l/s | 6.1l/s |
| Estimated Stormwater Storage Volume | 256cm.m-425cu.m | 583cu.m-807cu.m | 1144cu.m-1471cu.m |

*Table 5: Estimated Stormwater Storage Requirements (Betts Hydro, 2023)*

## 5.7 Discharge to Public Sewer Network

5.7.1 UU sewer records identify there to be public surface water sewers to the north, east, south, and west of site, however, if infiltration is not feasible then the surface water run-off should discharge into the nearest watercourse or waterbody and not the existing public sewer network.

## 5.8 Climate Change

5.8.1 There are indications that the climate in the UK is changing significantly, and it is widely believed that the nature of climate change will vary greatly by region. Current opinion indicates the likelihood that future climate change would produce more frequent short duration and high intensity rainfall events with the addition of more frequent periods of long duration rainfall. It is believed that the impact of climate change means there is likely to be a long-term increase in the average sea levels, with an expectation that sea levels will rise gradually. An increase in flood water levels means that future flooding events will occur more frequently and will have a greater impact.

5.8.2 In light of the future uncertainties Climate Change should be accounted for within the design of all new developments. Climate change factors have been considered and any increase in the level of flood risk (to the site) from climate change is likely to be related to the increase in rainfall intensity and duration and its impact upon the surface water drainage system.

5.8.3 In accordance with the Alt and Crossens Management Catchment peak rainfall allowances, the central allowance (Table 6) for the 2070's has been utilised (development with a lifetime between 2061 and 2125).

| PROJECTIONS | TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE 2070'S |
|---|---|
| Upper End Allowance | 45% |
| Central Allowance | 30% |

*Table 6: Change to Peak Rainfall Compared to 1981-2000 Baseline (Environment Agency, 2023)*

## 6.0 FOUL WATER MANAGEMENT

6.1 UU sewer records identify multiple sewer assets to be in proximity of the wider site, including surface and foul water sewers to the south and west. A public foul water sewer is located to the east within Ingoe Lane, this joins a public foul water sewer (1200mm dia.) located running parallel to Valley Road to the south of the site (sewer records within Appendix C).

6.2 The wider site currently has an existing clubhouse, including shop, food establishment and managers accommodation, which generate foul water flows, although the exact method of dealing with these is not confirmed at present. It is assumed from review of the UU sewer records that these connect into the neighbouring public sewer network.

6.3 In terms of the proposed drainage areas being considered as part of this assessment (development parcel to the west of the River Alt), at present this area is undeveloped and there are no onsite foul water flows are currently generated, thus no existing foul water connections present. There is however the potential for a new foul water connection to the existing public foul water sewer network to cater for the additional foul water flows generated by these proposals (refer to aerial drainage plan in Figure 14 previously).

6.4 The primary option would be to form a new connection to cater for the foul water flows generated by the newly proposed buildings (clubhouse, driving range and multi-functional sports centre) to the public foul water sewer located to the south of the site. Detailed design will be required to confirm feasibility of the strategy and to confirm whether a full gravity connection can be achieved. The peak foul water flows generated by this development, will need to be calculated based on the guidance contained within Sewers for Adoption (4000 litres per dwelling per 24 hours).

6.5 Early dialogue with UU is advised to confirm where there preferred point of connection would be and any restrictions in terms of discharge rates. If a connection can be made within the wider land ownership boundary, then there would be no need to obtain consent from nearby land/asset owners to route to the public sewer network. Where this is not the case and offsite works are required then relevant consents will need to be obtained.

## 7.0 SUMMARY AND CONCLUSIONS

7.1 This Flood Risk Assessment and Drainage Management Strategy has been prepared to support a planning application for mixed-use development at Kirkby Valley Golf Club in Kirkby. The total site covers over 80ha, however the main development area covers a much smaller 2.970ha.

*Flood Risk*

7.2 The wider site is located within Flood Zone 1, Flood Zone 2 and Flood Zone 3 based on the Environment Agency Flood Zone Map for Planning. The proposals are 'recreational' in nature and as such is classified as mostly 'less vulnerable' in Table 2: Flood Risk Vulnerability Classification, within the Planning Practice Guidance. The Planning Practice Guidance confirms that this type of land-use is appropriate in this case providing there is no increase in flood risk elsewhere due to the proposals.

7.3 This report has reviewed all sources of flood risk both to and resulting from the proposed development site. Despite the flood zoning over the wider site, the main development areas are at 'very low' to 'low' risk from most flood sources considered including fluvial, tidal, surface water and sewer flooding. Consultations with the Environment Agency, United Utilities, and Knowsley Metropolitan Borough Council have been undertaken and have not identified any historical incidents of flooding directly to the site.

7.4 The nearest Main River is the River Alt, which flows through the site and splits the development area into an eastern and western parcel. The Environment Agency were able to provide in-channel top water levels for the key design events to determine the potential flood risk. In summary, based on the modelling completed by the Environment Agency and the existing ground levels onsite, the main development area remains flood free.

7.5 The existing Environment Agency modelling data has been refined and a detailed understanding of the potential flood risks to both the existing site, and the proposed development has been gained through a detailed hydraulic modelling assessment undertaken in 2019 by Betts Hydro. This modelling focuses on the effects of climate change and the effects on flood risk associated with the proposed bridge crossing. This modelling shows that the development area remains flood free in all the key design return period events including during the proposed modelled scenarios.

7.6 Surface water flood risks have also been considered and as the development proposals have the potential to increase the volumes of surface water run-off generated on the site, appropriate mitigation has been considered. The risk associated with surface water run-off will be managed and reduced as part of the proposals through implementation of mitigation proposals, including a sustainable surface water regime, appropriate levels design and permeable surfacing where feasible.

*Drainage Strategy*

7.7 Surface water management options have been assessed in accordance with the national and local policy to follow the sustainable drainage hierarchy. The primary measure to deal with surface water run-off from new sites is to drain to ground where at all practical. Based on the ground conditions noted online, infiltration is considered

to offer a possible means of dealing with surface water run-off, although the upper soil strata appear to be less favourable towards an infiltration-based solution, and deeper infrastructure may be required.

7.8 The proposals are to utilise permeable surfacing where at all feasible for external hardstanding areas including parking bays, footways and patio areas. Where access roads are being proposed for adoption permeable surfacing is not typically accepted for adoption by the Lead Local Flood Authority and in these cases an alternative management options would be required. Where testing onsite confirms that infiltration-based solutions would be feasible, the existing infiltration rates (determined during the onsite testing), will be the proposed discharge rates.

7.9 Should infiltration not provide a full or part drainage solution, then the proposals will be to form a new connection to the River Alt, subject to formal consents and agreements from the Environment Agency's. Detailed design would be required to confirm whether a gravity system can be achieved, although given the levels difference between the site and the existing River Alt a gravity connection is anticipated.

7.10 Consent and relevant agreements for works to the Main River will be required from the Environment Agency and the Lead Local Flood Authority. Consent will also be required from the LLFA (Knowsley Metropolitan Borough Council), who will also need to agree to any proposed discharge rates. Early discussion is advised with all parties, to ensure there are no other constraints in terms of points of connection or rates of discharge.

7.11 In accordance with the SuDS Manual (CIRIA 753) and the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. The proposals would be to therefore restrict surface water run-off to mimic a pre-development greenfield situation (QBar).

7.12 Restricting the rate of discharge will generate a stormwater storage requirement during the extreme storm events. It would be beneficial to implement SuDS features such as a pond or swales, near to the proposed outfall location. If designed appropriately the SuDS features can aid in the attenuation and provide added benefits in terms of water quality. In terms of design the sustainable drainage systems proposed onsite should be sized to ensure that exceedance up to and including the 1 in 100-year return period event with allowance for climate change is contained within site.

7.13 The Flood Risk Assessment and Drainage Management Strategy has been prepared in consultation with the relevant interested parties and incorporates their comments where possible. The report is commensurate with the scale and nature of the development proposals and in summary, the development can be considered appropriate in accordance with the Planning Practice Guidance.

## 8.0 RECOMMENDATIONS

8.1 It is typical to set the Finished Floor Levels (FFL) of proposed buildings of 150mm above the existing ground levels although where existing foundations are being used this would not be practical. By ensuring the FFLs are raised sufficiently above the external levels (following any re-grade) this should mitigate any risk of flooding from a variety of sources, including groundwater and surface water run-off exceedance risks.

8.2 As the River Alt is designated as a Main River by the EA, there will be a requirement to provide an 8m easement from the top of bank, into each development parcel to allow for any future maintenance requirements by the Environment Agency. The developer has confirmed that this 8m easement will be maintained, the nearest building proposed will be the new clubhouse which is located over 10m from the top of bank.

8.3 The new proposed bridge crossing will need to be designed to accommodate the design standards of the Environment Agency. It is understood that open deck structure would be preferable with the foundations on either side of the riverbank being located outside of the predicted floodplain extents. Formal design work has not been completed yet, but the bridge will be designed to have a soffit level set 600m above the predicted in-channel top water level, at its location, in the design event. The design event will be the 1 in 100yr plus climate change event and the top water level in channel, during the design event is anticipated to be 12.611mAOD. Based on the hydraulic modelling completed and as a minimum the soffit level of the proposed bridge deck will need to be set at level of 13.211mAOD.

8.4 The pre-application process with the Environment Agency has begun, to discuss the development proposals that are in proximity of the Main River network including the new bridge crossing. However due to unforeseen circumstances, the Environment Agency are unable to assist with pre-application discussions currently. Further discussion with the EA will therefore need to be carried out as part of the planning application as they will be statutory consultees.

8.5 In the case of a flood emergency, the Lead Local Flood Authority often prepare emergency plans in collaboration with the EA and other stakeholders to assist with improving community resilience. Additionally, it would be recommended that the business create their own independent Flood Action Plan which provides information to staff and patrons on what to do in the event of a future flood event.

8.6 To minimise the flood risk to the neighbouring property and proposed but it is proposed that the surface water run-off generated by the proposals be managed effectively with the peak rates of run-off being restricted in accordance with the NPPF and Non-Technical Standards for SuDS.

8.7 In accordance with LPA's and UU requirements, Soakaway Testing to BRE365 will be required to be to evidence that discharge to ground will be a viable solution. Onsite Soakaway Testing has therefore been commissioned by the client, to be undertaken on the site, in key locations where infiltration methods would likely be used (proposed car parking areas). This will also provide the existing percolation infiltration rates onsite to steer the detailed drainage design.

8.8 Detailed design will need to be carried out for both the proposed surface water and separate foul water drainage proposals, this will confirm the technical drainage details and identify whether a full gravity solution will be feasible.

8.9 The proposed onsite surface water drainage system will need to be sized to contain the 1 in 30yr return period event below ground with exceedance from storm events up to and including the 1 in 100yr return period storm event with an allowance for climate change being contained onsite.

8.10 It is important that should any drainage systems not be offered for adoption to either the Water Company or the Local Authority then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

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Streetmap – http://www.streetmap.co.uk/

# APPENDIX A: NPPF & PPG EXTRACTS

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# 14. Meeting the challenge of climate change, flooding and coastal change

152. The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

## Planning for climate change

153. Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures[53]. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

154. New development should be planned for in ways that:

a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and

b) can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.

155. To help increase the use and supply of renewable and low carbon energy and heat, plans should:

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);

b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and

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[53] In line with the objectives and provisions of the Climate Change Act 2008.

c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers.

156. Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

157. In determining planning applications, local planning authorities should expect new development to:

a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and

b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption.

158. When determining planning applications for renewable and low carbon development, local planning authorities should:

a) not require applicants to demonstrate the overall need for renewable or low carbon energy, and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions; and

b) approve the application if its impacts are (or can be made) acceptable[54]. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas.

## Planning and flood risk

159. Inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.

160. Strategic policies should be informed by a strategic flood risk assessment, and should manage flood risk from all sources. They should consider cumulative impacts in, or affecting, local areas susceptible to flooding, and take account of advice from the Environment Agency and other relevant flood risk management authorities, such as lead local flood authorities and internal drainage boards.

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[54] Except for applications for the repowering of existing wind turbines, a proposed wind energy development involving one or more turbines should not be considered acceptable unless it is in an area identified as suitable for wind energy development in the development plan; and, following consultation, it can be demonstrated that the planning impacts identified by the affected local community have been fully addressed and the proposal has their backing.

161. All plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property. They should do this, and manage any residual risk, by:

a) applying the sequential test and then, if necessary, the exception test as set out below;

b) safeguarding land from development that is required, or likely to be required, for current or future flood management;

c) using opportunities provided by new development and improvements in green and other infrastructure to reduce the causes and impacts of flooding, ( making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management); and

d) where climate change is expected to increase flood risk so that some existing development may not be sustainable in the long-term, seeking opportunities to relocate development, including housing, to more sustainable locations.

162. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.

163. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification set out in Annex 3.

164. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that:

a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and

b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

165. Both elements of the exception test should be satisfied for development to be allocated or permitted.

166. Where planning applications come forward on sites allocated in the development plan through the sequential test, applicants need not apply the sequential test again. However, the exception test may need to be reapplied if relevant aspects of the proposal had not been considered when the test was applied at the plan-

making stage, or if more recent information about existing or potential flood risk should be taken into account.

167. When determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment[55]. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.

168. Applications for some minor development and changes of use[56] should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments set out in footnote 55.

169. Major developments should incorporate sustainable drainage systems unless there is clear evidence that this would be inappropriate. The systems used should:

a) take account of advice from the lead local flood authority;

b) have appropriate proposed minimum operational standards;

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and

d) where possible, provide multifunctional benefits.

## Coastal change

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[55] A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.

[56] This includes householder development, small non-residential extensions (with a footprint of less than 250m$^2$) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate.

170. In coastal areas, planning policies and decisions should take account of the UK Marine Policy Statement and marine plans. Integrated Coastal Zone Management should be pursued across local authority and land/sea boundaries, to ensure effective alignment of the terrestrial and marine planning regimes.

171. Plans should reduce risk from coastal change by avoiding inappropriate development in vulnerable areas and not exacerbating the impacts of physical changes to the coast. They should identify as a Coastal Change Management Area any area likely to be affected by physical changes to the coast, and:

a) be clear as to what development will be appropriate in such areas and in what circumstances; and

b) make provision for development and infrastructure that needs to be relocated away from Coastal Change Management Areas.

172. Development in a Coastal Change Management Area will be appropriate only where it is demonstrated that:

a) it will be safe over its planned lifetime and not have an unacceptable impact on coastal change;

b) the character of the coast including designations is not compromised;

c) the development provides wider sustainability benefits; and

d) the development does not hinder the creation and maintenance of a continuous signed and managed route around the coast[57].

173. Local planning authorities should limit the planned lifetime of development in a Coastal Change Management Area through temporary permission and restoration conditions, where this is necessary to reduce a potentially unacceptable level of future risk to people and the development.

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[57] As required by the Marine and Coastal Access Act 2009.

Revision date: 06 03 2014

### What should be considered if bringing forward a Neighbourhood Development Order/Community Right to Build Order in an area at risk of flooding?

The general approach and requirements for site-specific flood risk assessments should be applied to developments in areas at risk of flooding to be permitted by Neighbourhood Development/ Community Right to Build Orders. This means that for any development proposals:

- in Flood Zone 2 or 3;
- or of at least 1 hectare;
- or in an area that has critical drainage problems (as notified to the local planning authority by the Environment Agency);
- or that may be subject to other sources of flood risk;

a site-specific flood risk assessment should support the draft Order. The flood risk assessment checklist may be helpful in this respect.

Where the neighbourhood planning area is in Flood Zone 2 or 3, or is in an area with critical drainage problems, advice on the scope of the flood risk assessment required should be sought from the Environment Agency. Where the area may be subject to other sources of flooding, it may be helpful to consult other bodies involved in flood risk management, as appropriate.

Where a Neighbourhood Development/Community Right to Build Order is under consideration for a site/area in Flood Zone 2 or 3, which has not been allocated in the development plan through the Sequential Test, and if necessary the Exception Test, it will be necessary for those proposing the development, in having regard to the National Planning Policy Framework's policies on flood risk, to demonstrate why the development cannot reasonably be located in areas of lower flood risk.

In all cases where new development is proposed, the sequential approach to locating development in areas of lower flood risk should still be applied within a neighbourhood planning area.

Neighbourhood Development/Community Right to Build Orders that propose new development that would be;

- contrary to the flood risk vulnerability and flood zone compatibility table (Table 3), or;
- within areas at risk of flooding where sequential testing shows there to be places at lower flood risk which are suitable and reasonably available for the development proposed,

should not be considered appropriate, having regard to the national policies on development and flood risk.

Paragraph: 064 Reference ID: 7-064-20140306

Revision date: 06 03 2014

## Flood Zone and flood risk tables

- Table 1: Flood Zones
- Table 2: Flood risk vulnerability classification
- Table 3: Flood risk vulnerability and flood zone 'compatibility'

### Table 1: Flood Zones

These Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea (https://flood-map-for-planning.service.gov.uk/)), available on the Environment Agency's web site, as indicated in the table below.

| Flood Zone | Definition |
|---|---|
| Zone 1 Low Probability | Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3) |
| Zone 2 Medium Probability | Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map) |
| Zone 3a High Probability | Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.(Land shown in dark blue on the Flood Map) |
| Zone 3b The Functional Floodplain | This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map) |

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Paragraph: 065 Reference ID: 7-065-20140306

Revision date: 06 03 2014

### Table 2: Flood risk vulnerability classification

**Essential infrastructure**

- Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk.
- Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

**Highly vulnerable**

- Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure').

**More vulnerable**

- Hospitals
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non–residential uses for health services, nurseries and educational establishments.
- Landfill* and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.

**Less vulnerable**

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill* and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.

**Water-compatible development**

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

" * " Landfill is as defined in Schedule 10 of the Environmental Permitting (England and Wales) Regulations 2010 (http://www.legislation.gov.uk/uksi/2010/675/schedule/10/made).

Paragraph: 066 Reference ID: 7-066-20140306

Revision date: 06 03 2014

## Table 3: Flood risk vulnerability and flood zone 'compatibility'

Table 3: flood risk vulnerability and flood zone ‘compatibility'
(https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/575184/Table_3_-_Flood_risk_vulnerability_and_flood_zone__compatibility_.pdf) (PDF, 58.1KB, 1 page)

**Key:**

✓ Development is appropriate

✗ Development should not be permitted.

**Notes to table 3:**

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

” * “ In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

Paragraph: 067 Reference ID: 7-067-20140306

Revision date: 06 03 2014

## Site-specific flood risk assessment: Checklist

### 1 - Development site and location

You can use this section to describe the site you are proposing to develop. It would be helpful to include, or make reference to, a location map which clearly indicates the development site.

a. Where is the development site located? (eg postal address or national grid reference)

b. What is the current use of the site? (eg undeveloped land, housing, shops, offices)

c. Which Flood Zone (for river or sea flooding) is the site within? (ie Flood Zone 1, Flood Zone 2, Flood Zone 3). As a first step, you should check the Flood Map for Planning (http://apps.environment-agency.gov.uk/wiyby/37837.aspx) (Rivers and Sea). It is also a good idea to check the Strategic Flood Risk Assessment for the area available from the local planning authority.

### 2 - Development proposals

# APPENDIX B: EA INFORMATION & CORRESPONDENCE

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## Kirsty Williams

**From:** Sayce, Stephen <stephen.sayce@environment-agency.gov.uk>
**Sent:** 08 August 2019 15:51
**To:** Kirsty Williams
**Subject:** FW: HYD444 Kirkby Valley Golf Course, Liverpool
**Attachments:** LOCATION PLAN 2.pdf; 9627-09_A.pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Dear Kirsty

Thank you for your email regarding the above site.

Unfortunately due to numerous recent events, we are now in incident mode. This means staff have been pulled offline to help respond. As such at this time we are unable to undertake any chargeable work until September/October time.

Sorry for any inconvenience caused.

Thanks,

**Kind Regards**

**Steve Sayce**
**Planning Specialist – Liverpool City Region**

**The Environment Agency**
**Sustainable Places**
**Richard Fairclough House**
**Knutsford Road**
**Latchford, Warrington**
**Cheshire**
**WA4 1HT**

**Mobile:**07557758625
**Office Tel:** 02030 251 027
**Email:** stephen.sayce@environment-agency.gov.uk
**Team email:** SPPlanning.RFH@environment-agency.gov.uk



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If you are planning a new project or development, we want to work with you to make the process as smooth as possible. Early engagement can improve subsequent planning applications to you and your clients' benefit and deliver environmental outcomes. For a cost recovery fee of £100 per hour + VAT we will provide you with a project manager who will coordinate all meetings and reviews in order to give you detailed specialist advice with guaranteed delivery dates. More information can be found on our website here.

**Liverpool City Region Year of the Environment 2019**

**Cleaner, Greener, Well, Together**

Please visit: http://yoe2019lcr.org.uk/

Creating a better place for people and wildlife

---

**From:** SPPlanning.RFH
**Sent:** 06 August 2019 11:00
**To:** Sayce, Stephen <stephen.sayce@environment-agency.gov.uk>; Hewitt, Dawn <dawn.hewitt@environment-agency.gov.uk>
**Subject:** FW: HYD444 Kirkby Valley Golf Course, Liverpool

---

**From:** PlanningSSD
**Sent:** 06 August 2019 10:58
**To:** SPPlanning.RFH <SPPlanning.RFH@environment-agency.gov.uk>
**Subject:** FW: HYD444 Kirkby Valley Golf Course, Liverpool

Hi SP

Apologies I this is not the correct mailbox to be sending this on to. Please let me know if not.

Charged advice request in email below.

Many thanks
Hannah

Hannah Brothwell | Planning Advisor | Sustainable Places | Solent and South Downs Area | Environment Planning and Engagement
Environment Agency | Romsey Depot | Canal Walk | Romsey | Hampshire | SO51 7LP
Tel: 02084 745865 Mobile: 07789747374
Hannah.brothwell@environment-agency.gov.uk

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**We offer a cost recovery service for bespoke pre-application advice. For more information go to: gov.uk or email us**

**Have a look at 'Building a Better Environment' , our guide for developers**

**Our Flood Risk Standing Advice has been updated**




**From:** Kirsty Williams [mailto:kirstywilliams@betts-associates.co.uk]
**Sent:** 06 August 2019 09:53
**To:** PlanningSSD <PlanningSSD@environment-agency.gov.uk>
**Cc:** GMMC Info Requests <InfoRequests.GMMC@environment-agency.gov.uk>
**Subject:** HYD444 Kirkby Valley Golf Course, Liverpool

To Whom it May Concern,

I have been asked to being dialogue with the EA on behalf of my client, who will be looking to formally submit a planning application over the coming months for the regeneration and new development of Kirkby Valley Golf Club in Liverpool. At this stage the proposals are still being developed and the various disciplines are being consulted to design and prepare their elements of work to support the application. I have attached a location plan illustrating the site area and those locations where development will be taking place. I'm not sure the best department to deal with this enquiry so I have sent to both the sustainable places team and the information requests team, please forward onto the correct department if one of these is not correct.

In terms of my dialogue with the EA, you will see from the attached that the River Alt (Main River) is shown to bisect the development area. My colleagues have already consulted with your data team to obtain the relevant river model and outputs for inclusion within our Flood Risk Assessment. While we wait for the data to land, I wanted to start initial discussions with the EA on some of the proposals. As noted, the layout is still being adapted however I have attached the current iteration for some context. The proposals do not include any residential type development. The hardstanding/building proposed will consist of new car parking, a new golf clubhouse/pavilion, new driving range building and multi-function sports centre. The other development being proposed involves alterations to two of the existing tees associated with the 18-hole golf course (nos. 1 and 18) and addition of a new Academy 9-hole golf course, with associated reprofiling work. You will see from the attached that the proposals also include a new detention lake (for irrigation) and adventure golf course.

Given the location of the River Alt to the proposals, we wanted to liaise with the EA at an early stage to understand whether there would be any constraints that need to be considered before we submit the application. We have advised the client that an 8m easement should be maintained from the top of bank on the Main River into the site (on both sides), they have confirmed that this has been allowed for and that the only proposed works within this 8m easement would be minor reprofiling associated with the moving of the golf tees no.1 and no.18 (see attached layout). They have confirmed that the new clubhouse will be located over 10m from the top of bank, and the driving range is outside of 16m from the top of bank. We would assume that this is acceptable, however please let me know if you require anything further in terms of these proposals. The key

proposals we are looking to identify and discuss with the EA at this early stage are pointed below. We are looking to identify if the EA will require anything specific to be provided or reviewed prior to the planning application being approved, we understand that in due course Environmental Permits might be required for some of the proposed works, but would think this can be conditioned as part of the application approval and would not hold up the consents process.

- Reprofiling works associated with the relocating of Tee no.18, the green area (to the north of the clubhouse) is located within the 8m easement area. Furthermore, the proposals are for Tee No. 1 and No.18 to be played across the Main River. We wanted to establish if you would have any constraints or requirements for this proposal.

- The furthest extent of the driving range area is shown (on the masterplan) to be within the 8m easement, I understand reprofiling works here would be kept to a minimum but would the EA requirement anything further on this aspect at this early stage.

- Resurfacing of the existing car park to the east of the River Alt is proposed as part of the wider works, some of the existing car parking bays are located within the 8m easement area from the Main River. We are assuming that given these existing here at present and resurfacing only is being proposed that this will be acceptable. Please let us know if this is not the case.

- A new Bridge Crossing is being proposed near to Tee No.1 & No.18 to allow the play over the watercourse. The initial designs are being drafted up although I understand that the EA will require a specific design to be adhered to. From experience its typically accepted for a new bridge crossing to be design in an open bridge deck formation, where the soffit of the deck is located above the predicted top water level in channel in the 1 in 100yr plus climate change event. Obviously at this stage we don't have the EA data to review and identify what this level should be, once we have received the data, we can provide these design requirements to the structural engineers who will be designing up the strategy. A further point would be that we would like to establish whether the EA will accept the foundations of the bridge to be located within the 8m easement on either side of the bank or does it need to be located fully outside of the easement and flood zones identified. Would the EA require anything further such as hydraulic modelling at this stage or can the more detailed assessment be carried out in due course by method of condition.

- There will be new outfalls into the Main River to serve the new 9-hole golf course tee drainage, currently there are 3no. outfalls proposed. I believe an Environmental permit will be required for these outfalls in due course, but at this stage would the EA require anything further. In terms of the new hardstanding areas onsite, we will be carrying out soakaway testing in September to confirm whether we can formally deal with the new drainage onsite, if this is not productive then we will be looking to form a new separate connection to the Main River to serve the hardstanding areas onsite. The rate of discharge will be required to mimic the pre-development situation and formal consents will be obtained in due course. If this is going to be a problem, then please let us know as soon as possible so that the EAs requirements can be considered.

I apologise for the extended email, but we need to identify the full proposals to the EA at this stage so that any constraints can be dealt with early doors. I trust that this is understandable, and I appreciate your assistance with this matter. My client is aware that this advice may be classed as pre-application advice and therefore may be subject to the EA's charged advice service. I would be grateful if you can confirm any required costs so that I can pass these onto the client and obtain approval from them.

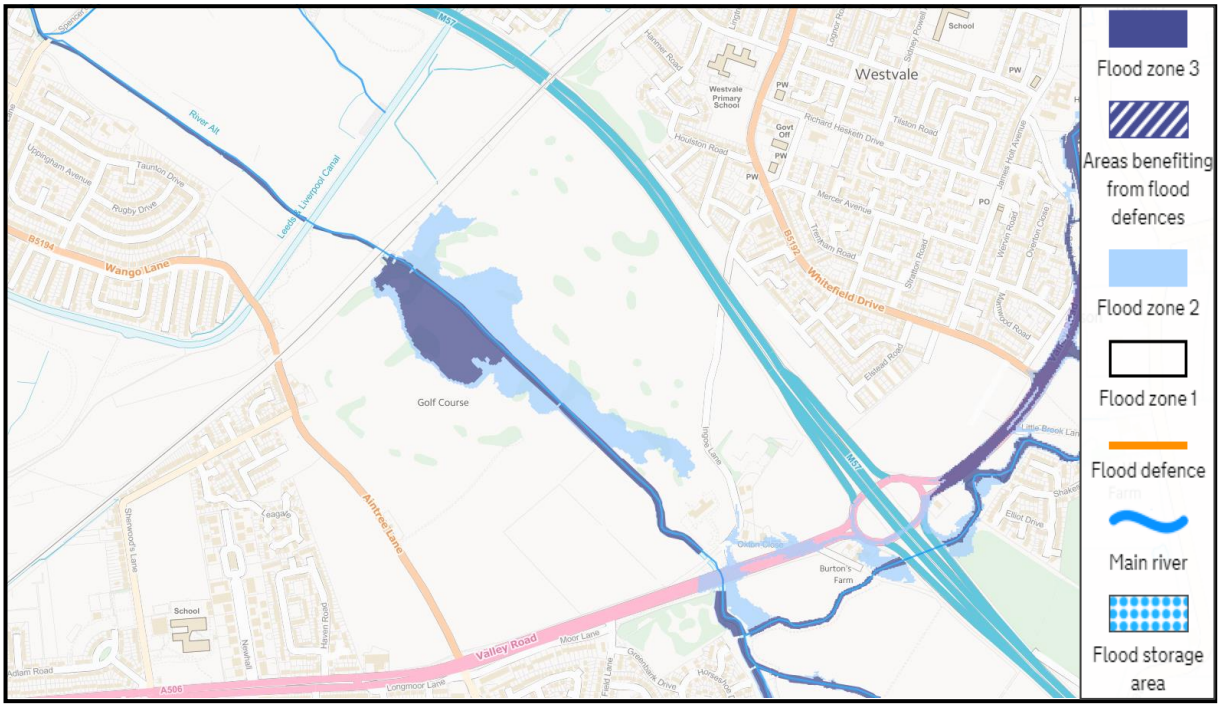
Kind Regards

Kirsty Williams BSc(Hons) GradCIWEM

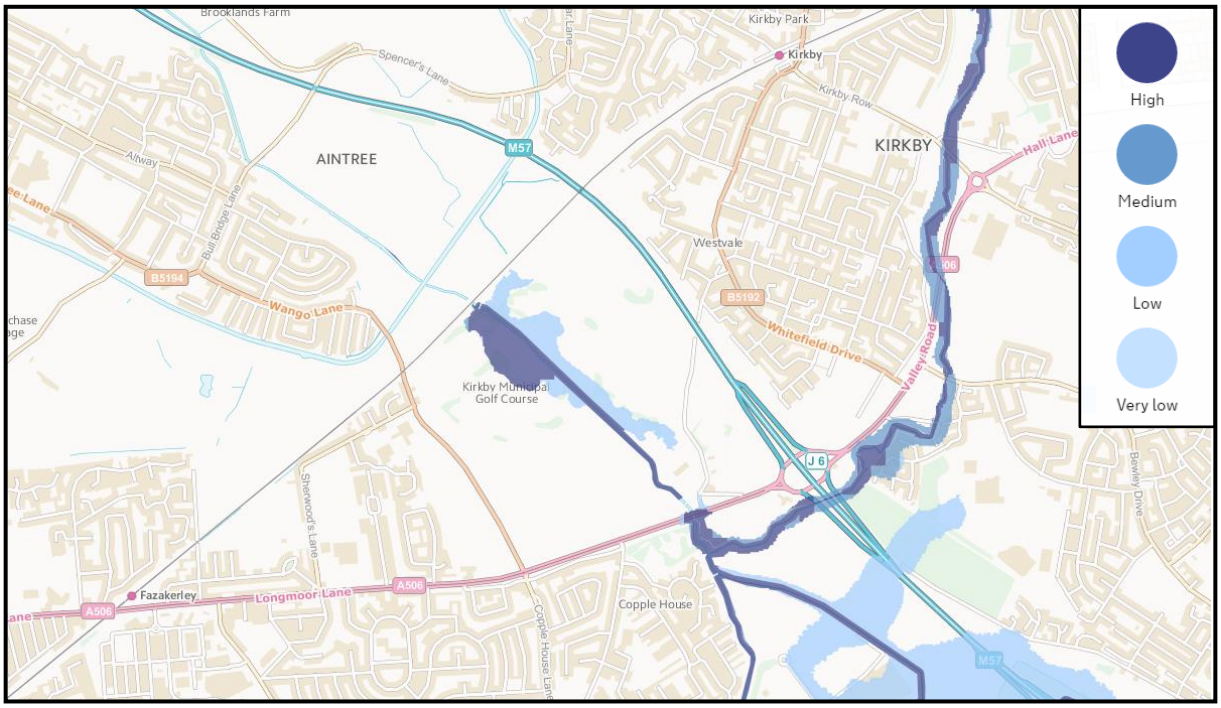
# NATIONAL FLOOD MAPPING

BETTS HYDRO
CONSULTING ENGINEERS

## Flood Map for Planning



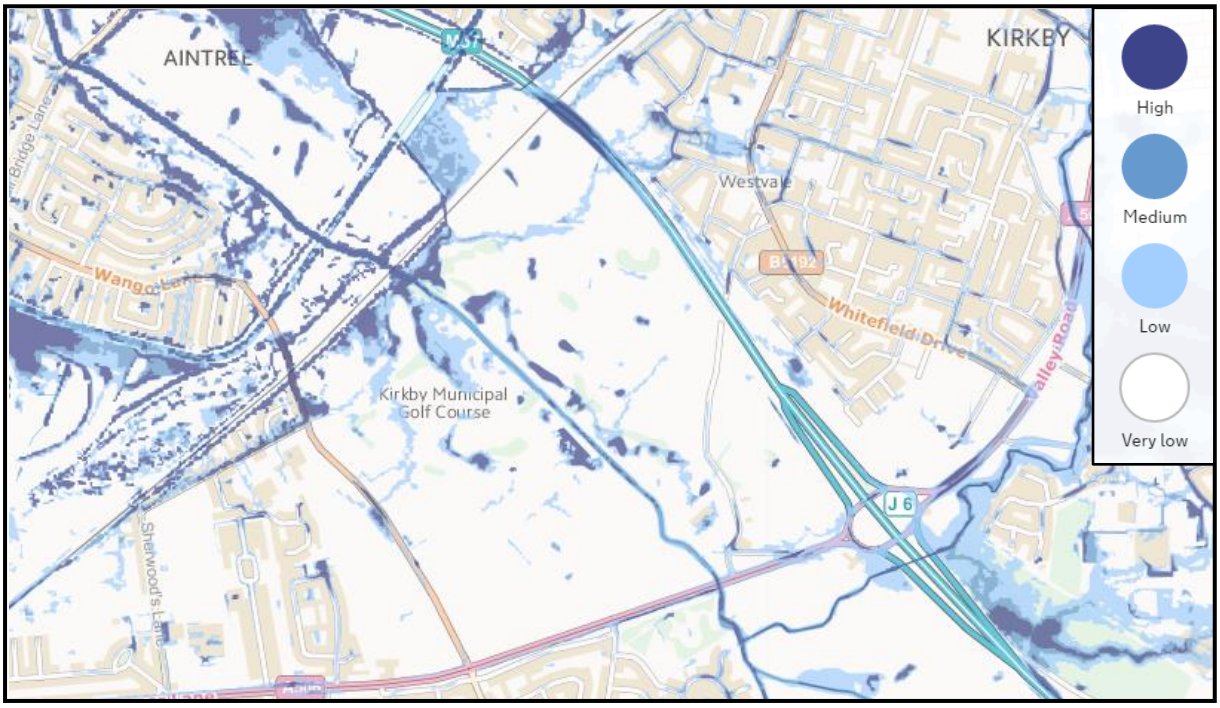

## Long Term Flood Risk – Rivers or Sea



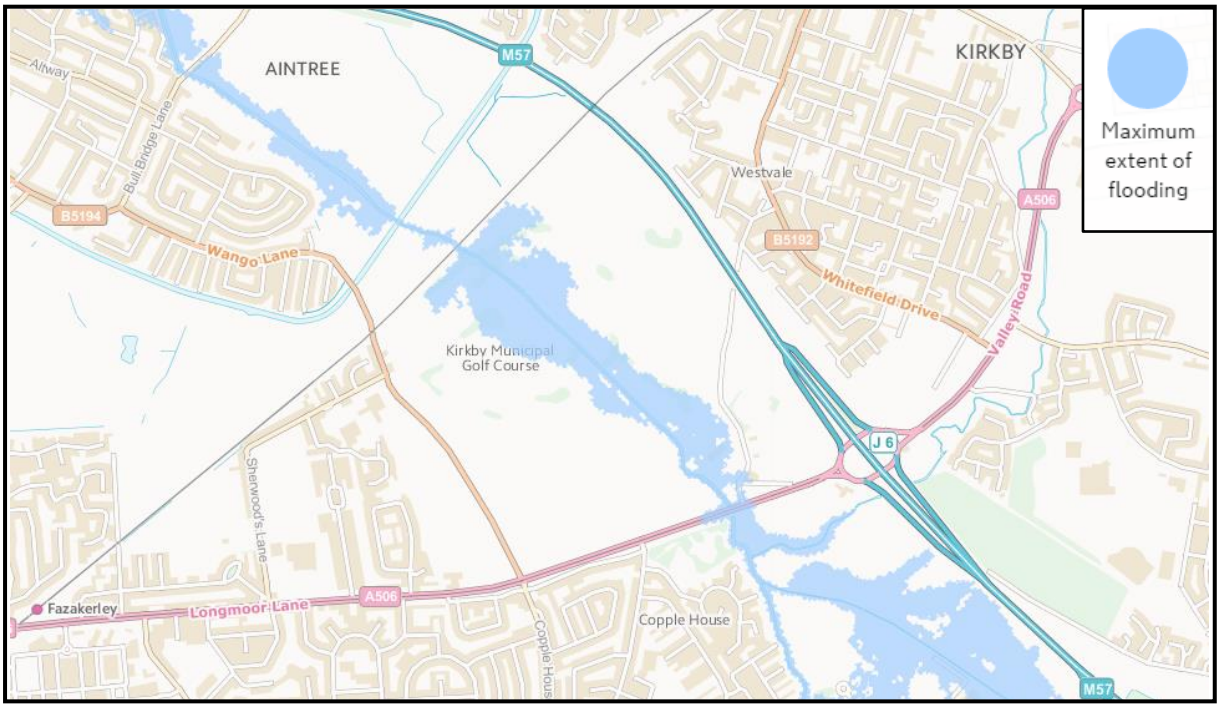
# NATIONAL FLOOD MAPPING

BETTS HYDRO
CONSULTING ENGINEERS

## Long Term Flood Risk – Surface Water




## Long Term Flood Risk - Reservoirs



# Flood Zone Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

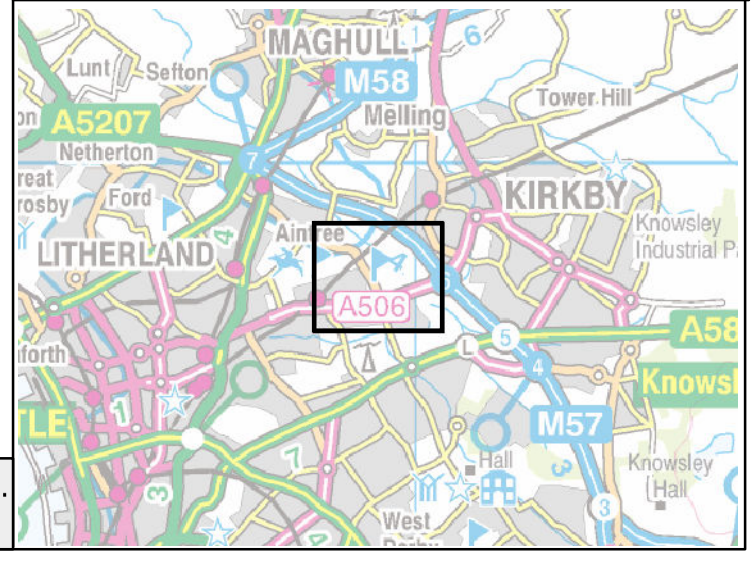
## Key

- Main River
- Areas Benefitting from Defences
- Flood Zone 3
- Flood Zone 2

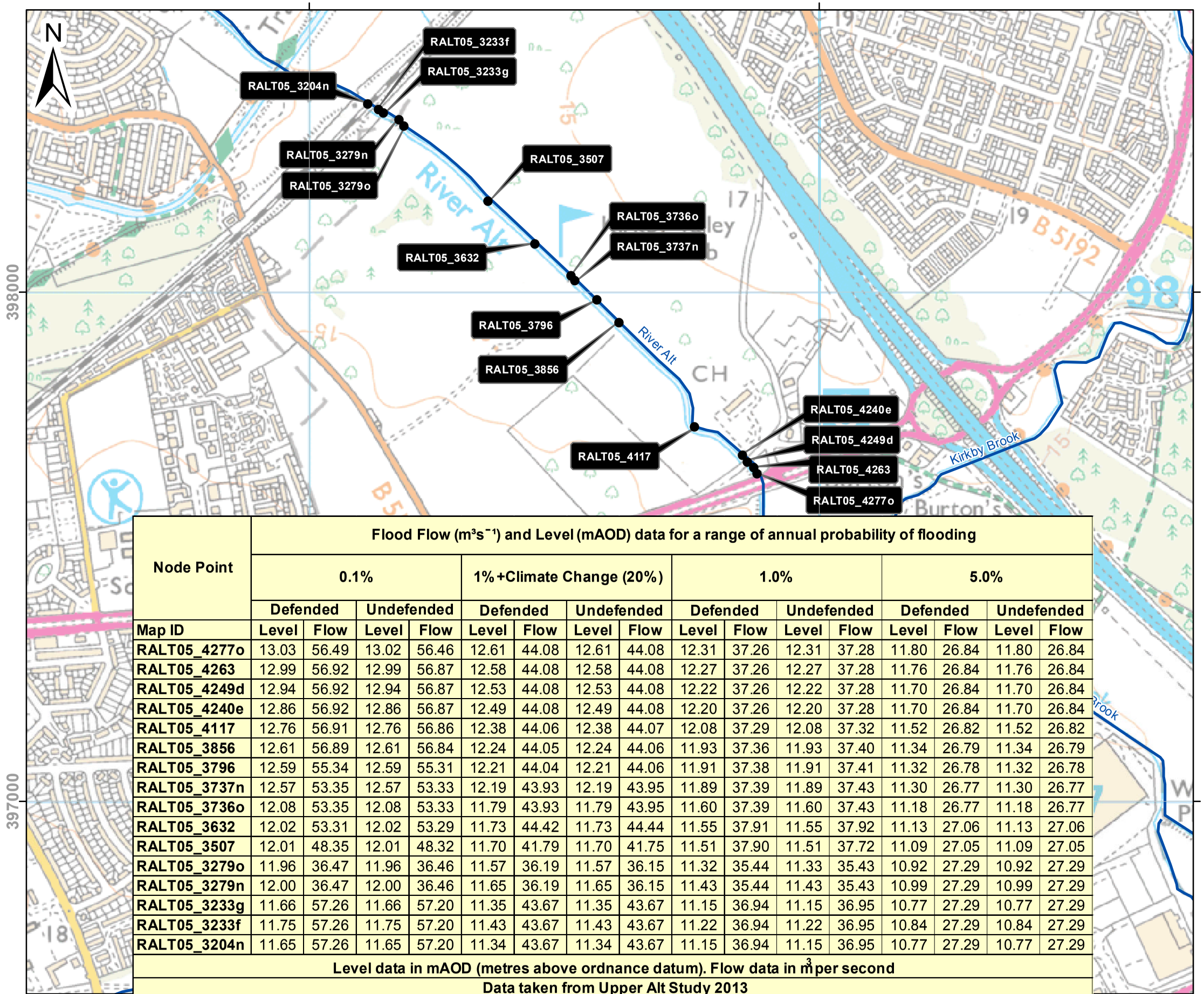
**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




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| Node Point | Flood Flow ($m^3s^{-1}$) and Level (mAOD) data for a range of annual probability of flooding | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.1% | | | | 1%+Climate Change (20%) | | | | 1.0% | | | | 5.0% | | | |
| | Defended | | Undefended | | Defended | | Undefended | | Defended | | Undefended | | Defended | | Undefended | |
| Map ID | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow | Level | Flow |
| RALT05_4277o | 13.03 | 56.49 | 13.02 | 56.46 | 12.61 | 44.08 | 12.61 | 44.08 | 12.31 | 37.26 | 12.31 | 37.28 | 11.80 | 26.84 | 11.80 | 26.84 |
| RALT05_4263 | 12.99 | 56.92 | 12.99 | 56.87 | 12.58 | 44.08 | 12.58 | 44.08 | 12.27 | 37.26 | 12.27 | 37.28 | 11.76 | 26.84 | 11.76 | 26.84 |
| RALT05_4249d | 12.94 | 56.92 | 12.94 | 56.87 | 12.53 | 44.08 | 12.53 | 44.08 | 12.22 | 37.26 | 12.22 | 37.28 | 11.70 | 26.84 | 11.70 | 26.84 |
| RALT05_4240e | 12.86 | 56.92 | 12.86 | 56.87 | 12.49 | 44.08 | 12.49 | 44.08 | 12.20 | 37.26 | 12.20 | 37.28 | 11.70 | 26.84 | 11.70 | 26.84 |
| RALT05_4117 | 12.76 | 56.91 | 12.76 | 56.86 | 12.38 | 44.06 | 12.38 | 44.07 | 12.08 | 37.29 | 12.08 | 37.32 | 11.52 | 26.82 | 11.52 | 26.82 |
| RALT05_3856 | 12.61 | 56.89 | 12.61 | 56.84 | 12.24 | 44.05 | 12.24 | 44.06 | 11.93 | 37.36 | 11.93 | 37.40 | 11.34 | 26.79 | 11.34 | 26.79 |
| RALT05_3796 | 12.59 | 55.34 | 12.59 | 55.31 | 12.21 | 44.04 | 12.21 | 44.06 | 11.91 | 37.38 | 11.91 | 37.41 | 11.32 | 26.78 | 11.32 | 26.78 |
| RALT05_3737n | 12.57 | 53.35 | 12.57 | 53.33 | 12.19 | 43.93 | 12.19 | 43.95 | 11.89 | 37.39 | 11.89 | 37.43 | 11.30 | 26.77 | 11.30 | 26.77 |
| RALT05_3736o | 12.08 | 53.35 | 12.08 | 53.33 | 11.79 | 43.93 | 11.79 | 43.95 | 11.60 | 37.39 | 11.60 | 37.43 | 11.18 | 26.77 | 11.18 | 26.77 |
| RALT05_3632 | 12.02 | 53.31 | 12.02 | 53.29 | 11.73 | 44.42 | 11.73 | 44.44 | 11.55 | 37.91 | 11.55 | 37.92 | 11.13 | 27.06 | 11.13 | 27.06 |
| RALT05_3507 | 12.01 | 48.35 | 12.01 | 48.32 | 11.70 | 41.79 | 11.70 | 41.75 | 11.51 | 37.90 | 11.51 | 37.72 | 11.09 | 27.05 | 11.09 | 27.05 |
| RALT05_3279o | 11.96 | 36.47 | 11.96 | 36.46 | 11.57 | 36.19 | 11.57 | 36.15 | 11.32 | 35.44 | 11.33 | 35.43 | 10.92 | 27.29 | 10.92 | 27.29 |
| RALT05_3279n | 12.00 | 36.47 | 12.00 | 36.46 | 11.65 | 36.19 | 11.65 | 36.15 | 11.43 | 35.44 | 11.43 | 35.43 | 10.99 | 27.29 | 10.99 | 27.29 |
| RALT05_3233g | 11.66 | 57.26 | 11.66 | 57.20 | 11.35 | 43.67 | 11.35 | 43.67 | 11.15 | 36.94 | 11.15 | 36.95 | 10.77 | 27.29 | 10.77 | 27.29 |
| RALT05_3233f | 11.75 | 57.26 | 11.75 | 57.20 | 11.43 | 43.67 | 11.43 | 43.67 | 11.22 | 36.94 | 11.22 | 36.95 | 10.84 | 27.29 | 10.84 | 27.29 |
| RALT05_3204n | 11.65 | 57.26 | 11.65 | 57.20 | 11.34 | 43.67 | 11.34 | 43.67 | 11.15 | 36.94 | 11.15 | 36.95 | 10.77 | 27.29 | 10.77 | 27.29 |

Level data in mAOD (metres above ordnance datum). Flow data in $m^3$ per second

Data taken from Upper Alt Study 2013

Environment Agency

# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

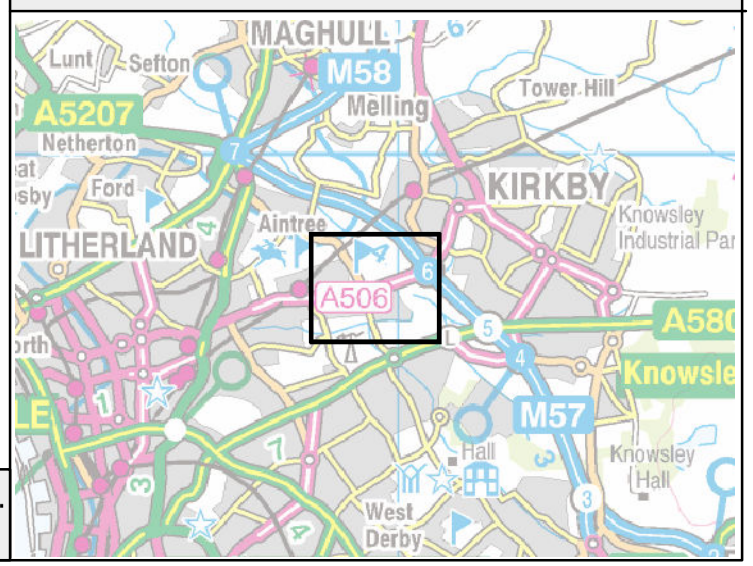
## Key

Main River

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




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# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

## Key

Main River

**Fluvial 5% annual probability of flooding Defended Scenario**

**mAOD**

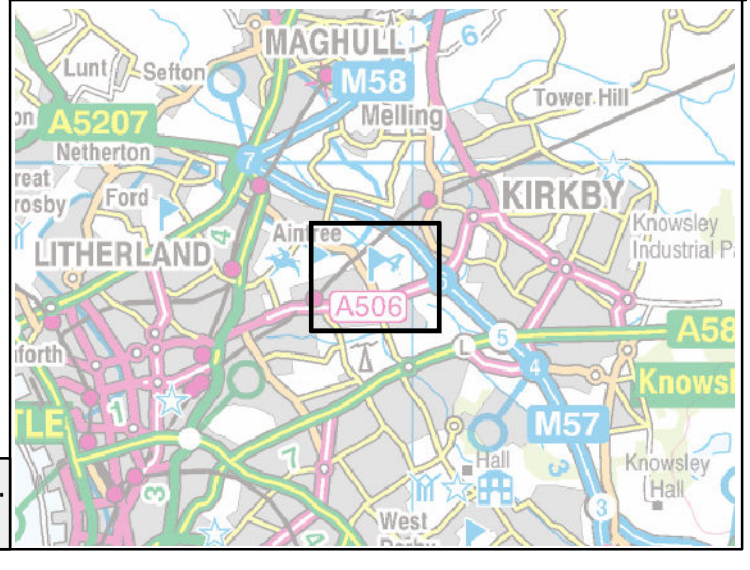
High : 12.75

Low : 10.75

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
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**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.



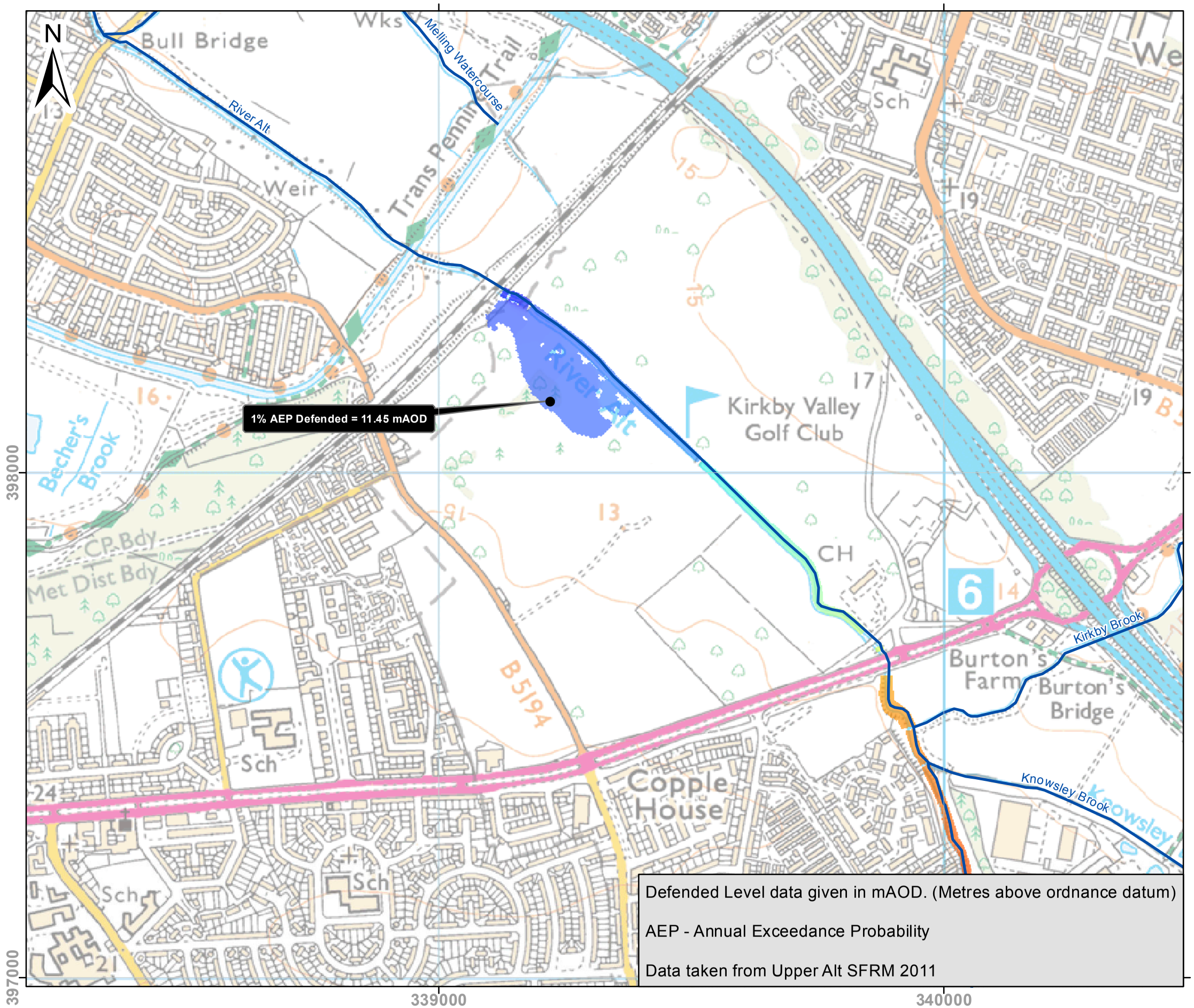

Defended Level data given in mAOD. (Metres above ordnance datum)

AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

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Defended Level data given in mAOD. (Metres above ordnance datum)

AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

Environment Agency

# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

## Key

Main River

**Fluvial 1% annual probability of flooding Defended Scenario**

**mAOD**

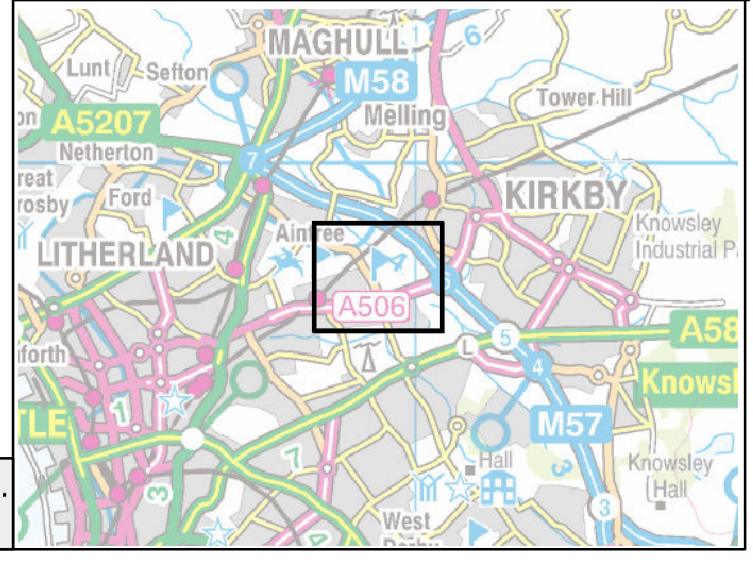
High : 13

Low : 11.25

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

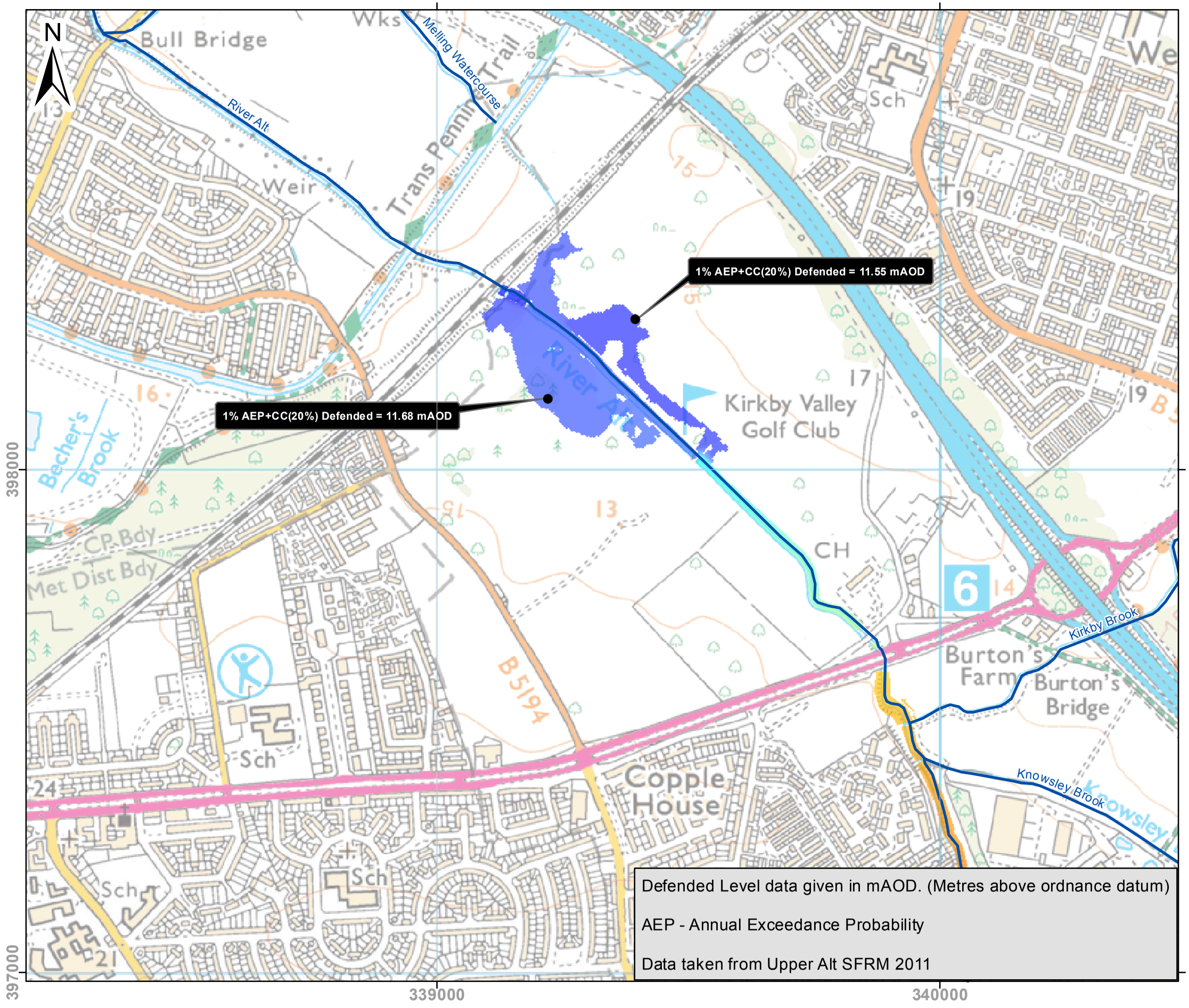
**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




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# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*




Defended Level data given in mAOD. (Metres above ordnance datum)

AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

## Key

Main River

**Fluvial Climate Change 1%(+20%) annual probability of flooding Defended Scenario**

**mAOD**

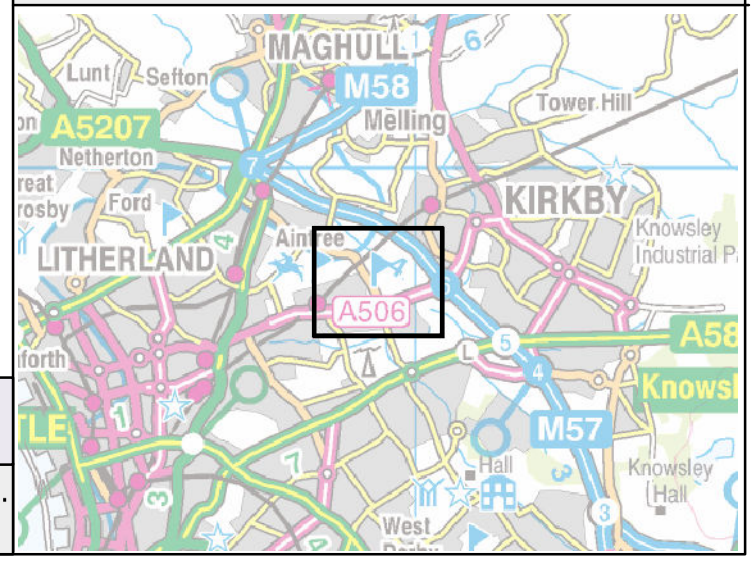
High : 13.5

Low : 11.5

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

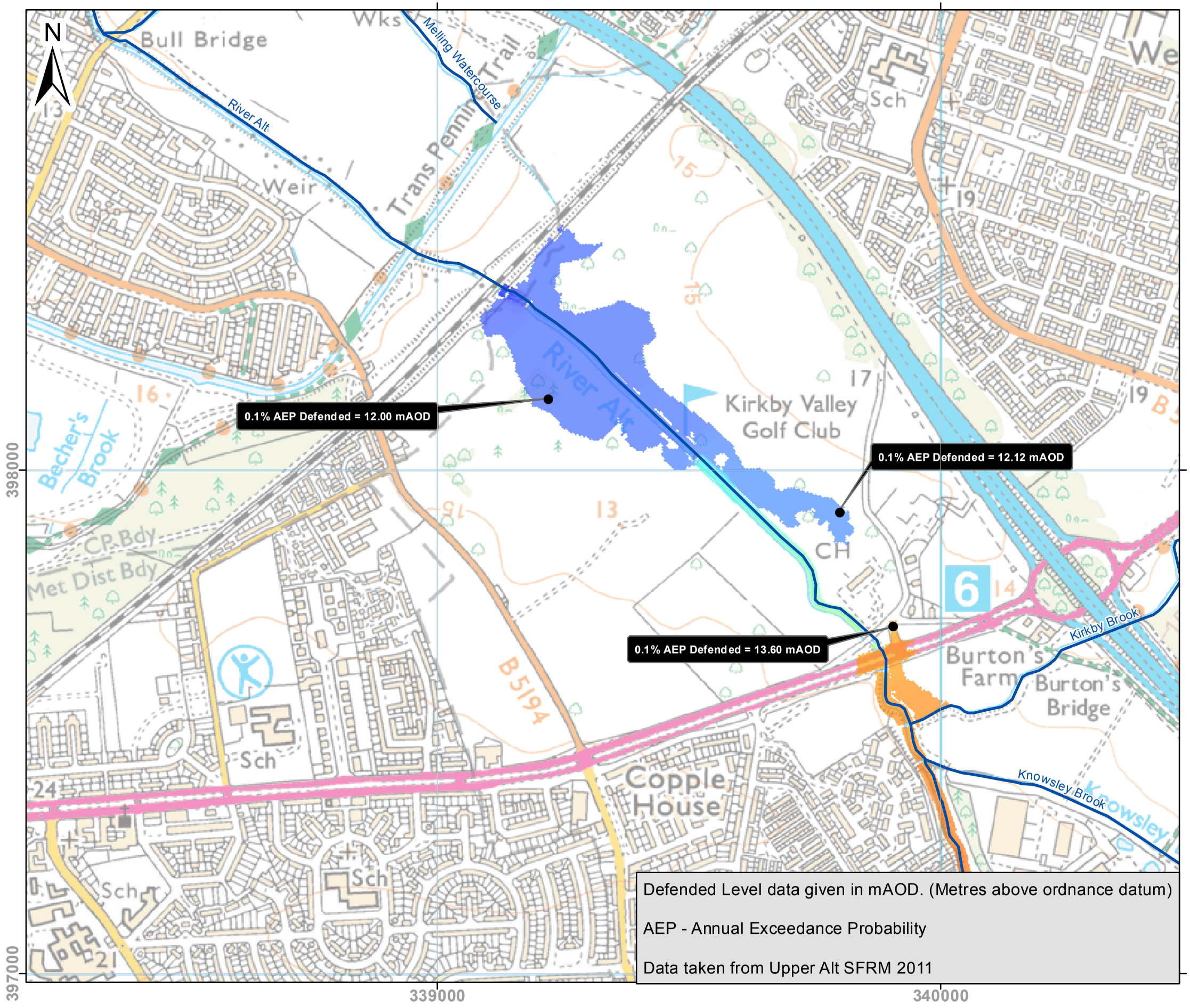
**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Defended Level data given in mAOD. (Metres above ordnance datum)

AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

Environment Agency

# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

## Key

Main River

**Fluvial 0.1% annual probability of flooding Defended Scenario**

**mAOD**

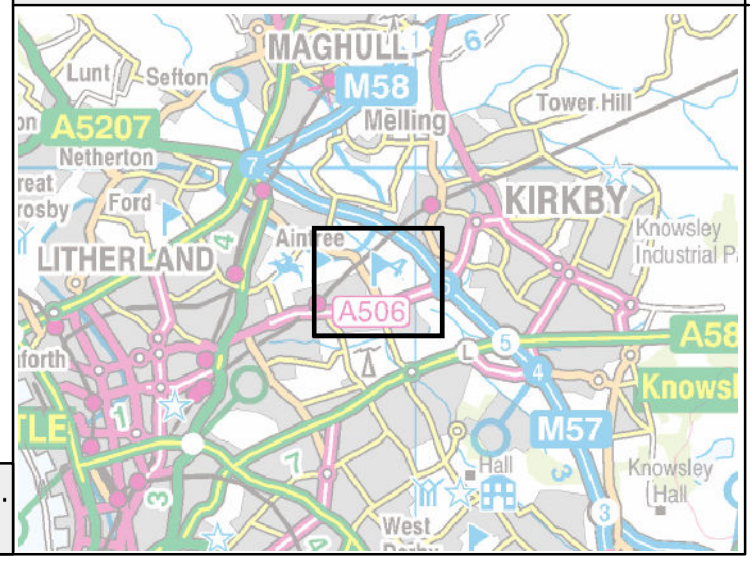
High : 14

Low : 11.75

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




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# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

## Key

Main River

**Fluvial 5% annual probability of flooding Undefended Scenario**

**mAOD**

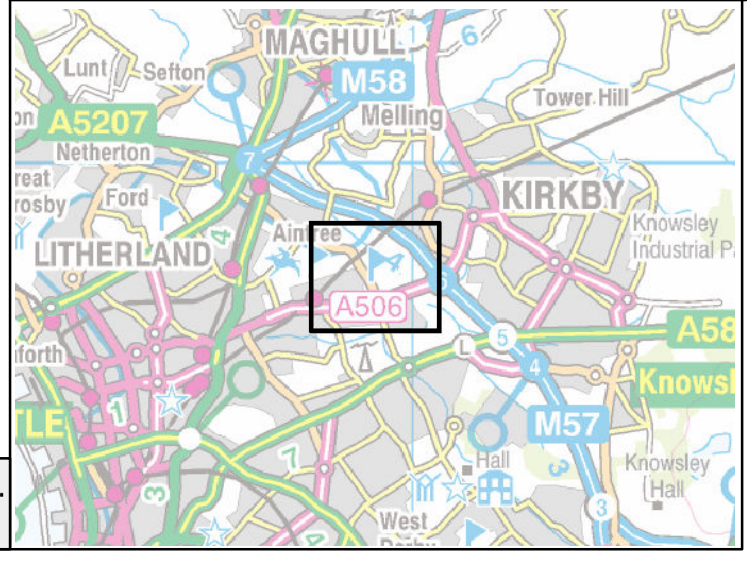
High : 12.5

Low : 10.75

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




Undefended Level data given in mAOD. (Metres above ordnance datum)

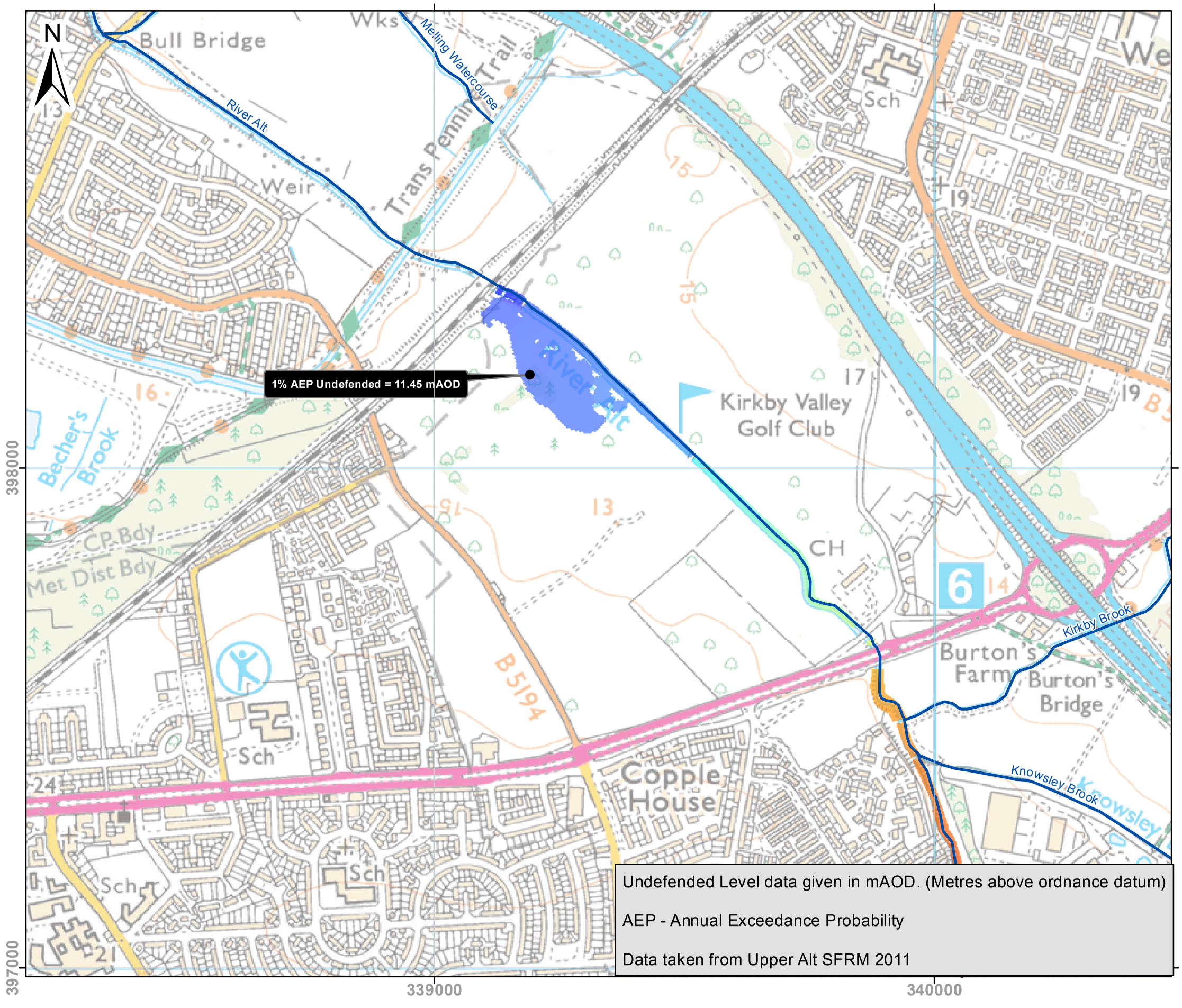
AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

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# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*




Undefended Level data given in mAOD. (Metres above ordnance datum)

AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

## Key

Main River

**Fluvial 1% annual probability of flooding Undefended Scenario**

**mAOD**

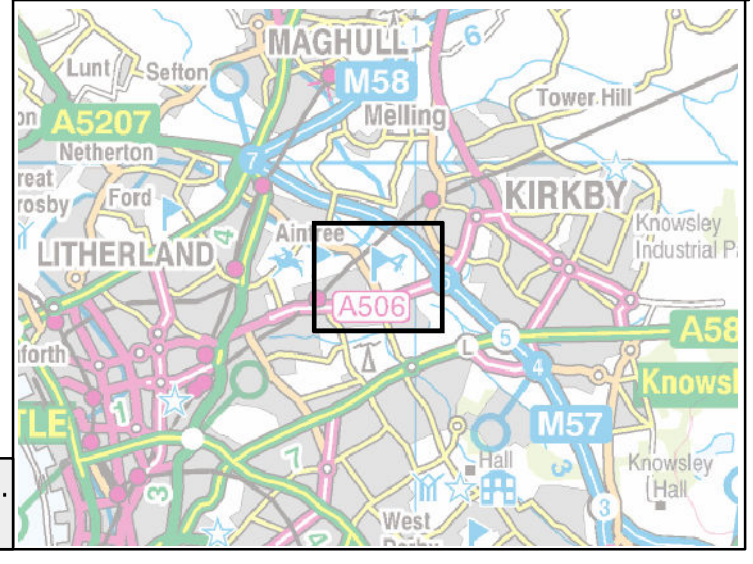
High : 13

Low : 11.25

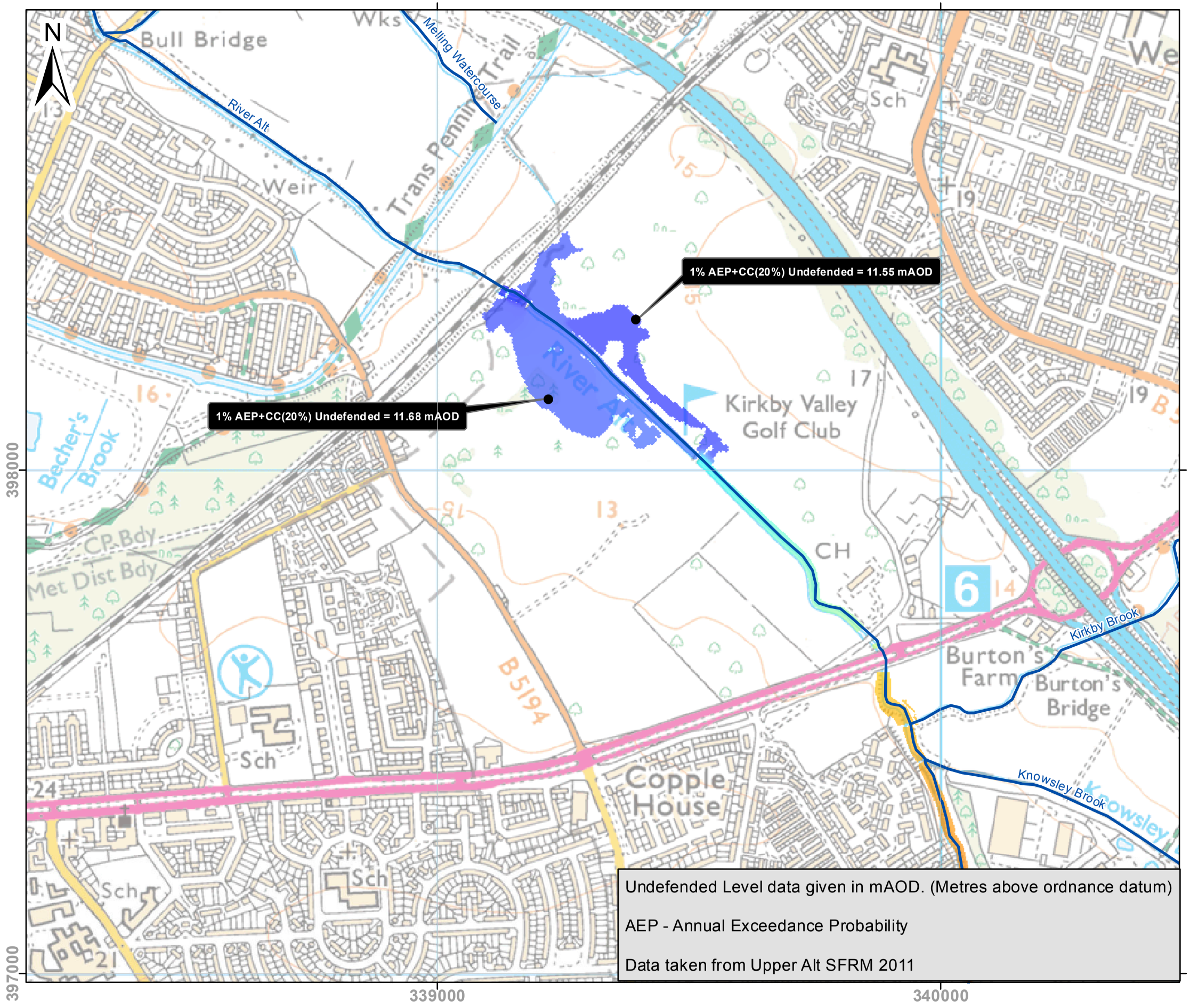
**Flood Zone 3** shows the area that could be affected by flooding:
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- or from a river with a 1% or greater chance of happening each year.

**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




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Undefended Level data given in mAOD. (Metres above ordnance datum)

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Modelled water levels with climate change using +20% flow allowances are not suitable for the majority of planning purposes. New climate change allowances can be checked on the following website; www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances.

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Environment Agency

# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
*Our Ref: CL136142*
*NGR: SJ3950498026*

## Key

Main River

**Fluvial Climate Change 1%(+20%) annual probability of flooding Undefended Scenario**

**mAOD**

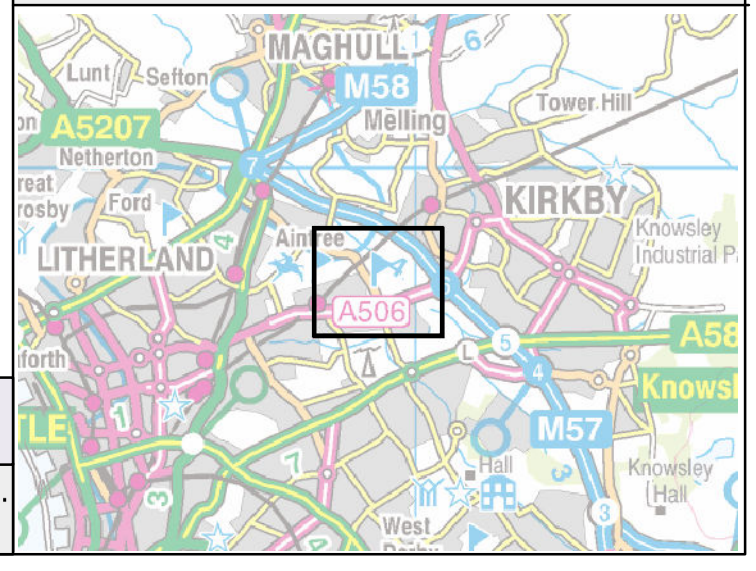
High : 13.5

Low : 11.5

**Flood Zone 3** shows the area that could be affected by flooding:
- from the sea with a 0.5% or greater chance of happening each year
- or from a river with a 1% or greater chance of happening each year.

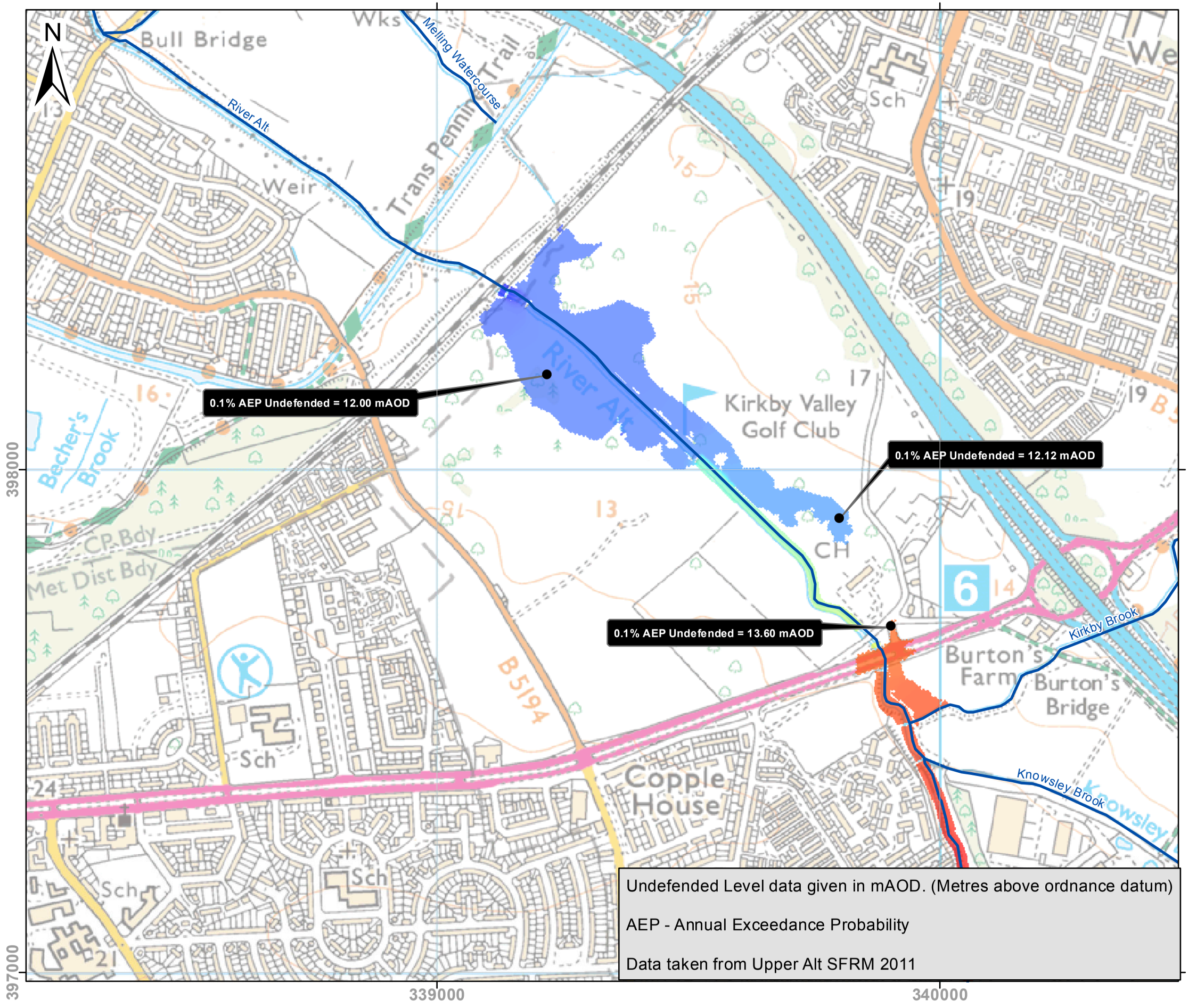
**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.



# Fluvial Flood Levels Map: Kirkby Valley Golf Club, Valley Road, Liverpool L10 8LQ

*Produced: 16 August 2019*
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AEP - Annual Exceedance Probability

Data taken from Upper Alt SFRM 2011

## Key

Main River

**Fluvial 0.1% annual probability of flooding Undefended Scenario**

**mAOD**

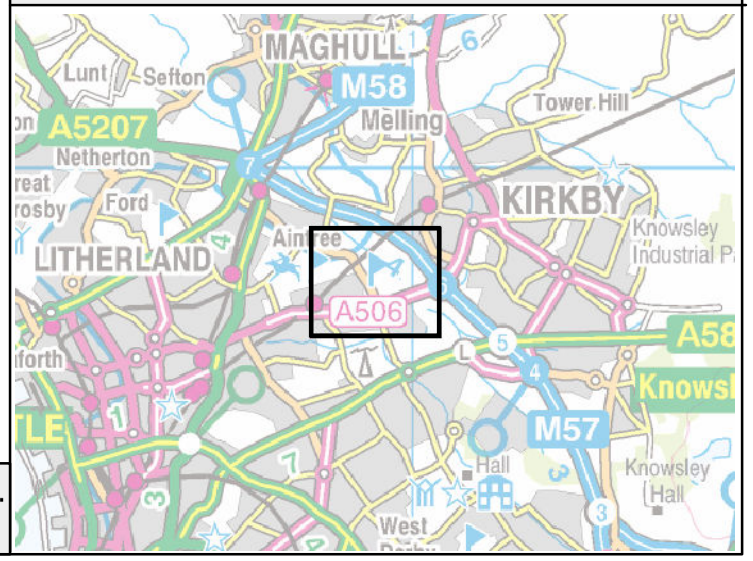
High : 13.75

Low : 11.75

**Flood Zone 3** shows the area that could be affected by flooding:
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**Flood Zone 2** shows the extent of an extreme flood from rivers or the sea with up to a 0.1% chance of occurring each year.

**ABDs** (Areas Benefiting from Defences) show the area benefiting from defences during a 0.5% tidal, or 1% fluvial flood event.




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# APPENDIX C: UU CORRESPONDENCE

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## Megan Berry

**From:** Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
**Sent:** 25 July 2019 08:11
**To:** Megan Berry
**Subject:** RE: Sewer Flood Risk

*Hi*

*'I can confirm we do have current records of sewer flooding on our DG5 register within the vicinity of the proposed development. The DG5 register is a register of properties that have flooded as a result of hydraulic inadequacy of the public sewer network.*

*Please note that United Utilities Water Limited (UUW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the register.*

*Our response does not include:*

- *any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which UUW has no control and not a facet of sewer capacity; or*

- *any historical sewer flooding events that have been removed from the register as a result of investment in our infrastructure.*

*As with all development sites, we recommend you liaise with our water and wastewater engineers by contacting our Developer Services team so the details of your development proposal can be considered further. Details can be found at the following link.*

*https://www.unitedutilities.com/services/builders-developers/*

*Should you require any further information please do not hesitate to contact me.'*

Regards,

The WOW! Awards
for outstanding customer service...
**If you have received a great service today why not tell us?**
**Visit: unitedutilities.com/wow**
**Sue King**
Developer Services Assistant
Developer Services
Network Delivery
**T:** 01925 679413 (internal 79413)
unitedutilities.com

**Please note that as from the 1 April 2019 the fee for the administration of a Building Over Agreement will be £139.00 (this fee is none vatable) http://www.unitedutilities.com/build-over-sewer.aspx).**

**Please send postal applications to the following address:**

**Wastewater Developer Services and Planning, 2nd floor Grasmere House, Lingley Mere Business Park, Lingley Green Ave, Great Sankey, Warrington WA5 3LP**

**Any applications sent to Gatewarth Industrial Estate will result in delays in your application.**

---

**From:** Megan Berry [mailto:meganberry@betts-associates.co.uk]
**Sent:** 24 July 2019 16:30
**To:** Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
**Subject:** Sewer Flood Risk

***F.A.O Flood Risk, Drainage and/or Planning department***

***Please forward to the correct department/ office***

To whom it may concern,

***Kirkby Valley Golf Club, Valley Road, Liverpool***

Please could you confirm whether you have any information that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the site above (see location plan attached), including details of historical flooding and any predicted flood water levels; this would be greatly appreciated. If there are any specific requirements that you require in a scope of works for this site please can you advise at this stage so that it can be fully incorporated into the proposals at an early stage.

Please do not hesitate to contact me on the details below to discuss further should you require additional information or clarification.

Kind Regards

Megan Berry BSc(Hons) GradCIWEM
*Graduate Flood Risk Analyst*

**BETTS HYDRO**
*Consulting Engineers*

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
Chester +44 (0)1244 289041

meganberry@betts-associates.co.uk
www.betts-associates.co.uk

CIVIL | STRUCTURAL | GEO-ENVIRONMENTAL | HYDROLOGY | FLOOD RISK MANAGEMENT
SUDS | STRUCTURAL SURVEYS | PARTY WALL DUTIES | INFILTRATION | GEOTECHNICAL

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

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 0001 | 17.78 | FO | 15.24 | 225 | | | VC | 44.10215 | |
| 7311 | 17.97 | FO | 13.53 | 150 | | | VC | 52.74548 | 1 in 182 |
| 9105 | 18.2 | SW | 15.88 | 300 | | | CO | 21.9545 | 1 in 366 |
| 9105 | 18.2 | SW | 15.88 | 300 | | | CO | 21.9545 | 1 in 366 |
| 5207 | 20.32 | FO | 18.36 | 150 | | | VC | 33.24154 | 1 in 87 |
| 5207 | 20.32 | FO | 18.36 | 150 | | | VC | 33.24154 | 1 in 87 |
| 8202 | 19.11 | FO | 16.35 | 225 | | | VC | 65.19202 | 1 in 6519.20240 |
| 6404 | 18.16 | FO | 9.55 | 1220 | | | BR | 140.4339 | 1 in 1170 |
| 6404 | 18.16 | FO | 9.55 | 1220 | | | BR | 140.4339 | 1 in 1170 |
| 6003 | 17.97 | SW | 16.71 | 225 | | | VC | 30.5873 | 1 in 78 |
| 6201 | | FO | | 100 | | | VC | 3.299389 | |
| 6307 | | FO | | 150 | | | VC | 13.62371 | |
| 4312 | 20.8 | SW | 19.69 | 300 | | | CO | 12.08305 | 1 in 110 |
| 6408 | 18.54 | FO | 12.57 | 150 | | | VC | 24.15855 | 1 in 69 |
| 6408 | 18.54 | FO | 12.57 | 150 | | | VC | 24.15855 | 1 in 69 |
| 9909 | | FO | | 150 | | | VC | 14.32865 | |
| 5305 | 19.81 | SW | 19.23 | 300 | | | VC | 23.25941 | 1 in 258 |
| 8003 | | SW | 0 | 150 | | | VC | 43.56604 | |
| 0102 | 18.44 | SW | 16.57 | 225 | | | VC | 41.34005 | 1 in 80 |
| 7306 | 18.73 | SW | 15.49 | 300 | | | CO | 17.13647 | 1 in 343 |
| 7007 | | SW | | 100 | | | VC | 35.55892 | |
| 6017 | | FO | | 100 | | | VC | 6.262609 | |
| 8311 | 18.07 | FO | 15.64 | 150 | | | VC | 29.2906 | 1 in 84 |
| 8109 | | FO | | 150 | | | VC | 13.05393 | |
| 7101 | | SW | 0 | 150 | | | VC | 39.66106 | |
| 9917 | | FO | | 150 | | | VC | 7.374465 | |
| 9917 | | FO | | 150 | | | VC | 7.374465 | |
| 6110 | | FO | | 100 | | | VC | 7.09701 | |
| 4307 | 20.88 | SW | 19.2 | 300 | | | CO | 45.88028 | 1 in 153 |
| 4307 | 20.88 | SW | 19.2 | 300 | | | CO | 45.88028 | 1 in 153 |
| 0901 | | FO | 0 | 225 | | | VC | 45.17606 | |
| 0901 | | FO | 0 | 225 | | | VC | 45.17606 | |
| 5402 | | FO | 0 | 225 | | | VC | 74.43118 | |
| 5402 | | FO | 0 | 225 | | | VC | 74.43118 | |
| 8413 | 17.73 | FO | 15.94 | 150 | | | VC | 15.01837 | 1 in 65 |
| 8413 | 17.73 | FO | 15.94 | 150 | | | VC | 15.01837 | 1 in 65 |
| 4004 | 17.71 | SW | 15.63 | 600 | | | CO | 67.92132 | 1 in 295 |
| 4004 | 17.71 | SW | 15.63 | 600 | | | CO | 67.92132 | 1 in 295 |
| 6403 | 17.98 | SW | 16.37 | 225 | | | VC | 15.9296 | 1 in 145 |
| 6403 | 17.98 | SW | 16.37 | 225 | | | VC | 15.9296 | 1 in 145 |
| 5408 | 21.34 | SW | 19.86 | 225 | | | VC | 13.92839 | 1 in 348 |
| 6105 | | FO | | 100 | | | VC | 24.79706 | |
| 7105 | | CO | | 100 | | | VC | 4.068139 | |
| 8305 | 17.94 | SW | 14.91 | 450 | | | CO | 24.42432 | 1 in 349 |
| 8601 | 13.42 | FO | 9.7 | 1220 | | | BR | 168.2788 | 1 in 1683 |
| 5406 | 19.66 | FO | 18.14 | 150 | | | VC | 18.21965 | |
| 5406 | 19.66 | FO | 18.14 | 150 | | | VC | 18.21965 | |
| 6916 | | CO | | 150 | | | VC | 4.822834 | |
| 8001 | 18.15 | SW | 16.6 | 225 | | | VC | 57.14018 | 1 in 190 |
| 4201 | 20.31 | SW | 18.37 | 450 | | | CO | 31.95309 | 1 in 399 |
| 4201 | 20.31 | SW | 18.37 | 450 | | | CO | 31.95309 | 1 in 399 |
| 5403 | | SW | | 100 | | | PVC | 7.147776 | |
| 5403 | | SW | | 100 | | | PVC | 7.147776 | |
| 8310 | 18 | FO | 15.75 | 150 | | | VC | 11.59532 | 1 in 105 |
| 8407 | 17.61 | FO | 14.22 | 150 | | | VC | 10.23668 | 1 in 205 |
| 9305 | 17.52 | SW | 15.31 | 375 | | | CO | 31.17039 | 1 in 164 |
| 5206 | 20.5 | FO | 18.74 | 150 | | | VC | 26.40076 | 1 in 69 |
| 5206 | 20.5 | FO | 18.74 | 150 | | | VC | 26.40076 | 1 in 69 |
| 9102 | 17.73 | FO | 15.27 | 225 | | | VC | 50.77401 | 1 in 1015 |
| 8216 | | FO | | 100 | | | VC | 10.028 | |
| 9916 | | FO | | 150 | | | VC | 30.26082 | |
| 6007 | | CO | | 150 | | | VC | 21.10933 | |
| 5003 | 17.49 | SW | 15.8 | 600 | | | CO | 8.83092 | 1 in 126 |
| 5003 | 17.49 | SW | 15.8 | 600 | | | CO | 8.83092 | 1 in 126 |
| 7209 | | CO | | 100 | | | VC | 14.6761 | |
| 0002 | 17.75 | SW | 15.52 | 375 | | | CO | 48.25971 | |
| 0002 | 17.75 | SW | 15.52 | 375 | | | CO | 48.25971 | |
| 5317 | | FO | | 100 | | | VC | 7.036206 | |
| 5317 | | FO | | 100 | | | VC | 7.036206 | |
| 7303 | 18.94 | SW | 17.45 | 300 | | | VC | 26.62705 | 1 in 296 |
| 8105 | 18.3 | SW | 16.66 | 225 | | | VC | 59.07622 | 1 in 269 |
| 7906 | 17.27 | FO | 15.63 | 225 | | | VC | 82.37718 | 1 in 44 |
| 4110 | | SW | 0 | 225 | | | VC | 48.25971 | |
| 4110 | | SW | 0 | 225 | | | VC | 48.25971 | |
| 7308 | 18.3 | SW | 15.44 | 300 | | | CO | 54.08308 | 1 in 135 |
| 7913 | | FO | | 100 | | | VC | 4.598158 | |
| 9111 | 18.28 | SW | 0 | 225 | | | VC | 39.11522 | |
| 9111 | 18.28 | SW | 0 | 225 | | | VC | 39.11522 | |
| 8912 | | FO | 0 | 225 | | | VC | 4.512362 | |
| 8401 | 17.94 | FO | 13.84 | 150 | | | VC | 26.1412 | 1 in 187 |
| 4314 | 20.73 | SW | 19.58 | 300 | | | CO | 29.73214 | 1 in 165 |
| 4314 | 20.73 | SW | 19.58 | 300 | | | CO | 29.73214 | 1 in 165 |
| 7205 | | SW | 0 | 375 | | | CO | 32.75668 | |
| 8206 | 17.97 | FO | 15.92 | 150 | | | VC | 27.19662 | 1 in 74 |
| 6301 | 19.49 | SW | 17.9 | 225 | | | VC | 29.01724 | 1 in 104 |
| 7207 | 18.59 | FO | 16.88 | 225 | | | VC | 96.51942 | 1 in 193 |
| 5201 | | FO | 0 | 1220 | | | BR | 4.123106 | |
| 0902 | | SW | 0 | 375 | | | CO | 30.06081 | |
| 0902 | | SW | 0 | 375 | | | CO | 30.06081 | |
| 9317 | 17.78 | SW | 15.42 | 300 | | | VC | 16.66022 | 1 in 278 |
| 7304 | 18.92 | FO | 17.29 | 225 | | | VC | 82.37718 | 1 in 206 |
| 9309 | 17.86 | SW | 16.25 | 225 | | | VC | 14.59231 | 1 in 69 |
| 8302 | 18.15 | FO | 15.03 | 150 | | | VC | 28.6397 | 1 in 19 |
| 9001 | 17.8 | SW | 16.3 | 225 | | | VC | 41.59538 | 1 in 33 |
| 9307 | 17.52 | SW | 15.12 | 450 | | | CO | 26.63845 | 1 in 148 |
| 9103 | 18.01 | SW | 16.22 | 450 | | | CO | 26.07452 | 1 in 109 |
| 9114 | | SW | | 150 | | | VC | 9.40096 | |
| 5110 | | SW | 0 | 100 | | | VC | 4.273706 | |
| 5110 | | SW | 0 | 100 | | | VC | 4.273706 | |
| 7211 | | CO | | 150 | | | VC | 17.95068 | |
| 8316 | | FO | | 0 | | | VC | 13.63618 | |
| 6415 | | FO | | 150 | | | VC | 7.894062 | |
| 8102 | 18.67 | FO | 15.82 | 225 | | | VC | 49.1078 | 1 in 214 |
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| 5410 | | FO | 0 | 150 | | | VC | 24.62195 | |
| 5307 | 21.41 | SW | 19.97 | 225 | | | VC | 33.65954 | 1 in 421 |
| 5307 | 21.41 | SW | 19.97 | 225 | | | VC | 33.65954 | 1 in 421 |
| 7912 | | FO | | 100 | | | VC | 6.303711 | |
| 8307 | 18.01 | SW | 16.04 | 225 | | | VC | 12.02686 | 1 in 93 |
| 9006 | | FO | | 150 | | | VC | 1.113355 | |
| 8312 | 17.55 | SW | 14.74 | 450 | | | CO | 30.54022 | 1 in 139 |
| 5319 | | FO | | 100 | | | VC | 14.07807 | |
| 5319 | | FO | | 100 | | | VC | 14.07807 | |
| 0005 | 18.36 | SW | 16.19 | 225 | | | VC | 30.80584 | 1 in 134 |
| 8212 | | FO | | 150 | | | VC | 14.93786 | |
| 8203 | 18.01 | SW | 16.18 | 225 | | | CO | 34.60461 | 1 in 55 |
| 7910 | | FO | | 100 | | | VC | 6.736717 | |
| 9314 | 17.5 | FO | 14.72 | 150 | | | VC | 29.24323 | 1 in 172 |
| 8208 | 18.07 | FO | 15.55 | 150 | | | VC | 20.33594 | 1 in 136 |
| 4204 | | SW | 0 | 225 | | | VC | 51.26402 | |
| 4204 | | SW | 0 | 225 | | | VC | 51.26402 | |
| 8306 | 17.82 | SW | 16.32 | 225 | | | VC | 16.60133 | 1 in 59 |
| 5405 | | FO | | 100 | | | PVC | 15.25413 | |
| 4106 | 19.29 | FO | 17.8 | 225 | | | VC | 53.85165 | 1 in 128 |
| 4106 | 19.29 | FO | 17.8 | 225 | | | VC | 53.85165 | 1 in 128 |
| 3301 | | FO | 0 | 450 | | | ST | 335.0761 | |
| 8211 | | FO | | 150 | | | VC | 7.687081 | |
| 7301 | 19.07 | SW | 17.43 | 150 | | | VC | 8.602325 | |
| 9315 | 17.5 | FO | 14.55 | 150 | | | VC | 12.93906 | 1 in 162 |
| 0101 | 18.08 | SW | 15.72 | 375 | | | CO | 28.30194 | 1 in 708 |
| 0101 | 18.08 | SW | 15.72 | 375 | | | CO | 28.30194 | 1 in 708 |
| 9119 | | FO | | 150 | | | VC | 14.11697 | |
| 9119 | | FO | | 150 | | | VC | 14.11697 | |
| 7002 | 17.58 | SW | 15.63 | 225 | | | VC | 9.055386 | |
| 5104 | 18.3 | FO | 16.57 | 225 | | | VC | 57.93962 | 1 in 92 |
| 9107 | 18.19 | SW | 16 | 300 | | | CO | 33.28663 | 1 in 303 |
| 9107 | 18.19 | SW | 16 | 300 | | | CO | 33.28663 | 1 in 303 |
| 5401 | 19.51 | FO | 17.65 | 225 | | | VC | 5.385165 | |
| 5401 | 19.51 | FO | 17.65 | 225 | | | VC | 5.385165 | |
| 9206 | 17.46 | SW | 15.93 | 225 | | | VC | 33.26924 | 1 in 79 |
| 5407 | | FO | 0 | 150 | | | VC | 16.49242 | |
| 5407 | | FO | 0 | 150 | | | VC | 16.49242 | |

# LEGEND

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

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

FO Foul
SW Surface Water
CO Combined
OV Overflow

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

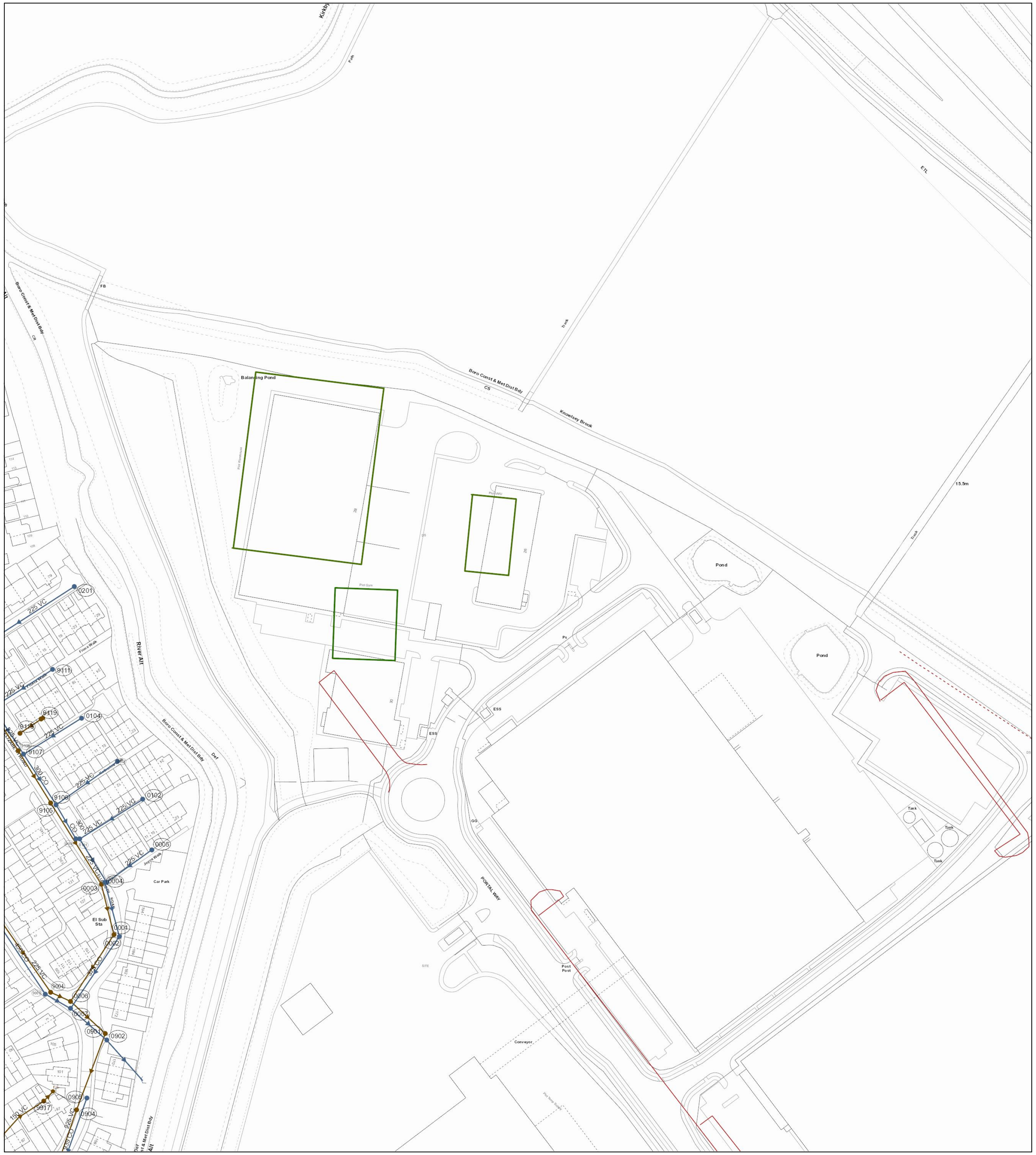
HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ3997SE
**Scale:** 1:1250 **Date:** 31/07/2019
**Nodes:** 384
**Sheet:** 1 of 9

**Printed by:** Property Searches

# SEWER RECORDS

United Utilities
helping life flow smoothly




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

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 0110 | 18.1 | SW | 15.74 | 375 | | | CO | 2 | 1 in 200 |
| 0110 | 18.1 | SW | 15.74 | 375 | | | CO | 2 | 1 in 200 |
| 9109 | 17.94 | SW | 16.18 | 225 | | | VC | 31.06445 | 1 in 259 |
| 0006 | | FO | 0 | 225 | | | VC | 26.29327 | |
| 0006 | | FO | 0 | 225 | | | VC | 26.29327 | |
| 9916 | | FO | | 150 | | | VC | 30.26082 | |
| 0905 | | SW | 0 | 939 | | | CO | 62.61435 | |
| 0905 | | SW | 0 | 939 | | | CO | 62.61435 | |
| 0001 | 17.78 | FO | 15.24 | 225 | | | VC | 44.10215 | |
| 0001 | 17.78 | FO | 15.24 | 225 | | | VC | 44.10215 | |
| 0103 | 18.53 | SW | 16.37 | 225 | | | VC | 41.61731 | 1 in 134 |
| 0103 | 18.53 | SW | 16.37 | 225 | | | VC | 41.61731 | 1 in 134 |
| 9005 | 17.51 | FO | 15.2 | 225 | | | VC | 52.43091 | 1 in 655 |
| 0002 | 17.75 | SW | 15.52 | 375 | | | CO | 48.25971 | |
| 0002 | 17.75 | SW | 15.52 | 375 | | | CO | 48.25971 | |
| 9105 | 18.2 | SW | 15.88 | 300 | | | CO | 21.9545 | 1 in 366 |
| 9105 | 18.2 | SW | 15.88 | 300 | | | CO | 21.9545 | 1 in 366 |
| 9108 | 18.2 | FO | 15.85 | 225 | | | VC | 34.1321 | |
| 9108 | 18.2 | FO | 15.85 | 225 | | | VC | 34.1321 | |
| 0003 | 18.01 | FO | 15.41 | 225 | | | VC | 28.86174 | 1 in 192 |
| 0003 | 18.01 | FO | 15.41 | 225 | | | VC | 28.86174 | 1 in 192 |
| 0102 | 18.44 | SW | 16.57 | 225 | | | VC | 41.34005 | 1 in 80 |
| 0005 | 18.36 | SW | 16.19 | 225 | | | VC | 30.80584 | 1 in 134 |
| 0007 | | SW | 0 | 375 | | | CO | 26.61977 | |
| 0007 | | SW | 0 | 375 | | | CO | 26.61977 | |
| 9106 | | FO | 0 | 225 | | | VC | 53 | |
| 9106 | | FO | 0 | 225 | | | VC | 53 | |
| 9003 | 17.55 | SW | 15.6 | 450 | | | CO | 16.12452 | |
| 9003 | 17.55 | SW | 15.6 | 450 | | | CO | 16.12452 | |
| 9201 | 18.04 | FO | 16.4 | 225 | | | VC | 61.29437 | 1 in 116 |
| 9917 | | FO | | 150 | | | VC | 7.374465 | |
| 9917 | | FO | | 150 | | | VC | 7.374465 | |
| 9111 | 18.28 | SW | 0 | 225 | | | VC | 39.11522 | |
| 9111 | 18.28 | SW | 0 | 225 | | | VC | 39.11522 | |
| 0901 | | FO | 0 | 225 | | | VC | 45.17606 | |
| 0901 | | FO | 0 | 225 | | | VC | 45.17606 | |
| 0101 | 18.08 | SW | 15.72 | 375 | | | CO | 28.30194 | 1 in 708 |
| 0101 | 18.08 | SW | 15.72 | 375 | | | CO | 28.30194 | 1 in 708 |
| 9119 | | FO | | 150 | | | VC | 14.11697 | |
| 9119 | | FO | | 150 | | | VC | 14.11697 | |
| 0201 | 18.3 | SW | 16.8 | 225 | | | VC | 73.78347 | 1 in 264 |
| 0201 | 18.3 | SW | 16.8 | 225 | | | VC | 73.78347 | 1 in 264 |
| 9004 | 17.58 | FO | 15.11 | 225 | | | VC | 12.08305 | |
| 9004 | 17.58 | FO | 15.11 | 225 | | | VC | 12.08305 | |
| 9107 | 18.19 | SW | 16 | 300 | | | CO | 33.28663 | 1 in 303 |
| 9107 | 18.19 | SW | 16 | 300 | | | CO | 33.28663 | 1 in 303 |
| 0904 | | FO | 0 | 225 | | | VC | 52.81141 | |
| 0904 | | FO | 0 | 225 | | | VC | 52.81141 | |
| 0902 | | SW | 0 | 375 | | | CO | 30.06081 | |
| 0902 | | SW | 0 | 375 | | | CO | 30.06081 | |
| 9101 | 17.74 | SW | 15.94 | 450 | | | CO | 103.1746 | 1 in 295 |
| 0104 | 18.36 | SW | 16.41 | 225 | | | VC | 37.73592 | 1 in 122 |
| 0104 | 18.36 | SW | 16.41 | 225 | | | VC | 37.73592 | 1 in 122 |
| 0004 | 17.96 | SW | 15.68 | 375 | | | CO | 1 | |
| 0004 | 17.96 | SW | 15.68 | 375 | | | CO | 1 | |
| 0008 | 17.98 | SW | 15.68 | 375 | | | CO | 31.04835 | 1 in 194 |
| 0008 | 17.98 | SW | 15.68 | 375 | | | CO | 31.04835 | 1 in 194 |

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

# LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

FO Foul
SW Surface Water
CO Combined
OV Overflow

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ4097SW
**Scale:** 1:1250   **Date:** 31/07/2019
**Nodes:** 57
**Sheet:** 2 of 9

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
helping life flow smoothly




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

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 3003 | | FO | 16.16 | 225 | | | VC | 1.414214 | 1 in 71 |
| 0306 | | CO | | 150 | | | VC | 29.51811 | |
| 9307 | | CO | 0 | 225 | | | VC | 60.00833 | |
| 2003 | | CO | 0 | 225 | | | VC | 68.09615 | |
| 2302 | | CO | | 225 | | | VC | 36.85826 | |
| 0205 | | SW | 0 | 225 | | | VC | 54.971 | |
| 4103 | 19.11 | SW | 16.96 | 225 | | | VC | 68.0294 | 1 in 227 |
| 1002 | | SW | 0 | 225 | | | VC | 78.10249 | |
| 5115 | | FO | 0 | 100 | | | VC | 12.75338 | |
| 5115 | | FO | 0 | 100 | | | VC | 12.75338 | |
| 2109 | | FO | 0 | 225 | | | VC | 77.34176 | |
| 2203 | | FO | 0 | 225 | | | VC | 73.58008 | |
| 1009 | | FO | | 100 | | | VC | 18.29491 | |
| 3203 | 20.29 | FO | 0 | 225 | | | VC | 36.92831 | |
| 4002 | | SW | 0 | 225 | | | VC | 68.593 | |
| 3301 | | FO | 0 | 900 | | | ST | 336.5427 | |
| 2227 | | CO | | 100 | | | VC | 12.22331 | |
| 3907 | | SW | 0 | 150 | | | VC | 7.615773 | |
| 5203 | 19.61 | SW | 0 | 225 | | | VC | 58.5235 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 0007 | | CO | | 150 | | | VC | 18.25468 | |
| 5205 | 20.5 | SW | 18.9 | 300 | | | CO | 31.38471 | 1 in 63 |
| 5205 | 20.5 | SW | 18.9 | 300 | | | CO | 31.38471 | 1 in 63 |
| 9117 | | CO | | 100 | | | VC | 7.615819 | |
| 4305 | 20.66 | FO | 18.97 | 225 | | | VC | 48.10405 | 1 in 253 |
| 9114 | | CO | | 100 | | | VC | 7.162227 | |
| 0908 | | FO | 0 | 150 | | | VC | 8.246211 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 0918 | | CO | | 150 | | | VC | 10.16833 | |
| 3008 | 17.47 | SW | 15.36 | 300 | | | CO | 9.086233 | 1 in 61 |
| 2303 | | SW | | 300 | | | CO | 8.245352 | |
| 1102 | | FO | | 225 | | | VC | 61.25428 | |
| 4108 | 18.28 | FO | 17.05 | 225 | | | VC | 47.38143 | 1 in 364 |
| 4109 | 18.28 | FO | 17.05 | 225 | | | VC | 47.38143 | 1 in 364 |
| 3903 | | SW | 0 | 225 | | | VC | 45.04442 | |
| 2218 | | CO | | 150 | | | VC | 5.397775 | |
| 1919 | | CO | | 100 | | | VC | 5.05739 | |
| 5114 | | FO | 0 | 100 | | | VC | 4.003606 | |
| 5114 | | FO | 0 | 100 | | | VC | 4.003606 | |
| 3016 | | FO | | 150 | | | VC | 5.19706 | |
| 1915 | | SW | 0 | 225 | | | VC | 21 | |
| 1909 | | SW | 0 | 225 | | | VC | 39.88909 | |
| 3102 | | FO | | 150 | | | VC | 12.31395 | |
| 5207 | 20.32 | FO | 18.36 | 150 | | | VC | 33.24154 | 1 in 87 |
| 5207 | 20.32 | FO | 18.36 | 150 | | | VC | 33.24154 | 1 in 87 |
| 4312 | 20.8 | SW | 19.69 | 300 | | | CO | 12.08305 | 1 in 110 |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0203 | 20.49 | SW | 17.44 | 225 | | | VC | 25.31798 | 1 in 133 |
| 0907 | | FO | 0 | 150 | | | VC | 10.04888 | |
| 2007 | | CO | | 150 | | | VC | 6.378764 | |
| 1202 | | SW | 0 | 225 | | | VC | 43.04649 | |
| 3009 | 17.56 | SW | 16.14 | 225 | | | VC | 2.194403 | 1 in 219 |
| 2108 | | SW | 0 | 225 | | | VC | 45.60702 | |
| 4307 | 20.88 | SW | 19.2 | 300 | | | CO | 45.88028 | 1 in 153 |
| 4307 | 20.88 | SW | 19.2 | 300 | | | CO | 45.88028 | 1 in 153 |
| 4005 | 17.77 | SW | 15.4 | 600 | | | CO | 67.92132 | 1 in 505 |
| 4004 | 17.71 | SW | 15.63 | 600 | | | CO | 67.92132 | 1 in 295 |
| 4004 | 17.71 | SW | 15.63 | 600 | | | CO | 67.92132 | 1 in 295 |
| 1308 | | CO | | 150 | | | CI | 8.707046 | |
| 2016 | | FO | | 150 | | | VC | 20.19808 | |
| 0014 | | FO | | 100 | | | VC | 4.0568 | |
| 0906 | 17.65 | SW | 15.54 | 225 | | | VC | 28.16026 | 1 in 176 |
| 9124 | | CO | | 150 | | | VC | 17.55441 | |
| 0117 | | CO | | 150 | | | VC | 3.432302 | |
| 2208 | | CO | 0 | 150 | | | VC | 10.42157 | |
| 0123 | | FO | | 150 | | | VC | 9.196805 | |
| 9103 | | SW | 0 | 225 | | | VC | 83.43403 | |
| 0101 | | CO | 0 | 225 | | | VC | 53.08484 | |
| 0003 | 17.73 | SW | 16.05 | 225 | | | VC | 15.81139 | |
| 4201 | 20.31 | SW | 18.37 | 450 | | | CO | 31.95309 | 1 in 399 |
| 4201 | 20.31 | SW | 18.37 | 450 | | | CO | 31.95309 | 1 in 399 |
| 5403 | | SW | | 100 | | | PVC | 7.147776 | |
| 5403 | | SW | | 100 | | | PVC | 7.147776 | |
| 0201 | 20.85 | CO | 17.01 | 225 | | | VC | 85.09406 | 1 in 75.9768442 |
| 3904 | | SW | 0 | 150 | | | VC | 19.23538 | |
| 2102 | | CO | 0 | 150 | | | VC | 47.31541 | |
| 0118 | | CO | | 150 | | | VC | 12.48347 | |
| 5206 | 20.5 | FO | 18.74 | 150 | | | VC | 26.40076 | 1 in 69 |
| 5206 | 20.5 | FO | 18.74 | 150 | | | VC | 26.40076 | 1 in 69 |
| 4311 | 20.89 | FO | 19.18 | 225 | | | VC | 21.73154 | 1 in 114 |
| 5003 | 17.49 | SW | 15.8 | 600 | | | CO | 8.83092 | 1 in 126 |
| 5003 | 17.49 | SW | 15.8 | 600 | | | CO | 8.83092 | 1 in 126 |
| 4202 | 20.4 | FO | 18.74 | 225 | | | VC | 61.7414 | 1 in 71 |
| 9302 | 21.03 | CO | 18.85 | 1200 | | | BR | 69.18092 | |
| 3105 | | SW | 0 | 300 | | | VC | 48.24612 | |
| 5317 | | FO | | 100 | | | VC | 7.036206 | |
| 5317 | | FO | | 100 | | | VC | 7.036206 | |
| 1101 | | FO | | 100 | | | VC | 17.8719 | |
| 0001 | 17.44 | CO | 13.93 | 225 | | | VC | 51.12915 | |
| 4107 | 18.2 | FO | 16.88 | 225 | | | VC | 37.01351 | 1 in 195 |
| 2105 | | FO | 0 | 225 | | | VC | 37.33631 | |
| 0303 | | SW | 0 | 225 | | | VC | 29.06888 | |
| 3010 | | FO | 0 | 225 | | | VC | 15.13275 | |
| 3303 | | SW | 0 | 150 | | | VC | 33.52611 | |
| 2001 | | CO | 0 | 225 | | | VC | 67.06713 | |
| 0224 | | CO | | 150 | | | VC | 10.8472 | |
| 2205 | | FO | 0 | 150 | | | VC | 13.88454 | |
| 0108 | | FO | | 150 | | | VC | 10.47305 | |
| 0302 | | CO | | 225 | | | VC | 33.01515 | |
| 4110 | | SW | 0 | 225 | | | VC | 48.25971 | |
| 4110 | | SW | 0 | 225 | | | VC | 48.25971 | |
| 1101 | | FO | 0 | 225 | | | VC | 52.03845 | |
| 4314 | 20.73 | SW | 19.58 | 300 | | | CO | 29.73214 | 1 in 165 |
| 4314 | 20.73 | SW | 19.58 | 300 | | | CO | 29.73214 | 1 in 165 |
| 1107 | | SW | 0 | 225 | | | VC | 70.57007 | |
| 1001 | 17.64 | CO | 14.5 | 225 | | | VC | 70.20607 | 1 in 123 |
| 3200 | | SW | 0 | 300 | | | VC | 97.4948 | |
| 2304 | | CO | | 100 | | | VC | 17.6933 | |
| 2020 | | CO | | 150 | | | VC | 2.901735 | |
| 0008 | | CO | | 150 | | | VC | 14.37753 | |
| 1102 | | FO | 0 | 225 | | | VC | 38.61909 | |
| 2102 | | FO | | 150 | | | VC | 63.23998 | |
| 3009 | | FO | 16.13 | 225 | | | VC | 2.192441 | 1 in 110 |
| 1922 | | CO | | 150 | | | VC | 29.60442 | |
| 3902 | | FO | 0 | 150 | | | VC | 96.25497 | |
| 0223 | | CO | | 150 | | | VC | 4.280543 | |
| 9906 | | SW | 0 | 600 | | | VC | 208.799 | |
| 5110 | | SW | 0 | 100 | | | VC | 4.273706 | |
| 5110 | | SW | 0 | 100 | | | VC | 4.273706 | |
| 3204 | 20.29 | SW | 18.14 | 450 | | | CO | 18.24829 | 1 in 140 |
| 2106 | | FO | 0 | 225 | | | VC | 23.5372 | |
| 5307 | 21.41 | SW | 19.97 | 225 | | | VC | 33.65954 | 1 in 421 |
| 5307 | 21.41 | SW | 19.97 | 225 | | | VC | 33.65954 | 1 in 421 |
| 2004 | | SW | 0 | 225 | | | VC | 70.17834 | |
| 4301 | 21.08 | SW | 19.57 | 225 | | | VC | 24.16609 | 1 in 101 |
| 5319 | | FO | | 100 | | | VC | 14.07807 | |
| 5319 | | FO | | 100 | | | VC | 14.07807 | |
| 3019 | | FO | | 150 | | | VC | 13.95905 | |
| 3918 | | FO | | 100 | | | VC | 7.459846 | |
| 4204 | | SW | 0 | 225 | | | VC | 51.26402 | |
| 4204 | | SW | 0 | 225 | | | VC | 51.26402 | |
| 3310 | 21.22 | SW | 19.23 | 225 | | | VC | 57.87054 | 1 in 141 |
| 9202 | 19.8 | SW | 15.89 | 225 | | | VC | 81.84131 | 1 in 248 |
| 2101 | | SW | 0 | 225 | | | VC | 66.07714 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 4106 | 19.29 | FO | 17.8 | 225 | | | VC | 53.85165 | 1 in 128 |
| 4106 | 19.29 | FO | 17.8 | 225 | | | VC | 53.85165 | 1 in 128 |
| 3012 | 17.46 | SW | 0 | | | | UN | 0.3545707 | |
| 3301 | | FO | 0 | 450 | | | ST | 335.0761 | |
| 4303 | 20.84 | SW | 19.32 | 225 | | | VC | 34.17601 | 1 in 228 |
| 1903 | | FO | 0 | 150 | | | VC | 36.34556 | |
| 4302 | 20.88 | FO | 19.71 | 225 | | | VC | 21.0238 | |
| 0909 | | FO | 0 | 150 | | | VC | 31.01612 | |
| 2301 | | CO | | 150 | | | VC | 12.00877 | |
| 4907 | 17.29 | SW | 16.1 | 225 | | | VC | 11.16741 | 1 in 37 |
| 5407 | | FO | 0 | 150 | | | VC | 16.49242 | |
| 5407 | | FO | 0 | 150 | | | VC | 16.49242 | |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 4102 | 19.19 | FO | 17.77 | 225 | | | VC | 30.67572 | 1 in 114 |
| 0207 | | CO | 0 | 225 | | | VC | 7.071068 | |
| 3210 | 20.79 | SW | 18.79 | 225 | | | VC | 5.385165 | 1 in 269 |
| 3103 | | FO | | 150 | | | VC | 24.51732 | |
| 1016 | | FO | | 150 | | | VC | 15.96794 | |
| 0901 | | CO | 0 | 225 | | | VC | 44.40721 | |
| 0919 | | CO | | 150 | | | VC | 5.452144 | |
| 0021 | | CO | | 100 | | | VC | 5.380207 | |
| 0213 | | FO | | 150 | | | VC | 9.974166 | |
| 2926 | 17.39 | SW | 14.37 | 750 | | | PVC | 22.62118 | 1 in 73 |
| 9501 | 19.38 | FO | 16.57 | 225 | | | VC | 48.50773 | 1 in 180 |
| 9501 | 19.38 | FO | 16.57 | 225 | | | VC | 48.50773 | 1 in 180 |
| 2002 | | SW | 0 | 225 | | | VC | 65.06919 | |
| 9130 | | CO | | 100 | | | VC | 4.132107 | |
| 9115 | | CO | | 100 | | | VC | 14.21476 | |
| 0009 | | CO | | 150 | | | VC | 10.94359 | |
| 2107 | | SW | 0 | 225 | | | VC | 38.47077 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 3011 | | SW | 0 | 225 | | | VC | 16.12452 | |
| 1109 | | FO | | 150 | | | VC | 13.1614 | |
| 0206 | | CO | 0 | 225 | | | VC | 90.48047 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 2114 | | CO | | 150 | | | VC | 16.449 | |
| 2910 | | SW | 0 | 150 | | | VC | 33.06555 | |
| 3909 | | FO | | 100 | | | VC | 9.831995 | |
| 1127 | | FO | | 150 | | | VC | 33.76673 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 1012 | | CO | | 150 | | | VC | 6.388664 | |
| 0422 | | CO | | 100 | | | VC | 6.272639 | |
| 0422 | | CO | | 100 | | | VC | 6.272639 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 1904 | | SW | 0 | 150 | | | VC | 15.23155 | |
| 9405 | | SW | 0 | 225 | | | VC | 75.00667 | |
| 9009 | | CO | | 150 | | | VC | 16.22367 | |
| 1307 | | CO | | 150 | | | CI | 3.855924 | |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 0104 | | FO | 0 | 225 | | | VC | 53.03772 | |
| 4203 | 20.39 | SW | 18.28 | 450 | | | CO | 59.09315 | 1 in 591 |
| 9010 | | CO | | 150 | | | VC | 8.814127 | |
| 3912 | | FO | | 150 | | | VC | 12.03112 | |
| 5904 | 17.24 | FO | 15.3 | 150 | | | VC | 10.71871 | 1 in 2 |
| 5904 | 17.24 | FO | 15.3 | 150 | | | VC | 10.71871 | 1 in 2 |
| 3023 | | FO | | 100 | | | VC | 8.631138 | |
| 0120 | | FO | | 150 | | | VC | 5.886763 | |
| 2201 | | SW | 0 | 225 | | | VC | 28.86174 | |
| 0102 | | FO | 0 | 225 | | | VC | 51.15662 | |
| 0204 | 20.37 | SW | 17.25 | 225 | | | VC | 17.08801 | |
| 4313 | 20.93 | SW | 19.81 | 300 | | | CO | 29.96665 | 1 in 130 |
| 4313 | 20.93 | SW | 19.81 | 300 | | | CO | 29.96665 | 1 in 130 |
| 2935 | | CO | | 150 | | | VC | 15.36178 | |
| 9907 | | SW | 0 | 600 | | | VC | 37.48333 | |
| 5301 | 20.45 | SW | 19.17 | 225 | | | CO | 24.20744 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 5102 | 18.31 | FO | 17.29 | 225 | | | VC | 40.84647 | |
| 1122 | | FO | | 100 | | | VC | 5.590019 | |
| 2005 | | SW | 0 | 225 | | | VC | 34.9285 | |
| 9401 | 20.5 | FO | 16.8 | 225 | | | VC | 77.02597 | 1 in 62 |
| 4906 | 17.4 | SW | 15.8 | 450 | | | VC | 58.17262 | 1 in 145 |
| 0208 | | SW | 0 | 225 | | | VC | 56.0357 | 1 in 26.0631164 |
| 5103 | 18.37 | SW | 16.91 | 225 | | | VC | 16.37816 | |
| 0912 | 17.28 | SW | 15.19 | 300 | | | CO | 23.02173 | 1 in 110 |
| 5209 | 19.81 | SW | 19.14 | 300 | | | CO | 32.89377 | 1 in 274 |
| 9106 | | CO | 0 | 225 | | | VC | 62.96825 | |
| 1021 | | CO | | 100 | | | VC | 6.891249 | |
| 1905 | | SW | 0 | 150 | | | VC | 28.07134 | |
| 3201 | 20.34 | SW | 18.61 | 225 | | | VC | 19.23538 | 1 in 77 |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 0212 | | FO | | 150 | | | VC | 37.86659 | |
| 9303 | 21.04 | CO | 15.71 | 300 | | | VC | 71.17584 | 1 in 117 |
| 1108 | | FO | | 150 | | | VC | 2.951878 | |
| 0110 | | FO | | 150 | | | VC | 11.35379 | |
| 1104 | | FO | 0 | 225 | | | VC | 51.04046 | |
| 4304 | 20.85 | FO | 19.31 | 225 | | | CO | 31.77508 | 1 in 244 |
| 5208 | 20.32 | SW | 19.02 | 300 | | | CO | 27.313 | 1 in 228 |
| 5208 | 20.32 | SW | 19.02 | 300 | | | CO | 27.313 | 1 in 228 |
| 0216 | | FO | | 100 | | | PVC | 17.93446 | |
| 9207 | | CO | | 150 | | | VC | 11.00325 | |
| 2008 | | CO | | 150 | | | VC | 6.082704 | |
| 3013 | 17.46 | SW | 15.21 | 300 | | | CO | 65.08363 | 1 in 97 |
| 2207 | | CO | 0 | 150 | | | VC | 9.876294 | |
| 2112 | | FO | | 150 | | | VC | 11.66524 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 4310 | 20.87 | SW | 19.13 | 325 | | | VC | 9.174094 | 1 in 54 |
| 5318 | | FO | | 100 | | | VC | 14.90664 | |
| 5318 | | FO | | 100 | | | VC | 14.90664 | |
| 2103 | | SW | 0 | 225 | | | VC | 86.30135 | |
| 5004 | 17.45 | FO | 15.81 | 150 | | | VC | 9.839408 | 1 in 30 |
| 5004 | 17.45 | FO | 15.81 | 150 | | | VC | 9.839408 | 1 in 30 |
| 4309 | 20.94 | SW | 19.4 | 300 | | | CO | 33.61547 | 1 in 168 |
| 4309 | 20.94 | SW | 19.4 | 300 | | | CO | 33.61547 | 1 in 168 |
| 0902 | | SW | 0 | 225 | | | VC | 22.82542 | |
| 3007 | | SW | 17.48 | 300 | | | CO | 69.32677 | 1 in 33 |
| 5105 | 18.97 | FO | 10.97 | 1220 | | | BR | 205.0004 | 1 in 325 |
| 2908 | | CO | | 150 | | | VC | 5.13049 | |
| 3925 | 16.9 | SW | 14.54 | 300 | | | CO | 23.01836 | |
| 2924 | | SW | | 150 | | | VC | 10.31057 | |
| 2907 | | SW | 0 | 150 | | | VC | 22.26506 | |
| 2919 | | SW | | 150 | | | VC | 19.703 | |
| 3001 | 17.3 | FO | 16.22 | 225 | | | VC | 97.9901 | |
| 5304 | 19.54 | FO | 18.28 | 225 | | | VC | 52.20153 | 1 in 109 |
| 2909 | | SW | 0 | 150 | | | CO | 23.92475 | |
| 3002 | 17.6 | FO | 16.35 | 225 | | | VC | 20.95479 | 1 in 161 |
| 5216 | | FO | | 100 | | | VC | 9.274999 | |
| 5216 | | FO | | 100 | | | VC | 17.5984 | |
| 5216 | | FO | | 100 | | | VC | 17.5984 | |
| 3018 | | FO | | 225 | | | VC | 12.87249 | |
| 4203 | 20.93 | SW | 19.81 | 300 | | | CO | 29.96665 | 1 in 130 |
| 9902 | | CO | 0 | 375 | | | CO | 82.18047 | |
| 0402 | 20.94 | SW | 17.99 | 225 | | | VC | 70.17834 | 1 in 128 |
| 0006 | | SW | 0 | 225 | | | VC | 51.08816 | |
| 3004 | | FO | 0 | 225 | | | VC | 26.07681 | |
| 1105 | | FO | | 150 | | | VC | 19.7895 | |
| 4104 | 19.06 | FO | 17.38 | 225 | | | VC | 60 | 1 in 120 |
| 3302 | 20.85 | SW | 19.36 | 150 | | | CO | 28.4605 | 1 in 77 |
| 4308 | 20.88 | FO | 19.2 | 150 | | | VC | 44.94441 | 1 in 98 |
| 4308 | 20.88 | FO | 19.2 | 150 | | | VC | 44.94441 | 1 in 98 |
| 9008 | | SW | 0 | 225 | | | VC | 32.38827 | |
| 3104 | | CO | | 150 | | | VC | 5.897793 | |
| 2111 | | CO | | 150 | | | VC | 9.589 | |
| 4003 | 17.6 | SW | 15.72 | 600 | | | CO | 11.5215 | 1 in 128 |
| 4003 | 17.6 | SW | 15.72 | 600 | | | CO | 11.5215 | 1 in 128 |
| 1112 | | FO | | 150 | | | VC | 31.53576 | |
| 2116 | | FO | | 150 | | | VC | 9.025078 | |
| 9902 | | CO | 0 | 375 | | | CO | 82.18047 | |
| 1018 | | FO | | 150 | | | VC | 11.44651 | |
| 2904 | | SW | 0 | 150 | | | CI | 13.48367 | |
| 1907 | 17.58 | FO | 15.82 | 150 | | | BR | 128.6178 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | 1 in 123 |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 2401 | | FO | 0 | 1200 | | | CO | 51.97115 | |
| 2104 | | SW | 0 | 225 | | | VC | 73.68175 | |
| 0301 | | FO | 0 | 1200 | | | CO | 187.4166 | |
| 1201 | | FO | 0 | 225 | | | VC | 46.95743 | |
| 0005 | | SW | 0 | 225 | | | VC | 47.16991 | |
| 2202 | | SW | 0 | 225 | | | VC | 44.01136 | |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 1126 | | SW | | 150 | | | VC | 34.0507 | |
| 3006 | | FO | | 225 | | | VC | 58.93209 | |
| 9310 | | CO | | 225 | | | VC | 14.60509 | |
| 1003 | | SW | 0 | 225 | | | VC | 65.06919 | |
| 2209 | | CO | 0 | 150 | | | VC | 9.815034 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 3914 | | FO | | 100 | | | VC | 15.31061 | |
| 4001 | 18.41 | FO | 16.68 | 225 | | | VC | 60.959 | |
| 0004 | | CO | 0 | 225 | | | VC | 39.08202 | |
| 2225 | | CO | | 150 | | | VC | 12.24907 | |
| 5005 | 17.4 | FO | 15.48 | 150 | | | VC | 25.10326 | 1 in 139 |
| 5005 | 17.4 | FO | 15.48 | 150 | | | VC | 25.10326 | 1 in 139 |
| 2221 | | FO | | 225 | | | VC | 2.568128 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 1120 | | FO | | 150 | | | VC | 1.150356 | |
| 9212 | | CO | | 150 | | | VC | 14.39401 | |
| 4315 | 20.98 | FO | 19.83 | 150 | | | VC | 51.47815 | 1 in 80 |
| 0103 | | SW | 0 | 225 | | | VC | 60.07495 | 1 in 35.7589018 |
| 2012 | | FO | 0 | 225 | | | VC | 54.14795 | |
| 9007 | | SW | 0 | 225 | | | VC | 36.05551 | |
| 5109 | | SW | 0 | 100 | | | VC | 21.02526 | |
| 2905 | | FO | | 150 | | | VC | 18.59704 | |
| 2908 | | SW | | 150 | | | VC | 19.05912 | |
| 3925 | 16.9 | SW | 14.54 | 300 | | | CO | 23.01836 | |
| 2924 | | SW | | 150 | | | VC | 10.31057 | |
| 2907 | | SW | 0 | 150 | | | VC | 22.26506 | |
| 2919 | | SW | | 150 | | | VC | 19.703 | |
| 3001 | 17.3 | FO | 16.22 | 225 | | | VC | 97.9901 | |
| 5304 | 19.54 | FO | 18.28 | 225 | | | VC | 52.20153 | 1 in 109 |
| 2909 | | SW | 0 | 150 | | | CO | 23.92475 | |
| 3002 | 17.6 | FO | 16.35 | 225 | | | VC | 20.95479 | 1 in 161 |
| 5216 | | FO | | 100 | | | VC | 9.274999 | |
| 5216 | | FO | | 100 | | | VC | 17.5984 | |
| 5216 | | FO | | 100 | | | VC | 17.5984 | |
| 3018 | | FO | | 225 | | | VC | 12.87249 | |

## LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

### MANHOLE FUNCTION

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

### SEWER SHAPE

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

### SEWER MATERIAL

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

**Address or Site Reference:**

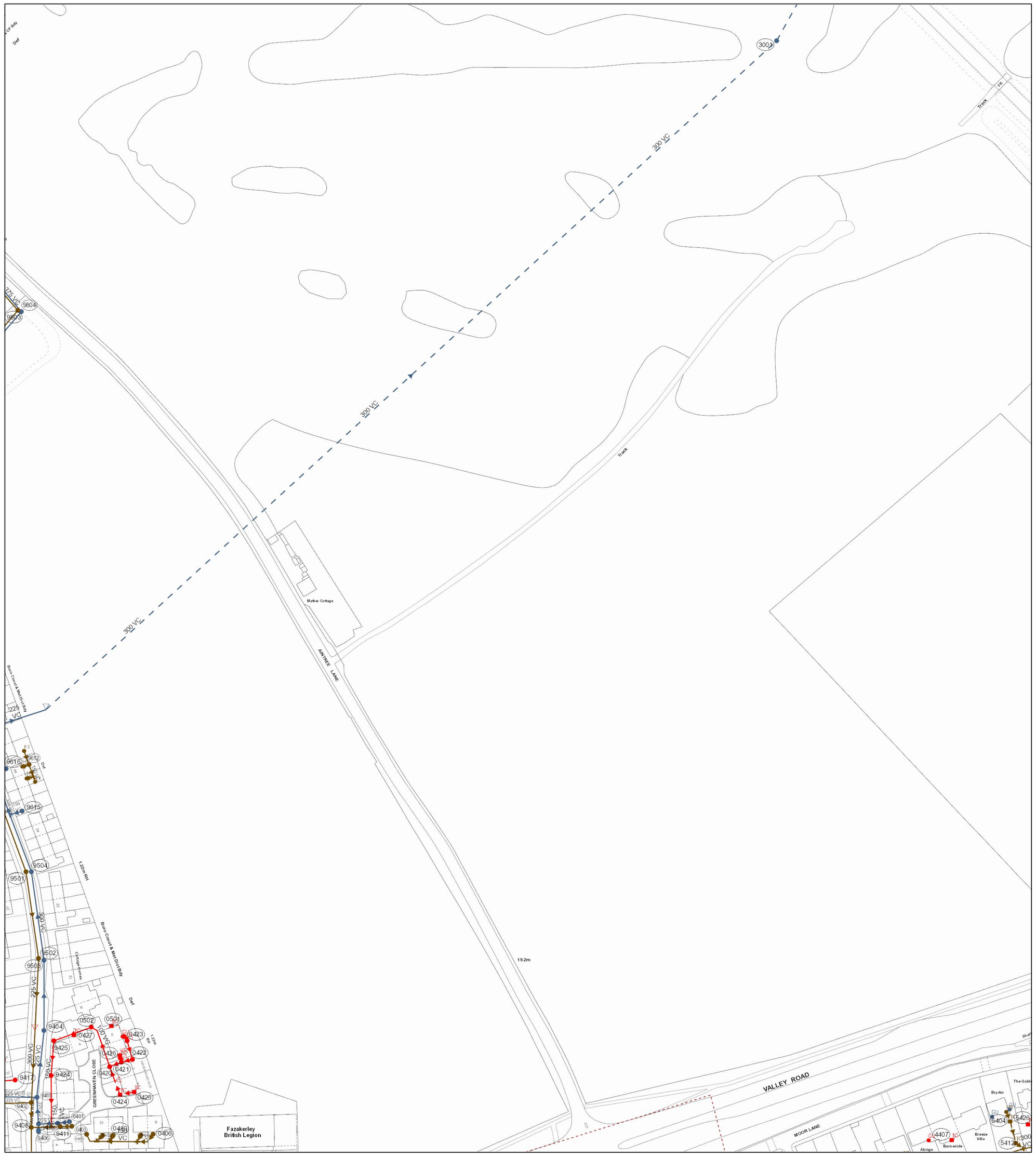
HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ3997SW
**Scale:** 1:1250 **Date:** 31/07/2019
**Nodes:** 361
**Sheet:** 3 of 9

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities — helping life flow smoothly




| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 9501 | 19.38 | FO | 16.57 | 225 | | | VC | 48.50773 | 1 in 180 |
| 9501 | 19.38 | FO | 16.57 | 225 | | | VC | 48.50773 | 1 in 180 |
| 9803 | 17.4 | FO | 14.65 | 225 | | | CO | 48.35311 | 1 in 134 |
| 9803 | 17.4 | FO | 14.65 | 225 | | | CO | 48.35311 | 1 in 134 |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 9401 | 20.5 | FO | 16.8 | 225 | | | VC | 77.02597 | 1 in 62 |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 9411 | 20.5 | FO | 17.44 | 150 | | | VC | 16.08351 | 1 in 22 |
| 9411 | 20.5 | FO | 17.44 | 150 | | | VC | 16.08351 | 1 in 22 |
| 9411 | 20.5 | FO | 17.44 | 150 | | | VC | 16.08351 | 1 in 22 |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9504 | 19.39 | SW | 16.59 | 300 | | | VC | 73.73602 | |
| 9504 | 19.39 | SW | 16.59 | 300 | | | VC | 73.73602 | |
| 0403 | | FO | 0 | 150 | | | VC | 6.371142 | |
| 0403 | | FO | 0 | 150 | | | VC | 6.371142 | |
| 0403 | | FO | 0 | 150 | | | VC | 6.371142 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 9419 | | CO | | 150 | | | VC | 19.39855 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 3001 | | SW | | 300 | | | VC | 67.37228 | |
| 9801 | 17.89 | SW | 15.83 | 375 | | | CO | 86.71454 | 1 in 117 |
| 0422 | | CO | | 100 | | | VC | 6.272639 | |
| 0422 | | CO | | 100 | | | VC | 6.272639 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 4401 | 20.39 | FO | 19.19 | 150 | | | VC | 62.99297 | 1 in 95 |
| 4401 | 20.39 | FO | 19.19 | 150 | | | VC | 62.99297 | 1 in 95 |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 9804 | 16.98 | SW | 15.09 | 375 | | | VC | 88.25493 | 1 in 130 |
| 9804 | 16.98 | SW | 15.09 | 375 | | | VC | 88.25493 | 1 in 130 |
| 9405 | | SW | 0 | 225 | | | VC | 75.00667 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9616 | | SW | | 150 | | | VC | 7.160587 | |
| 9616 | | SW | | 150 | | | VC | 7.160587 | |
| 9606 | | SW | 0 | 225 | | | VC | 38.8973 | |
| 9604 | | FO | 0 | 225 | | | VC | 69.28925 | |
| 9612 | | FO | | 150 | | | VC | 10.22571 | |
| 9612 | | FO | | 150 | | | VC | 10.22571 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9802 | 18.04 | FO | 15.28 | 939 | | | CO | 85.15882 | 1 in 135 |
| 9615 | | SW | | 150 | | | VC | 7.160758 | |
| 9615 | | SW | | 150 | | | VC | 7.160758 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |

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

# LEGEND

Abandoned — Foul — Surface Water — Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

**All point assets follow the standard colour convention:**

red - combined  blue - surface water

brown - foul  purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ3997NW

**Scale:** 1:1250  **Date:** 31/07/2019

**Nodes:** 80

**Sheet:** 4 of 9

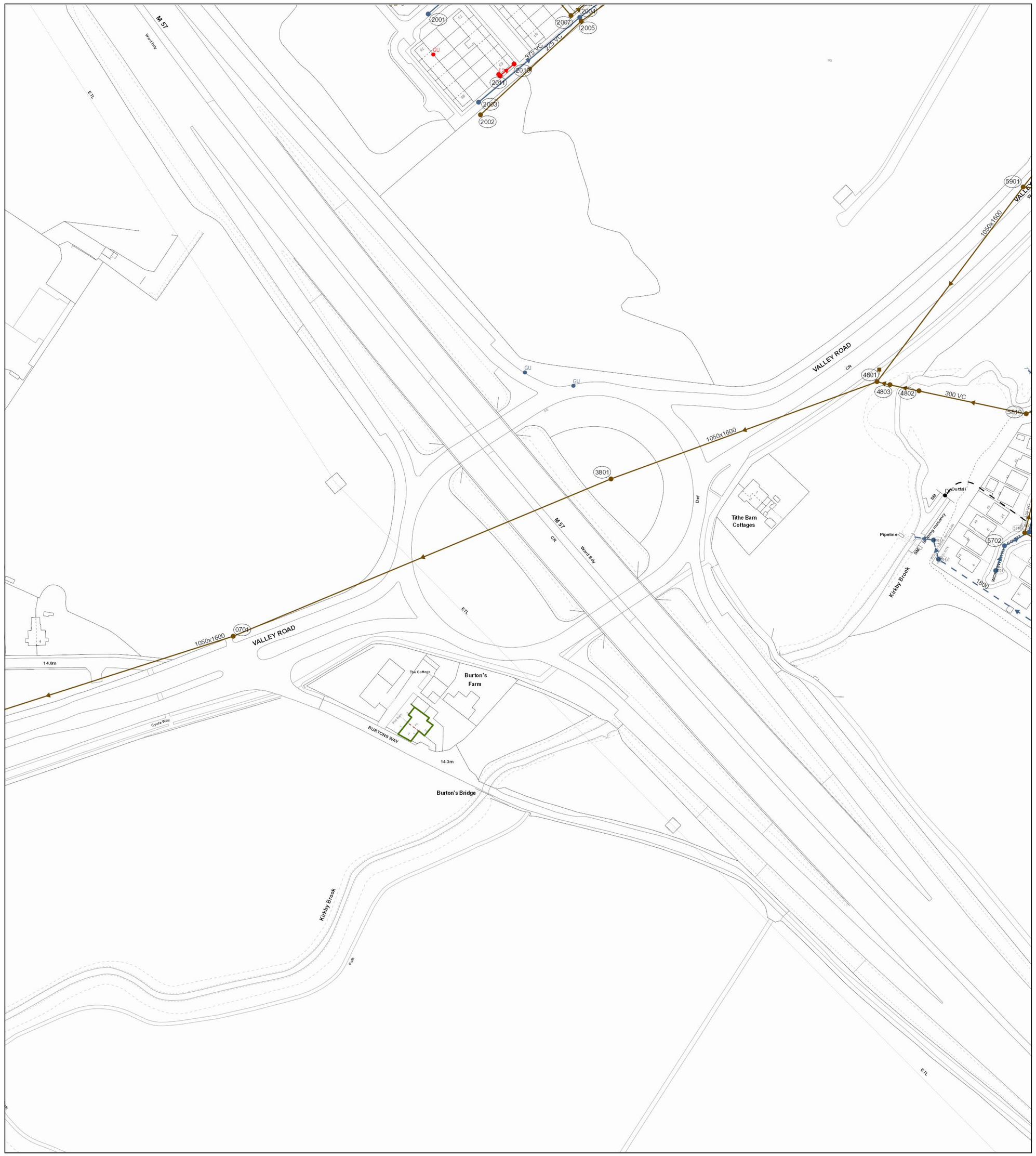
**Printed by:** Property Searches

**SEWER RECORDS**

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 4803 | | FO | 0 | 300 | | | VC | 7.307272 | |
| 3801 | 14.59 | FO | 10.85 | 1050 | | | BR | 226.9277 | 1 in 1194 |
| 0701 | 14.2 | FO | 10.66 | 1050 | | | BR | 216.2997 | 1 in 865 |
| 2007 | | FO | | 150 | | | VC | 11.72824 | |
| 2007 | | FO | | 150 | | | VC | 11.72824 | |
| 4801 | 15.28 | FO | 11.07 | 1050 | | | BR | 157.0062 | 1 in 714 |
| 5710 | | FO | 0 | 150 | | | VC | 18.61196 | |
| 2006 | | FO | | 150 | | | VC | 34.92025 | |
| 2005 | 18.26 | FO | 15.94 | 225 | | | VC | 75.21303 | |
| 2005 | 18.26 | FO | 15.94 | 225 | | | VC | 75.21303 | |
| 5702 | | SW | 0 | 150 | | | VC | 15.66708 | |
| 2004 | 18.26 | SW | 0 | 375 | | | CO | 73.60027 | |
| 2004 | 18.26 | SW | 0 | 375 | | | CO | 73.60027 | |
| 2011 | | CO | | 150 | | | VC | 10.08586 | |
| 2011 | | CO | | 150 | | | VC | 10.08586 | |
| 4701 | | SW | | 1800 | | | | 11.01291 | |
| 5701 | | SW | 0 | 150 | | | VC | 14.53521 | |
| 2001 | 18.87 | SW | 17.49 | 225 | | | VC | 102.8251 | 1 in 219 |
| 2001 | 18.87 | SW | 17.49 | 225 | | | VC | 102.8251 | 1 in 219 |
| 4704 | | SW | | 1800 | | | | 10.99513 | |
| 4802 | | FO | 0 | 300 | | | VC | 16.4877 | |
| 5901 | 16.05 | FO | 11.22 | 1050 | | | BR | 134.9978 | 1 in 900 |
| 5901 | 16.05 | FO | 11.22 | 1050 | | | BR | 134.9978 | 1 in 900 |
| 5703 | | SW | 0 | 1200 | | | CO | 17.63349 | |
| 2003 | 18.18 | SW | 0 | 375 | | | VC | 73.1095 | |
| 2003 | 18.18 | SW | 0 | 375 | | | VC | 73.1095 | |
| 2002 | | FO | 0 | 225 | | | VC | 76.41989 | |
| 2002 | | FO | 0 | 225 | | | VC | 76.41989 | |
| 5810 | | FO | 0 | 300 | | | VC | 60.7816 | |

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

# LEGEND

Abandoned / Foul / Surface Water / Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

**All point assets follow the standard colour convention:**

red - combined  blue - surface water

brown - foul  purple - overflow

- Manhole
- Head of System
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- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ4097NW

**Scale:** 1:1250  **Date:** 31/07/2019

**Nodes:** 29

**Sheet:** 5 of 9

**Printed by:** Property Searches

**SEWER RECORDS**

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

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 6801 | 18.05 | FO | 16.42 | 225 | | | VC | 43.1707 | |
| 8904 | 16.26 | SW | 14.92 | 225 | | | VC | 30.76326 | 1 in 192 |
| 8807 | 18.29 | SW | 16.86 | 225 | | | PVC | 27.51457 | 1 in 275 |
| 9703 | 18.5 | SW | 16.52 | 939 | | | CO | 10.41758 | 1 in 80 |
| 7808 | 18.85 | SW | 16.96 | 939 | | | CO | 18.62595 | 1 in 373 |
| 7812 | | SW | 0 | 375 | | | CO | 23.49944 | |
| 8704 | 18.57 | SW | 16.39 | 939 | | | CO | 37.36299 | 1 in 121 |
| 6804 | | FO | | 100 | | | VC | 6.106473 | |
| 8503 | 19.6 | SW | 17.97 | 225 | | | VC | 52.7731 | |
| 7811 | 18.29 | SW | 16.42 | 375 | | | VC | 35.90588 | 1 in 106 |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 9424 | | CO | | 150 | | | VC | 28.51561 | |
| 7904 | 17.26 | FO | 15.16 | 225 | | | VC | 58.55059 | 1 in 115 |
| 7908 | 17.18 | SW | 15.54 | 225 | | | VC | 46.10608 | 1 in 171 |
| 8024 | | FO | | 100 | | | VC | 11.86249 | |
| 8001 | 16.22 | SW | 14.71 | 225 | | | VC | 34.48188 | 1 in 115 |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 9404 | | SW | 0 | 300 | | | VC | 39 | |
| 7807 | 18.77 | SW | 17.26 | 939 | | | CO | 29.11229 | 1 in 97 |
| 9418 | | CO | | 150 | | | VC | 6.188895 | |
| 9001 | 15 | SW | | 375 | | | VC | 15.48666 | |
| 8003 | 15.67 | FO | 14.39 | 225 | | | VC | 17.26268 | 1 in 58 |
| 9803 | 17.4 | FO | 14.65 | 225 | | | CO | 48.35311 | 1 in 134 |
| 9803 | 17.4 | FO | 14.65 | 225 | | | CO | 48.35311 | 1 in 134 |
| 8710 | 19.34 | FO | 16.94 | 939 | | | CO | 14.15631 | 1 in 129 |
| 9412 | | CO | | 0 | | | VC | 5.971643 | |
| 9415 | | CO | | 0 | | | VC | 11.31898 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 0401 | | SW | 0 | 225 | | | VC | 6.653003 | |
| 8802 | 18.47 | FO | 15.52 | 939 | | | CO | 31.06574 | 1 in 129 |
| 8901 | 15.62 | FO | 13.16 | 225 | | | VC | 11.65921 | |
| 5703 | | CO | | 100 | | | VC | 12.32709 | |
| 5803 | 18.82 | FO | 16.95 | 225 | | | VC | 83.65002 | 1 in 167 |
| 7815 | | FO | | 150 | | | VC | 12.51272 | |
| 8705 | 19.34 | SW | 17.58 | 939 | | | CO | 11.98666 | 1 in 71 |
| 7802 | 18.84 | FO | 16.63 | 225 | | | CO | 18.49163 | 1 in 185 |
| 8902 | 15.97 | FO | 13.24 | 225 | | | VC | 18.59076 | 1 in 232 |
| 8025 | | FO | | 100 | | | VC | 11.63136 | |
| 8715 | | CO | | 150 | | | VC | 8.810678 | |
| 9606 | | SW | 0 | 225 | | | VC | 38.8973 | |
| 8908 | 15.37 | SW | 14.11 | 375 | | | VC | 38.26529 | 1 in 96 |
| 9603 | | SW | 0 | 225 | | | VC | 20.61553 | |
| 7806 | 18.2 | FO | 16.81 | 225 | | | VC | 22.99007 | 1 in 34 |
| 6803 | 17.65 | SW | 16.08 | 375 | | | VC | 41.43839 | |
| 8912 | 17.62 | FO | 15.6 | 150 | | | PVC | 30.21436 | 1 in 45 |
| 9601 | | SW | 0 | 225 | | | VC | 25.31798 | |
| 7825 | 18.55 | FO | 15.75 | 150 | | | PVC | 43.88879 | 1 in 54 |
| 9706 | 18.49 | FO | 16.04 | 939 | | | CO | 11.58609 | 1 in 61 |
| 7903 | 17.23 | SW | | 375 | | | VC | 58.5573 | |
| 9901 | 18.26 | FO | 14.26 | 150 | | | PVC | 22.73641 | 1 in 142 |
| 9903 | 17.5 | FO | 14.1 | 150 | | | PVC | 25.19754 | 1 in 157 |
| 9904 | 16.6 | FO | 13.94 | 225 | | | VC | 33.98718 | 1 in 131 |
| 9801 | 17.89 | SW | 15.83 | 375 | | | CO | 86.71454 | 1 in 117 |
| 5402 | 21.94 | CO | 19.91 | 300 | | | VC | 91.5478 | |
| 6805 | | FO | | 100 | | | VC | 15.47634 | |
| 8917 | 17.69 | SW | 14.48 | 525 | | | CO | 22.34949 | 1 in 172 |
| 8709 | 18.57 | FO | 15.85 | 939 | | | CO | 40.20974 | 1 in 122 |
| 8501 | | SW | 0 | 225 | | | VC | 97.86214 | |
| 5801 | | SW | | 375 | | | | 195.0932 | |
| 7909 | | SW | | 0 | | | | 4.702716 | 1 in |
| 9804 | 16.98 | SW | 15.09 | 375 | | | VC | 88.25493 | 1 in 130 |
| 9804 | 16.98 | SW | 15.09 | 375 | | | VC | 88.25493 | 1 in 130 |
| 8914 | 17.5 | SW | 15.38 | 450 | | | CO | 34.73658 | 1 in 217 |
| 7902 | 17.74 | SW | 16.06 | 225 | | | VC | 36.66946 | |
| 5805 | 20.2 | SW | 16.68 | 825 | | | CO | 91.01151 | 1 in 433 |
| 4802 | 20.77 | SW | 16.93 | 825 | | | CO | 99.80339 | 1 in 399 |
| 7805 | 18.3 | FO | 16.13 | 225 | | | VC | 34.88217 | 1 in 145 |
| 9001 | 15 | SW | 14 | 375 | | | VC | 28.83352 | |
| 7907 | 17.2 | FO | 15.33 | 225 | | | VC | 51.61615 | 1 in 89 |
| 8009 | 15.09 | FO | 13.64 | 150 | | | VC | 7.475636 | 1 in 107 |
| 8708 | 19.04 | FO | 0 | 939 | | | CO | 44.33566 | |
| 9422 | | CO | | 150 | | | VC | 27.84713 | |
| 5802 | 19.87 | FO | 17.73 | 225 | | | VC | 30.60596 | 1 in 1530 |
| 9905 | 15.41 | FO | 13.78 | 225 | | | VC | 15.94657 | 1 in 133 |
| 4418 | | CO | | 150 | | | VC | 7.77204 | |
| 9504 | 19.39 | SW | 16.59 | 300 | | | VC | 73.73602 | |
| 9504 | 19.39 | SW | 16.59 | 300 | | | VC | 73.73602 | |
| 8711 | 19.24 | FO | 16.83 | 939 | | | CO | 24.63223 | 1 in 107 |
| 8809 | 18.66 | SW | 16.21 | 300 | | | PVC | 27.31929 | 1 in 91 |
| 9414 | | CO | | 0 | | | VC | 18.1037 | |
| 8603 | 19.45 | SW | 17.7 | 939 | | | CO | 19.38774 | 1 in 162 |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 9408 | 20.62 | FO | 15.85 | 150 | | | VC | 59.22202 | |
| 9616 | | SW | | 150 | | | VC | 7.160587 | |
| 9616 | | SW | | 150 | | | VC | 7.160587 | |
| 9701 | 18.8 | SW | 17.05 | 939 | | | CO | 39.45269 | 1 in 96 |
| 8701 | 19.06 | SW | 17.34 | 939 | | | CO | 22.55968 | 1 in 113 |
| 9612 | | FO | | 150 | | | VC | 10.22571 | |
| 9612 | | FO | | 150 | | | VC | 10.22571 | |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 9503 | 19.74 | SW | 16.78 | 300 | | | VC | 49.49747 | 1 in 291 |
| 7901 | 17.71 | FO | 15.98 | 225 | | | VC | 42.04496 | 1 in 67 |
| 8913 | 18.3 | SW | 14.94 | 525 | | | CO | 12.46567 | 1 in 27 |
| 9420 | | CO | | 150 | | | VC | 8.499342 | |
| 9501 | 19.38 | FO | 16.57 | 225 | | | VC | 48.50773 | 1 in 180 |
| 9501 | 19.38 | FO | 16.57 | 225 | | | VC | 48.50773 | 1 in 180 |
| 8916 | 18.07 | SW | 14.98 | 525 | | | CO | 14.00206 | 1 in 350 |
| 9505 | | SW | 0 | 225 | | | VC | 39.62323 | |
| 7816 | | FO | | 100 | | | PVC | 2.308113 | |
| 7910 | | SW | | 0 | | | | 12.66228 | 1 in |
| 7801 | 18.82 | FO | 16.86 | 939 | | | CO | 26.33231 | 1 in 114 |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 9409 | 20.54 | SW | 18.63 | 225 | | | VC | 10.62063 | |
| 8604 | 19.49 | FO | 17.05 | 939 | | | CO | 19.68637 | 1 in 179 |
| 8606 | | SW | | 100 | | | VC | 16.53145 | |
| 6901 | 20.27 | SW | 16.47 | 825 | | | CO | 91.13161 | 1 in 396 |
| 7803 | 18.77 | FO | 16.53 | 225 | | | VC | 28.27796 | 1 in 166 |
| 8801 | 18.44 | SW | 16.08 | 939 | | | CO | 30.37682 | 1 in 122 |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 9403 | | SW | 0 | 225 | | | VC | 37.21559 | |
| 8805 | 18.92 | FO | 16.15 | 150 | | | PVC | 59.24426 | 1 in 148 |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 9410 | 20.62 | SW | 18.29 | 225 | | | VC | 14.87864 | |
| 8502 | | FO | 0 | 225 | | | VC | 112.45 | |
| 9602 | | FO | 0 | 225 | | | VC | 23.4094 | |
| 0422 | | CO | | 100 | | | VC | 6.272639 | |
| 0422 | | CO | | 100 | | | VC | 6.272639 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 9406 | | SW | 0 | 225 | | | VC | 4.149458 | |
| 8911 | 18.13 | FO | 14.35 | 150 | | | PVC | 13.45148 | 1 in 149 |
| 8903 | 16.01 | SW | 14.64 | 375 | | | VC | 43.20702 | 1 in 82 |
| 9607 | 18.77 | FO | 17.02 | 225 | | | VC | 19.31321 | |
| 9405 | | SW | 0 | 225 | | | VC | 75.00667 | |
| 8401 | | FO | | 150 | | | VC | 9.395504 | |
| 8002 | 16.23 | FO | 13.63 | 225 | | | VC | 23.5372 | 1 in 147 |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 0420 | | CO | | 100 | | | VC | 24.91066 | |
| 8713 | | CO | | 150 | | | VC | 5.048918 | |
| 9401 | 20.5 | FO | 16.8 | 225 | | | VC | 77.02597 | 1 in 62 |
| 8915 | 18.29 | SW | 15.05 | 525 | | | CO | 28.10625 | 1 in 402 |
| 8810 | 18.9 | SW | 16.51 | 300 | | | PVC | 61.96256 | 1 in 188 |
| 9907 | 16.84 | FO | 14.29 | 225 | | | VC | 36.97453 | 1 in 106 |
| 7001 | 20.26 | SW | 16.03 | 825 | | | CO | 89.38535 | 1 in 470 |
| 5401 | | CO | 0 | 225 | | | VC | 44.55334 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 9425 | | CO | | 150 | | | VC | 19.3184 | |
| 8601 | | SW | 0 | 225 | | | VC | 35.51056 | |
| 9605 | | SW | 0 | 225 | | | VC | 9.486833 | |
| 5702 | | FO | 0 | 150 | | | VC | 43.95583 | |
| 5701 | | FO | 0 | 150 | | | VC | 16.74414 | |
| 9604 | | FO | 0 | 225 | | | VC | 69.28925 | |
| 7809 | 18.79 | SW | 16.91 | 375 | | | CO | 30.78991 | 1 in 114 |
| 8905 | 16.27 | FO | 13.49 | 225 | | | VC | 35.10986 | 1 in 207 |
| 8712 | 18.91 | SW | 17.56 | 0 | | | | 24.3665 | 1 in 111 |
| 9704 | 18.78 | FO | 16.6 | 939 | | | CO | 36.50525 | 1 in 96 |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 0421 | | CO | | 100 | | | VC | 6.969846 | |
| 4703 | | CO | | 100 | | | VC | 9.825393 | |
| 8602 | | FO | 0 | 225 | | | VC | 47.85394 | |
| 8907 | 15.13 | FO | 13.66 | 225 | | | VC | 46.09162 | 1 in 92 |
| 7813 | | SW | | 300 | | | VC | 94.69231 | 1 in |
| 7810 | 18.51 | SW | 16.64 | 375 | | | VC | 23.36146 | 1 in 106 |
| 7906 | 16.63 | SW | 15.13 | 375 | | | VC | 60.40531 | 1 in 129 |
| 8803 | 18.29 | FO | 16.65 | 150 | | | PVC | 23.7241 | 1 in 77 |
| 6902 | 20.27 | SW | 16.24 | 825 | | | CO | 90.89562 | 1 in 433 |
| 9411 | 20.5 | FO | 17.44 | 150 | | | VC | 16.08351 | 1 in 22 |
| 9411 | 20.5 | FO | 17.44 | 150 | | | VC | 16.08351 | 1 in 22 |
| 9411 | 20.5 | FO | 17.44 | 150 | | | VC | 16.08351 | 1 in 22 |
| 8006 | 15.61 | FO | 14.14 | 225 | | | VC | 5.385165 | 1 in 108 |
| 4701 | | CO | | 100 | | | VC | 6.456467 | |
| 8806 | 18.28 | FO | 14.93 | 150 | | | PVC | 34.83096 | 1 in 151 |
| 0403 | | FO | 0 | 150 | | | VC | 6.371142 | |
| 0403 | | FO | 0 | 150 | | | VC | 6.371142 | |
| 0403 | | FO | 0 | 150 | | | VC | 6.371142 | |
| 9419 | | CO | | 150 | | | VC | 19.39855 | |
| 8703 | 19.22 | SW | 17.57 | 939 | | | CO | 20.38157 | 1 in 47 |
| 8702 | 19.06 | SW | 17.14 | 939 | | | CO | 47.10944 | 1 in 63 |
| 8612 | | FO | | 100 | | | PVC | 29.37902 | |
| 7826 | 18.55 | SW | 16.18 | 300 | | | PVC | 47.66317 | 1 in 59 |
| 8012 | 15.47 | SW | 13.94 | 225 | | | VC | 24.63564 | 1 in 224 |
| 9702 | 18.41 | SW | 16.64 | 939 | | | CO | 14.21687 | 1 in 118 |
| 9902 | 16.66 | SW | 14 | 375 | | | VC | 31.20672 | 1 in 120 |
| 6802 | 17.69 | FO | 15.89 | 225 | | | VC | 41.51911 | 1 in 58 |
| 5704 | | CO | | 100 | | | VC | 28.40424 | |
| 8706 | 19.22 | SW | 17.41 | 939 | | | CO | 26.52426 | 1 in 74 |
| 8804 | 18.61 | FO | 16.34 | 150 | | | PVC | 28.89978 | 1 in 152 |
| 7905 | 16.67 | FO | 14.64 | 225 | | | VC | 59.39046 | 1 in 205 |
| 9413 | | CO | | 0 | | | VC | 10.96608 | |
| 9705 | 18.44 | FO | 16.22 | 939 | | | CO | 13.91154 | 1 in 77 |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 9402 | 20.51 | FO | 15.56 | 300 | | | VC | 13.77808 | |
| 8605 | | FO | | 100 | | | VC | 16.07862 | |
| 8714 | | CO | | 100 | | | PP | 7.292731 | |
| 9906 | 15.3 | SW | 13.74 | 375 | | | VC | 15.02917 | 1 in 58 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 9502 | 19.73 | FO | 16.28 | 225 | | | VC | 40.04997 | 1 in 267 |
| 8007 | 15.71 | SW | 14.19 | 225 | | | VC | 26.91447 | 1 in 112 |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 7804 | 18.51 | FO | 16.36 | 225 | | | VC | 23.59751 | 1 in 103 |
| 7814 | | SW | | 300 | | | VC | 15.74499 | 1 in |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 0423 | | CO | | 100 | | | VC | 10.71548 | |
| 9805 | 18.08 | SW | 16.65 | 225 | | | PVC | 48.22357 | 1 in 172 |
| 8707 | 19.25 | FO | 0 | 939 | | | CO | 20.40091 | |
| 8005 | 15.75 | FO | 13.93 | 225 | | | VC | 37.21658 | 1 in 128 |
| 7702 | | SW | | 300 | | | VC | 48.61322 | 1 in |
| 4403 | | CO | | 150 | | | VC | 17.66487 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 0502 | | CO | | 150 | | | VC | 22.08449 | |
| 8808 | 18.29 | SW | 15.14 | 525 | | | CO | 29.75791 | 1 in 331 |
| 9802 | 18.04 | FO | 15.28 | 939 | | | CO | 85.15882 | 1 in 135 |
| 8004 | 15.78 | SW | 14.4 | 225 | | | VC | 27.0363 | 1 in 135 |
| 9615 | | SW | | 150 | | | VC | 7.160758 | |
| 9615 | | SW | | 150 | | | VC | 7.160758 | |
| 8910 | 18.24 | FO | 14.7 | 150 | | | PVC | 33.13602 | 1 in 95 |
| 7701 | | SW | | 300 | | | VC | 3.613108 | 1 in |

# LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

FO Foul
SW Surface Water
CO Combined
OV Overflow

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

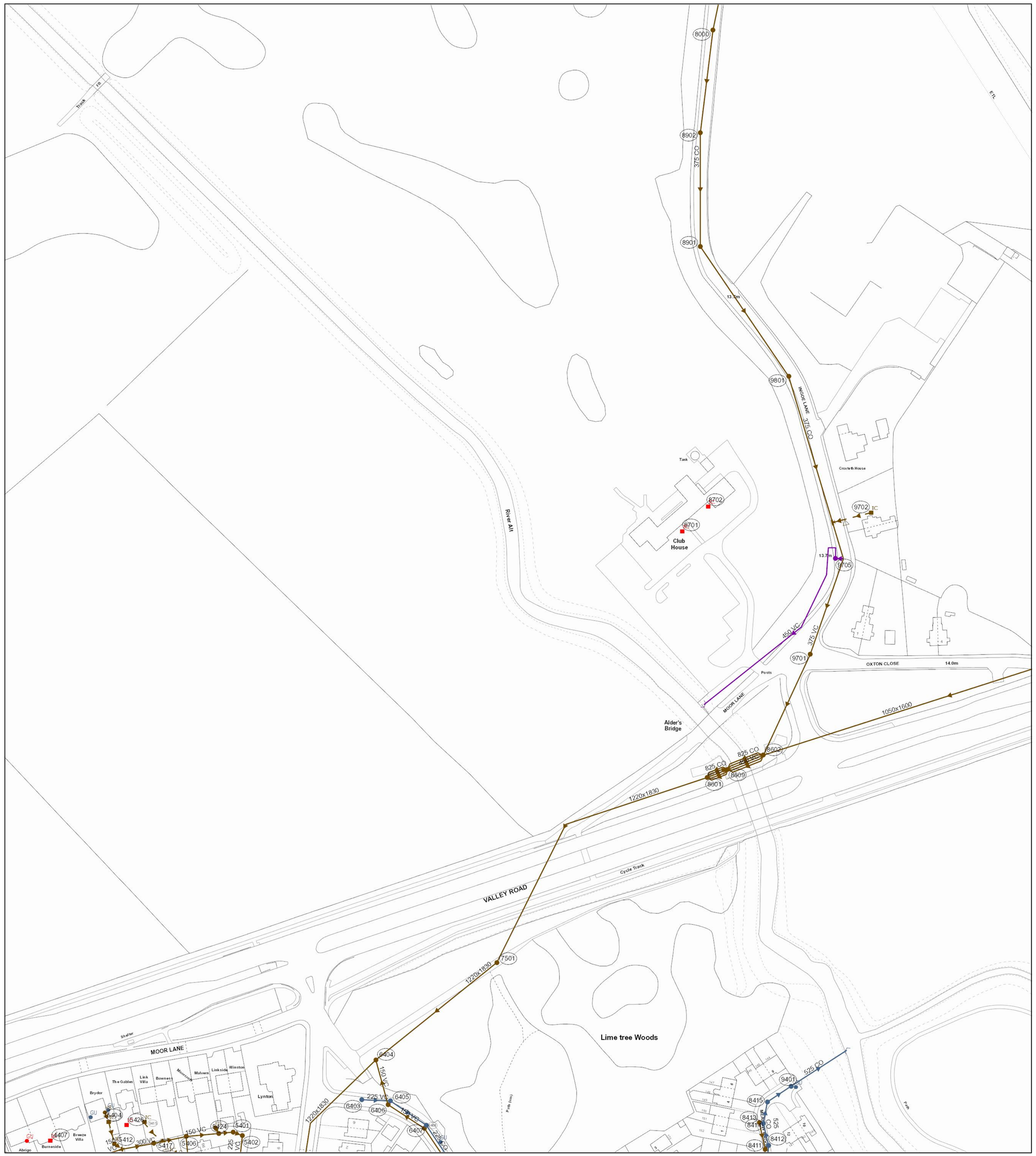
HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ3897NE
**Scale:** 1:1250 **Date:** 31/07/2019
**Nodes:** 221
**Sheet:** 6 of 9

**Printed by:** Property Searches

# SEWER RECORDS

United Utilities
helping life flow smoothly




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

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 5406 | 19.66 | FO | | 150 | | | VC | 8.091113 | |
| 5406 | 19.66 | FO | | 150 | | | VC | 8.091113 | |
| 8609 | | FO | | 825 | | | CO | 14.28059 | |
| 8609 | | FO | | 825 | | | CO | 14.10025 | |
| 8414 | 17.71 | SW | 12.84 | 525 | | | CO | 12.036 | 1 in 93 |
| 8414 | 17.71 | SW | 12.84 | 525 | | | CO | 12.036 | 1 in 93 |
| 9705 | | OV | 0 | 450 | | | VC | 126.2648 | |
| 8901 | 14.08 | FO | 11.91 | 375 | | | CO | 87.0919 | 1 in 335 |
| 8901 | 14.08 | FO | 11.91 | 375 | | | CO | 87.0919 | 1 in 335 |
| 7501 | 16.37 | FO | 9.6 | 1220 | | | BR | 86.18609 | 1 in 1724 |
| 7501 | 16.37 | FO | 9.6 | 1220 | | | BR | 86.18609 | 1 in 1724 |
| 8602 | 13.65 | FO | | 825 | | | CO | 23.61954 | |
| 8602 | 13.65 | FO | | 450 | | | VC | 22.08659 | |
| 8412 | 17.64 | SW | 13.91 | 525 | | | CO | 12.70254 | 1 in 12 |
| 8412 | 17.64 | SW | 13.91 | 525 | | | CO | 12.70254 | 1 in 12 |
| 5410 | | FO | 0 | 150 | | | VC | 24.62195 | |
| 8000 | 16.02 | FO | 12.37 | 375 | | | CO | 57.42822 | 1 in 185 |
| 8000 | 16.02 | FO | 12.37 | 375 | | | CO | 57.42822 | 1 in 185 |
| 6404 | 18.16 | FO | 9.55 | 1220 | | | BR | 140.4339 | 1 in 1170 |
| 6404 | 18.16 | FO | 9.55 | 1220 | | | BR | 140.4339 | 1 in 1170 |
| 6408 | 18.54 | FO | 12.57 | 150 | | | VC | 24.15855 | 1 in 69 |
| 6408 | 18.54 | FO | 12.57 | 150 | | | VC | 24.15855 | 1 in 69 |
| 8415 | 17.77 | SW | 12.71 | 525 | | | CO | 15.7563 | 1 in 315 |
| 8415 | 17.77 | SW | 12.71 | 525 | | | CO | 15.7563 | 1 in 315 |
| 8602 | 13.65 | FO | | 825 | | | CO | 23.48585 | |
| 8411 | 17.63 | FO | 15.71 | 150 | | | VC | 16.37448 | 1 in 164 |
| 8411 | 17.63 | FO | 15.71 | 150 | | | VC | 16.37448 | 1 in 164 |
| 8609 | | FO | | 450 | | | VC | 12.62752 | |
| 0701 | 14.2 | FO | 10.66 | 1050 | | | BR | 216.2997 | 1 in 865 |
| 5417 | | FO | | 300 | | | VC | 18.37557 | |
| 5417 | | FO | | 300 | | | VC | 18.37557 | |
| 9401 | 17.61 | SW | 12.66 | 525 | | | CO | 36.79497 | 1 in 26 |
| 9401 | 17.61 | SW | 12.66 | 525 | | | CO | 36.79497 | 1 in 26 |
| 6407 | 18.46 | SW | 16.05 | 225 | | | CO | 59.89844 | 1 in 107 |
| 6407 | 18.46 | SW | 16.05 | 225 | | | CO | 59.89844 | 1 in 107 |
| 4401 | 20.39 | FO | 19.19 | 150 | | | VC | 62.99297 | 1 in 95 |
| 4401 | 20.39 | FO | 19.19 | 150 | | | VC | 62.99297 | 1 in 95 |
| 7307 | 18.72 | FO | 12.84 | 150 | | | VC | 60.16059 | 1 in 223 |
| 8609 | | FO | | 450 | | | VC | 12.52655 | |
| 9701 | | FO | 0 | 375 | | | VC | 61.7414 | |
| 5402 | | FO | 0 | 225 | | | VC | 74.43118 | |
| 5402 | | FO | 0 | 225 | | | VC | 74.43118 | |
| 8413 | 17.73 | FO | 15.94 | 150 | | | VC | 15.01837 | 1 in 65 |
| 8413 | 17.73 | FO | 15.94 | 150 | | | VC | 15.01837 | 1 in 65 |
| 9801 | 13.8 | FO | 11.65 | 375 | | | CO | 105.518 | 1 in 310 |
| 8410 | 17.57 | SW | 14.19 | 525 | | | CO | 17.32754 | 1 in 62 |
| 8602 | 13.65 | FO | | 450 | | | VC | 22.10023 | |
| 6403 | 17.98 | SW | 16.37 | 225 | | | VC | 15.9296 | 1 in 145 |
| 6403 | 17.98 | SW | 16.37 | 225 | | | VC | 15.9296 | 1 in 145 |
| 8101 | 16.81 | FO | 12.67 | 375 | | | CO | 68.44706 | 1 in 228 |
| 5401 | 19.51 | FO | 17.65 | 225 | | | VC | 5.385165 | |
| 5401 | 19.51 | FO | 17.65 | 225 | | | VC | 5.385165 | |
| 8601 | 13.42 | FO | 9.7 | 1220 | | | BR | 168.2788 | 1 in 1683 |
| 5406 | 19.66 | FO | 18.14 | 150 | | | VC | 18.21965 | |
| 5406 | 19.66 | FO | 18.14 | 150 | | | VC | 18.21965 | |
| 6405 | 18.14 | SW | 16.26 | 225 | | | VC | 23.91133 | 1 in 114 |
| 6405 | 18.14 | SW | 16.26 | 225 | | | VC | 23.91133 | 1 in 114 |
| 8609 | | FO | | 375 | | | VC | 11.96892 | |
| 6406 | 18.18 | FO | 12.22 | 150 | | | VC | 25.69859 | 1 in 15 |
| 6406 | 18.18 | FO | 12.22 | 150 | | | VC | 25.69859 | 1 in 15 |
| 8602 | 13.65 | FO | | 375 | | | VC | 21.54066 | |
| 8902 | 14.29 | FO | 12.06 | 375 | | | CO | 63 | 1 in 420 |
| 8902 | 14.29 | FO | 12.06 | 375 | | | CO | 63 | 1 in 420 |

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

# LEGEND

Abandoned
Foul
Surface Water
Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

**All point assets follow the standard colour convention:**

red - combined  blue - surface water
brown - foul  purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

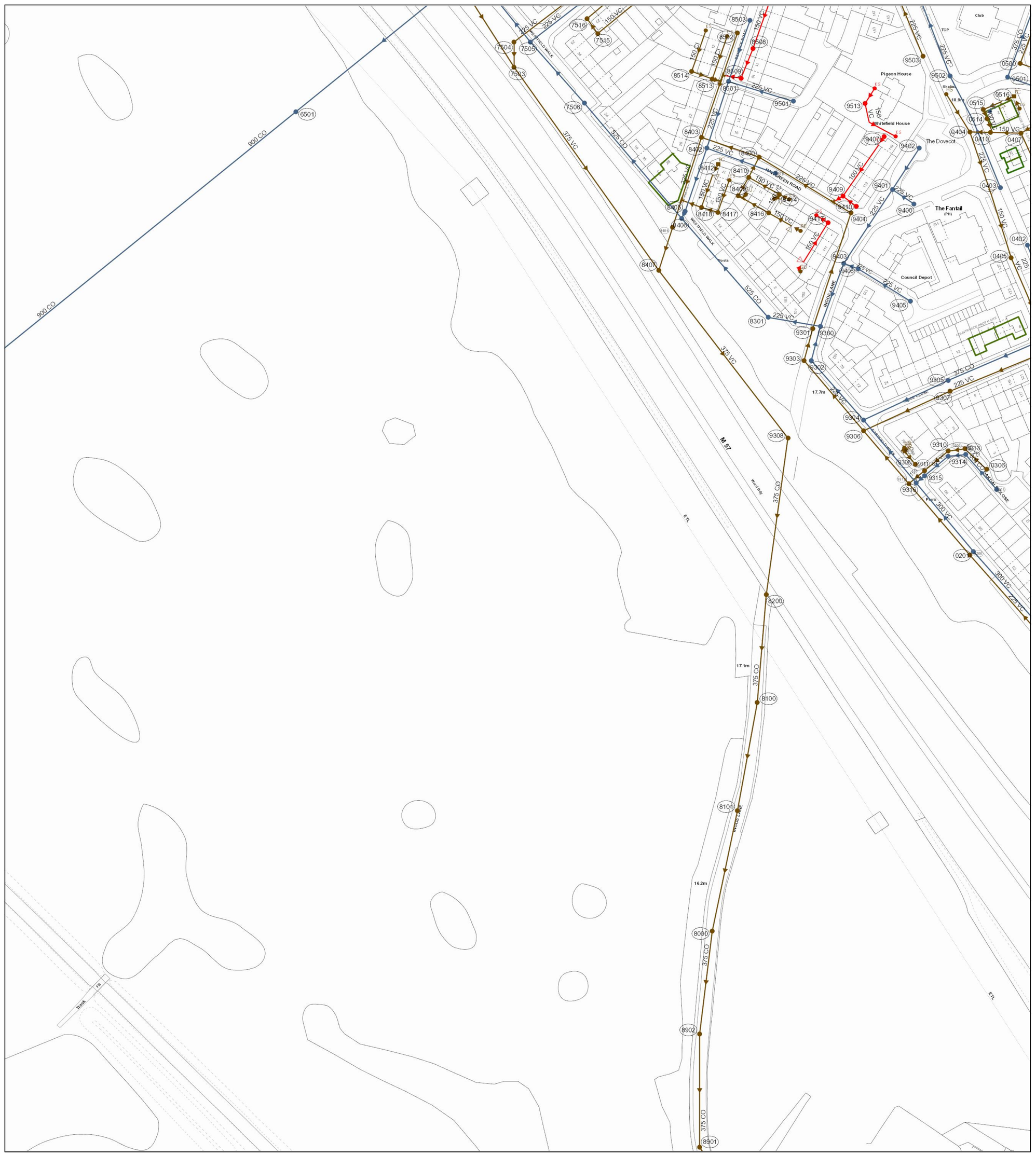
HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ3997NE
**Scale:** 1:1250  **Date:** 31/07/2019
**Nodes:** 63
**Sheet:** 7 of 9

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
helping life flow smoothly




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

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| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 0101 | 18.69 | FO | 0 | 225 | | | VC | 92.09777 | |
| 6501 | | SW | 0 | 900 | | | CO | 426.2905 | |
| 8509 | | CO | | 150 | | | VC | 10.22339 | |
| 0514 | | FO | | 100 | | | VC | 8.113119 | |
| 0514 | | FO | | 100 | | | VC | 8.113119 | |
| 0507 | | SW | 17.62 | 375 | | | CO | 56.86266 | |
| 9305 | 18.14 | SW | 16.4 | 375 | | | CO | 51.89412 | |
| 9305 | 18.14 | SW | 16.4 | 375 | | | CO | 51.89412 | |
| 9503 | 18.83 | FO | 0 | 225 | | | VC | 52 | |
| 9503 | 18.83 | FO | 0 | 225 | | | VC | 52 | |
| 7506 | 16.84 | SW | 13.79 | 525 | | | CO | 45.34314 | 1 in 206 |
| 0206 | | SW | 0 | 600 | | | CO | 25.98385 | |
| 0206 | | SW | 0 | 600 | | | CO | 25.98385 | |
| 9400 | 18.5 | SW | 16.58 | 225 | | | VC | 14.4222 | |
| 9400 | 18.5 | SW | 16.58 | 225 | | | VC | 14.4222 | |
| 8418 | | FO | | 150 | | | VC | 11.83688 | |
| 8410 | | FO | | 150 | | | VC | 12.58507 | |
| 8100 | 17.44 | FO | 12.9 | 375 | | | CO | 61 | 1 in 265 |
| 9404 | 18.23 | FO | 16.2 | 225 | | | VC | 59.68365 | 1 in 298 |
| 0402 | 19.26 | SW | 0 | 375 | | | VC | 51.62364 | |
| 0402 | 19.26 | SW | 0 | 375 | | | VC | 51.62364 | |
| 9315 | | SW | 0 | 150 | | | VC | 6.043146 | |
| 9315 | | SW | 0 | 150 | | | VC | 6.043146 | |
| 0500 | 18.94 | FO | 0 | 225 | | | VC | 40.49691 | |
| 0500 | 18.94 | FO | 0 | 225 | | | VC | 40.49691 | |
| 0306 | | FO | 0 | 150 | | | VC | 16.59257 | |
| 0306 | | FO | 0 | 150 | | | VC | 16.59257 | |
| 8101 | 16.81 | FO | 12.67 | 375 | | | CO | 68.44706 | 1 in 228 |
| 8502 | 17.81 | FO | 15.83 | 225 | | | VC | 61.35145 | 1 in 6135 |
| 8402 | 17.48 | SW | 15.9 | 225 | | | VC | 37 | 1 in 103 |
| 8417 | | FO | | 150 | | | VC | 9.492887 | |
| 8508 | | CO | | 150 | | | VC | 17.64671 | |
| 8409 | | FO | | 150 | | | VC | 11.76333 | |
| 8200 | | FO | 0 | 375 | | | CO | 60.20797 | |
| 7505 | 16.82 | SW | 13.54 | 525 | | | CO | 25.6125 | 1 in 171 |
| 9405 | 18.4 | SW | 16.96 | 225 | | | VC | 34.1321 | 1 in 88 |
| 9405 | 18.4 | SW | 16.96 | 225 | | | VC | 34.1321 | 1 in 88 |
| 9501 | | SW | 0 | 225 | | | VC | 37.64306 | |
| 9401 | 18.42 | SW | 0 | 225 | | | VC | 49.09175 | |
| 0201 | 18.82 | SW | 15.6 | 300 | | | VC | 49.52304 | |
| 0201 | 18.82 | SW | 15.6 | 300 | | | VC | 49.52304 | |
| 9309 | | FO | 0 | 150 | | | VC | 9.378772 | |
| 9309 | | FO | 0 | 150 | | | VC | 9.378772 | |
| 9301 | | FO | 0 | 225 | | | VC | 67.77612 | |
| 9310 | | FO | 0 | 150 | | | VC | 17.04485 | |
| 9310 | | FO | 0 | 150 | | | VC | 17.04485 | |
| 9308 | | FO | 0 | 375 | | | CO | 87.82368 | |
| 8406 | 17.34 | SW | 0 | 525 | | | CO | 83.73769 | |
| 0200 | 18.81 | FO | 15.08 | 225 | | | VC | 52.11584 | |
| 0200 | 18.81 | FO | 15.08 | 225 | | | VC | 52.11584 | |
| 8514 | | FO | | 150 | | | CI | 12.18866 | |
| 9502 | 19.03 | SW | 16.92 | 225 | | | VC | 61.09828 | 1 in 255 |
| 9502 | 19.03 | SW | 16.92 | 225 | | | VC | 61.09828 | 1 in 255 |
| 9302 | | SW | 0 | 375 | | | CO | 19.64688 | |
| 0407 | | FO | | 150 | | | VC | 16.96986 | |
| 0407 | | FO | | 150 | | | VC | 16.96986 | |
| 9304 | | SW | 0 | 375 | | | CO | 43.93177 | |
| 9316 | | SW | 0 | 300 | | | VC | 45.60844 | |
| 9316 | | SW | 0 | 300 | | | VC | 45.60844 | |
| 9303 | 17.66 | SW | 0 | 225 | | | VC | 18.26938 | |
| 0100 | 18.59 | SW | 16.16 | 300 | | | VC | 96.33276 | 1 in 175 |
| 8901 | 14.08 | FO | 11.91 | 375 | | | CO | 87.0919 | 1 in 335 |
| 8901 | 14.08 | FO | 11.91 | 375 | | | CO | 87.0919 | 1 in 335 |
| 8407 | 17 | FO | 13.66 | 375 | | | VC | 117.4637 | |
| 8000 | 16.02 | FO | 12.37 | 375 | | | CO | 57.42822 | 1 in 185 |
| 8000 | 16.02 | FO | 12.37 | 375 | | | CO | 57.42822 | 1 in 185 |
| 7515 | | FO | | 150 | | | VC | 10.15826 | |
| 0404 | 19 | FO | 16.85 | 225 | | | VC | 37 | |
| 0404 | 19 | FO | 16.85 | 225 | | | VC | 37 | |
| 9417 | | CO | | 150 | | | VC | 7.637989 | |
| 9406 | 17.98 | SW | 16.55 | 225 | | | VC | 8.544003 | |
| 9311 | | FO | 0 | 150 | | | VC | 11.32768 | |
| 9311 | | FO | 0 | 150 | | | VC | 11.32768 | |
| 8503 | 17.65 | SW | 16.32 | 225 | | | VC | 36.05551 | 1 in 240 |
| 0515 | | FO | | 100 | | | VC | 5.577366 | |
| 0515 | | FO | | 100 | | | VC | 5.577366 | |
| 0403 | 19.22 | SW | 17.32 | 225 | | | VC | 68.10294 | 1 in 175 |
| 0403 | 19.22 | SW | 17.32 | 225 | | | VC | 68.10294 | 1 in 175 |
| 9403 | 17.98 | SW | 0 | 225 | | | VC | 37.33631 | |
| 9513 | | CO | | 150 | | | VC | 27.38451 | |
| 0509 | | FO | 0 | 225 | | | VC | 58.8517 | |
| 9314 | | SW | 0 | 600 | | | VC | 17.07885 | |
| 9314 | | SW | 0 | 600 | | | VC | 17.07885 | |
| 8400 | 17.79 | FO | 0 | 225 | | | VC | 33.83785 | |
| 0302 | 19.06 | SW | 0 | 375 | | | CO | 68.54196 | |
| 0511 | | FO | | 150 | | | VC | 7.5449 | |
| 8403 | 17.55 | FO | 15.72 | 225 | | | VC | 52.49762 | 1 in 262 |
| 8513 | | FO | | 150 | | | CI | 4.879072 | |
| 9312 | | FO | 0 | 225 | | | VC | 38.66962 | |
| 9312 | | FO | 0 | 225 | | | VC | 38.66962 | |
| 9402 | 18.57 | SW | 16.67 | 225 | | | VC | 27.45906 | |
| 9402 | 18.57 | SW | 16.67 | 225 | | | VC | 27.45906 | |
| 9306 | 17.94 | FO | 14.55 | 225 | | | VC | 51.08816 | |
| 9307 | 18.28 | FO | 15.6 | 225 | | | VC | 52.80151 | 1 in 52 |
| 9307 | 18.28 | FO | 15.6 | 225 | | | VC | 52.80151 | 1 in 52 |
| 8501 | 17.67 | SW | 16.15 | 225 | | | VC | 38.8973 | 1 in 169 |
| 9409 | | CO | | 100 | | | VC | 6.345841 | |
| 9410 | | CO | | 100 | | | VC | 9.464212 | |
| 0501 | 18.99 | SW | 0 | 375 | | | CO | 48.61557 | |
| 0501 | 18.99 | SW | 0 | 375 | | | CO | 48.61557 | |
| 8301 | 17.5 | SW | 0 | 525 | | | CO | 73 | |
| 8416 | | FO | | 150 | | | VC | 19.32677 | |
| 8401 | 17.72 | SW | 16.21 | 225 | | | VC | 40.49691 | 1 in 135 |
| 8405 | 17.19 | SW | 15.42 | 225 | | | VC | 4.472136 | |
| 7504 | | FO | 0 | 225 | | | VC | 14 | |
| 0410 | | FO | | 150 | | | VC | 11.46373 | |
| 0410 | | FO | | 150 | | | VC | 11.46373 | |
| 9313 | | SW | 0 | 600 | | | CO | 9.751273 | |
| 9313 | | SW | 0 | 600 | | | CO | 9.751273 | |
| 0405 | 19.25 | FO | 17 | 225 | | | VC | 55.54278 | 1 in 105 |
| 0405 | 19.25 | FO | 17 | 225 | | | VC | 55.54278 | 1 in 105 |
| 8414 | | FO | | 150 | | | VC | 19.51754 | |
| 7503 | 16.65 | FO | 13.94 | 375 | | | VC | 138.5905 | 1 in 495 |
| 9300 | 17.74 | SW | 0 | 225 | | | VC | 29.42788 | |
| 8404 | 17.35 | FO | 0 | 225 | | | VC | 25.14614 | |
| 8902 | 14.29 | FO | 12.06 | 375 | | | CO | 63 | 1 in 420 |
| 8902 | 14.29 | FO | 12.06 | 375 | | | CO | 63 | 1 in 420 |
| 0303 | 18.97 | FO | 16.42 | 225 | | | VC | 60.53924 | 1 in 78 |

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

# LEGEND

Abandoned
Foul
Surface Water
Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
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- Summit
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- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
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- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

**MANHOLE FUNCTION**

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

**SEWER SHAPE**

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

**SEWER MATERIAL**

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

**Address or Site Reference:**

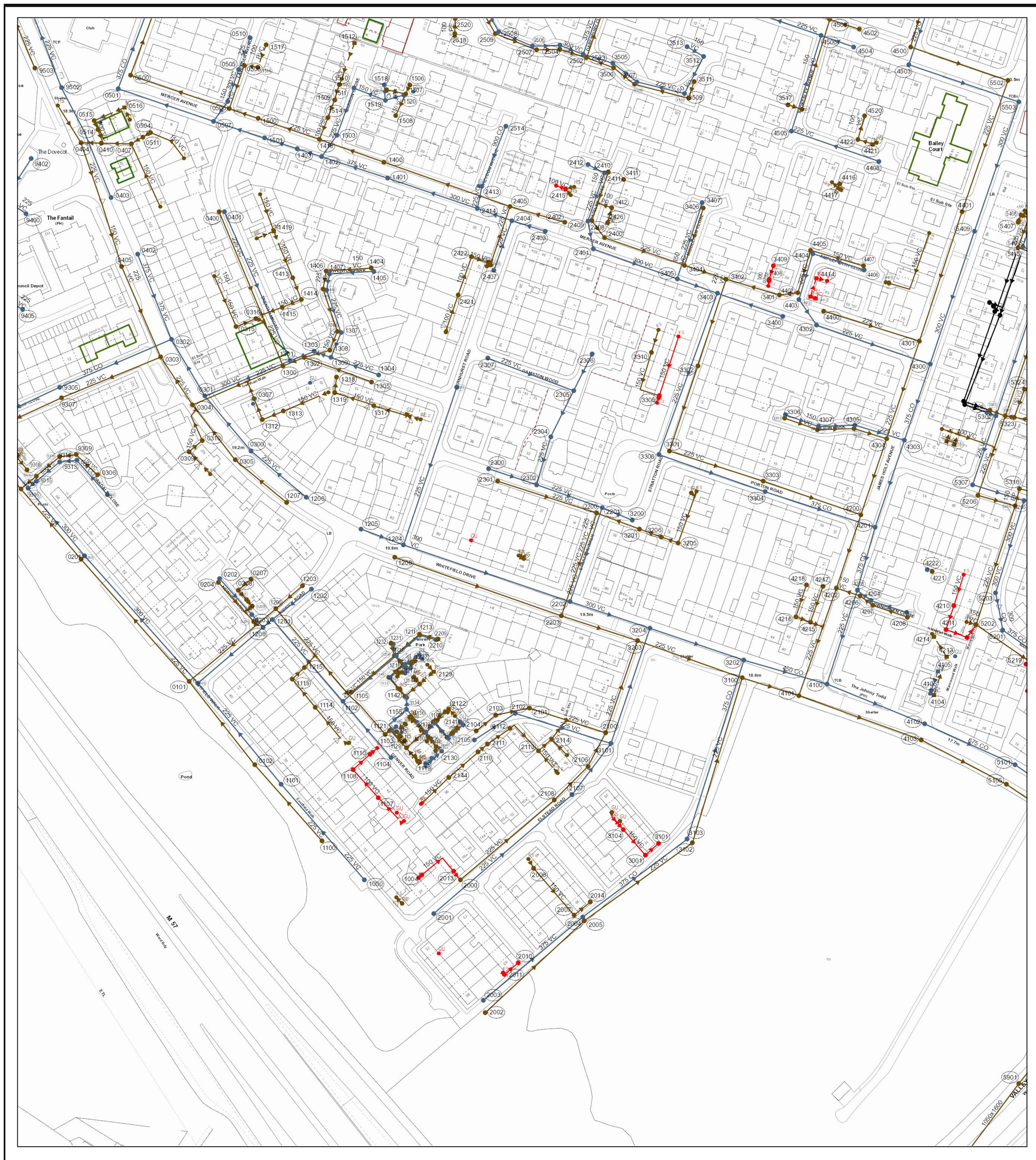
HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ3998SE
**Scale:** 1:1250 **Date:** 31/07/2019
**Nodes:** 118
**Sheet:** 8 of 9

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities
helping life flow smoothly




| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 1153 | | FO | | 0 | | | UN | 2.013427 | |
| 1502 | 20.98 | SW | 19.13 | 225 | | | VC | 28.21424 | 1 in 66 |
| 3511 | 22.17 | FO | 20.53 | 150 | | | VC | 9.943239 | 1 in 110 |
| 9305 | 18.14 | SW | 16.4 | 375 | | | CO | 51.89412 | |
| 9305 | 18.14 | SW | 16.4 | 375 | | | CO | 51.89412 | |
| 1402 | 20.5 | SW | 17.99 | 375 | | | VC | 14.54518 | 20.5 |
| 9400 | 18.5 | SW | 16.58 | 225 | | | VC | 14.4222 | |
| 9400 | 18.5 | SW | 16.58 | 225 | | | VC | 14.4222 | |
| 2504 | 22.03 | SW | 20.44 | 300 | | | VC | 14.04902 | 1 in 176 |
| 1104 | 19.3 | SW | 17.67 | 225 | | | VC | 41.642 | 19.3 |
| 4302 | 20.52 | SW | 18.8 | 225 | | | VC | 67.6757 | 1 in 141 |
| 2502 | 22.02 | SW | 20.32 | 375 | | | VC | 48.19424 | 1 in 161 |
| 4306 | 20.48 | FO | 18.35 | 150 | | | VC | 20.69323 | 1 in 74 |
| 3104 | | CO | | 150 | | | VC | 19.08839 | |
| 3101 | 19.49 | FO | 17.19 | 225 | | | VC | 45.22168 | 1 in 146 |
| 2402 | 20.69 | FO | 0 | 225 | | | VC | 32.28003 | |
| 1103 | 19.31 | FO | 17.15 | 225 | | | VC | 33.99535 | 1 in 177 |
| 3309 | | CO | | 150 | | | VC | 1.197858 | |
| 4402 | 20.51 | FO | 18.65 | 150 | | | VC | 15.54545 | 1 in 117 |
| 2506 | 21.92 | SW | 20.55 | 300 | | | VC | 15.57827 | 1 in 142 |
| 1142 | | FO | | 0 | | | UN | 14.15104 | |
| 1232 | | FO | | 0 | | | UN | 7.320569 | |
| 2007 | | FO | | 150 | | | VC | 11.72824 | |
| 2007 | | FO | | 150 | | | VC | 11.72824 | |
| 1401 | 21.02 | SW | 18.35 | 375 | | | VC | 39.13205 | 1 in 109 |
| 3402 | 20.79 | FO | 0 | 225 | | | VC | 51.5461 | |
| 4101 | 18.33 | FO | 14.81 | 225 | | | VC | 73.38937 | |
| 4309 | 20.46 | SW | 18.19 | 375 | | | CO | 45.31562 | 1 in 78 |
| 1415 | | FO | | 150 | | | VC | 12.16044 | |
| 4403 | 20.44 | SW | 18.92 | 225 | | | VC | 17.56783 | 1 in 251 |
| 1102 | 18.95 | FO | 0 | 225 | | | VC | 60.98309 | |
| 2104 | 19.61 | FO | 17.35 | 225 | | | VC | 14.21267 | 1 in 237 |
| 9502 | 19.03 | SW | 16.92 | 225 | | | VC | 61.09828 | 1 in 255 |
| 9502 | 19.03 | SW | 16.92 | 225 | | | VC | 61.09828 | 1 in 255 |
| 1205 | 19.55 | SW | 0 | 225 | | | VC | 25.63201 | 19.55 |
| 2422 | | FO | | 150 | | | VC | 0.866335 | |
| 1201 | 19.42 | FO | 0 | 225 | | | VC | 40.49986 | |
| 1201 | 18.99 | SW | 0 | 225 | | | VC | 6.840902 | |
| 1305 | 20.52 | FO | 18.48 | 225 | | | VC | 40.38182 | 1 in 46 |
| 1305 | 19.28 | FO | 16.95 | 225 | | | VC | 39.20459 | 1 in 123 |
| 4306 | 20.01 | FO | 18.07 | 150 | | | VC | 19.27453 | 1 in 26 |
| 1406 | 20.58 | FO | 19.2 | 150 | | | VC | 25.08279 | 1 in 114 |
| 1409 | 20.48 | SW | 19.03 | 225 | | | VC | 25.3004 | 1 in 120 |
| 3509 | 22.08 | SW | 20.81 | 225 | | | VC | 27.54458 | 1 in 125 |
| 2210 | | FO | | 0 | | | UN | 10.76778 | |
| 0404 | 19 | FO | 16.85 | 225 | | | VC | 37 | |
| 0404 | 19 | FO | 16.85 | 225 | | | VC | 37 | |
| 4407 | 21.35 | FO | 19.24 | 150 | | | VC | 31.10838 | 1 in 89 |
| 1306 | 20.44 | FO | 18.98 | 150 | | | VC | 11.52553 | 1 in 40 |
| 4405 | 21.19 | FO | 18.88 | 150 | | | VC | 25.007 | 1 in 109 |
| 2301 | 20.18 | FO | 18.19 | 225 | | | VC | 58.82177 | 1 in 95 |
| 2110 | | FO | | 0 | | | VC | 7.00199 | |
| 1108 | | FO | | 100 | | | VC | 13.01272 | |
| 1404 | 20.92 | FO | 19.55 | 150 | | | VC | 25.32404 | 1 in 97 |
| 2001 | 18.87 | SW | 17.49 | 225 | | | VC | 102.8251 | 1 in 219 |
| 2001 | 18.87 | SW | 17.49 | 225 | | | VC | 102.8251 | 1 in 219 |
| 1303 | 20.12 | SW | 17.99 | 225 | | | VC | 14.5752 | |
| 0909 | | FO | | 0 | | | VC | 58.8517 | |
| 2133 | | SW | | 0 | | | UN | 7.366146 | |
| 5901 | 16.05 | FO | 11.22 | 1050 | | | BR | 134.9978 | 1 in 900 |
| 5901 | 16.05 | FO | 11.22 | 1050 | | | BR | 134.9978 | 1 in 900 |
| 4409 | | FO | | 150 | | | VC | 1.834444 | |
| 9312 | | FO | 0 | 225 | | | VC | 38.66962 | |
| 9312 | | FO | 0 | 225 | | | VC | 38.66962 | |
| 2003 | 18.18 | SW | 0 | 375 | | | VC | 73.1095 | |
| 2003 | 18.18 | SW | 0 | 375 | | | VC | 73.1095 | |
| 0209 | | FO | | 100 | | | VC | 5.234568 | |
| 4400 | 20.4 | FO | 18.28 | 225 | | | VC | 56.61272 | |
| 4202 | 22.04 | FO | 16.33 | 225 | | | VC | 64.26118 | 18.64 |
| 4505 | 22.76 | SW | 21.46 | 225 | | | VC | 56.36341 | 1 in 91 |
| 3510 | 22.03 | FO | 20.44 | 150 | | | VC | 31.5998 | 1 in 144 |
| 3302 | 20.38 | FO | 17.74 | 225 | | | VC | 50.59644 | 1 in 163 |
| 4503 | | FO | | 100 | | | VC | 13.79682 | |
| 2303 | 20.77 | SW | 19.17 | 225 | | | VC | 93.92018 | 1 in 72 |
| 3303 | 19.42 | FO | 17.07 | 225 | | | VC | 58.18935 | 1 in 162 |
| 0509 | | FO | | 300 | | | VC | 13.66445 | |
| 1507 | | FO | | 150 | | | VC | 13.43119 | |
| 5205 | 19.5 | SW | 17.34 | 300 | | | VC | 54.40588 | 1 in 42 |
| 1400 | 20.95 | FO | 17.97 | 225 | | | VC | 38.6817 | |
| 2412 | 20.76 | SW | 19.42 | 225 | | | VC | 10.44264 | 1 in 75 |
| 1200 | 19.09 | FO | 16.57 | 225 | | | VC | 63.89053 | 1 in 290 |
| 1000 | 18.64 | SW | 17.28 | 225 | | | VC | 71.5891 | |
| 2409 | 20.51 | SW | 18.99 | 225 | | | VC | 15.98182 | 1 in 123 |
| 2411 | 20.83 | SW | 19.28 | 225 | | | VC | 28.73112 | 1 in 106 |
| 2408 | 20.54 | FO | 18.53 | 150 | | | VC | 12.06409 | 1 in 57 |
| 1204 | 19.68 | SW | 17.8 | 300 | | | VC | 99.29753 | 1 in 301 |
| 2403 | 20.77 | SW | 0 | 300 | | | VC | 19.92486 | |
| 1313 | | FO | | 150 | | | VC | 12.81414 | |
| 4207 | 18.38 | FO | 16.93 | 150 | | | VC | 8.890022 | 1 in 23 |
| 0510 | | SW | | 225 | | | | 19.00853 | |
| 1154 | | SW | | 0 | | | UN | 14.70551 | |
| 0504 | | FO | | 150 | | | VC | 4.987774 | |
| 5502 | | FO | 0 | 225 | | | VC | 78.43554 | |
| 4301 | 20.43 | SW | 18.67 | 225 | | | VC | 20.51011 | 1 in 82 |
| 3507 | 21.92 | SW | 20.59 | 300 | | | VC | 17.1256 | 1 in 143 |
| 2006 | | FO | | 150 | | | VC | 34.92025 | |
| 2421 | | FO | | 100 | | | VC | 22.85014 | |
| 0307 | | FO | | 150 | | | VC | 10.42618 | |
| 1410 | | FO | 0 | 225 | | | VC | 36.47485 | |
| 1410 | | FO | 0 | 225 | | | VC | 58.18935 | |
| 5316 | | FO | | 100 | | | PP | 16.90009 | |
| 4502 | 23.03 | FO | 20.49 | 225 | | | VC | 17.44629 | 1 in 103 |
| 3304 | 19.28 | SW | 0 | 375 | | | CO | 65.14599 | |
| 1407 | 20.58 | FO | 19.09 | 225 | | | VC | 0.299949 | 1 in 155 |
| 1143 | | FO | | 100 | | | UN | 10.76773 | |
| 9405 | 18.4 | SW | 16.96 | 225 | | | VC | 34.1321 | 1 in 88 |
| 9405 | 18.4 | SW | 16.96 | 225 | | | VC | 34.1321 | 1 in 88 |
| 9309 | | FO | 0 | 150 | | | VC | 9.378772 | |
| 9309 | | FO | 0 | 150 | | | VC | 9.378772 | |
| 5324 | | FO | | 150 | | | VC | 16.91735 | |
| 1301 | 20.28 | SW | 0 | 300 | | | VC | 52 | |
| 9310 | | FO | 0 | 150 | | | VC | 17.04485 | |
| 9310 | | FO | 0 | 150 | | | VC | 17.04485 | |
| 1514 | | FO | | 100 | | | PSC | 13.26945 | |
| 0202 | | SW | 0 | 225 | | | VC | 27.32517 | |
| 1212 | 19.35 | SW | 17.9 | 225 | | | VC | 39.60245 | 1 in 66 |
| 2005 | 18.26 | FO | 15.94 | 225 | | | VC | 75.21303 | |
| 2005 | 18.26 | FO | 15.94 | 225 | | | VC | 75.21303 | 18.26 |
| 2413 | 21.06 | SW | 18.98 | 225 | | | VC | 12.75943 | 1 in 142 |
| 2108 | 19.47 | FO | 16.83 | 225 | | | VC | 26.87006 | 1 in 537 |
| 3405 | 20.82 | SW | 18.61 | 300 | | | VC | 24.09003 | |
| 3101 | | CO | | 150 | | | VC | 10.98586 | |
| 2011 | | CO | | 150 | | | VC | 10.98586 | |
| 1207 | 19.38 | FO | 0 | 225 | | | VC | 37.64306 | |
| 3102 | | FO | 0 | 225 | | | VC | 97.12363 | |
| 2400 | 20.62 | FO | 18.31 | 225 | | | VC | 47.79844 | 1 in 184 |
| 1307 | 20.43 | SW | 18.82 | 225 | | | VC | 15.10865 | 1 in 29 |
| 0407 | | FO | | 150 | | | VC | 16.96986 | |
| 0407 | | FO | | 150 | | | VC | 16.96986 | |
| 3310 | | FO | | 150 | | | VC | 33.2211 | |
| 9316 | | SW | 0 | 300 | | | VC | 45.60844 | |
| 9316 | | SW | 0 | 300 | | | VC | 45.60844 | |
| 2209 | | SW | | 0 | | | UN | 9.459296 | |
| 1211 | 20.1 | FO | 18.45 | 225 | | | VC | 17.61868 | 1 in 50 |
| 5105 | | FO | 0 | 225 | | | VC | 66.28725 | |
| 3201 | 19.93 | SW | 17.68 | 225 | | | VC | 25.63201 | 1 in 160 |
| 1155 | | SW | | 0 | | | UN | 6.597276 | |
| 3100 | 18.63 | FO | 0 | 225 | | | VC | 33.52611 | |
| 1114 | | FO | | 150 | | | VC | 20.37773 | |
| 9311 | | FO | 0 | 150 | | | VC | 11.32768 | |
| 9311 | | FO | 0 | 150 | | | VC | 11.32768 | |
| 5206 | 19.44 | FO | 16.99 | 225 | | | VC | 21.84033 | 1 in 137 |
| 1414 | | FO | | 150 | | | VC | 11.67436 | |
| 1156 | | SW | | 0 | | | UN | 16.87407 | |
| 4205 | 18.22 | SW | 17.26 | 225 | | | VC | 21.143 | 1 in 163 |
| 1130 | | FO | | 0 | | | UN | 13.53476 | |
| 3400 | 20.66 | SW | 18.77 | 225 | | | VC | 39.21734 | |
| 1510 | | FO | | 100 | | | PSC | 8.892412 | |
| 1227 | | FO | | 0 | | | UN | 5.399405 | |
| 2111 | | FO | | 0 | | | VC | 15.45494 | |
| 1403 | 20.28 | SW | 0 | 375 | | | CO | 19.35118 | |
| 0505 | | SW | | 300 | | | VC | 19.20266 | |
| 2414 | 21.03 | SW | 18.82 | 300 | | | VC | 53.45624 | 1 in 144 |
| 4406 | 21.39 | SW | 19.68 | 225 | | | VC | 30.51405 | 1 in 74 |
| 3204 | 19.15 | SW | 16.5 | 375 | | | CO | 55.97321 | 1 in 175 |
| 1208 | 19.72 | FO | 0 | 225 | | | VC | 99.62429 | |
| 3203 | 19.07 | FO | 15.99 | 225 | | | VC | 62.62587 | |
| 2200 | 19.91 | FO | 17.52 | 225 | | | VC | 61.38145 | 1 in 92 |
| 1216 | | SW | | 100 | | | UN | 6.924065 | |
| 2410 | 20.87 | FO | 18.98 | 150 | | | VC | 28.91838 | 1 in 69 |
| 1214 | 19.3 | FO | 17.6 | 150 | | | VC | 31.61762 | 1 in 57 |
| 2106 | 19.38 | FO | 16.75 | 225 | | | VC | 21.47091 | 1 in 358 |
| 5302 | 20.35 | SW | 18.46 | 225 | | | VC | 41.07877 | 1 in 46 |
| 4206 | 18.48 | FO | 16.54 | 150 | | | VC | 14.05954 | 1 in 67 |
| 2518 | | FO | | 100 | | | PE | 8.434606 | |
| 4506 | 22.63 | SW | 20.82 | 225 | | | VC | 50.36296 | 1 in 201 |
| 2103 | 19.48 | FO | 17.27 | 225 | | | VC | 19.41549 | 1 in 216 |
| 4210 | | CO | | 150 | | | VC | 14.12785 | |
| 3508 | 21.9 | FO | 20.22 | 150 | | | VC | 15.0446 | 1 in 137 |
| 1304 | 20.44 | SW | 0 | 225 | | | VC | 28.74632 | |
| 2102 | 19.4 | SW | 17.69 | 225 | | | VC | 56.61272 | 1 in 177 |
| 4303 | 19.68 | SW | 17.61 | 375 | | | CO | 51.76683 | |
| 1217 | | FO | | 100 | | | UN | 5.964092 | |
| 1516 | | FO | | 100 | | | PVC | 7.760666 | |
| 5204 | 19.38 | FO | 16.81 | 225 | | | VC | 70.5195 | 1 in 50 |
| 3407 | 21.02 | SW | 19.42 | 225 | | | VC | 45.18977 | 1 in 56 |
| 4203 | 18.5 | SW | 16.73 | 225 | | | VC | 55.4964 | 18.5 |
| 2505 | 22.03 | FO | 20.12 | 150 | | | VC | 15.92188 | 1 in 122 |
| 5203 | 17.97 | SW | 15.99 | 300 | | | VC | 10.15804 | 1 in 146 |
| 5201 | 17.72 | SW | 15.76 | 375 | | | CO | 57.42822 | 1 in 302 |
| 2307 | 20.99 | SW | 19.43 | 225 | | | VC | 51.74609 | 1 in 96 |
| 0514 | | FO | | 100 | | | VC | 8.113119 | |
| 0514 | | FO | | 100 | | | VC | 8.113119 | |
| 0204 | | FO | 0 | 150 | | | VC | 29.77362 | |
| 0507 | | SW | 17.62 | 375 | | | CO | 56.86266 | |
| 9503 | 18.83 | FO | 0 | 225 | | | VC | 52 | |
| 9503 | 18.83 | FO | 0 | 225 | | | VC | 52 | |
| 1209 | | SW | | 0 | | | VC | 48.47636 | |
| 4301 | | FO | 0 | 225 | | | VC | 58.09763 | |
| 3101 | 19.17 | SW | 16.77 | 300 | | | VC | 58.62215 | 1 in 343 |
| 2407 | 20.85 | SW | 19.24 | 225 | | | VC | 29.73214 | |
| 2508 | 22.07 | SW | 20.69 | 300 | | | VC | 20.55091 | 1 in 147 |
| 4211 | | CO | | 150 | | | VC | 12.56196 | |
| 9315 | | SW | 0 | 150 | | | VC | 6.043146 | |
| 9315 | | SW | 0 | 150 | | | VC | 6.043146 | |
| 0500 | 18.94 | FO | 0 | 225 | | | VC | 40.49691 | |
| 0500 | 18.94 | FO | 0 | 225 | | | VC | 40.49691 | |
| 1121 | | FO | | 100 | | | UN | 3.979373 | |
| 0400 | 19.99 | FO | 17.88 | 225 | | | VC | 94.15434 | 1 in 294 |
| 1231 | | SW | | 0 | | | UN | 5.659174 | |
| 0401 | 19.86 | SW | 18.31 | 225 | | | VC | 91.7878 | |

| Refno | Cover | Func | Invert | Size x | Size y | Shape | Matl | Length | Grad |
|---|---|---|---|---|---|---|---|---|---|
| 3200 | 19.74 | SW | 18.1 | 225 | | | VC | 18.38478 | |
| 3305 | 20.29 | SW | 18.97 | 225 | | | VC | 19.78034 | 1 in 66 |
| 0304 | 19.11 | FO | 16.62 | 225 | | | VC | 32.44996 | 1 in 155 |
| 2001 | | FO | 0 | 225 | | | VC | 76.41989 | |
| 2002 | | FO | 0 | 225 | | | VC | 76.41989 | |
| 3512 | 22.33 | SW | 20.97 | 225 | | | VC | 23.58324 | 1 in 147 |
| 5408 | | FO | | 150 | | | VC | 4.523649 | |
| 2302 | 19.96 | SW | 18.46 | 225 | | | VC | 39.21734 | |
| 2013 | | CO | | 150 | | | VC | 6.114699 | |
| 0316 | | FO | | 150 | | | VC | 5.094981 | |
| 2113 | | FO | | 0 | | | VC | 9.782475 | |
| 2304 | 20.15 | SW | 18.7 | 225 | | | VC | 28.16026 | 1 in 122 |
| 1319 | | FO | | 150 | | | VC | 8.899934 | |
| 3505 | 22.01 | SW | 20.47 | 300 | | | VC | 17.53525 | 1 in 159 |
| 0200 | 18.81 | FO | 15.08 | 225 | | | VC | 52.11584 | |
| 0200 | 18.81 | FO | 15.08 | 225 | | | VC | 52.11584 | |
| 1406 | 20.59 | FO | 19.29 | 150 | | | VC | 10.46709 | 1 in 116 |
| 2420 | | FO | | 150 | | | VC | 2.063432 | |
| 2401 | 20.64 | SW | 18.86 | 300 | | | VC | 50.24042 | 1 in 209 |
| 3408 | | CO | | 100 | | | RPM | 3.776175 | |
| 4217 | | FO | | 150 | | | VC | 21.43623 | |
| 3306 | 20.25 | FO | 18.58 | 150 | | | VC | 19.51165 | 1 in 85 |
| 2105 | 19.55 | SW | 17.81 | 225 | | | VC | 27.45906 | 1 in 305 |
| 3401 | 20.64 | FO | 18.44 | 225 | | | VC | 31.32092 | |
| 1213 | 20.1 | FO | 17.92 | 150 | | | VC | 18.73706 | 1 in 59 |
| 2123 | | FO | | 0 | | | UN | 11.75186 | |
| 1110 | | CO | | 100 | | | VC | 5.283685 | |
| 1215 | | FO | | 150 | | | VC | 9.239074 | |
| 3202 | 18.69 | SW | 15.42 | 450 | | | CO | 48.70123 | |
| 2201 | 19.79 | SW | 0 | 225 | | | VC | 55.97321 | |
| 1115 | | FO | | 150 | | | VC | 9.428757 | |
| 4304 | 19.45 | FO | 0 | 225 | | | VC | 45.30933 | |
| 1519 | | SW | | 300 | | | VC | 18.90105 | |
| 5409 | 21.96 | SW | 20.2 | 300 | | | VC | 79.05694 | 1 in 49 |
| 5415 | 22.19 | FO | 20.48 | 225 | | | VC | 24.19824 | 1 in 151 |
| 2305 | 20.54 | SW | 18.89 | 225 | | | VC | 29.04484 | 1 in 153 |
| 5210 | | CO | | 150 | | | VC | 8.858676 | |
| 5407 | | FO | | 150 | | | VC | 4.309632 | |
| 0309 | | FO | | 150 | | | VC | 9.845066 | |
| 1107 | | CO | | 100 | | | VC | 21.25615 | |
| 1105 | 19 | FO | 17.05 | 150 | | | VC | 2.581203 | |
| 1312 | | FO | | 150 | | | VC | 12.86958 | |
| 3506 | 22.01 | FO | 20.11 | 150 | | | VC | 16.17632 | 1 in 135 |
| 4204 | 18.4 | SW | 17.13 | 225 | | | VC | 9.550131 | 1 in 24 |
| 0403 | 19.22 | SW | 17.32 | 225 | | | VC | 68.10294 | 1 in 175 |
| 0403 | 19.22 | SW | 17.32 | 225 | | | VC | 68.10294 | 1 in 175 |
| 3404 | 20.67 | FO | 18.05 | 225 | | | VC | 24.77139 | |
| 1504 | | FO | | 150 | | | VC | 11.17078 | |
| 1300 | 20.26 | FO | 18.01 | 225 | | | VC | 55.54278 | 1 in 40 |
| 0102 | 18.77 | FO | 0 | 225 | | | VC | 59.81639 | |
| 0302 | 19.06 | SW | 0 | 375 | | | CO | 68.54196 | |
| 1308 | 20.2 | FO | 18.69 | 150 | | | VC | 14.86221 | 1 in 99 |
| 2509 | 22.07 | FO | 20.4 | 150 | | | VC | 25.02492 | 1 in 132 |
| 0211 | | FO | | 100 | | | VC | 4.964791 | |
| 5307 | 18.28 | FO | 15.6 | 225 | | | VC | 52.80151 | 1 in 52 |
| 9307 | 18.28 | FO | 15.6 | 225 | | | VC | 52.80151 | 1 in 52 |
| 5307 | 19.38 | SW | 17.53 | 300 | | | VC | 30.36445 | 1 in 202 |
| 1100 | 18.63 | FO | 0 | 225 | | | VC | 57.38467 | |
| 3205 | | FO | | 150 | | | VC | 10.09529 | |
| 0315 | | FO | | 150 | | | VC | 11.97998 | |
| 1309 | 20.29 | SW | 0 | 225 | | | VC | 9.928858 | |
| 4215 | | FO | | 150 | | | VC | 7.501253 | |
| 4216 | | FO | | 150 | | | VC | 8.750779 | |
| 3403 | | SW | 0 | 225 | | | VC | 96.79878 | |
| 4408 | 22.77 | SW | 21.81 | 225 | | | VC | 52.16333 | 1 in 153 |
| 0207 | | FO | | 100 | | | VC | 9.565463 | |
| 2107 | 19.36 | SW | 17 | 225 | | | VC | 36.40055 | 1 in 202 |
| 2004 | 18.26 | SW | 0 | 375 | | | CO | 73.60027 | |
| 2004 | 18.26 | SW | 0 | 375 | | | CO | 73.60027 | |
| 2000 | 18.99 | FO | 17.23 | 225 | | | VC | 69.52697 | 1 in 188 |
| 0405 | 19.25 | FO | 17 | 225 | | | VC | 55.54278 | 1 in 105 |
| 0405 | 19.25 | FO | 17 | 225 | | | VC | 55.54278 | 1 in 105 |
| 4504 | 22.97 | SW | 20.96 | 225 | | | VC | 19.52982 | 1 in 150 |
| 1162 | | FO | | 0 | | | UN | 1.915553 | |
| 2405 | 20.93 | FO | 18.37 | 225 | | | VC | 75.27283 | 1 in 198 |
| 2406 | 20.95 | FO | 18.7 | 225 | | | VC | 34.78505 | 1 in 109 |
| 1141 | | FO | | 0 | | | UN | 10.88804 | |
| 3001 | | CO | | 150 | | | VC | 9.930977 | |
| 0303 | 18.97 | FO | 16.42 | 225 | | | VC | 60.53924 | 1 in 78 |
| 3300 | 19.83 | SW | 0 | 225 | | | VC | 63.56886 | |
| 2112 | | FO | | 0 | | | VC | 22.83689 | |
| 0101 | 18.69 | FO | 0 | 225 | | | VC | 92.09777 | |
| 4201 | 18.97 | SW | 0 | 375 | | | CO | 37.04642 | |
| 1413 | | FO | | 150 | | | VC | 13.11877 | |
| 1302 | 20.24 | FO | 17.6 | 225 | | | VC | 13.02996 | |
| 5101 | | SW | 0 | 675 | | | CO | 63.24555 | |
| 3206 | | FO | | 150 | | | VC | 13.20963 | |
| 1202 | 19.21 | SW | 0 | 225 | | | VC | 27.80288 | |
| 0206 | | SW | 0 | 600 | | | CO | 25.98385 | |
| 0206 | | SW | 0 | 600 | | | CO | 25.98385 | |
| 0508 | | FO | | 150 | | | VC | 25.9286 | |
| 0402 | 19.26 | SW | 0 | 375 | | | VC | 51.62364 | |
| 0402 | 19.26 | SW | 0 | 375 | | | VC | 51.62364 | |
| 0306 | | FO | | 150 | | | VC | 16.59257 | |
| 0306 | | FO | | 150 | | | VC | 16.59257 | |
| 4102 | 17.79 | SW | 0 | 675 | | | CO | 55.9464 | |
| 0201 | | FO | | 225 | | | VC | 76.84399 | |
| 5301 | 20.46 | FO | 18.03 | 225 | | | VC | 47.4343 | 1 in 49 |
| 2415 | | CO | | 100 | | | VC | 5.564246 | |
| 0206 | 18.03 | FO | 15.36 | 225 | | | VC | 65.45992 | 1 in 182 |
| 5503 | 23.6 | SW | 20.84 | 300 | | | VC | 77.16217 | 1 in 124 |
| 2144 | | FO | | 0 | | | VC | 21.90752 | |
| 2100 | 19.16 | FO | 16.68 | 225 | | | VC | 55.02727 | 1 in 89 |
| 1004 | | CO | | 150 | | | VC | 24.9303 | |
| 3406 | 21.01 | FO | 18.9 | 150 | | | VC | 33.99822 | 1 in 42 |
| 2404 | 20.79 | SW | 0 | 300 | | | VC | 20.54472 | |
| 1500 | 20.07 | FO | | 225 | | | VC | 17.15601 | |
| 3409 | | CO | | 100 | | | RPM | 7.987676 | |
| 0310 | | FO | | 150 | | | VC | 19.86874 | |
| 0201 | 18.82 | SW | 15.6 | 300 | | | VC | 49.52304 | |
| 0201 | 18.82 | SW | 15.6 | 300 | | | VC | 49.52304 | |
| 0300 | 19.25 | SW | 0 | 225 | | | VC | 40.45986 | |
| 5308 | | SW | 0 | 225 | | | VC | 5.478248 | |
| 3513 | 22.16 | SW | 21.11 | 150 | | | VC | 10.93357 | 1 in 78 |
| 2300 | 20.11 | SW | 0 | 225 | | | VC | 28.4605 | |
| 5418 | 22.28 | SW | 21 | 225 | | | VC | 16.58455 | 1 in 128 |
| 4100 | | SW | 0 | 450 | | | CO | 59.62289 | |
| 1518 | | SW | | 150 | | | VC | 8.626295 | |
| 3301 | 19.81 | FO | 17.38 | 225 | | | VC | 55.65968 | 1 in 186 |
| 1165 | | FO | | 0 | | | UN | 7.775018 | |
| 0205 | | FO | 0 | 150 | | | VC | 2.515449 | |
| 2514 | | SW | 19.09 | 900 | | | CO | 36.51183 | 1 in 332 |
| 0100 | 18.59 | SW | 16.16 | 300 | | | VC | 96.33276 | 1 in 175 |
| 4103 | 17.75 | FO | 0 | 225 | | | VC | 54.12024 | |
| 2202 | 19.52 | SW | 17.45 | 300 | | | VC | 47.43417 | 1 in 216 |
| 1503 | 20.54 | SW | 18.7 | 225 | | | VC | 14.96527 | 1 in 29 |
| 4305 | 20.02 | SW | 18.42 | 225 | | | VC | 29.27846 | 1 in 52 |
| 4507 | 22.62 | FO | 20.85 | 150 | | | VC | 53.1128 | 1 in 111 |
| 3103 | | SW | 0 | 375 | | | CO | 105.9481 | |
| 0208 | | FO | | 100 | | | VC | 7.107531 | |
| 4208 | 18.17 | FO | 17.11 | 150 | | | VC | 20.70398 | 1 in 115 |
| 0515 | | FO | | 100 | | | VC | 5.577366 | |
| 0515 | | FO | | 100 | | | VC | 5.577366 | |
| 1520 | | SW | | 150 | | | VC | 10.94098 | |
| 9314 | | SW | 0 | 600 | | | VC | 17.07885 | |
| 9314 | | SW | 0 | 600 | | | VC | 17.07885 | |
| 4503 | 23.24 | SW | 21.13 | 300 | | | VC | 65.45992 | 1 in 242 |
| 1501 | 20.12 | SW | 17.62 | 375 | | | CO | 30.26011 | |
| 0511 | | FO | | 150 | | | VC | 7.5449 | |
| 1405 | 20.94 | SW | 19.3 | 225 | | | VC | 24.95688 | 1 in 119 |
| 9402 | 18.57 | SW | 16.67 | 225 | | | VC | 27.45906 | |
| 9402 | 18.57 | SW | 16.67 | 225 | | | VC | 27.45906 | |
| 2503 | 22.02 | FO | 19.99 | 150 | | | VC | 25.90677 | 1 in 130 |
| 0301 | 19.09 | SW | 17.15 | 300 | | | VC | 37.21559 | |
| 2306 | 20.58 | SW | 19.1 | 225 | | | VC | 23.29915 | 1 in 111 |
| 0501 | 18.99 | SW | 0 | 375 | | | CO | 48.61557 | |
| 0501 | 18.99 | SW | 0 | 375 | | | CO | 48.61557 | |
| 1517 | | FO | | 100 | | | PVC | 13.48511 | |
| 1120 | | FO | | 100 | | | UN | 13.5928 | |
| 2203 | 19.52 | FO | 16.78 | 225 | | | VC | 45.22168 | 1 in 174 |
| 4218 | | FO | | 150 | | | VC | 18.97775 | |
| 4200 | 18.86 | FO | 16.7 | 225 | | | VC | 43.57935 | 1 in 118 |
| 2507 | 21.91 | FO | 20.21 | 150 | | | VC | 13.11383 | 1 in 146 |
| 1151 | | SW | | 0 | | | UN | 11.04056 | |
| 5303 | | FO | 0 | 225 | | | VC | 9.406052 | |
| 0203 | | SW | 0 | 225 | | | VC | 9.625153 | |
| 4508 | 22.88 | FO | 20.32 | 225 | | | VC | 55.2861 | 1 in 158 |
| 2520 | | FO | | 100 | | | PE | 5.258845 | |
| 2114 | | FO | | 0 | | | VC | 13.71752 | |
| 3412 | | FO | | 100 | | | PP | 8.404153 | |
| 0410 | | FO | | 150 | | | VC | 11.46373 | |
| 0410 | | FO | | 150 | | | VC | 11.46373 | |
| 9313 | | SW | 0 | 600 | | | CO | 9.751273 | |
| 9313 | | SW | 0 | 600 | | | CO | 9.751273 | |
| 4404 | 21.15 | SW | 19.26 | 225 | | | VC | 26.98609 | 1 in 79 |
| 1101 | 18.97 | SW | 0 | 225 | | | VC | 73.87828 | |
| 1203 | 19.16 | FO | 16.97 | 225 | | | VC | 19.84943 | 1 in 58 |

## LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

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

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

### MANHOLE FUNCTION

| | |
|---|---|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| OV | Overflow |

### SEWER SHAPE

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

### SEWER MATERIAL

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

**Address or Site Reference:**

HUNTERS HOUSE AINTREE LANE,
LIVERPOOL,
L10 8LQ

**OS sheet Number:** SJ4098SW
**Scale:** 1:1250 **Date:** 31/07/2019
**Nodes:** 368
**Sheet:** 9 of 9

**Printed by:** Property Searches

**SEWER RECORDS**

United Utilities — helping life flow smoothly

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

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# APPENDIX D: LPA/LLFA CORRESPONDENCE

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## Megan Berry

**From:** Lead Local Flood Authority <LLFA@knowsley.gov.uk>
**Sent:** 09 August 2019 12:13
**To:** Megan Berry
**Subject:** RE: Historical Flood Risk Information
**Attachments:** Knowsley MBC - Sustainable Drainage and Surface Water Management - Guida....pdf

**Follow Up Flag:** Follow up
**Flag Status:** Flagged

Hi Megan,

Thank you for your email.

With regards to historical flooding; Aintree Lane has experienced flooding at various times over the past few years. Part of the investigatory work undertaken by Knowsley Council Highways, identified 2no 300dia drains crossing the development site.
The highway drainage from Aintree Lane, as well as the surface water from the nearby Haven Road housing state outfall into the River Alt via these drains.

The designation and ownership of the drains are not clear, however 1no is noted on the United Utilities asset maps as a 300dia watercourse.
The condition of both drains have previously been identified to be poor and will likely need repair or replacement.
I am in possession of a historical drainage plan which shows a number of land drains crossing the development site, together with the approximate locations of the 2no drains and their manholes.

As the LLFA, we would support the de-culverting of the watercourse if this was proposed.
We would also recommend that the drains are repaired / replaced as part of the wider aspirations of the development, and even diverted to facilitate comprehensive development.

Could I therefore request that you liaise with me as the LLFA on the proposals from a very early stage to ensure that an integrated sustainable drainage system is proposed, that encompasses the wider drainage issues.

As you are likely aware, the River Alt is classified as main river and any works on or near main rivers is regulated by environmental permitting by The Environment Agency.

With regards to local policy and specific guidance:
Please take a look at our Strategic and Preliminary Flood Risk Assessments.
They can be found on Knowsley Council's Lead Local Flood Authority website.

The Strategic Flood Risk Assessments provide an overview of flood risk in Knowsley. The SFRA Part 1 focuses on future development in the borough but does not focus upon individual properties or sites. The SFRA Part 2 provides more detailed information regarding the nature of flood risk at a number of sites allocated within the Local Plan. The Preliminary Flood Risk Assessment (PFRA) report was submitted to the Environment Agency and approved in October 2011. According to the guidelines set by the Environment Agency / DEFRA, Knowsley does not have a nationally significant flood risk.

In addition, I have attached Knowsley MBC's 'Sustainable Drainage & Surface Water Management - Technical Guidance for Developers' document for your information.

Guidance on the production of Flood Risk Assessments can be found here:
https://www.gov.uk/guidance/flood-risk-assessment-for-planning-applications

From the limited information provided: the LLFA considers the development site to be greenfield and will require the surface water discharge rate be restricted to greenfield (Qbar) runoff rates, in accordance with our technical guidance and the Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacement national standards.

If the development is classified as Major Development under Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2015; the development must include Sustainable Urban Drainage Systems (SuDS) unless it can be demonstrated that it is inappropriate for the site.

If the development is classified as Major Development; the LLFA will require a comprehensive and detailed Flood Risk Assessment and Drainage Strategy, together with a corresponding detailed surface water drainage scheme to be submitted, together with hydraulic drainage calculations for a 1:2yr, 1:30yr and a 1:100yr plus an appropriate climate change allowance design storm event. (summer and winter storms, for all storm durations from 15mins to 10080mins). The drainage plan should be annotated with the pipe numbers from the calculations and show any attenuation, restricted discharge, exceedance storage and overland flow routes.

Any works on or near a main river may need an Environmental Permit for Flood Risk Activities from the Environment Agency (EA).
Any works on or near an ordinary watercourse will need Ordinary Watercourse Consent (OWC) from the Lead Local Flood Authority.

With regards to Surface Water, Groundwater, Coastal flooding; I have directed you towards our Strategic and Preliminary Flood Risk Assessments for this information. We do not have any additional information or knowledge at this time.

Knowsley MBC do not have any modelling for the area and SuDS will not be adopted by the Lead Local Flood Authority.

If I can be of further assistance, please contact me on 0151 443 2704.

Thank you,
Kevin.

**Kevin McKeown**

*Principal Engineer – Drainage / Lead Local Flood Authority (LLFA)*

*Major Development Team / Invest Knowsley*

Knowsley Metropolitan Borough Council

1st Floor, Huyton Library,

Civic Way, Huyton, Liverpool, L36 9GD

Email: kevin.mckeown@knowsley.gov.uk

Tel: 0151 443 2704

Mobile: 07766 500 208

www.knowsley.gov.uk

---

**From:** Megan Berry <meganberry@betts-associates.co.uk>
**Sent:** 24 July 2019 16:30
**To:** Lead Local Flood Authority <LLFA@knowsley.gov.uk>
**Subject:** Historical Flood Risk Information

***F.A.O Flood Risk, Drainage and/or Planning department***

***Please forward to the correct department/ office***

To whom it may concern,

***Kirkby Valley Golf Club, Valley Road, Liverpool***

Please could you confirm whether you have any information that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the site above (see location plan

attached), including details of historical flooding and any predicted flood water levels; this would be greatly appreciated. If there are any specific requirements that you require in a scope of works for this site please can you advise at this stage so that it can be fully incorporated into the proposals at an early stage.

Please do not hesitate to contact me on the details below to discuss further should you require additional information or clarification.

Kind Regards

Megan Berry BSc(Hons) GradCIWEM
*Graduate Flood Risk Analyst*

**BETTS HYDRO**
*Consulting Engineers*

Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire, CH5 2LY
Chester +44 (0)1244 289041

meganberry@betts-associates.co.uk
www.betts-associates.co.uk

CIVIL | STRUCTURAL | GEO-ENVIRONMENTAL | HYDROLOGY | FLOOD RISK MANAGEMENT
SUDS | STRUCTURAL SURVEYS | PARTY WALL DUTIES | INFILTRATION | GEOTECHNICAL

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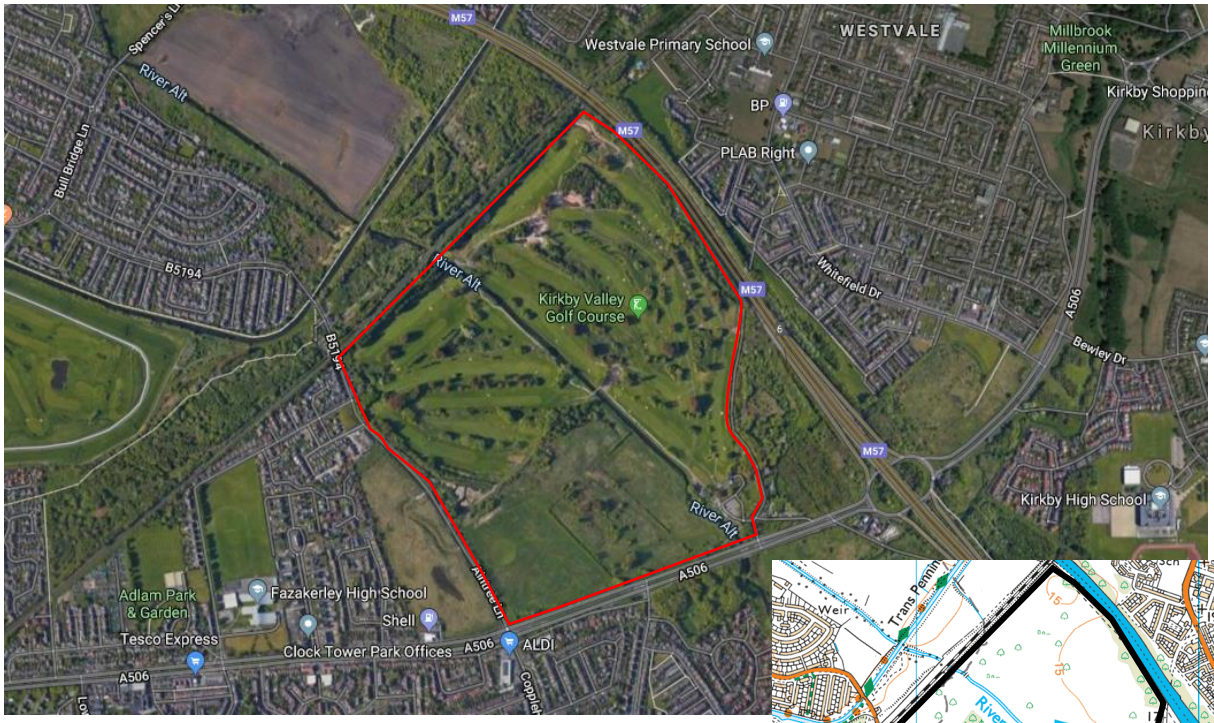
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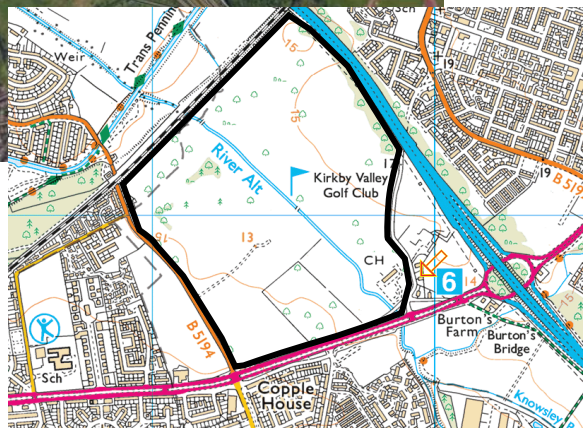
# APPENDIX E: LOCATION PLAN

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# LOCATION PLAN

Kirkby Valley Golf Club, Kirkby




| | |
|---|---|
| OS X (Eastings) | 339329 |
| OS Y (Northings) | 397949 |
| Nearest Post Code | L10 8LQ |
| Lat (WGS84) | N53:28:29 (53.474757) |
| Long (WGS84) | W2:54:56 (-2.915559) |
| Lat,Long | 53.474757,-2.915559 |
| Nat Grid | SJ393979 / SJ3932997949 |
| mX | -324558 |
| mY | 7036941 |

# APPENDIX F: TOPOGRAPHIC SURVEY

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# APPENDIX G: PROPOSED PLANNING LAYOUT

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All dimensions to be checked on site.
Figured dimensions to be read in preference to scaled.
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N

0m 50m 100m 150m 200m 250m

VISUAL SCALE 1:2500 @ A1

| Date | Rev. | Description | Issued |
|---|---|---|---|
| 23/03/23 | P1 | Final Comment for Planning | OB |
| 15/05/23 | P2 | Additional Cycle Parking | OB |

**KEY**

- Application Site Boundary
  802,992.5m²
  80.29 Hectare
- Golf Course works boundary. Area within flood zone is not to be developed
- Flood Zone 3
- Flood Zone 2

**NOTES - River**

- There is no direct discharge into the river
- There is no development within 5m of the top of the river bank

RAILWAY LINE
RIVER ALT
M57 MOTORWAY
AINTREE LANE
MAINTENANCE YARD
maintenance
9 HOLE COURSE
DRIVING RANGE
ADVENTURE GOLF
CLUB HOUSE
PARKING
GOLF ACADEMY
INGLE LANE
OXTON CLOSE
ACADEMY ENTRANCE
SITE ENTRANCE
VALLEY ROAD
FIELD LANE

**Site Plan Proposed - Overall Masterplan**
1 : 2500

Brock Carmichael
19 Old Hall Street
Liverpool, L3 9LQ
brockcarmichael.co.uk
+44 (0) 151 242 6222

Client: Green Circle Leisure
BCA Project Ref: 22.017
Project Title: Kirkby Valley Golf Course
Drawing Title: Site Plan Proposed - Overall Masterplan
Drawing Reference: 22017 - BCA - ZZ - ZZ - DR - A - 02100
Status: S2
Revision: P2
Drawn By: OB
Checked By: JC
Date: 15/05/23
Scale@A1: As indicated

# APPENDIX H: PHOTOGRAPHS

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Kirkby Valley
Golf Club
0151 546 5435









































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# APPENDIX I: HYDRAULIC ASSESSMENT OUTPUTS

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**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

BETTS HYDRO
CONSULTING ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk

green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP (1 in 100 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 107 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Level (mAOD)

- <11.0
- 11.00 - 11.25
- 11.26 - 11.50
- 11.51 - 11.75
- 11.76 - 12.00
- 12.01 - 12.25
- 12.26 - 12.50
- 12.51 - 12.75
- 12.76 - 13.00
- 13.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

BETTS HYDRO
CONSULTING ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk

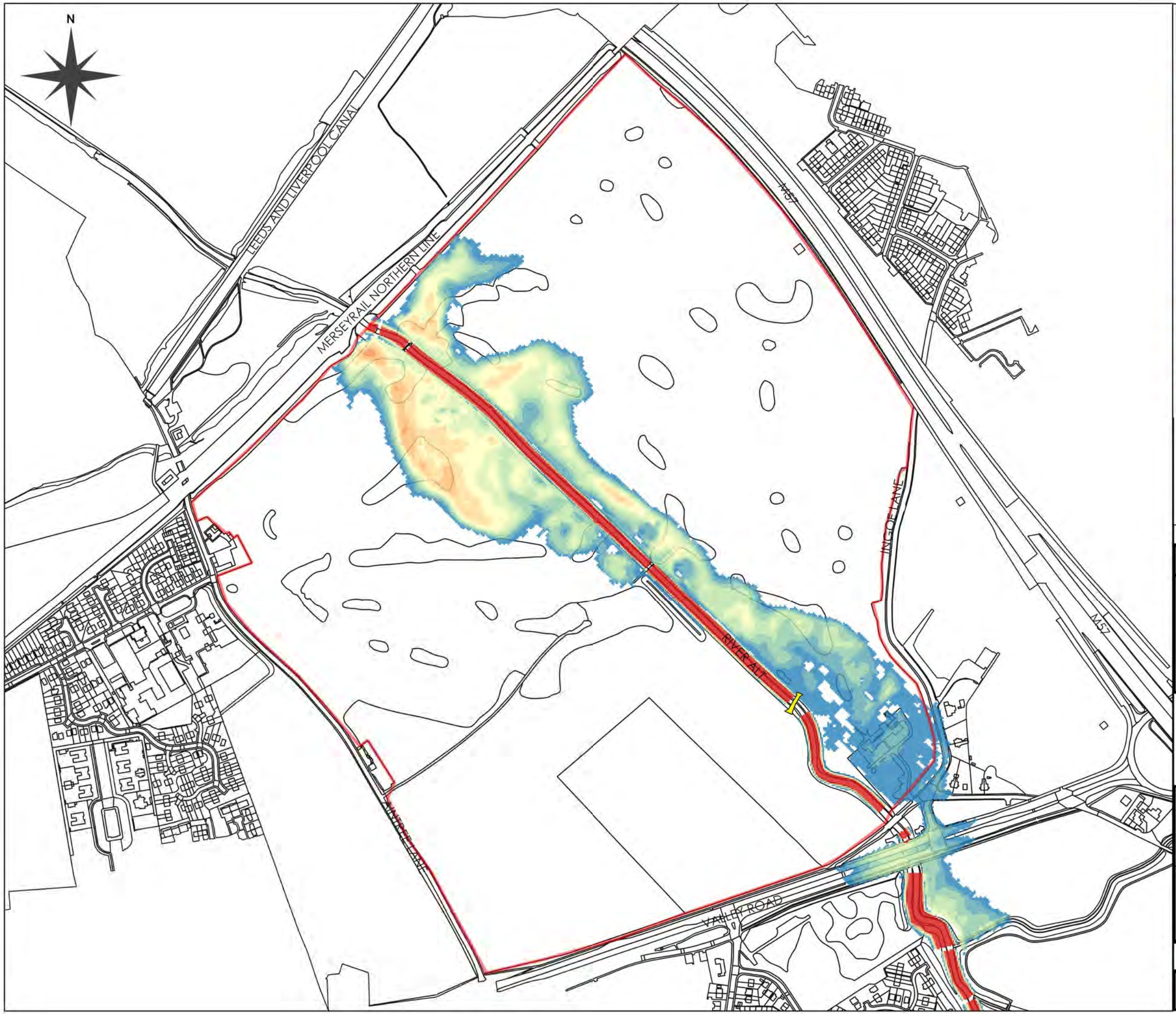
green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 0.1% AEP (1 in 1000 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD LEVEL PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 112 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

BETTS HYDRO
CONSULTING ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk

green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 0.1% AEP (1 in 1000 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 111 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Level (mAOD)

- <11.0
- 11.00 - 11.25
- 11.26 - 11.50
- 11.51 - 11.75
- 11.76 - 12.00
- 12.01 - 12.25
- 12.26 - 12.50
- 12.51 - 12.75
- 12.76 - 13.00
- 13.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

BETTS HYDRO
CONSULTING ENGINEERS
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Tel: 01244 288178 enquiries@betts-associates.co.uk

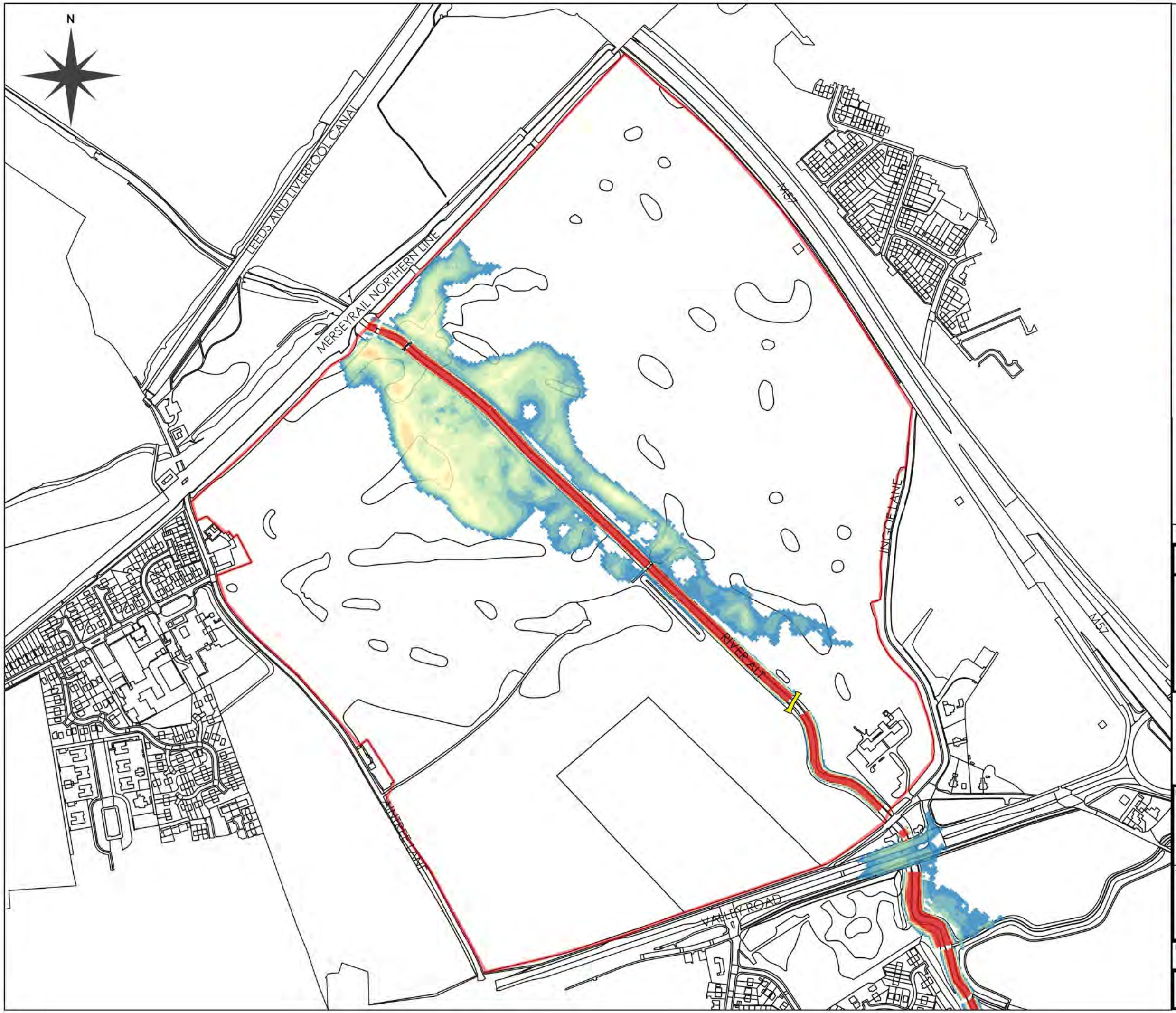
green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP + CC (1 in 100 YEAR RETURN PERIOD PLUS 35% CLIMATE CHANGE) WITH PROPOSED BRIDGE FLOOD LEVEL PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 110 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

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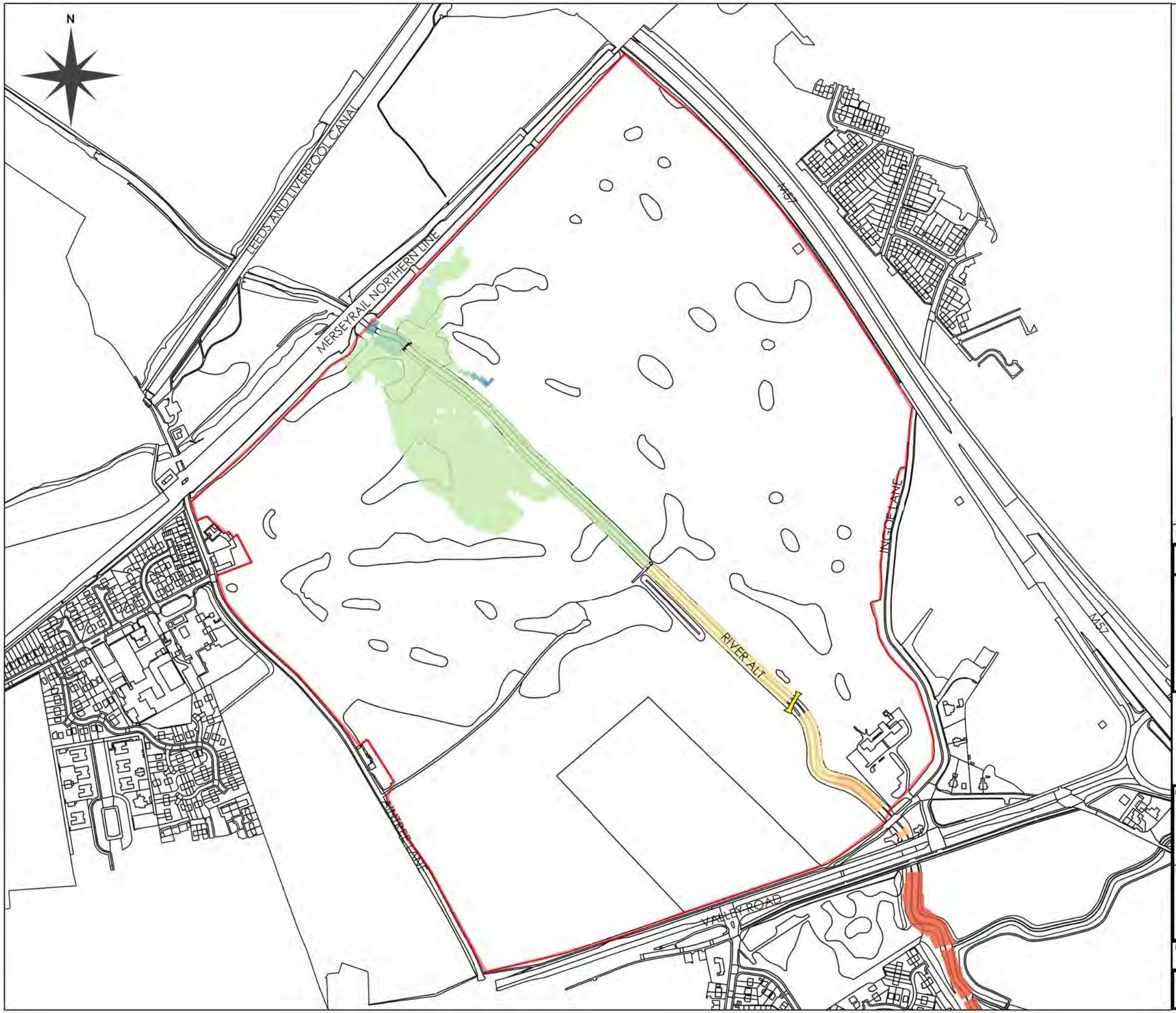
green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP + CC (1 in 100 YEAR RETURN PERIOD PLUS 35% CLIMATE CHANGE) WITH PROPOSED BRIDGE FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 109 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
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PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP (1 in 100 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD LEVEL PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
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| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 108 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

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PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP (1 in 100 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 107 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Level (mAOD)

- <11.0
- 11.00 - 11.25
- 11.26 - 11.50
- 11.51 - 11.75
- 11.76 - 12.00
- 12.01 - 12.25
- 12.26 - 12.50
- 12.51 - 12.75
- 12.76 - 13.00
- 13.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

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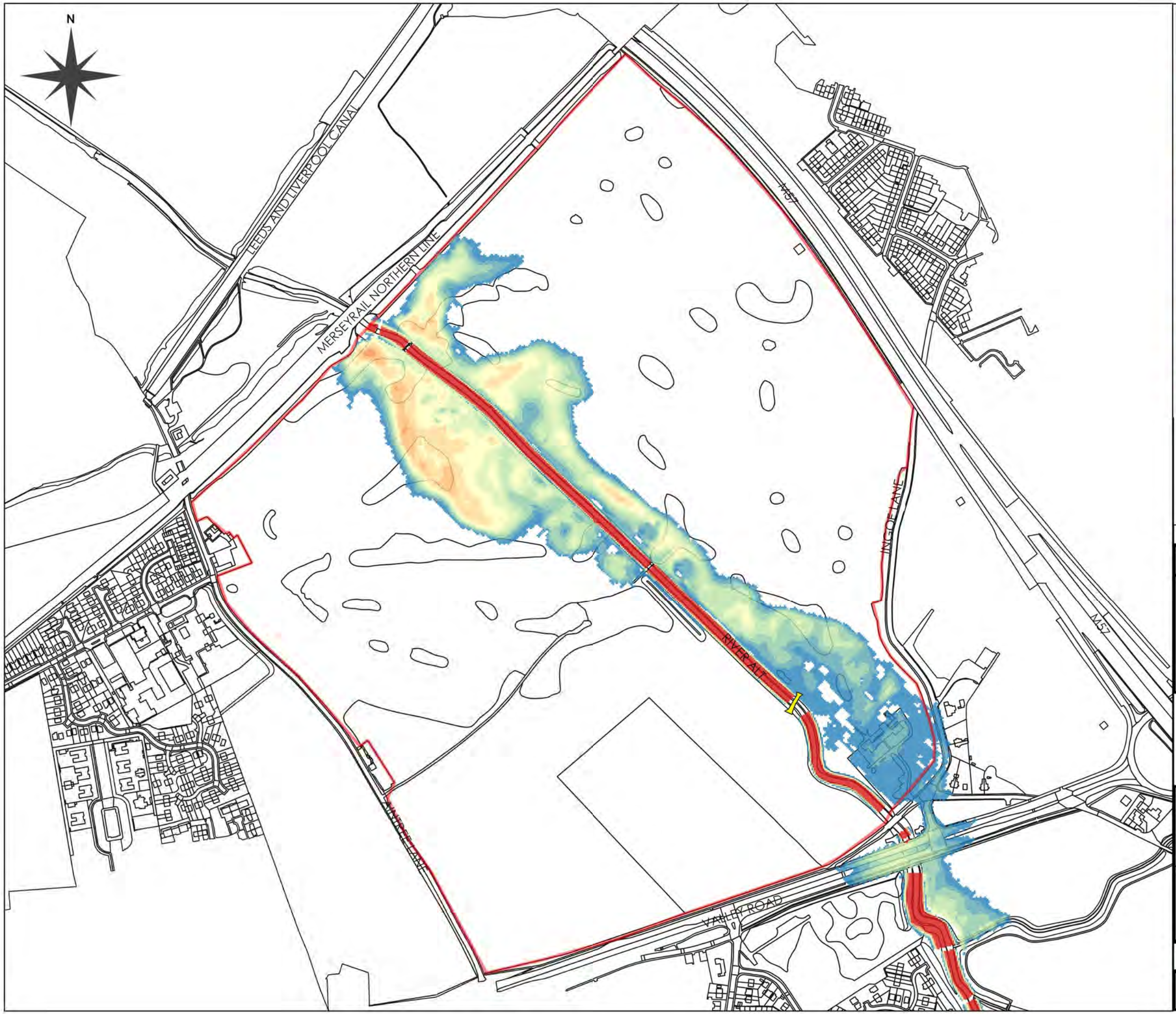
green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 0.1% AEP (1 in 1000 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD LEVEL PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 112 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

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PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 0.1% AEP (1 in 1000 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 111 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Level (mAOD)

- <11.0
- 11.00 - 11.25
- 11.26 - 11.50
- 11.51 - 11.75
- 11.76 - 12.00
- 12.01 - 12.25
- 12.26 - 12.50
- 12.51 - 12.75
- 12.76 - 13.00
- 13.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

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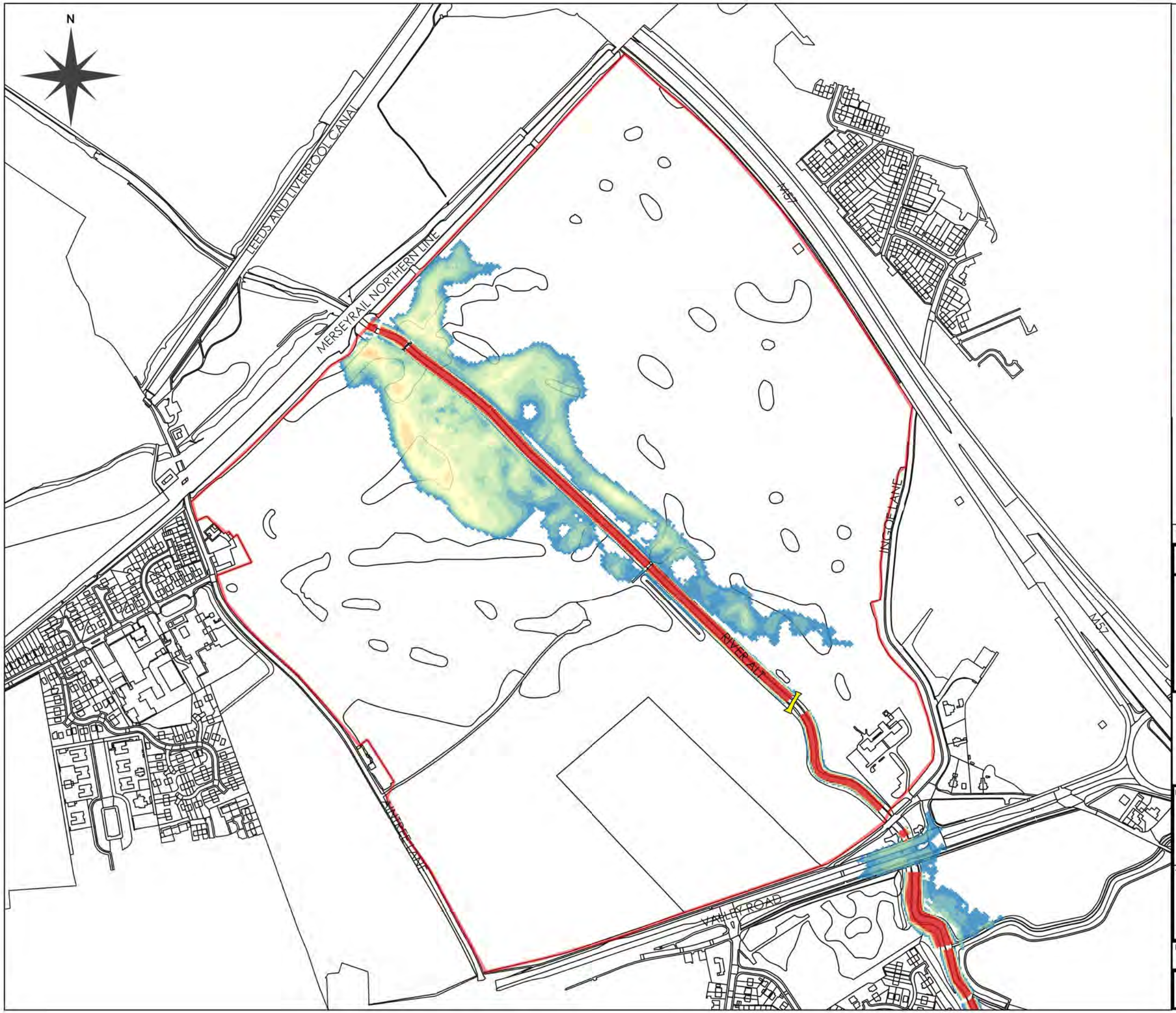
green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP + CC (1 in 100 YEAR RETURN PERIOD PLUS 35% CLIMATE CHANGE) WITH PROPOSED BRIDGE FLOOD LEVEL PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 110 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

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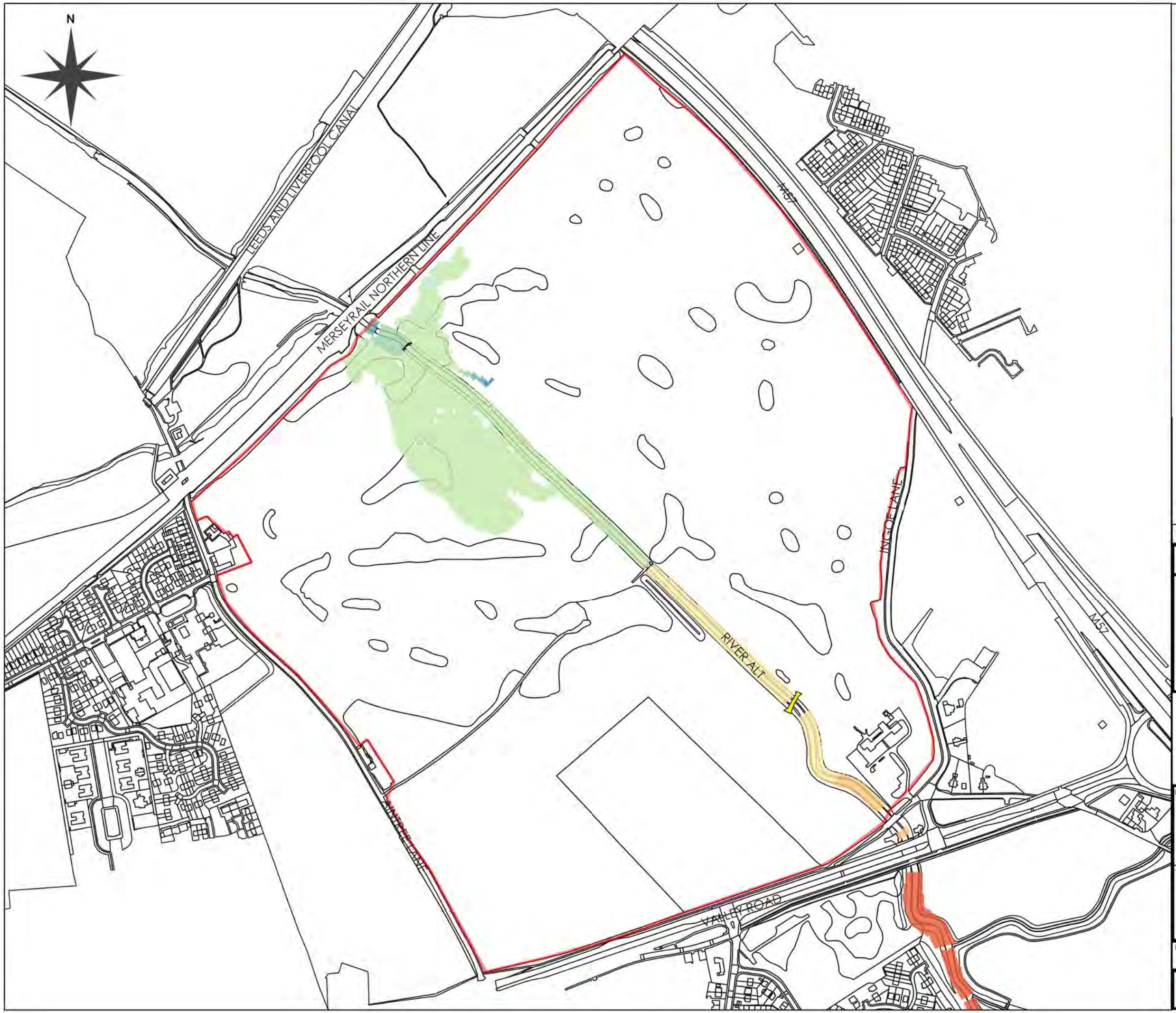
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PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP + CC (1 in 100 YEAR RETURN PERIOD PLUS 35% CLIMATE CHANGE) WITH PROPOSED BRIDGE FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
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| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 109 | A |




**DO NOT SCALE**

## Legend

- Site Boundary
- Proposed Bridge

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 11/11/19 | PT | PRELIMINARY | DK |

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PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE: 1% AEP (1 in 100 YEAR RETURN PERIOD) WITH PROPOSED BRIDGE FLOOD LEVEL PLAN

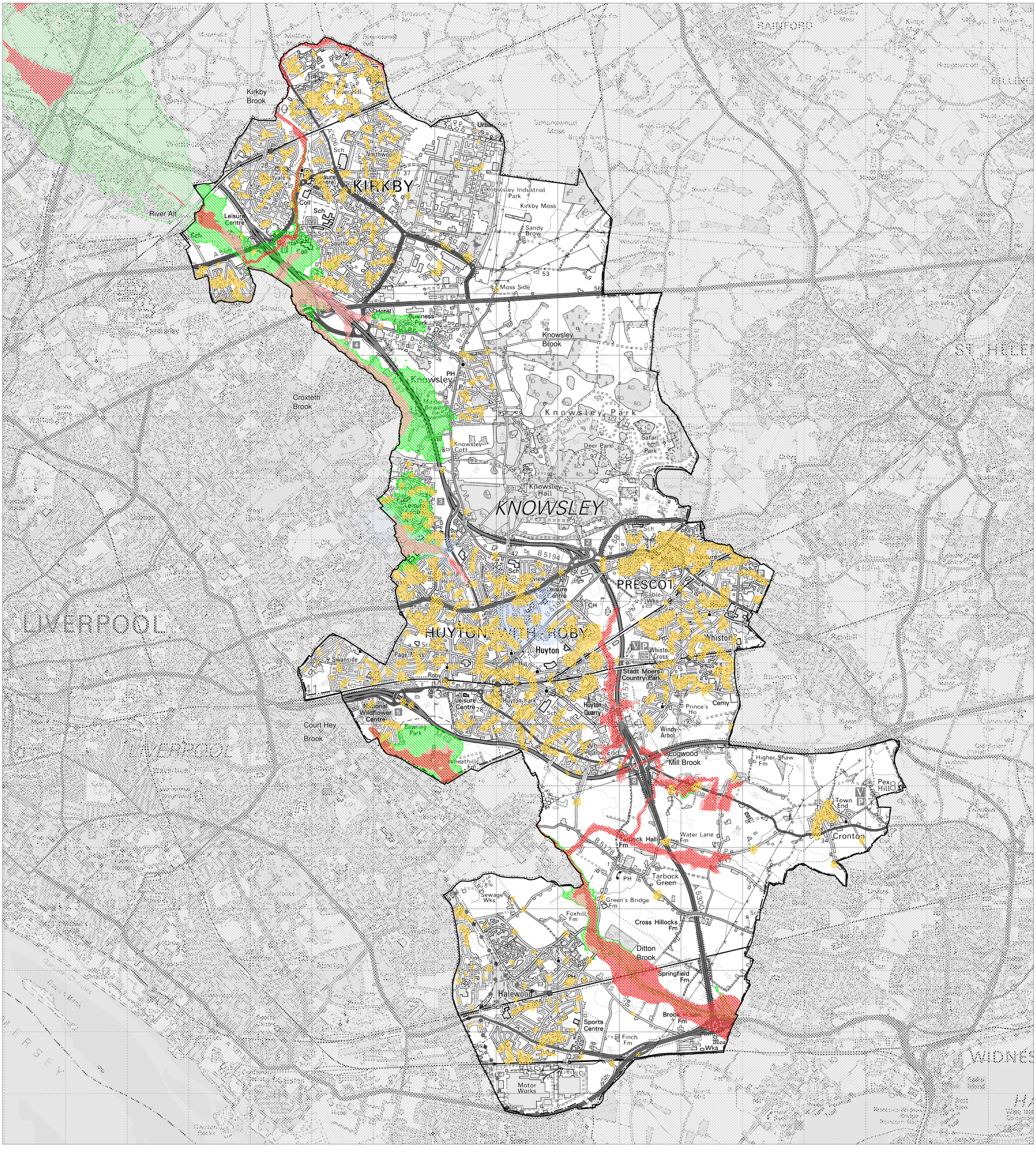
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| NOV 19 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD444 | 108 | A |

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# APPENDIX J: PFRA/SFRA PLANNING EXTRACTS

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Legend:

- Knowsley Boundary
- Flood Zone 3b - High Risk
- Flood Zone 3a - High Risk
- Flood Zone 2 - High Risk
- Surface Water Flooding Indicated From Council Records - Medium Risk
- High Frequency Internal DG5 Surface Water Flooding - Medium Risk
- Potential Groundwater Flooding - Low Risk

**SCALE: NTS**

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Project Title:

**Knowsley and Sefton Strategic Flood Risk Assessment**

Figure Title:

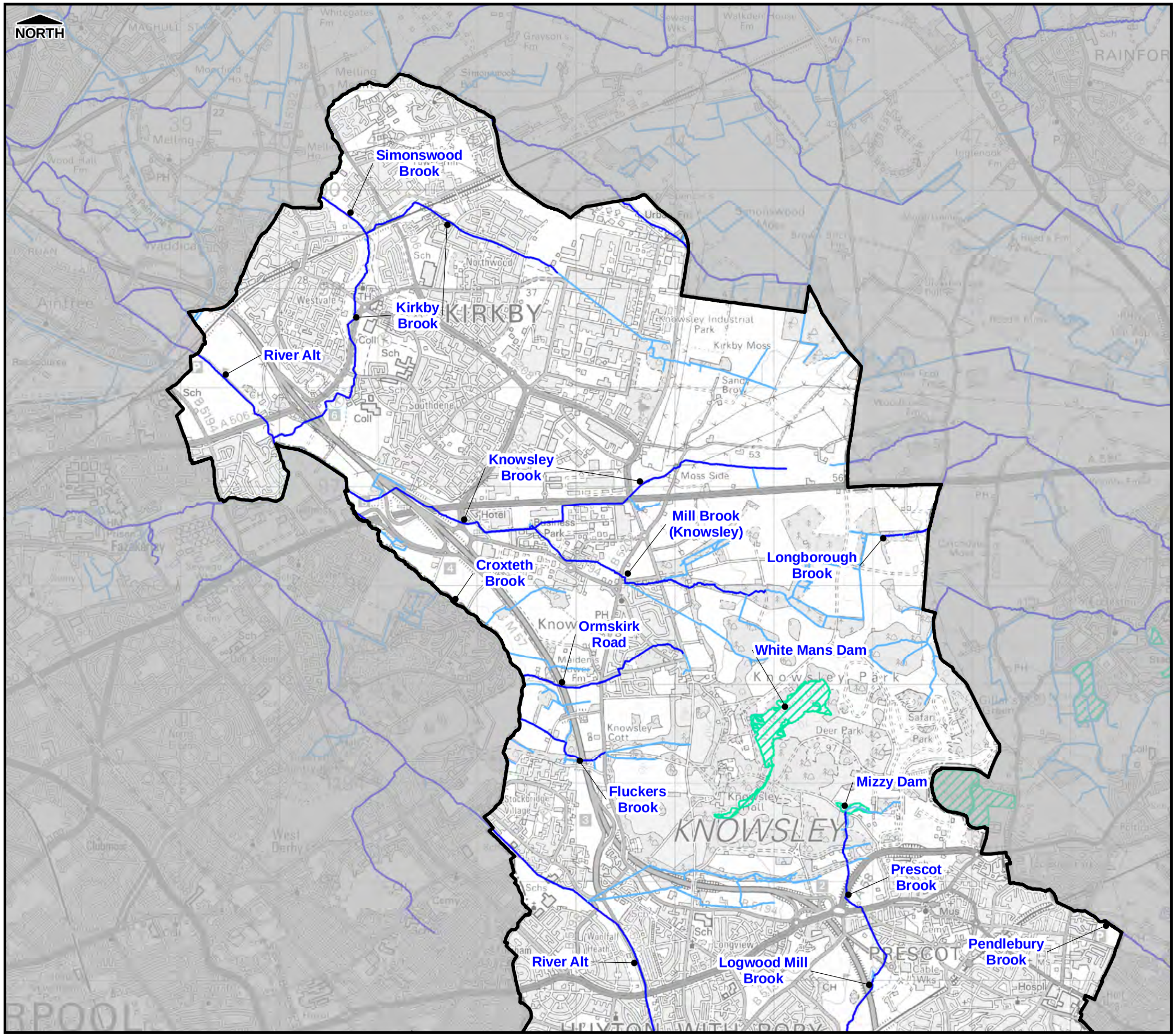
**Combined Risk Matrix Map Knowsley**

Document Ref: **5074164/DG/002**

Figure Ref: **J1**

Knowsley Council

ATKINS




## Legend

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

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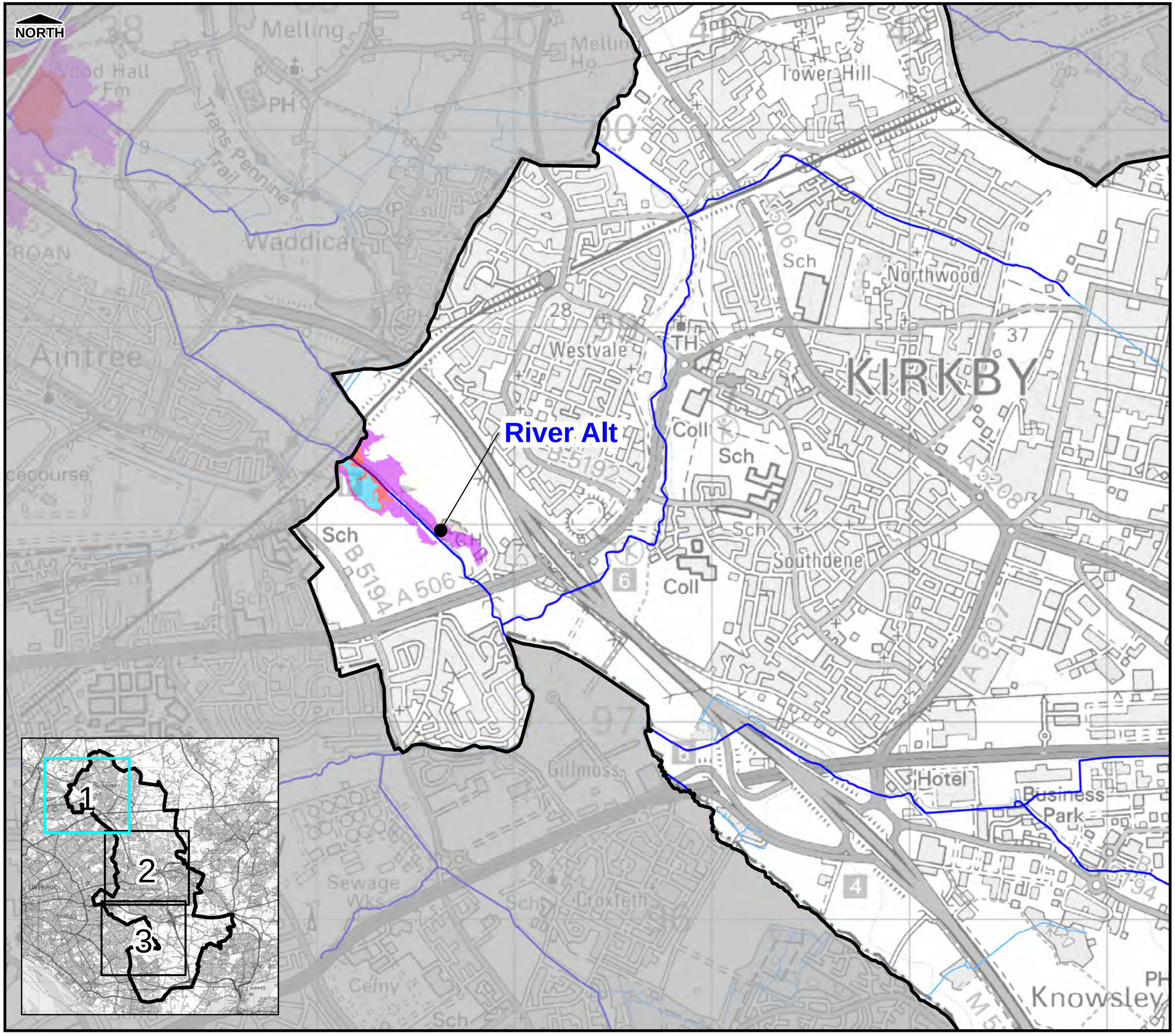
# KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B1-1-1
Catchment Overview

Knowsley Council

CAPITA SYMONDS

| DRAWING NUMBER | REV |
|---|---|
| CS056421/B1-1-1 | - |







## Legend

- Borough Administrative Boundary
- 5% AEP Flood Extent
- 1% AEP Flood Extent
- 1%+CC AEP Flood Extent
- 0.1% AEP Flood Extent
- Main River
- Ordinary Watercourse

NOTES:

The flood extents are taken from the Logwood Mill Brook (2012), Netherley and Halewood (2012), Childwall Brook (2008) and Lower Alt (2010) studies and take into account the presence of existing defences

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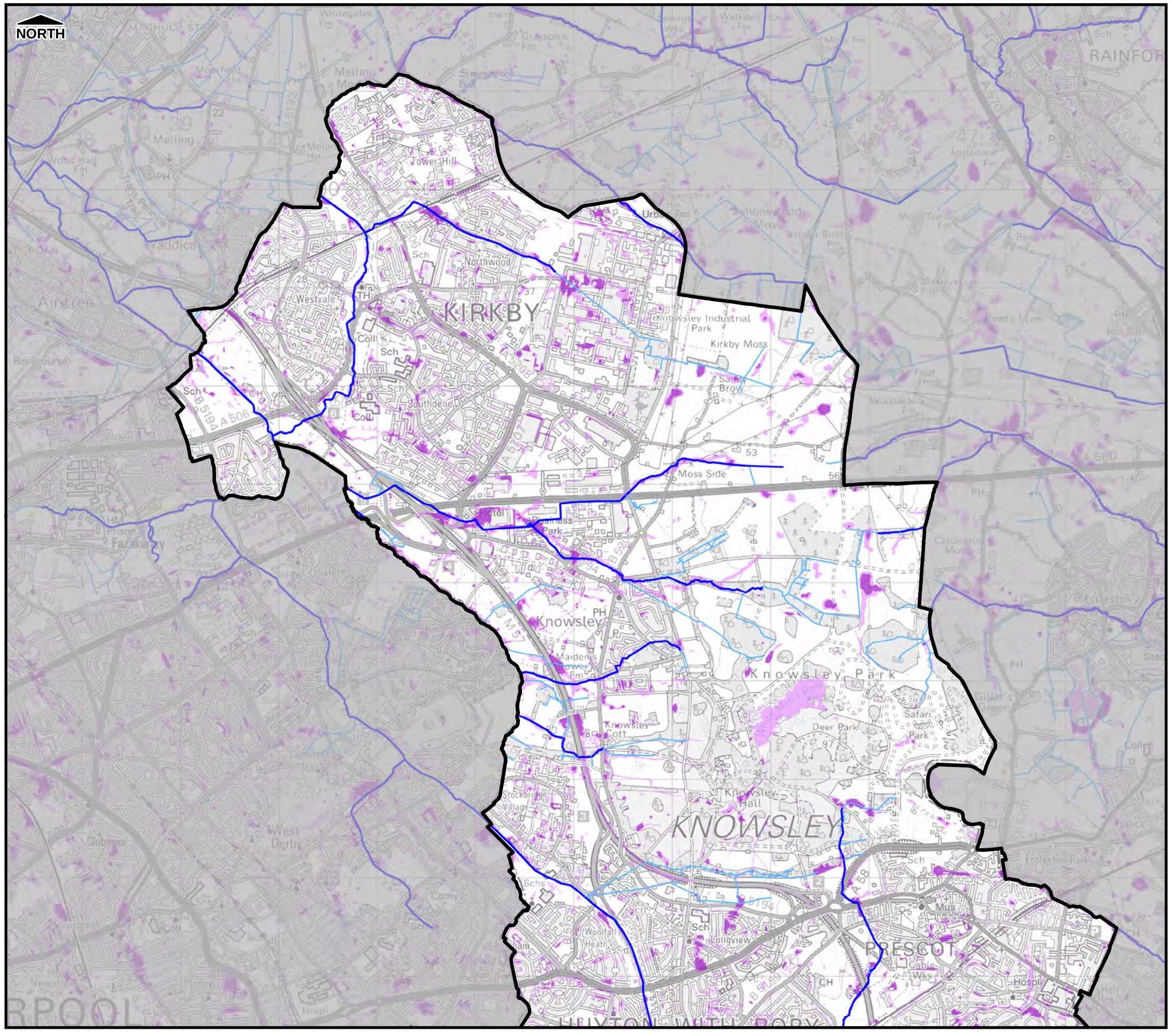
# KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B3-A-1
Actual Risk
Flood Extent

Knowsley Council

CAPITA SYMONDS

| DRAWING NUMBER | REV |
|---|---|
| CS056421/B3-A-1 | - |




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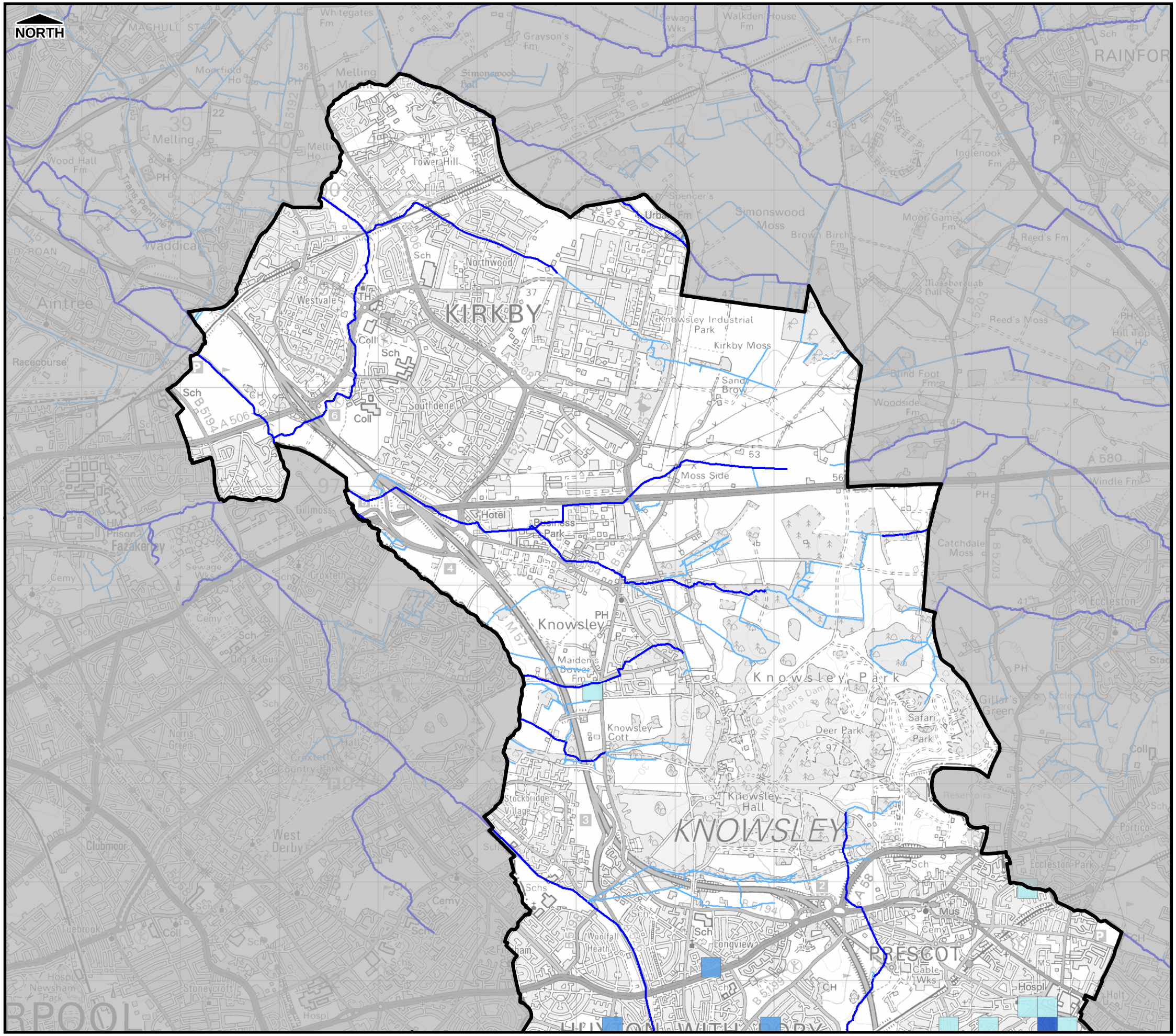
# KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

## Figure B5-1 Environment Agency Flood Map for Surface Water

Knowsley Council

CAPITA SYMONDS

| DRAWING NUMBER | REV |
|---|---|
| CS056421/B5-1 | - |




## 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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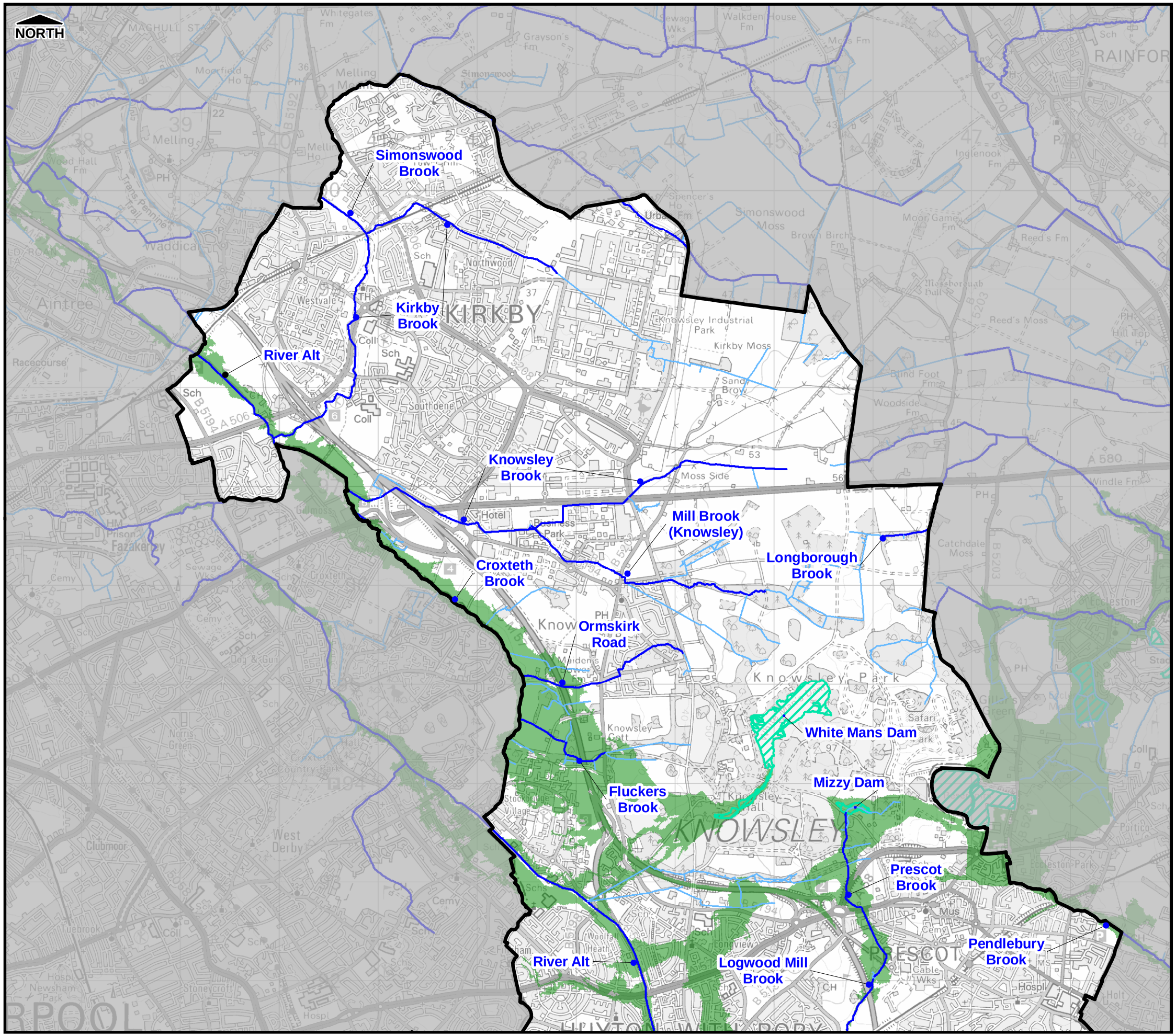
# KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

## Figure B6-1 Number of Sewer Related Surface Water Flooding Incidents

Knowsley Council

CAPITA SYMONDS

| DRAWING NUMBER | REV |
|---|---|
| CS056421/B6-1 | - |




## Legend

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

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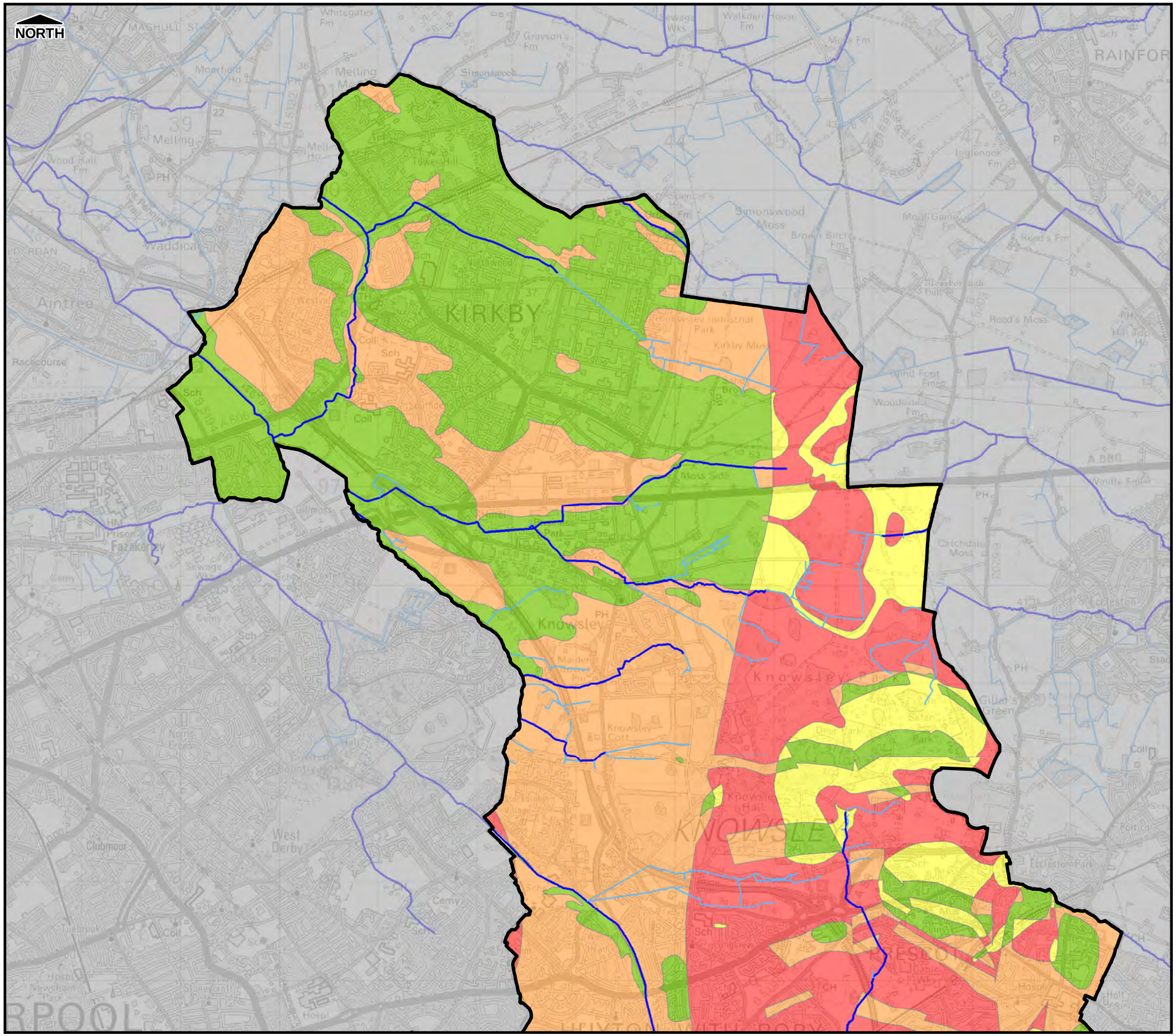
# KNOWSLEY METROPOLITAN BOROUGH COUNCIL LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B7-1
Reservoir Flooding

Knowsley Council

CAPITA SYMONDS

| DRAWING NUMBER | REV |
|---|---|
| CS056421/B7-1 | - |




**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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| SCALE @ A3 | ISSUING OFFICE |
|---|---|
| 1:40,000 | Sheffield |

KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B11-1
Potential Suitability for SuDS

Knowsley Council

CAPITA SYMONDS

| DRAWING NUMBER | REV |
|---|---|
| CS056421/B11-1 | - |

velocity of flow, the speed of onset of flooding and duration. Flood hazard can therefore vary greatly throughout catchments and even across floodplain areas. Hazardous river flows can pose a significant risk to exposed people, property and infrastructure. Lower hazard flooding can be less of a risk to life, by virtue of being shallower or with low velocity. It can, however, disrupt communities, require significant post-flood cleanup and can cause costly and possibly structural damage to property.

2.2.4 Knowsley lies at the head of the River Alt catchment, which rises in Huyton. It is in culvert along Salerno Drive and then open channel through Woolfall Heath where it is met by two unnamed drains that drain areas bordering the M57. It then leaves the Borough west of Stockbridge Village and flows through Croxteth Country Park before meeting Fazakerley Brook north of the sewage works before it re-enters the Borough in the northwest corner of Gillmoss Industrial Estate. It then flows for approximately 1.2km through Kirkby Golf Course before finally leaving the Borough at the weir slightly north of Hancocks Bridge.

2.2.5 Knowsley Brook is a significant tributary of the River Alt that drains the predominantly rural area to the west of the settlement of Knowsley Village, which includes parts of the Knowsley Hall Estate. The watercourse has two branches, the southern branch (Mill Brook) rises in Berry Hill and the northern branch rises close to Coopers Moss Farm on Cut Lane. Both branches meet at Ainsworth Lane west of Knowsley Business Park. Knowsley Brook then flows for approximately 1.9km meeting the River Alt at Willow Bed Plantation.

2.2.6 Croxteth Brook meets Knowsley Brook in Gillmoss and prior this it flows in open channel along the Knowsley boundary and Croxteth in Liverpool. A number of small watercourses drain westwards from the settlement of Knowsley Village and to the north of Stockbridge Village meeting the Croxteth Brook, including Flukers Brook.

2.2.7 Kirkby Brook is another significant tributary of the River Alt and it drains an area to the north of Kirkby. Rising in rural Kirkby Moss and flowing in culvert under Knowsley Industrial Park, it then meets the Simonswood Brook, changing direction to flow south in open channel through Millbrook Park and Valley Park before flowing under the M57 to meet the River Alt approximately 100m upstream of the confluence with the Knowsley Brook. Simonswood Brook is a much larger watercourse that drains the area to the north of the Borough. It follows the northern Knowsley boundary flowing around the Tower Hill urban area before meeting Kirkby Brook.

2.2.8 In the south of the Borough the principal catchment is that of Ditton Brook. The source of Ditton Brook is just upstream of Mizzy Dam, located in Knowsley Park

**Table 2-1: Records of fluvial flooding from ordinary watercourses within Knowsley (Source: Knowsley PFRA)**

| Date flooding reported | Location | Sewer Type | Outfall | Chance of rainfall happening in any year | Consequence |
|---|---|---|---|---|---|
| Nov 2000 | Kirkby | Culverted Watercourse | River Alt | Not Known | Highway Flooding |
| Feb 2005 | Kirkby | Culverted Watercourse | River Alt | Not Known | Highway Flooding |
| Jan 2008 | Kirkby | Culverted Watercourse | River Alt | Not Known | Highway Flooding |
| Oct 2010 | Kirkby | Culverted Watercourse | River Alt | Not Known | Highway Flooding |
| Jan 2011 | Kirkby | Culverted Watercourse | River Alt | Not Known | Highway Flooding |
| Feb 2011 | Kirkby | Culverted Watercourse | River Alt | Not Known | Internal flooding to one property |

2.2.13 Flow and level data is also available from the Environment Agency's HiFlows-UK website for the Alt at Kirkby flow and stage monitoring gauge (Gauge Ref: 69032). This is located at NGR 339180, 398340 on the boundary of Knowsley and is operated by the Environment Agency. A review of the annual maximum series, which identifies the highest flow within each water year (1st October to 30th September), indicates that the highest recorded flow at the gauge was approximately $31m^3s^{-1}$ recorded on 10th August 2004. Prior to this the highest recorded flow had been of $26m^3s^{-1}$ on 10th August 1971, followed by two events of nearly $25m^3s^{-1}$ in successive water years, on 30th October 2000 and 9th September 2002. It is not known whether these events caused flooding anywhere, however, they do not coincide with records presented in the PFRA[11] for Kirkby Brook or those within the Mersey Estuary CFMP[13] for Ditton Brook.

2.2.14 A review of the Chronology of British Hydrological Events website, managed by University of Dundee, and an internet search were also carried out for other historical fluvial flooding information but no results were found within the Borough of Knowsley.

**Flood Zones**

2.2.15 Current national planning policy defines three distinct flood zones, 1, 2 and 3, with further sub-classification of Flood Zone 3 into Flood Zone 3a and Flood Zone 3b.

2.2.16 Table 2-2, provides detail of how each flood zone is defined. It is important to

the Borough should have reasonable permeability and may therefore be suitable for infiltration based drainage system. The Coal and Millstone Grit deposits of the Borough generally give rise to poor permeability therefore the potential for infiltration based drainage solutions in these areas may be limited. Overlying drift deposits also influence the suitability for SuDS, as this can allow or inhibit the infiltration of runoff into the underlying solid geology. For example, less permeable till deposits are likely to reduce the opportunities for the infiltration of rainfall into underlying strata, whilst permeable sand deposits are likely to facilitate infiltration.

4.3.24 Figure B11 presents a schematic of the potential to use SuDS to manage surface water. Areas identified as High Probability are those that combine permeable drift or no drift above 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.

4.3.25 Overall Figure B11 indicates that opportunities for infiltration-based SuDS systems are likely to be highest in those areas around Kirkby in the north of the Borough, which lie in an area with both sand drift deposits and underlying sandstone solid geology, though there are isolated pockets of land that may however be favourable elsewhere. Away from Kirkby, it is likely that there will be fewer opportunities for infiltration-based SuDS systems, with limited opportunities in a band of land extending northwards from midway between Huyton and Prescot towards the eastern edge of Kirkby.

4.3.26 Where space is available within developments then SuDS such as swales, balancing ponds and wetlands should be promoted, though it should be acknowledged that these require space to be set aside for their operation, as well as having maintenance requirements. Green roofs are a valuable technique in the urban environment to reduce existing site runoff and KMBC should consider actively promoting their use. In February 2011 the Green Roof Organisation produced the Green Roof Code[24] for the United Kingdom. The code, which was the result of technical co-operation across the UK green roof industry, is intended to be recognised as a code of best practice and guide behaviour relating to green roof design, specification, installation and maintenance.

4.3.27 The use of possible infiltration-based SuDS should be investigated at a site specific scale when individual development sites come forward for development. Infiltration tests should be carried out as there may be opportunities for some

[24] The Green Roof Code, February 2011.

covers, flood gates for doorways and windows and no-return valves for drainage pipes.

4.3.35 Guidance from CLG in *Improving the Flood Performance of New Buildings: Flood resilient construction* (2007)[26] indicates that most buildings that are impacted by flooding to a depth of greater than 100mm may benefit from resistance measures. These are likely to be effective when depths are relatively shallow and potentially up to approximately 0.6m. Above this, and inevitably in some cases below this value, flood water is more than likely to ingress through an unprotected pathway and flood resilience measures become more appropriate.

4.3.36 Assessment of the Flood Map for Surface Water (FMfSW) 200yr (deep) dataset would suggest that there are isolated areas of Kirkby, Huyton, Prescot and Halewood that might benefit from flood resilience and resistance measures. Further assessment of the FMfSW outlines against the National Receptor Database has been undertaken to count properties at risk and to identify where there may be benefits from retrofitting flood resilience and resistance measures. The definition of acceptability is based on the CLG guidance above, in which it is recommended that depths below 0.3m are potentially appropriate for flood resistance measures and depths that are less than 0.6m are potentially appropriate for flood resilience measures.

4.3.37 Using this criteria, the 30yr Flood Map for Surface Water dataset identifies at least 1,267 ground floor properties at risk from flooding whilst the 200yr dataset identifies at least 4,792 properties at risk from flooding. Of these 1,032 and 4,156 properties respectively are homes and the remainder are businesses and other uses that may benefit from flood risk management measures.

4.3.38 The 30yr (deep) Flood Map for Surface Water dataset identifies at least 179 properties at risk from flooding that is greater than 0.3m, whilst the 200yr (deep) dataset identifies at least 1,006 properties at risk from flooding that is greater than 0.3m. The potential depth of flooding at these properties implies that flood resilience measures may be suitable, whilst for the remainder flood resistance measures may also be appropriate.

**Urban Creep**

4.3.39 A recent study by Martin Allitt and Andrew Tewkesbury[27] investigated the problem of urban creep in five cities across the UK. Urban creep is the loss of permeable surfaces within urban areas, typically development like extensions, patios and paving of front gardens to create off-street parking, all of which were until recently forms of permitted development. The latter, paving of front gardens, has now

[26] CLG, Improving the flood performance of new buildings: flood resilient construction.
[27] Allitt, M & Tewkesbury, A (2009) Investigations into Urban Creep at 5 Cities

## 4. FLOOD RISK IN THE PAST

The PFRA requires significant historic flood events to be recorded and reported to Europe through this report. There has been no formal guidance on what 'significant' means in terms of historic local flooding; Defra has left it to LLFAs to determine their own definition. For the recording of past local flood risk, the "indicative flood risk" criteria of 200 people in a 1km grid square was reduced to 20 people (or approximately 8 houses) in a 1km grid. To ensure a consistent Merseyside approach, this method for establishing past local flood risk was discussed at the Merseyside Drainage Group meeting on 17th January 2011 and on 21st February 2011 adopted across the region as the accepted way forward.

Figure 4-1: Spatial Distribution of Past Surface Water Flood Locations.

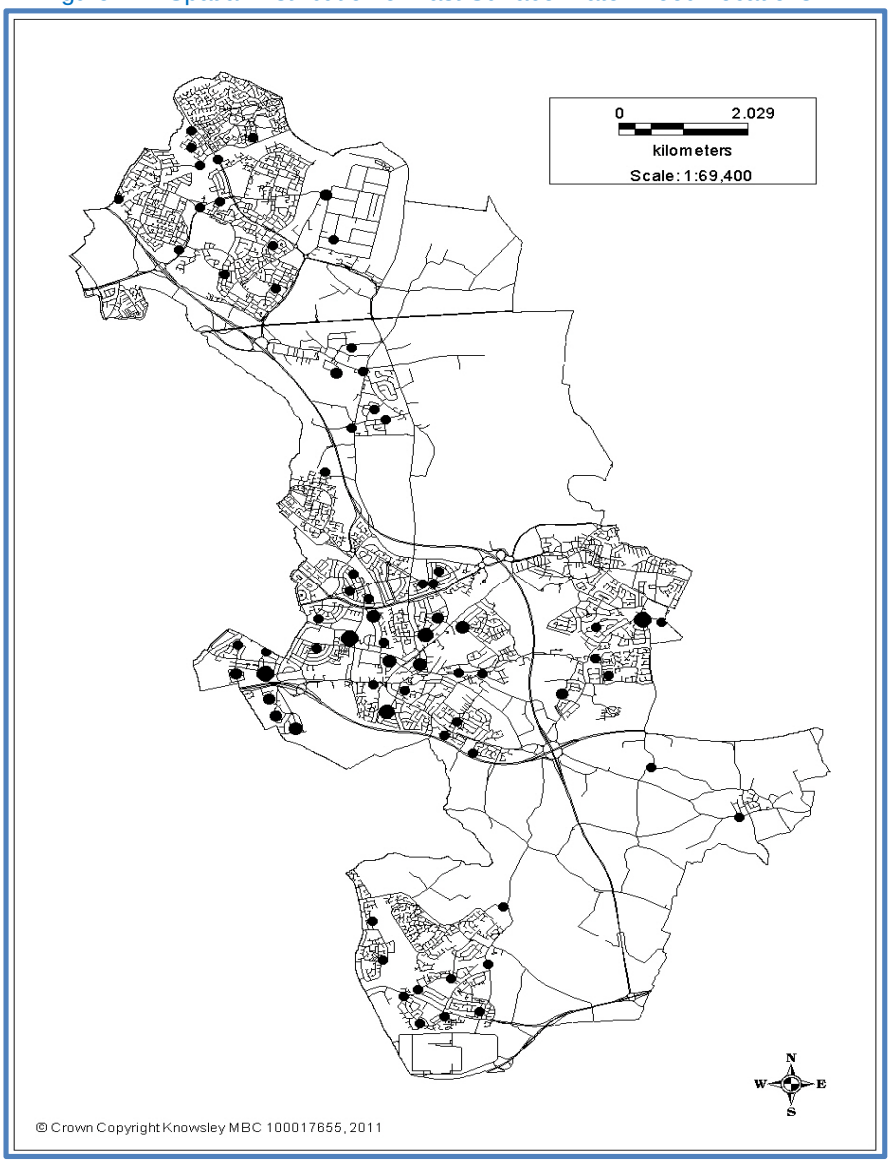
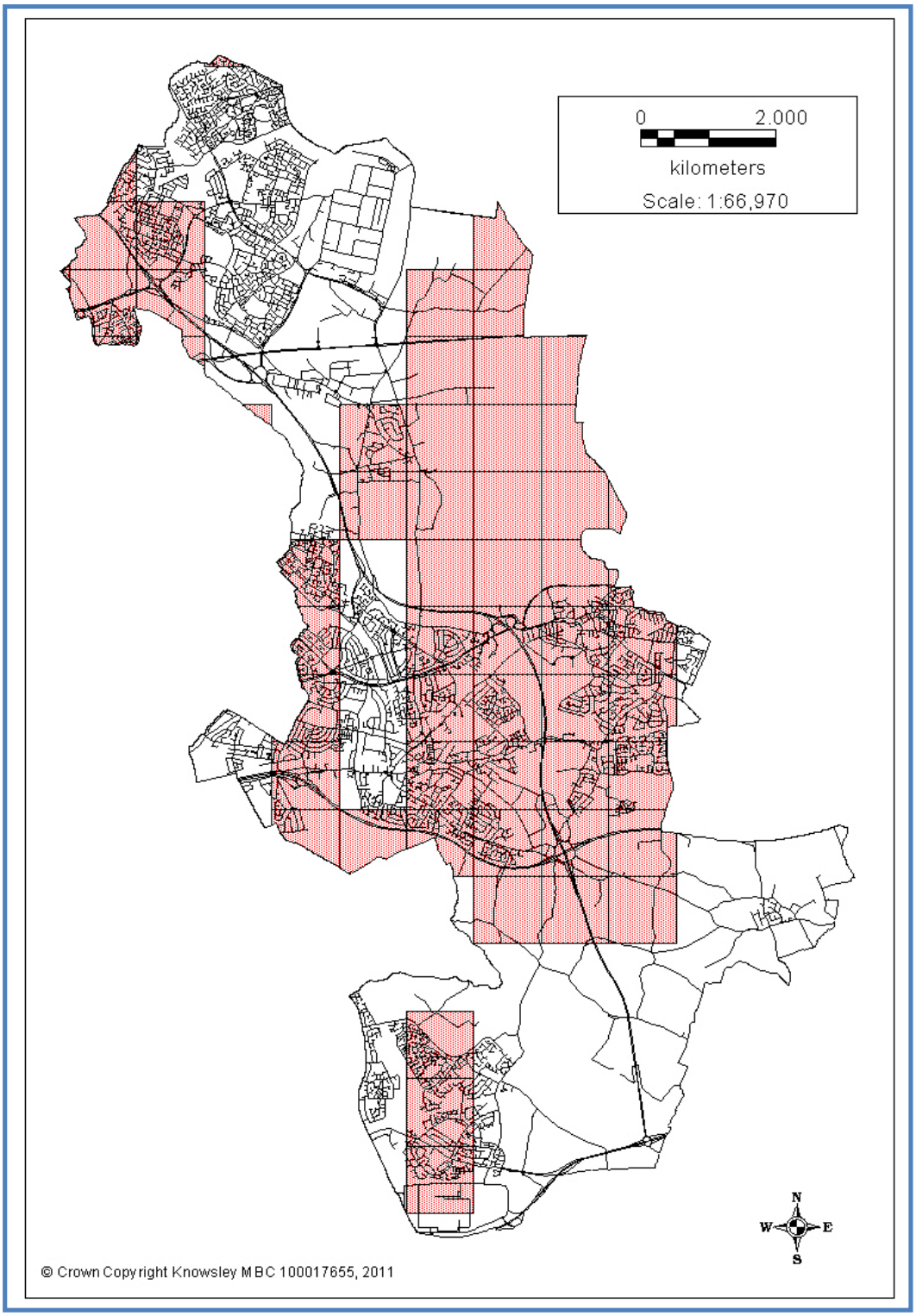


**Figure 5-1 – Areas Susceptible to Ground Water Flooding**



no Areas Benefiting from Defences (ABD) within Knowsley, which implies that none of the defences provides protection against flooding with a 1% chance of occurring. An ABD does exist on Netherley Brook, however, this is within the adjacent Liverpool District.

2.3.2 Figure B2 presents the Environment Agency's Flood Zones and defences. The NFCDD data indicates that none of the man-made raised defences in the Borough are in a good condition. They are all in either a fair or very poor condition. The design standard of the defences varies between a 5 year Standard of Protection (SoP) and a 100 year Standard of Protection.

2.3.3 The defences with a high SoP (100 year) are in the south of the Borough, along Ditton Brook and Dog Clog Brook. The Ditton Brook defences consist of raised earth embankments which have been assessed as being in a very poor condition. As described above, the modelling results suggest that these defences do not actually provide a 100 year SoP. The flood bank at Dog Clog Brook is classified as being in a fair condition and is supposed to provide property protection up to the 1% AEP event. This watercourse has not been modelled.

2.3.4 The defences with a lower SoP (less than 100 years) include short reaches on the Netherley Brook and Spring Brook in the south of the Borough which are in a fair condition. The low SoP is confirmed by the modelling data which shows the defences are overtopped in the 1% AEP. In the north of the Borough the embankment along Croxteth Brook is considered to be in a fair condition and had a SoP of 25-50 years.

2.3.5 Within the south of the Borough, the Netherley and Halewood Brook hydraulic model includes both defended and undefended model runs, however, the defences are on the right bank of the watercourse and therefore protect properties within Liverpool District and not Knowsley. The model results have been reviewed and the defences appear to provide a level of protection equivalent to between a 0.5% AEP and a 0.1% AEP flood event. From the 1% AEP event and above, there are small areas within Knowsley that appear to receive disbenefit from the presence of these defences, however, they are rural and there is no increase in risk to property.

2.3.6 The results of the River Alt Strategy Model show only a small floodplain in the 1% AEP within the boundary of KMBC on the Kirkby golf course in the north west of the Borough. There are no defences here and the extent of the 1% AEP floodplain is the same in the defended and undefended scenarios.

**Culverted Watercourses**

2.3.7 A review of the Environment agency's National Flood and Coastal Defence

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# APPENDIX K: SURFACE WATER RUN-OFF CALCULATIONS

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# SURFACE WATER RUN-OFF CALCULATION SHEET

| | |
|---|---|
| **Development** | KIRKBY VALLEY GOLF COURSE |
| **Project No.** | HYD778 |

| | | | |
|---|---|---|---|
| **Revision** | D | **Completed by** | HB |
| **Date** | 07/06/2023 | **Checked by** | KH |

## Areas

| | | | |
|---|---|---|---|
| Total Site | 80.290 | ha | |
| Development Area[1] | 2.163 | ha | |
| Existing Impermeable | 0.000 | ha | |
| Existing Impermeable[2] | 0.000 | ha | |
| Existing Pervious | 80.290 | ha | |
| Existing Pervious[2] | 0.000 | ha | |
| Proposed total impermeable | 1.789 | ha | 83% |

## Catchment Characteristics

| | | | | | |
|---|---|---|---|---|---|
| SAAR | 841 | mm | | | |
| SPR | 0.3 | | | | |
| BFI | 0.659 | | | | |
| $i_1$ | 16.6 | mm/hr | $d_1$ | 21.0 | mm |
| $i_{30}$ | 30.8 | mm/hr | $d_{30}$ | 47.2 | mm |
| $i_{100}$ | 41.0 | mm/hr | $d_{100}$ | 62.0 | mm |

## Run-off Rates

***Pre-development***

| | | | |
|---|---|---|---|
| Impermeable ------ | 1yr | 0.0 | l/s |
| | 30yr | 0.0 | l/s |
| | 100yr | 0.0 | l/s |
| | 50mm/hr[3] | 0.0 | l/s |
| Pervious[4] ------ | 1yr | 5.3 | l/s |
| | 30yr | 10.4 | l/s |
| | 100yr | 12.8 | l/s |
| | QBar[5] | 6.1 | l/s |
| Total ------ | 1yr | 5.3 | l/s |
| | 30yr | 10.4 | l/s |
| | 100yr | 12.8 | l/s |

***Post-development (without control)***

| | | | |
|---|---|---|---|
| Impermeable[6] ------ | 1yr | 82.5 | l/s |
| | 30yr | 153.3 | l/s |
| | 100yr+30%CC | 264.9 | l/s |

## Volumes

***Pre-development***

| | | | |
|---|---|---|---|
| Impermeable ------ | 1yr | 0.0 | cu.m |
| | 30yr | 0.0 | cu.m |
| | 100yr | 0.0 | cu.m |
| Pervious[4] ------ | 1yr | 157.2 | cu.m |
| | 30yr | 310.2 | cu.m |
| | 100yr | 442.8 | cu.m |
| Total ------ | 1yr | 157.2 | cu.m |
| | 30yr | 310.2 | cu.m |
| | 100yr | 442.8 | cu.m |

***Post-development***

| | | | |
|---|---|---|---|
| Impermeable[6] ------ | 1yr | 375.7 | cu.m |
| | 30yr | 844.8 | cu.m |
| | 100yr | 1109.2 | cu.m |

## Stormwater Storage Estimates

***Based on Greenfield run-off QBar***

**Microdrainage Quick Storage Estimates** (using FEH catchment data)

| Return Period | Rate | | lower | upper | mean | |
|---|---|---|---|---|---|---|
| 1yr | 6.1 | l/s | 256 | 425 | 340.5 | cu.m |
| 30yr | 6.1 | l/s | 583 | 807 | 695 | cu.m |
| 100yr+30%CC | 6.1 | l/s | 1144 | 1471 | **1307.5** | **cu.m** |

1/ The 'development area' removes areas of POS and/or landscaped areas of the wider site that are to remain as existing.
2/ On occasion the existing impermeable area cannot be evidenced to connect and a reduction is applied.
3/ 50mm/hr is used for BRegs calculations and often used by Water Companies when considering allowable post-development rates of discharge. (Rational Method)
4/ The Greenfield rates and of run-off have been calculated using the UK SUDS Calculator
5/ QBar is the estimated flood flow for the 2.33yr return period event and is often used as a post-development rate restriction.

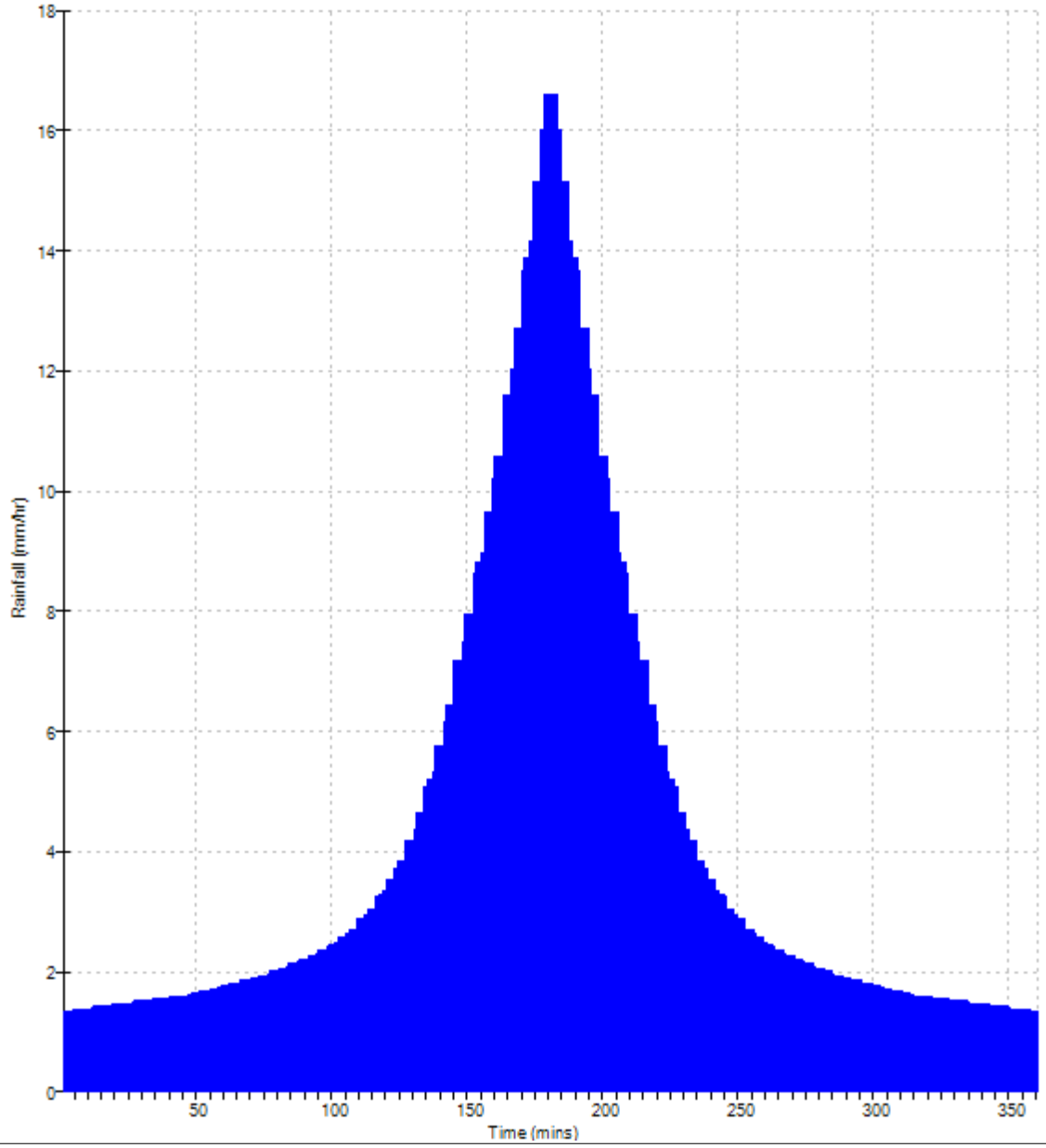
6/ Post-development run-off is only considered from the impermeable area when the proposed post-development impermeable area >50% in accordance with the EA Guidance Preliminary rainfall runoff management for developments (W5-074/A/TR1/1 rev E (2012).

NB. The catchment characteristics are from the FEH catchment, the UK SUDS Calculator and Microdrainage.
NB. The rainfall intensities and depths are calculated for the 6hr duration rainfall event (peak summer intensity)

## Rainfall profile

Storm duration (mins) 360

| FEH Data | |
|---|---|
| FEH Rainfall Version | 2013 |
| Site Location GB | 339428 398090 |
| Data Type | Point |
| Peak Intensity (mm/hr) | 16.614 |
| Ave. Intensity (mm/hr) | 4.238 |
| Return Period (years) | 2.0 |

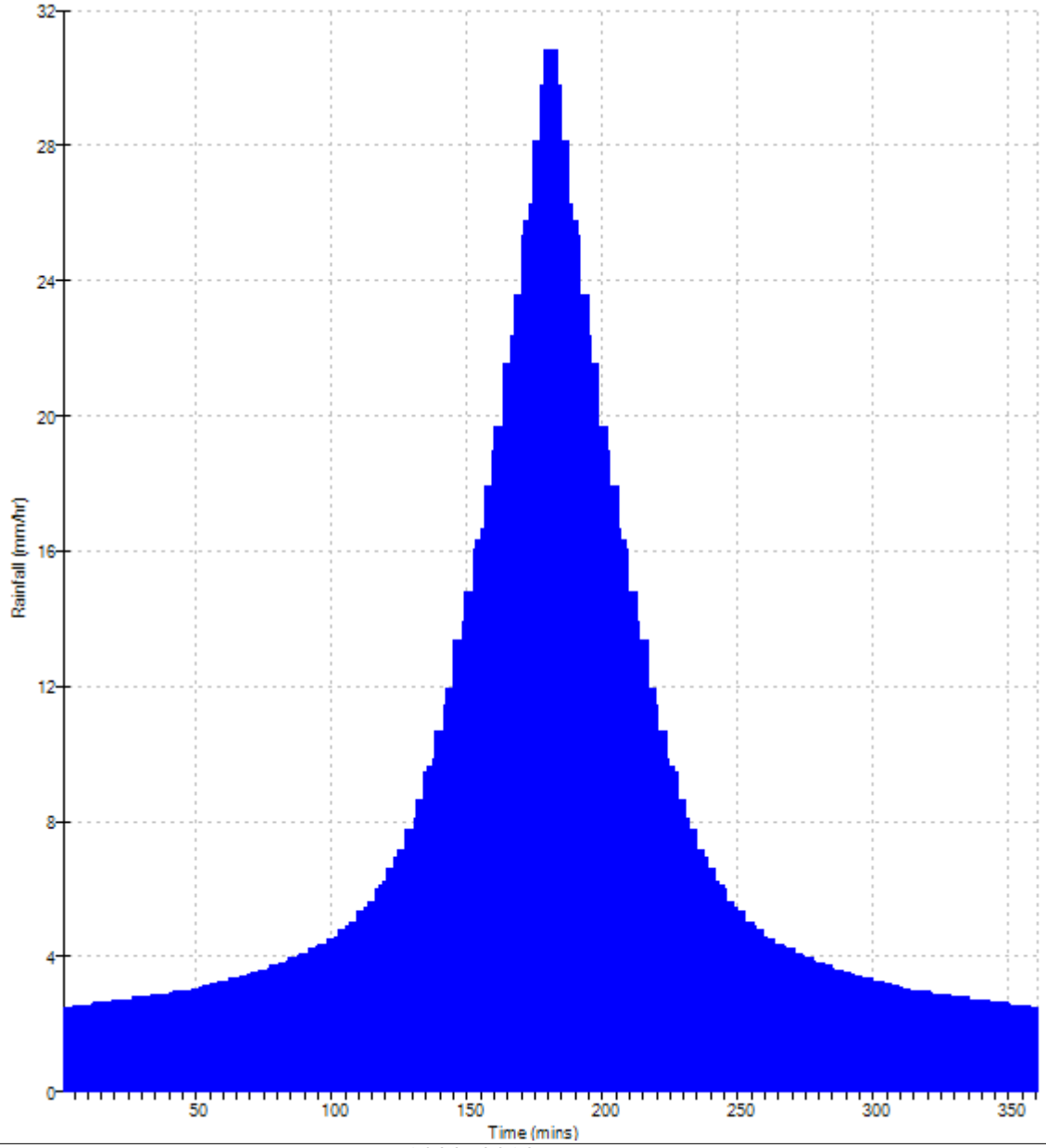



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## Rainfall profile

Storm duration (mins) 360

| FEH Data | |
|---|---|
| FEH Rainfall Version | 2013 |
| Site Location GB | 339428 398090 |
| Data Type | Point |
| Peak Intensity (mm/hr) | 30.849 |
| Ave. Intensity (mm/hr) | 7.870 |
| Return Period (years) | 30.0 |

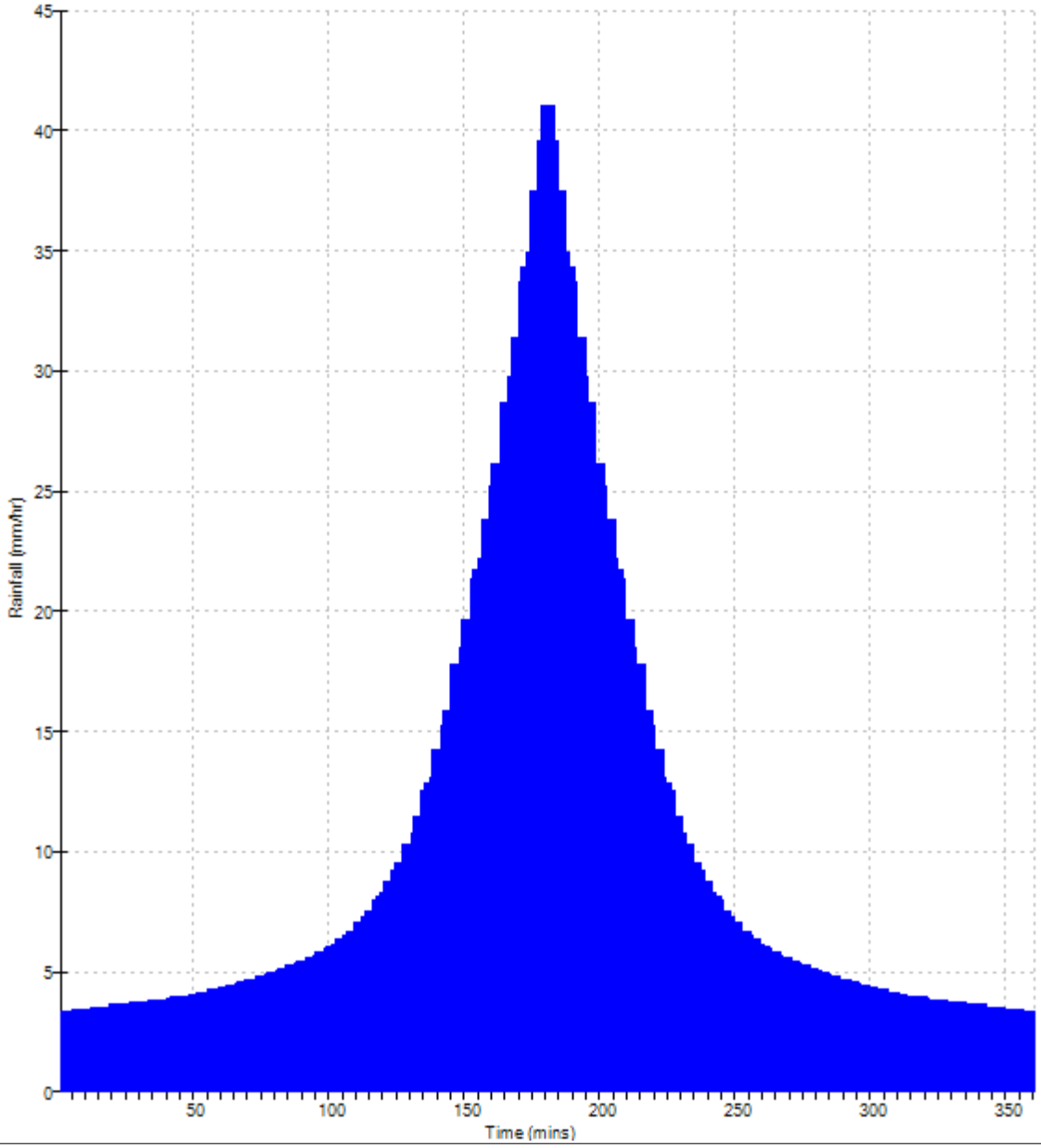



©1982-2018 Innovyze

## Rainfall profile

Storm duration (mins) 360

| FEH Data | |
|---|---|
| FEH Rainfall Version | 2013 |
| Site Location GB | 339428 398090 |
| Data Type | Point |
| Peak Intensity (mm/hr) | 41.032 |
| Ave. Intensity (mm/hr) | 10.467 |
| Return Period (years) | 100.0 |




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## Greenfield Runoff Volume

FEH Data

| | |
|---|---|
| Return Period (years) | 100 |
| Storm Duration (mins) | 360 |
| FEH Rainfall Version | 2013 |
| Site Location | GB 339428 398090 |
| Data Type | Point |
| Areal Reduction Factor | 1.00 |
| Area (ha) | 2.163 |
| SAAR (mm) | 841 |
| CWI | 119.327 |
| SPR Host | 30.000 |
| URBEXT (1990) | 0.0000 |

Results

| | |
|---|---|
| Percentage Runoff (%) | 32.60 |
| Greenfield Runoff Volume ($m^3$) | 442.827 |

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## Greenfield Runoff Volume

FEH Data

| | |
|---|---|
| Return Period (years) | 30 |
| Storm Duration (mins) | 360 |
| FEH Rainfall Version | 2013 |
| Site Location | GB 339428 398090 |
| Data Type | Point |
| Areal Reduction Factor | 1.00 |
| Area (ha) | 2.163 |
| SAAR (mm) | 841 |
| CWI | 119.327 |
| SPR Host | 30.000 |
| URBEXT (1990) | 0.0000 |

Results

| | |
|---|---|
| Percentage Runoff (%) | 30.38 |
| Greenfield Runoff Volume ($m^3$) | 310.243 |

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## Greenfield Runoff Volume

FEH Data

| | |
|---|---|
| Return Period (years) | 2 |
| Storm Duration (mins) | 360 |
| FEH Rainfall Version | 2013 |
| Site Location | GB 339428 398090 |
| Data Type | Point |
| Areal Reduction Factor | 1.00 |
| Area (ha) | 2.163 |
| SAAR (mm) | 841 |
| CWI | 119.327 |
| SPR Host | 30.000 |
| URBEXT (1990) | 0.0000 |

Results

| | |
|---|---|
| Percentage Runoff (%) | 28.58 |
| Greenfield Runoff Volume ($m^3$) | 157.213 |

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# APPENDIX L: FLOOD RISK PLAN OVERLAYS

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**DO NOT SCALE**

## Legend

Flood Depth (m)

- 0.01 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.81 - 1.00
- 1.01 - 1.20
- 1.21 - 1.40
- 1.41 - 1.60
- 1.61 - 1.80
- 1.81 - 2.00
- 2.00 +

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|
| A | 22/11/19 | PT | PRELIMINARY | DK |

DRAWING STATUS: PRELIMINARY

BETTS HYDRO
CONSULTING ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 enquiries@betts-associates.co.uk

green circle estates

PROJECT: KIRKBY VALLEY GOLF COURSE

TITLE:
1% AEP + CC
(1 in 100 YEAR RETURN PERIOD P-LUS 35% CC)
EXISTING SCENARIO
FLOOD DEPTH PLAN

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| NOV 22 | 1:5000 | P.T. | D.K. |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| HYD778 | 101 | A |

# APPENDIX M: PROPOSED DRAINAGE PLANS

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**SITE:** Kirkby Valley Golf Club, Liverpool
**REF:** HYD778
**REV:** 3.0
**DATE:** 07/06/2023

BETTS HYDRO CONSULTING ENGINEERS

# PRELIMINARY PROPOSED DRAINAGE STRATEGY PLAN




**LEGEND**

Site Extent

**Existing Drainage Features**

- Main River
- Ordinary Watercourse
- Ponds

**Existing Sewer Network**

- Public Foul Water Sewer
- Public Surface Water Sewer
- Private Surface Water Sewer
- Public Combined Water Sewer
- Public Overflow Sewer
- Existing SW Connection (assumed)

**Proposed Drainage Connections**

**Opt.1:** Surface Water to Ground

- *Soakaways*
- *Permeable Surfacing*

**Opt.2:** Surface Water to Watercourse

- *Connection to River Alt*
- Tee/Land Drainage Proposed
- Foul Water to Public Sewer

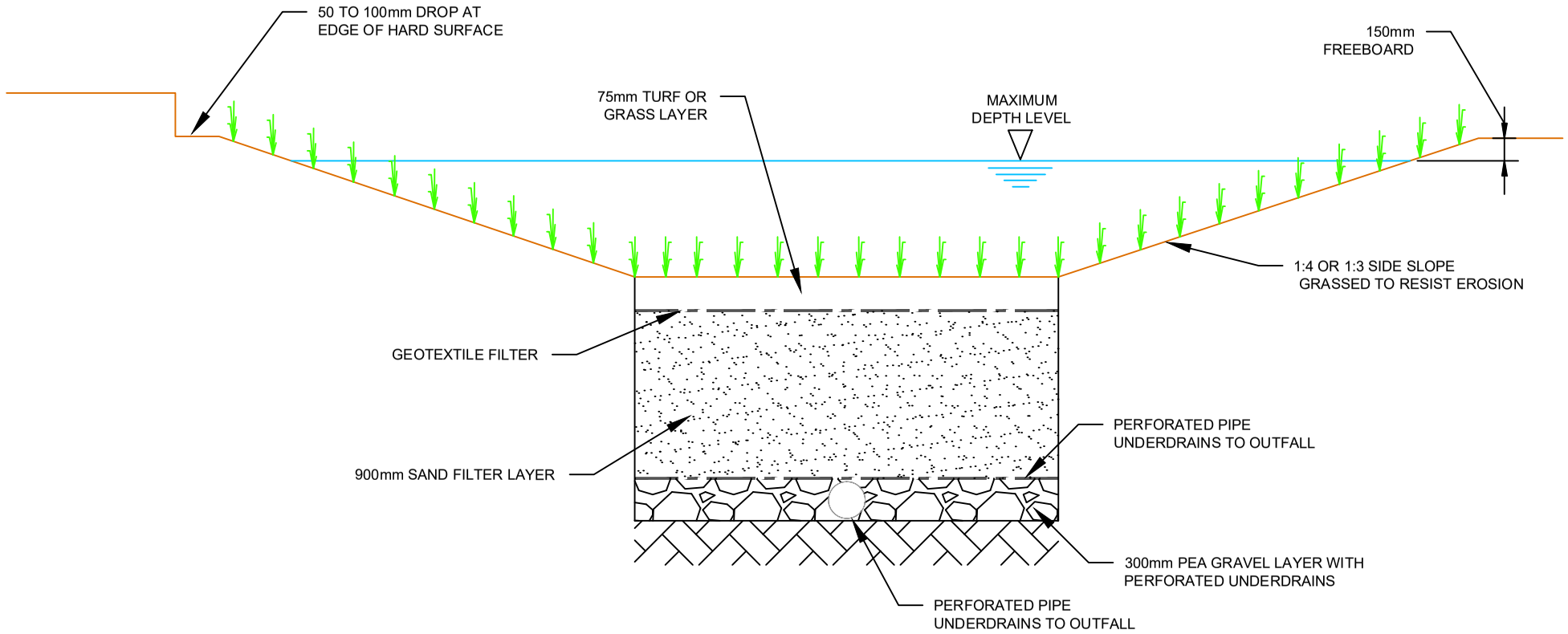
**FURTHER NOTES:**

*This drawing is not a drainage 'design' it is a preliminary drainage strategy showing indicative sewer locations. No hydraulic simulation or assessment of these proposals has been undertaken. Proposed points of connection to the existing culverts require invert levels to be accurately established. Surcharging of the proposed outfall will require modelling to satisfy the requirements of united utilities along with full hydraulic analysis.*

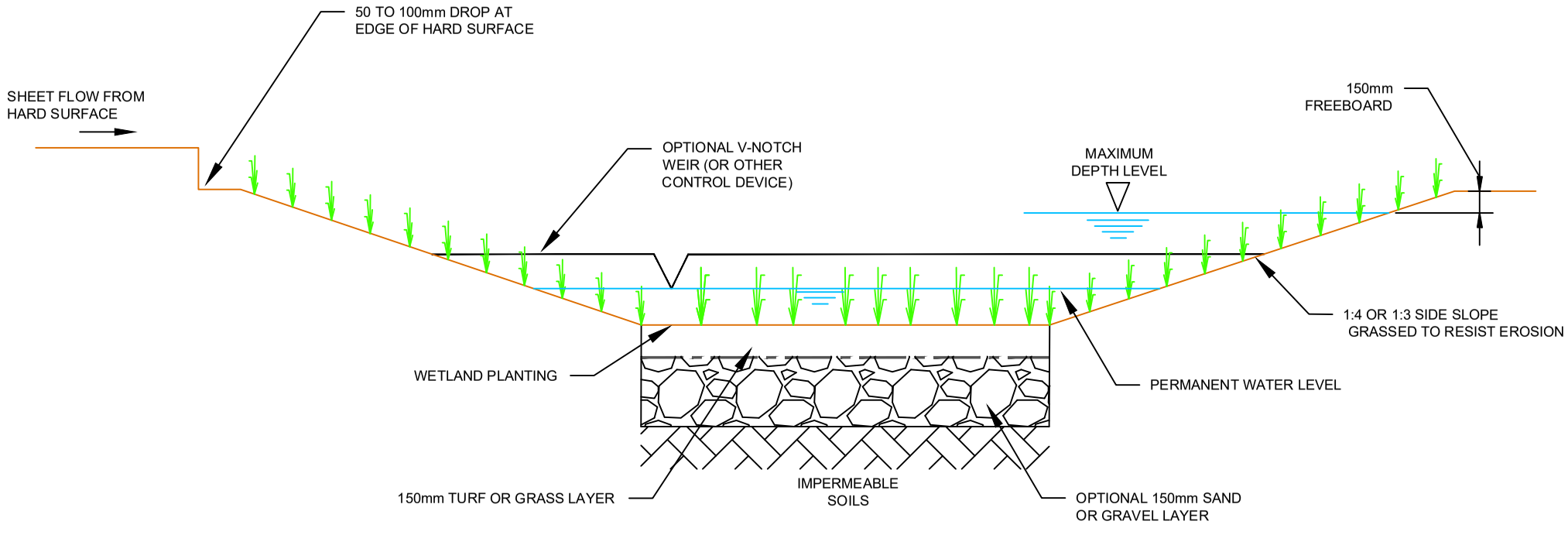
# APPENDIX N: TYPICAL SUDS DETAILS

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DO NOT SCALE




DRY SWALE




WET SWALE

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

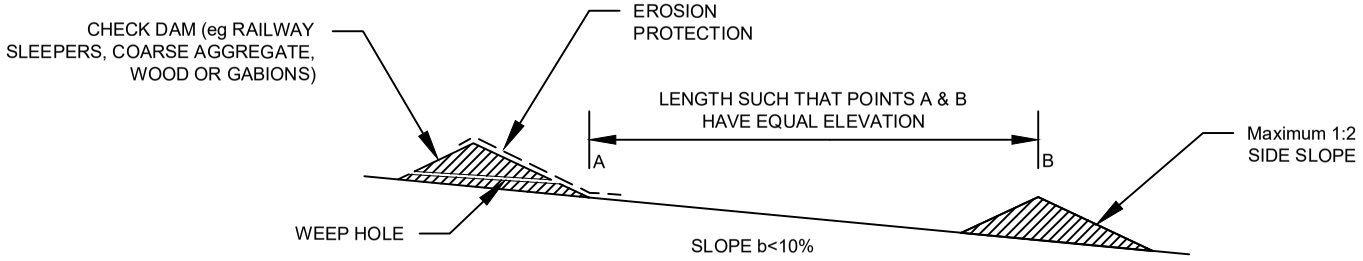
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TITLE: SWALES (1 of 2)

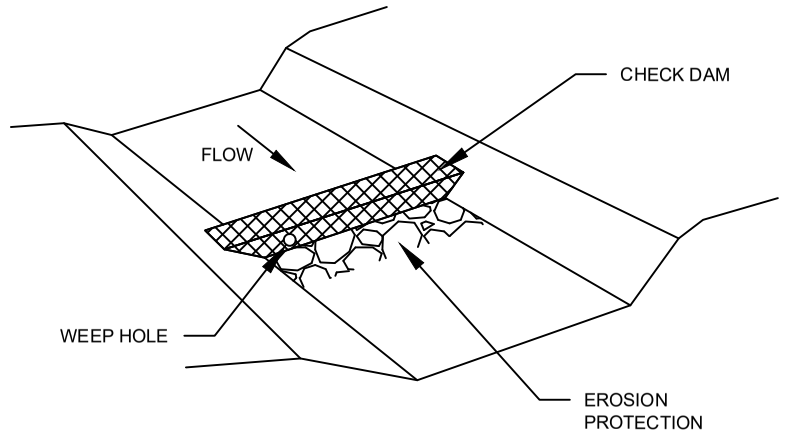
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|---|---|---|---|
| SEP 2014 | @ A3 | CP | RDN |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| BETTS | 103 | A |

DO NOT SCALE

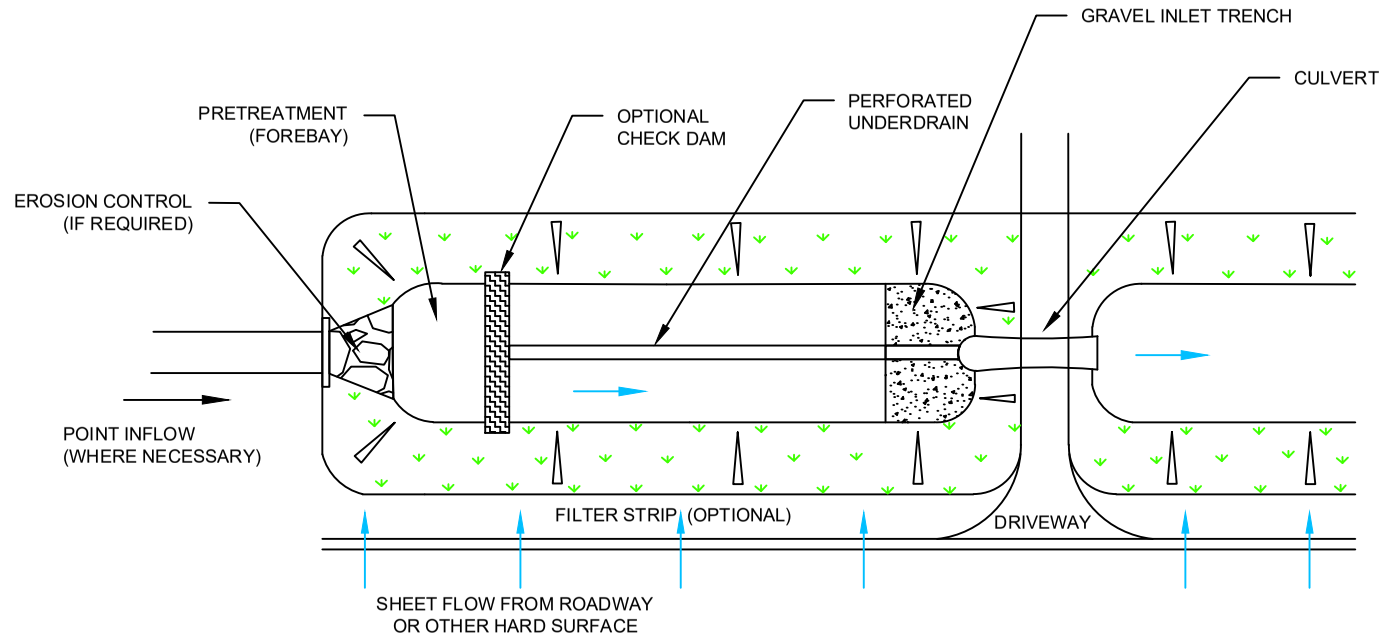



ELEVATION




SCHEMATIC

# CHECK DAM




ENHANCED DRY SWALE

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

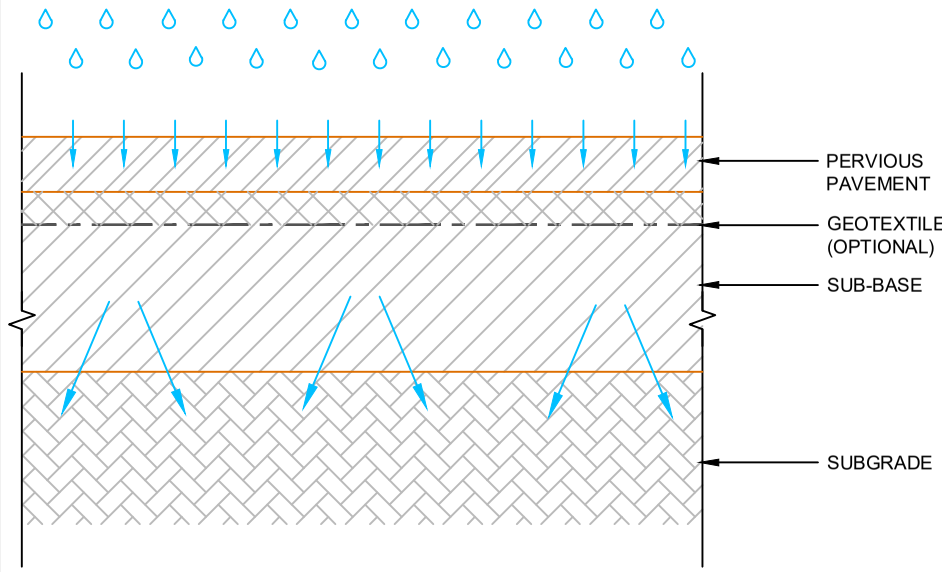
PROJECT: TYPICAL SUDS DETAIL

TITLE: SWALES (2 of 2)

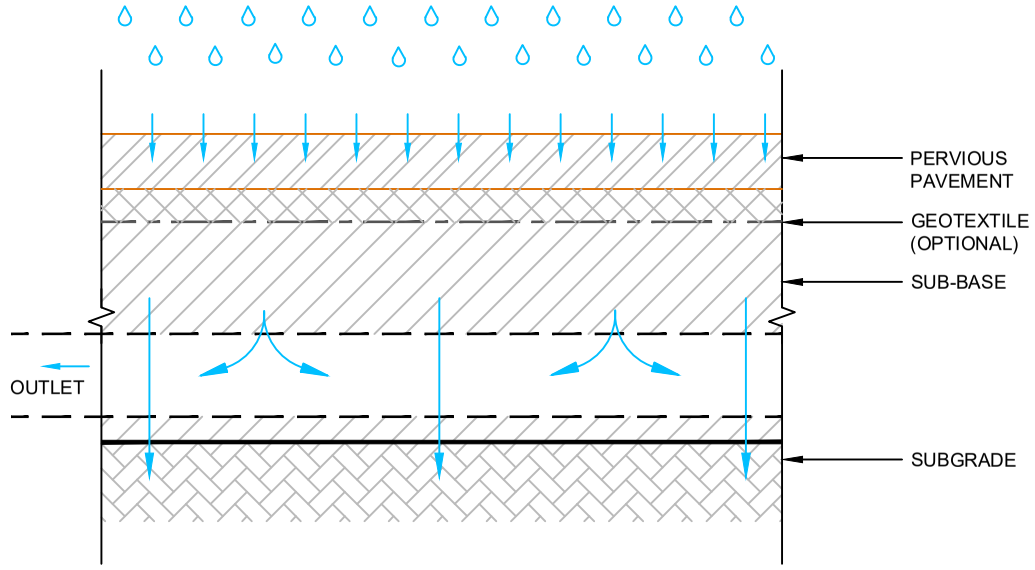
| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| SEP 2014 | @ A3 | CP | RDN |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| BETTS | 104 | A |

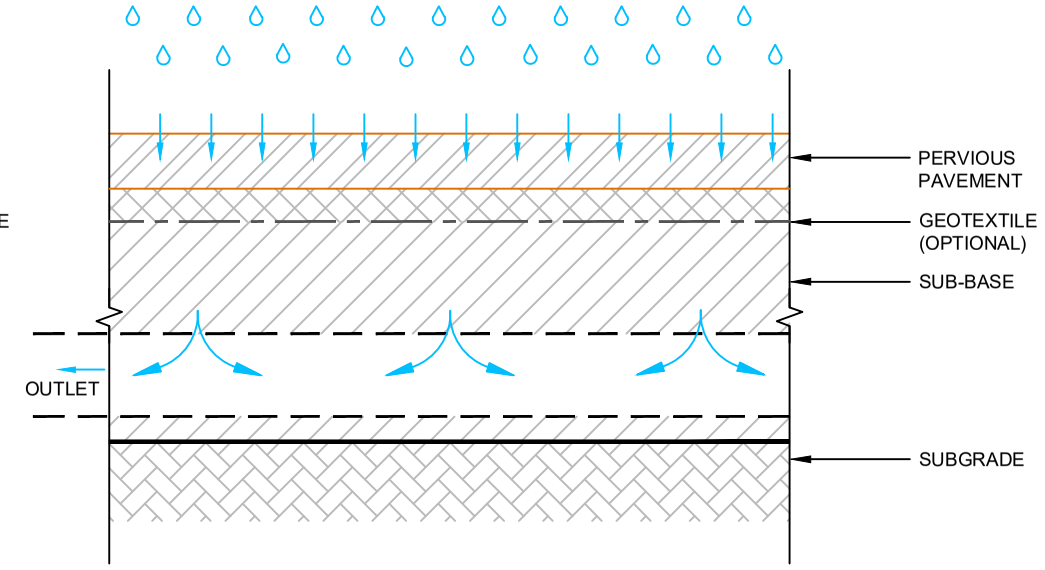
DO NOT SCALE



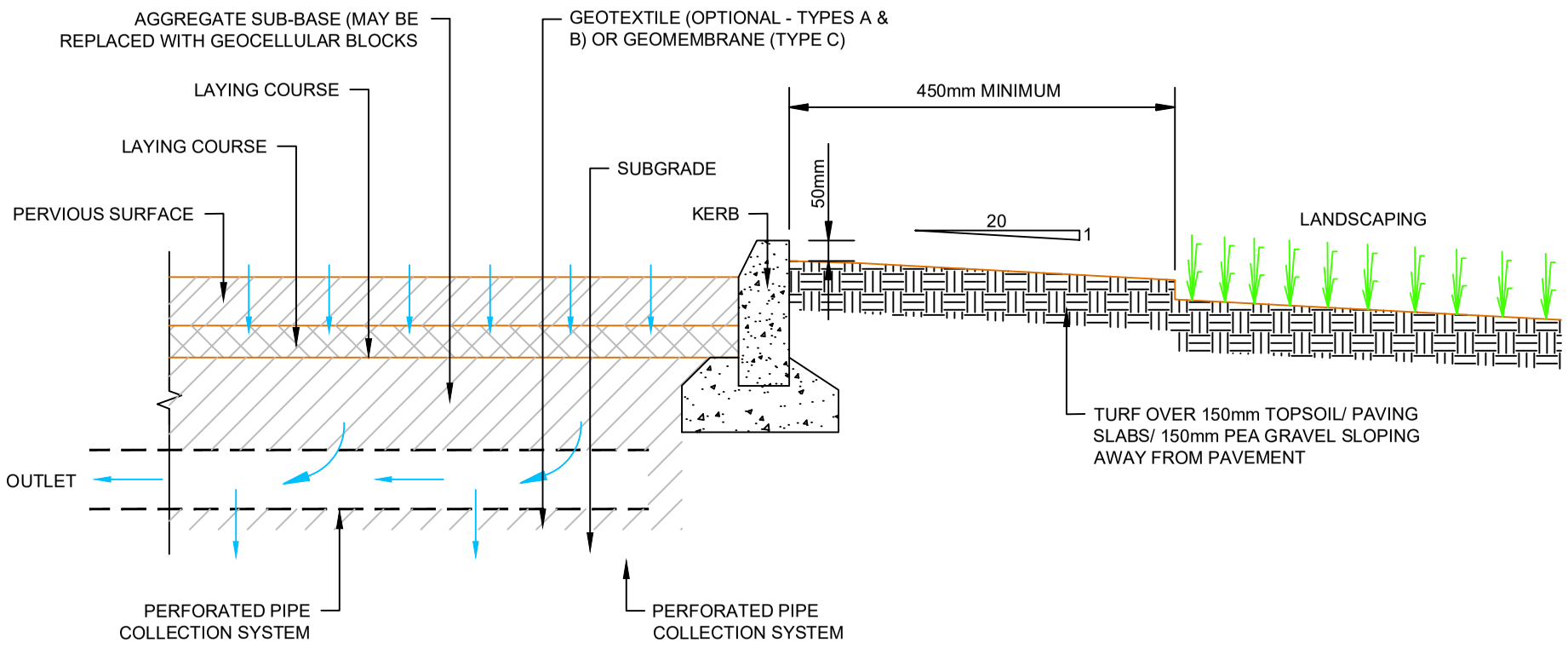

TYPE A: TOTAL INFILTRATIPN




TYPE B: PARTIAL INFILTRATION




TYPE C: NO INFILTRATION




LANDSCAPING DETAIL

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
CIVIL AND STRUCTURAL ENGINEERS
Unit 6, Old Marsh Farm Barns, Welsh Road, Sealand, Flintshire CH5 2LY
Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

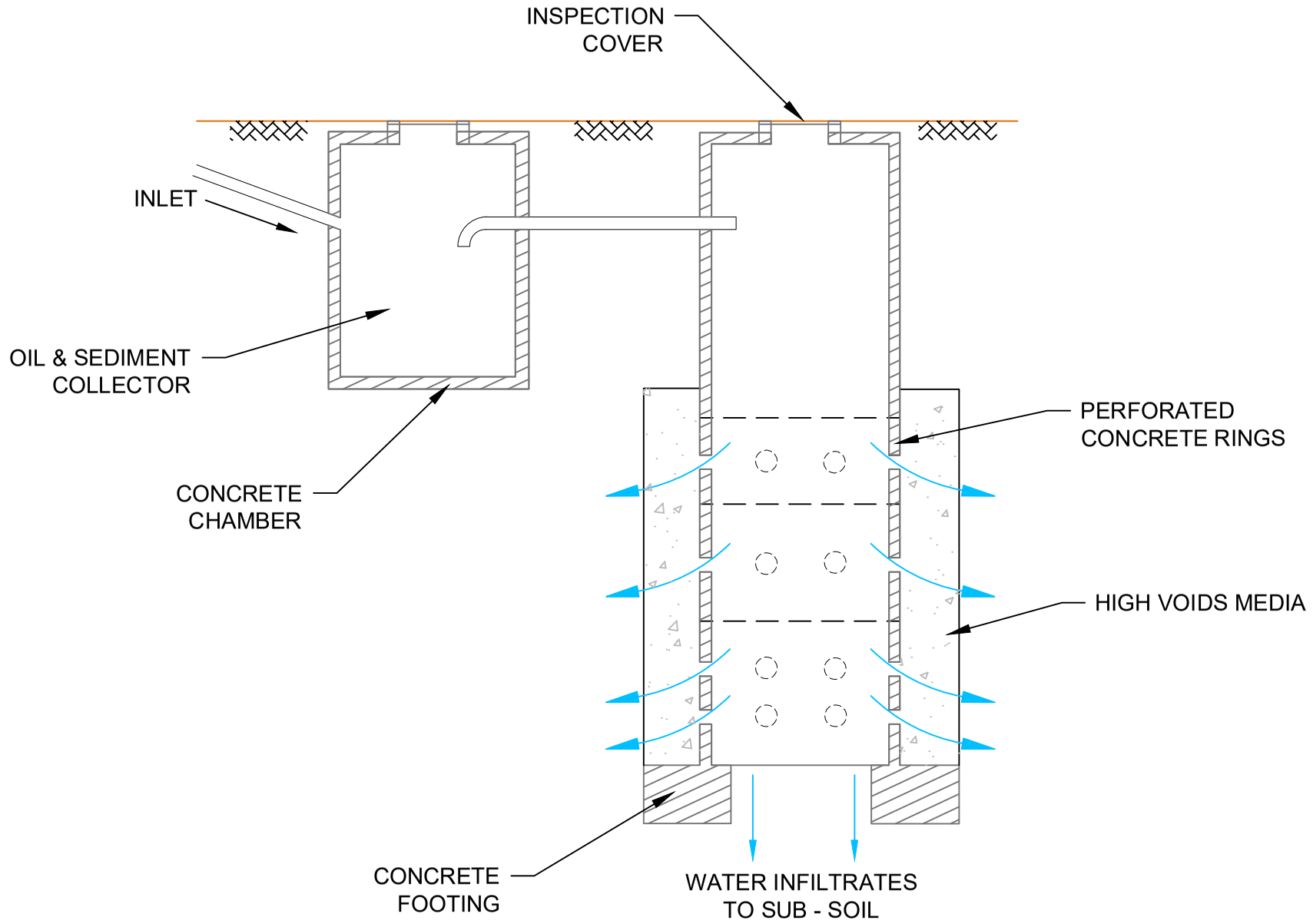
PROJECT: TYPICAL SUDS DETAIL

TITLE: PERVIOUS PAVEMENTS

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| SEP 2014 | @ A3 | CP | RDN |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| BETTS | 105 | A |

DO NOT SCALE




## SOAKAWAY DETAILS (INCLUDING PRE-TREATMENT DEVICE)

| REV | DATE | BY | DESCRIPTION | CHK |
|---|---|---|---|---|

DRAWING STATUS: PRELIMINARY

BETTS ASSOCIATES
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Tel: 01244 288178 Fax: 01244 288516 enquiries@betts-associates.co.uk

PROJECT: TYPICAL SUDS DETAIL

TITLE: SOAKAWAYS

| DATE: | SCALE @ SIZE: | DRAWN: | CHECKED: |
|---|---|---|---|
| SEP 2014 | @ A3 | CP | RDN |

| PROJECT No: | DRAWING No: | REV: |
|---|---|---|
| BETTS | 108 | A |

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# APPENDIX O: NOTES OF LIMITATIONS

The data essentially comprised a study of available documented information from various sources together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our conclusions, we request the opportunity to review the information, reassess the potential concerns, and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information.

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