BETTS HYDRO
CONSULTING ENGINEERS

CHERRYFIELD DRIVE
KIRKBY

FLOOD RISK ASSESSMENT AND DRAINAGE MANAGEMENT STRATEGY



For

Barratt & David Wilson Homes North West
303 Bridgewater Place
Birchwood
Warrington
WA3 6XF

DAVID WILSON HOMES
WHERE QUALITY LIVES

DECEMBER 2021

This page has been intentionally left blank

CHERRYFIELD DRIVE
KIRKBY

FLOOD RISK ASSESSMENT AND DRAINAGE MANAGEMENT STRATEGY

Document Tracking Sheet

Document Reference:	HYD659_CHERRYFIELD.DRIVE_FRA&DMS
Revision:	0
Date of Issue:	10th December 2021
Report Status:	DRAFT

Prepared by:
Hannah Buchanan *BSc (Hons)*
Graduate Flood Risk Analyst

Checked by:
Richard Nicholas *BEng (Hons) MSc MBA GMICE MCIWEM*
Director

Authorised by:
Richard Nicholas *BEng (Hons) MSc MBA GMICE MCIWEM*
Director

Revision History:

Rev.:	Date:	Status:	Prepared by:	Checked by:	Issued by:
0	10/11/21	DRAFT	HB	MB/RDN	HB

Old Marsh Farm Barns
Welsh Road, Sealand
Flintshire CH5 2LY
Telephone: 01244 289 041

Betts Hydro Ltd trading as Betts Hydro. Registered in England and Wales No. 09663830
Head Office Betts Associates Ltd

www.betts-associates.co.uk

This page has been intentionally left blank

EXECUTIVE SUMMARY

This Flood Risk Assessment and Drainage Management Strategy was commissioned by Barratt & David Wilson Homes North West referred to hereafter as 'the client'. This report has been prepared to support a planning application for residential development on land located off Cherryfield Drive in Kirkby. The proposals are classified as 'more vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework. This type of development is appropriate when located within Flood Zone 1, providing there is no increase in flood risk elsewhere.

Flood Risk

This report has reviewed all sources of flood risk both to and resulting from the proposed development. Consultation with the Environment Agency, Knowsley Metropolitan Borough Council, and United Utilities have not identified any historical flooding at the site or the wider area. The nearest Main River to site is Kirkby Brook located 53m to the west of the site. The risk to site from Kirkby Brook is understood to be low due to the proximity to site and the surrounding topography.

In terms of other flood risk sources, the mapping has identified some surface water flood risk onsite associated with areas of hardstanding, and low-lying depressions onsite that are neighboured by elevated land as identified by the topographic survey. This surface water flood risk to site will be reduced and sustainably managed post-development, following the implementation of a sustainable surface water management regime and appropriate levels design.

To summarise, the proposals are at low flood risk from the flood sources reviewed as part of this assessment. This assessment has been prepared in consultation with the relevant interested parties and the reports is commensurate with the scale and nature of the development proposals. The development proposals can therefore be considered appropriate in accordance with the Planning Practice Guidance.

Drainage Strategy

Due to the relatively low flood risks identified, the principle focus of this assessment is on the sustainable management of surface water run-off to ensure no increased flood risk results from the development. The surface water discharge options have been assessed in accordance with the sustainable drainage hierarchy. Based on the ground conditions identified by the published online datasets, infiltration will not be able to provide a viable drainage solution for the development due to the impermeable underlying strata.

As infiltration may not be feasible (subject to onsite testing); this assessment also considered the alternative options. The next method in the sustainable drainage hierarchy is discharge surface water run-off generated by the proposals to a nearby watercourse. The nearest watercourse to the site is Kirkby Brook (Main River) located 53m to the west of the development site.

A separate sustainable drainage management strategy has been undertaken by Coopers and has been included within this report for completeness. The proposals are therefore to discharge surface water run-off from the site post-development to Kirkby Brook via two outfalls, one for each parcel given the scale and nature of the development proposed.

In accordance with the SuDS Manual (CIRIA) and the Non-Technical Standards for SuDS (March 2015) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. Based on the site area, the pre-development greenfield rate (QBar) has been calculated by Coopers to be 137.5l/s (this equates to 6.0l/s/ha).

Coopers have however undertaken a more conservative approach and designed the surface water discharge rate to 90.0l/s, as per UU pre-development enquiry. In the northern parcel the discharge rate will be restricted to 30.0l/s, and in the southern parcel this will be restricted to 60.0l/s, flows conveyed by a network of swales to the point of outfall south-west of the site, as shown within Coopers sustainable drainage management strategy.

Restricting the rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. 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. Detailed design will determine with accuracy the attenuation requirements.

This 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.

CONTENTS

Document Tracking Sheet iii

EXECUTIVE SUMMARY v

Figures & Tables viii

Specialist Software ix

Abbreviations & Acronyms ix

1.0 INTRODUCTION 11

1.1 Planning Policy Context 11

1.2 Site Context 11

1.3 Consultation 11

2.0 EXISTING SITE LOCATION 12

2.1 Location 12

2.2 Existing and Historical Land Use 12

2.3 Topography 13

3.0 DEVELOPMENT PROPOSALS 14

3.1 Nature of the development 14

4.0 SOURCES OF FLOOD RISK 16

4.1 Fluvial Flood Risk 16

4.2 Tidal Flood Risk 16

4.3 Flood Risk Vulnerability Classification and Flood Zone Compatibility 16

4.4 Surface Water Flood Risk 17

Pluvial (Overland run-off) Flood Risk 18

Sewer Flood Risk 18

4.5 Groundwater Flood Risk 18

4.6 Artificial Sources of Flood Risk 19

Reservoirs 19

Canals 19

4.7 Historical and Anecdotal Flooding Information 19

4.8 Flood Risk Mitigation Measures & Residual Risks 19

Mitigation Measures 19

Residual Risks 20

5.0 SURFACE WATER MANAGEMENT 21

5.1 Pre-Development Surface Water Run-off 21

5.2 Post Development Surface Water Run-Off 21

5.3 Sustainable Drainage Systems (SuDS) 22

5.4 Methods of Surface Water Management 23

5.5 Discharge via Infiltration 23

5.6 Discharge to Watercourse/Waterbody 23
Proposed Discharge Rates 24
5.7 Discharge to Public Sewer Network 24
5.8 Climate Change 24
6.0 FOUL WATER MANAGEMENT 26
7.0 SUMMARY AND CONCLUSIONS 27
8.0 RECOMMENDATIONS 29
BIBLIOGRAPHY & REFERENCES 30
Web-based References 30

Figures & Tables

Figure 1: Existing Features Plan (Google Maps, 2021) 12
Figure 2: Feasibility Plan – Northern Parcel (Urban Design, 2021) 14
Figure 3: Feasibility Plan – Southern Parcel (Urban Design, 2021) 15
Figure 4: Fluvial/Tidal Flood Zone Map for Planning Extract (Gov.UK, 2021) 16
Figure 5: Surface Water Flood Map Extract (GOV.UK, 2021) 17
Table 1: Pre-Development Surface Water Run-Off Rates (Betts Hydro, 2021) 21
Table 2: Post-Development Un-Restricted Run-Off Rates (Betts Hydro, 2021) 21
Figure 6: SuDS Photographs (SusDrain, 2012) 22
Table 3: Change to Extreme Rainfall Intensity (Environment Agency, 2016) 25

APPENDIX A: NPPF & PPG EXTRACTS .....
APPENDIX B: EA INFORMATION & CORRESPONDENCE .....
APPENDIX C: UU CORRESPONDENCE .....
APPENDIX D: LPA/LLFA CORRESPONDENCE .....
APPENDIX E: LOCATION PLAN .....
APPENDIX F: TOPOGRAPHIC SURVEY .....
APPENDIX G: PROPOSED PLANNING LAYOUT .....
APPENDIX H: PFRA/SFRA PLANNING EXTRACTS .....
APPENDIX I: SURFACE WATER RUN-OFF CALCULATIONS .....
APPENDIX J: COOOPER'S DRAINAGE STRATEGY PLAN .....
APPENDIX K: TYPICAL SUDS DETAILS .....
APPENDIX L: NOTES OF LIMITATIONS .....

Specialist Software

- MicroDrainage WinDES (v.14.1) – Calculation of Greenfield run-off rates IH124/ICP-SUDS, Greenfield run-off volumes, rates of rainfall and stormwater storage estimates.
- Flood Estimation Handbook FEH– Determination of Catchment Descriptors and depths of rainfall.

Abbreviations & Acronyms

AEP	Annual Exceedance Probability
BGS	British Geological Survey
CC	Climate Change
CSAI	Cranfield Soil and Agrifood Institute
EA	Environment Agency
FEH	Flood Estimation Handbook
FRA	Flood Risk Assessment
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
SfA	Sewers for Adoption
SFRA	Strategic Flood Risk Assessment
SuDS	Sustainable Drainage Systems
TWL	Top Water Level
UU	United Utilities

This Page Has Been Left Intentionally Blank

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 residential in nature which is identified to be 'more vulnerable' in Table 2: Flood Risk Vulnerability Classification, within the Planning Practice Guidance (PPG). The PPG confirms that this type of land-use is appropriate for Flood Zone 1, 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 planning application for the construction of 730no. residential dwellings on land off Cherryfield Drive in Kirkby. The site is comprised of a northern and southern parcel, both parcels to be assessed within this report. The proposals will be complete with, access, car parking, boundary fencing and drainage.

1.3 Consultation

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

2.0 EXISTING SITE LOCATION

2.1 Location

2.1.1 The development site is located on land off Cherryfield Drive in Kirkby. The Ordnance Survey National Grid Reference for the site is E: 340947, N: 398414 and the nearest postcode is L32 8SF (see Location Plan in **Appendix E**). The total site covers 22.92ha and is edged in red in **Figure 1**.

2.1.2 In terms of the surrounding land use, adjacent to the north and eastern boundaries of site is Cherryfield Drive, with a mixture of commercial and residential development located beyond. To the south of site is Bewley Drive, separating the development proposals from existing residential development. Finally, to the west of site is Valley Road (A506) in addition to undeveloped land, as illustrated in **Figure 1**.



Figure 1: Existing Features Plan (Google Maps, 2021)

2.2 Existing and Historical Land Use

2.2.1 The site is currently developed and comprises of the Knowsley Community College buildings and surrounding hardstanding for access and parking. Historically, the land surrounding Cherryfield Crescent within the north of the site comprised of residential

development, which has since been demolished leaving only the access and the associated hardstanding. No other historical uses have been identified during the preparation of this report.

2.3 Topography

2.3.1 A full topographical survey has been undertaken and included within **Appendix F**. The topographic survey has identified that the northern parcel falls from a central high point of 26.61mAOD down to 24.04mAOD in adjacent to the north-eastern boundary, and 21.00mAOD adjacent to the western boundary.

2.3.2 The southern parcel of site also falls from this high point (26.61mAOD) down to 19.50mAOD in the south-western corner of site. The western half of the parcel instead falls in a north-easterly direction from 26.10mAOD down to a low point at 23.98mAOD.

3.0 DEVELOPMENT PROPOSALS

3.1 Nature of the development

3.1.1 This FRA&DMS has been prepared to support a planning application for the construction of 730no. residential dwellings on land off Cherryfield Drive in Kirkby. The proposals will be complete with, access, car parking, boundary fencing, and drainage as illustrated in **Figure 2** and **3**. A full planning layout is included in **Appendix G**.

3.1.2 The total site covers 22.54ha and is currently developed, comprised of Knowsley Community College buildings and surrounding hardstanding for access and parking. Due to the nature of the development, the impermeable areas of the site will increase to 75% post-development (which equates to 16.58ha).

3.1.3 National and local policy identifies that Sustainable Drainage Systems (SuDS) should be incorporated into new development where at all feasible. It is highly recommended that permeable surfacing be utilised where at all feasible for proposed developed areas, to minimise the surface water run-off generated. Given the scale and nature of the proposals there is likely to be scope to incorporate SuDS features onsite such as ponds and basins. Detailed design will be required to confirm, subject to ground investigations and detailed levels review.

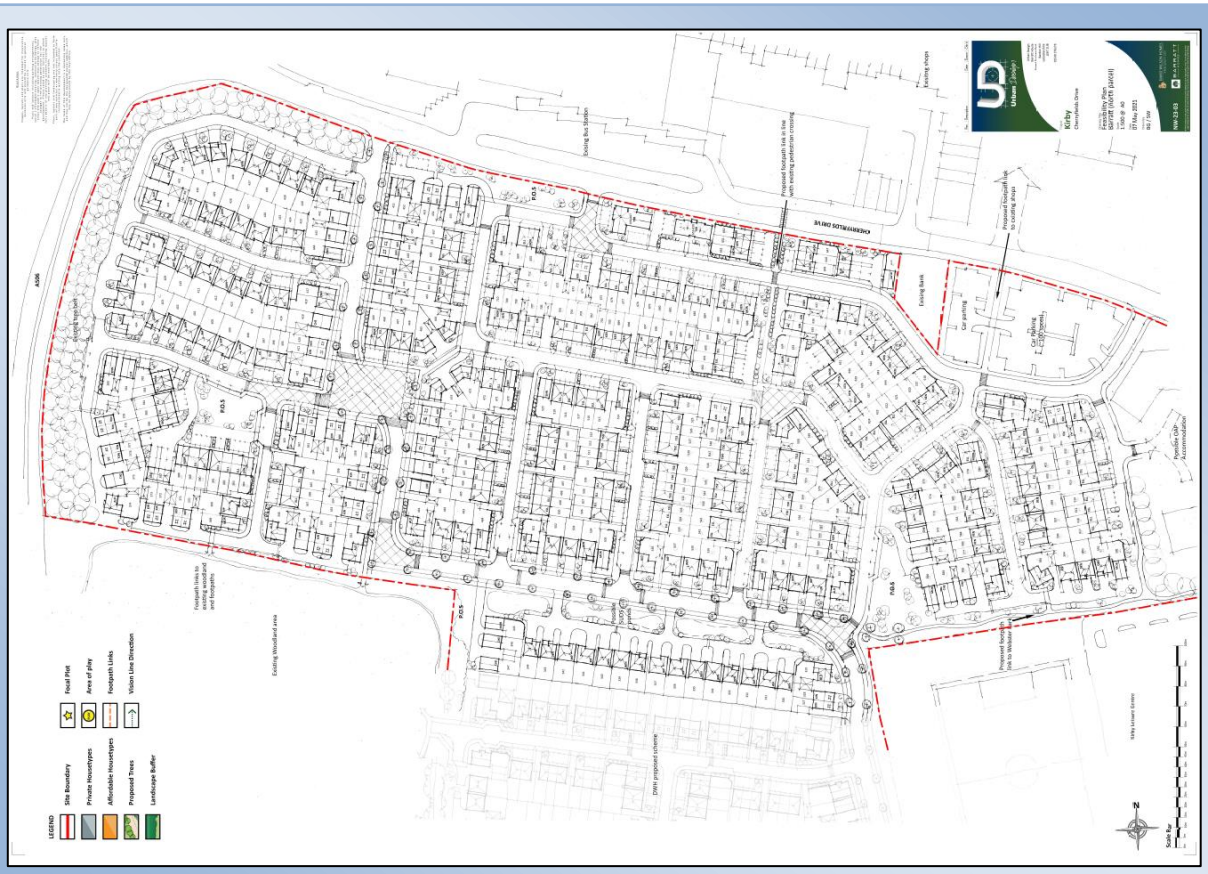


Figure 2: Feasibility Plan – Northern Parcel (Urban Design, 2021)

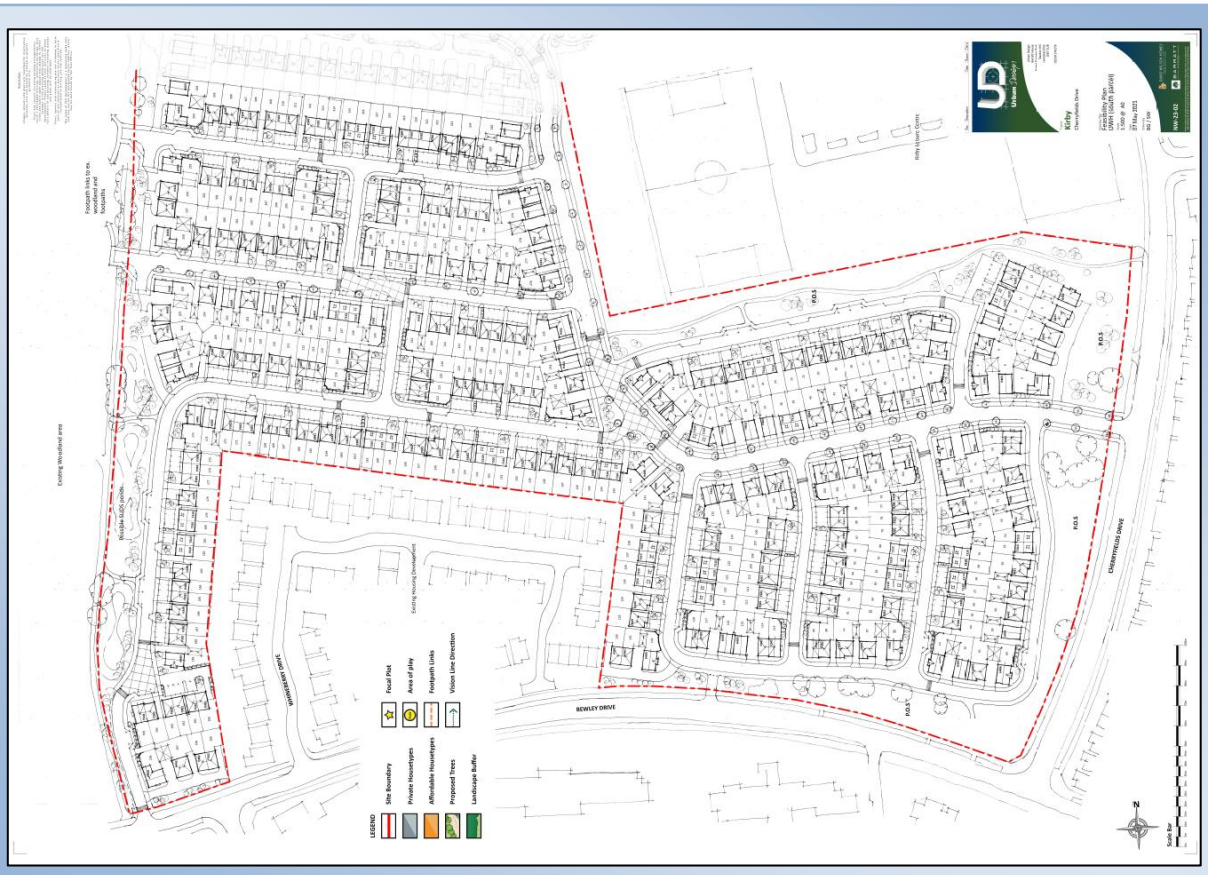


Figure 3: Feasibility Plan – Southern Parcel (Urban Design, 2021)

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 4**, which illustrates that the site and proposed development area are located solely within Flood Zone 1. Flood Zone 1 is an area considered to be at little or no flood risk from rivers and/or the sea (as defined by the EA).

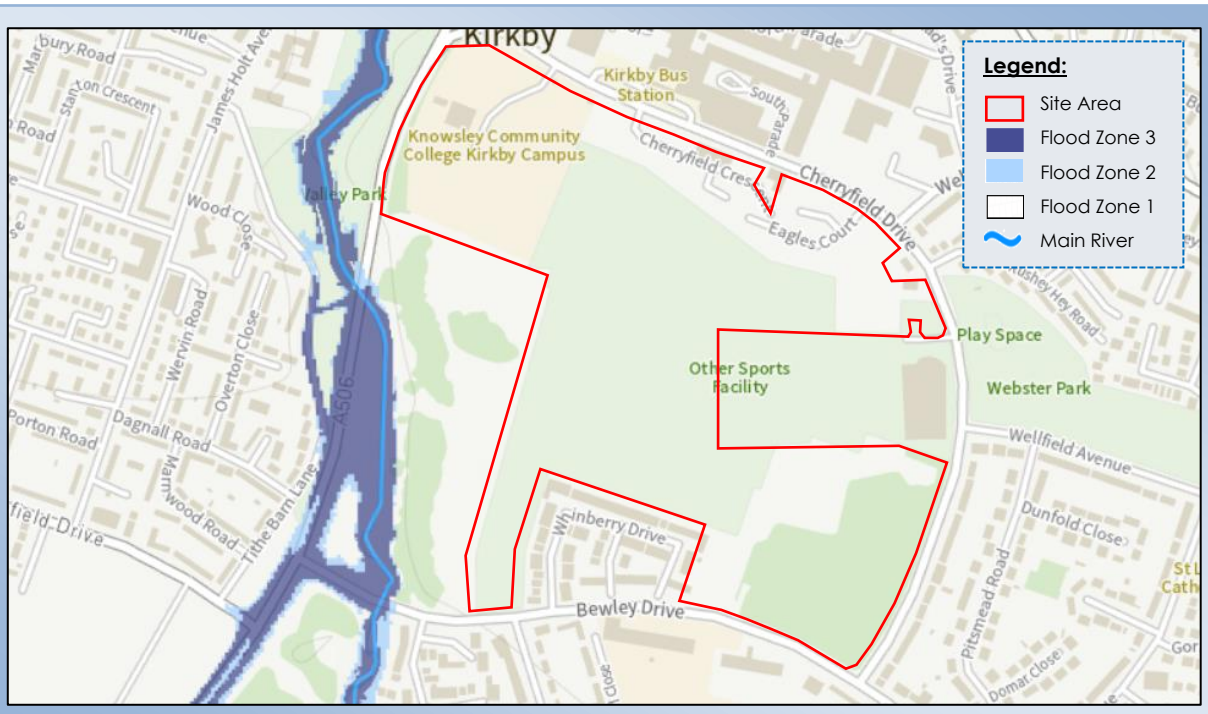


Figure 4: Fluvial/Tidal Flood Zone Map for Planning Extract (Gov.UK, 2021)

4.1.2 The nearest Main River to site is Kirkby Brook located 53m to the west of the site. It is understood based on the proximity to site and the surrounding topography, the risk to site from this Main River is very low. This is reflected in the national flood mapping data sets (see full mapping in **Appendix B**). Initial Consultation with the EA, KMBC and UU also failed to highlight any historical flooding directly to the site (see correspondence in **Appendix B, C** and **D**).

4.2 Tidal Flood Risk

4.2.1 The Northwest Coastline and the Mersey Estuary are located over 10km west of the development and due to the distance from the site, the tidal flood risk from these sources is 'low'. This is supported by the EA's Flood Zone Map for Planning also for the site being in Flood Zone 1.

4.3 Flood Risk Vulnerability Classification and Flood Zone Compatibility

4.3.1 The proposals are residential in nature and therefore considered to be 'more vulnerable' development in Table 2: Flood Risk Vulnerability Classification, within the

Planning Practice Guidance (PPG). The PPG confirms that this type of land-use is appropriate for Flood Zone 1, 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 flooding is indicated by the long-term flood mapping (extract shown in **Figure 5**).

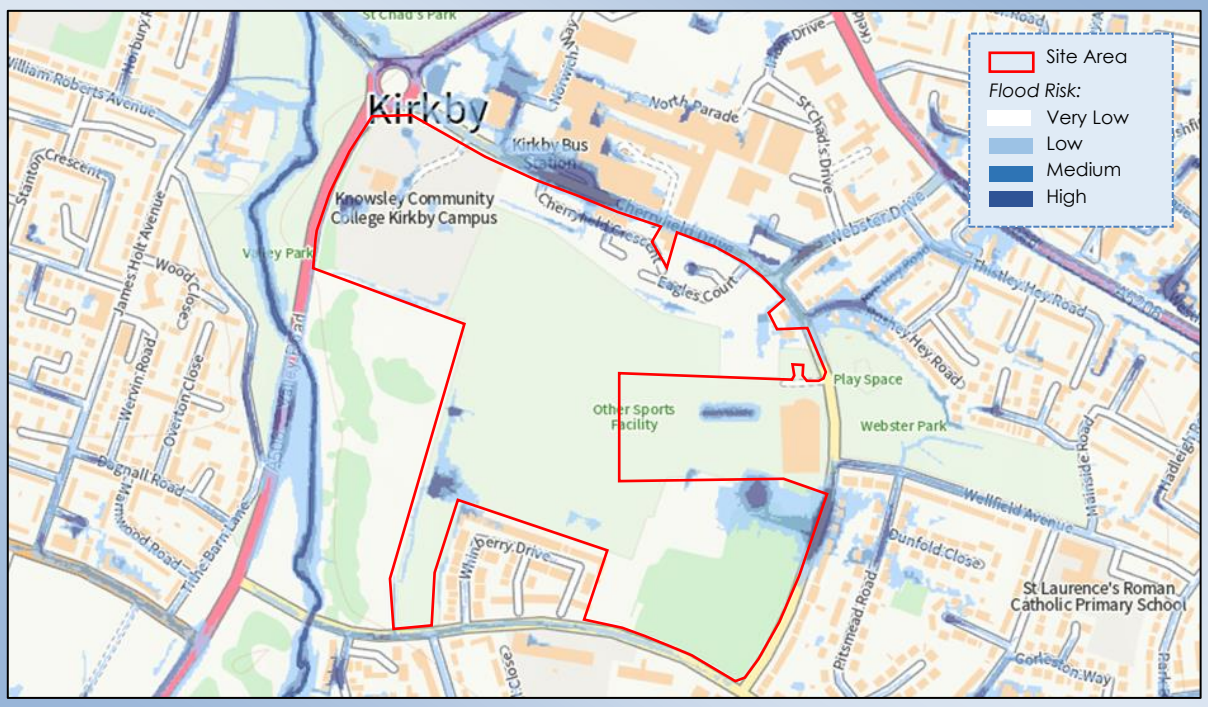


Figure 5: Surface Water Flood Map Extract (GOV.UK, 2021)

4.4.2 As indicated in **Figure 5**, the site is predominantly at 'very low' risk from surface water flooding, however there are areas onsite shown to be at higher risk. Generally, areas at higher risk of surface water flooding corresponds with either existing watercourses, conveyance features, existing ponds, or natural low-lying depressions. In this case those areas onsite at higher risk from surface water are associated with areas of hardstanding, and low-lying depressions onsite that are neighboured by elevated land as identified by the topographic survey. These areas would therefore be susceptible to ponding in the extreme storm events.

4.4.3 The risk to the proposals from surface water flooding will be managed and reduced, post-development through the design and implementation of a sustainable surface water management regime. To further mitigate for any residual risks, it is advised that (following any re-grade of the site) finished floor levels of the residential dwellings are elevated above the external levels to provide safe overland flood routes for any excess surface water run-off.

Pluvial (Overland run-off) Flood Risk

4.4.4 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. The topography of the surrounding developed areas means there is little potential for overland flows to impact the site.

4.4.5 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 with safe avenues directing overland flow away from adjacent development being advised.

Sewer Flood Risk

4.4.6 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.

4.4.7 Consultation with United Utilities identified no recorded historical sewer flooding issues on or near to the proposed development site (see **Appendix C** for correspondence). UU sewer records identified sewer infrastructure within close proximity to the site, with a public foul water and a surface water sewer north of site within Cherryfield Drive. Both a public foul water and a surface water sewer have also been identified to the south of site within Bewley Drive.

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.

4.5.2 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 water, table 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.

4.5.3 The mapping data for groundwater shows that the site is underlain by a Principal Aquifer with Secondary (undifferentiated) superficial deposits. The site is also located within a Medium to High Groundwater Vulnerability Zone. No historical flooding at or adjacent to the site due to groundwater related sources has been identified as part of this assessment, including review of KMBC's Strategic Flood Risk Assessment (SFRA).

4.5.4 Irrespective, it is advised that the Finished Floor Levels of the proposed buildings be raised sufficiently above the external levels where possible to safeguard dwellings (this is typically 150mm). The external levels should fall away from the proposed dwellings where practical to provide safe avenues for overland flows around/away from any proposed more vulnerable development.

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** which shows the extents of flooding associated with reservoirs does not impact on or near to the development site.

Canals

4.6.3 There are no canals located in proximity to site therefore the risk of flooding associated with canals is 'low'. Irrespective, it is advised that external levels fall away from the proposed buildings, to minimise the flood risk from a variety of sources. By keeping the finished floor levels elevated relative to the externals, this should help create an overland flood flow route in the event of a breach or any other source of flooding that could lead to overland flows including reservoir or canal flooding.

4.7 Historical and Anecdotal Flooding Information

4.7.1 No historical flooding has been identified during our review of online sources, including review of the Knowsley Metropolitan Borough Council Strategic Flood Risk Assessment (see general mapping extracts in **Appendix I**). Consultation with Knowsley Metropolitan Borough Council, United Utilities, and the Environment Agency has been carried out for this specific application and at this time we are still awaiting some responses. See **Appendix B, C**, and **D** for correspondence.

4.8 Flood Risk Mitigation Measures & Residual Risks

4.8.1 The development parcels are located wholly within Flood Zone 1 and are at little risk of fluvial/tidal flooding. To observe a conservative approach however, mitigation measures have been proposed below to safeguard against other potential residual sources of flood risk. The mitigation measures also consider the uncertainties of climate change in accordance with the revised NPPF and PPG.

Mitigation Measures

4.8.2 For 'more vulnerable' development located within Flood Zone 1, it is typical to set the Finished Floor Levels (FFL) of the proposed buildings, a minimum of 150mm above the existing ground levels. 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 risks.

4.8.3 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings are advised. It is therefore recommended that an interception drain is designed to intercept any overland flows from the neighbouring undeveloped land before it can impact upon the proposals post-development.

4.8.4 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 equivalent of the pre-development situation (with betterment where required).

4.8.5 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.

4.8.6 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 UU or KMBC then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

Residual Risks

4.8.7 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 if 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 22.54ha and it is currently understood that some of the site which is currently developed has an existing drainage regime which is understood to either discharge surface water run-off into the public sewer network or the nearby Main River. Details of these existing systems have not yet been provided.

5.1.2 Further investigation of any existing drainage infrastructure serving the site will be required in due course to confirm the exact location, routing and condition of these existing drainage systems onsite, should they be re-used to serve for the new development proposals. This assessment has therefore considered the site to be 100% permeable to calculate existing run-off, given the lack of information available to evidence the current formal drainage infrastructure severing the site.

5.1.3 Additionally, a sustainable drainage management strategy has been undertaken by Coopers, which has been included within this report for completeness (see **Appendix K**). Coopers have also calculated the peak rates and volumes of run-off generated by the site area for the key storm events using the IH124 Method as shown within **Table 2**. Details of the pre-development rates and volumes can be found in **Appendix J**.

Development 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
22.54ha	119.59l/s	233.68l/s	285.91l/s	137.46l/s	1658.1cu.m	4435.1cu.m

Table 1: Pre-Development Surface Water Run-Off Rates (Betts Hydro, 2021)

5.2 Post Development Surface Water Run-Off

5.2.1 As previously discussed due to the nature of the development the impermeable areas of the site post-development will likely increase. We have therefore assumed the site will be 75% impermeable post development which equates to 16.58ha. The unrestricted post-development run-off rates generated by this impermeable area has been detailed in **Table 2**.

Impermeable Areas	Run-Off Rates		
	1 In 1 Yr	1 In 30 Yr	1 In 100 Yr +CC
16.58ha	778.7l/s	1440.5l/s	2678.7l/s

Table 2: Post-Development Un-Restricted Run-Off Rates (Betts Hydro, 2021)

5.2.2 In accordance with national and local planning policies it is, however, necessary to restrict surface water run-off rates where at all practical to mimic a pre-development greenfield equivalent situation. Further details of the proposals can be found in Section 5.6.

5.3 Sustainable Drainage Systems (SuDS)

5.3.1 In accordance with national and local planning policy, peak surface water discharge rates from new development should be appropriately managed and where possible reduced. To manage surface water run-off policy shows that 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 (if designed and situated appropriately) address the four key sustainability objectives embedded in planning policy including providing space for water (water quantity), improving water quality and biodiversity, along with providing valuable amenity/recreational space within new development sites. These benefits depend on the type of SuDS features being proposed, some examples are illustrated in **Figure 6**.



Figure 6: SuDS Photographs (SusDrain, 2012)

5.3.3 Opportunities should also be taken to provide soft landscaping where at all possible on site to assist in minimising surface water run-off. It would be recommended that permeable surfacing and bio-filtration be considered where at all feasible. By including measures such as these the surface water run-off is being dealt with at source and this will assist locally with surface water management (subject to optimum ground conditions). If infiltration is not feasible then a connection into the main drainage systems is needed, but the presence of the permeable surfaces will still allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).

5.3.4 The proposed planning layout has highlighted the opportunity to incorporate SuDS methods such as permeable surfacing and swales onsite where feasible to provide a degree of treatment before flows discharge to ground or are carried offsite. Promoting SuDS to deal with surface water at the source, will limit the required attenuation and in turn reduce the volume of surface water in nearby watercourses/sewer infrastructure. Detailed design should confirm whether this site would be suitable for incorporation of SuDS following more detailed analysis of levels, ground conditions and attenuation requirements.

5.4 Methods of Surface Water Management

5.4.1 There are three methods that have been reviewed for the management and discharge of surface water. 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
- 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 system onsite. The ground conditions have been identified based on the online datasets given there has been no onsite infiltration testing at this time to support this assessment.

5.5.2 The online Cranfield Soil and AgriFood Institute (CSAI), Soilscapes viewer identifies naturally wet very acid sandy and loamy soils. The British Geology Survey (BGS) mapping data indicates that the bedrock geology consists of Chester Formation (Sandstone) with Devensian Till superficial deposits.

5.5.3 Furthermore, the soil classification based on the FEH characteristics is 0.3, which indicates medium permeability based on the scale of 0.1 being very high permeability and 0.5 being very low. Based on the ground conditions identified by these published online datasets and the soil classification, infiltration may not offer a possible means of managing surface water run-off generated by the site (in part/full), therefore other surface water discharge methods have been reviewed.

5.5.4 To confirm if infiltration will be feasible onsite given the mixed suitability for infiltration, based on published online datasets, it is recommended that Soakaway Testing (to BRE365) is undertaken at an early stage ascertain the specific onsite underlying ground conditions and suitability of such to achieve a full infiltration-based drainage approach for surface water run-off.

5.5.5 It is however understood that some of the site, which is currently developed has an existing drainage regime, which is understood to either discharge surface water run-off into the public sewer network or the nearby Main River. Details of these existing systems have not yet been provided. Further investigation of any existing drainage infrastructure serving the site will be required in due course to confirm the exact location, routing and condition of these existing drainage systems onsite, should they be re-used to serve for the new development proposals.

5.6 Discharge to Watercourse/Waterbody

5.6.1 As infiltration may not be feasible (subject to onsite testing); this assessment also considered the alternative options. The next method in the sustainable drainage hierarchy is discharge surface water run-off generated by the proposals to a nearby watercourse. The nearest watercourse to the site is Kirkby Brook (Main River) located 53m to the west of the development site.

5.6.2 A separate sustainable drainage management strategy has been undertaken by Coopers and has been included within this report for completeness (see **Appendix K** for full drawings). The proposals are therefore to discharge surface water run-off from the site post-development to Kirkby Brook via two outfalls, one for each parcel given the scale and nature of the development proposed.

5.6.3 Detailed design will also be required to confirm feasibility of the strategy and to confirm whether a full gravity connection can be achieved. Consent and formal agreement will be required from the EA and the KMBC (who are the Lead Local Flood Authority) for any works to the Main River network, where the surface water outfall locations are proposed. The LLFA will also need to agree to the proposed rates of discharge. The outfall routing is also located outside of the site area, therefore Third-Party agreements with the adjacent landowners (Highways Authority) will also need to be attained.

Proposed Discharge Rates

5.6.4 In accordance with the SuDS Manual (CIRIA) and the Non-Technical Standards for SuDS (March 2015) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. Based on the site area, the pre-development greenfield rate (QBar) has been calculated by Coopers to be 137.5l/s (this equates to 6.0l/s/ha).

5.6.5 Coopers have however undertaken a more conservative approach and designed the surface water discharge rate to 90.0l/s, as per UU pre-development enquiry (see email correspondence within **Appendix K**). In the northern parcel the discharge rate will be restricted to 30.0l/s, and in the southern parcel this will be restricted to 60.0l/s, flows conveyed by a network of swales to the point of outfall south-west of the site, as shown within Coopers sustainable drainage management strategy (**Appendix K**). Restricting the rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. Detailed design will determine with accuracy the attenuation requirements.

5.6.7 The proposals are also to implement SuDS features such as swales where at all feasible onsite, to provide water quality benefits and assist with the required onsite attenuation, subject to ground investigation and a detailed levels review. SuDS features such as permeable surfaces on private driveways will also allow the first 5mm of rainfall to be dealt with at source as identified in the SuDS Manual (CIRIA 753).

5.7 Discharge to Public Sewer Network

5.7.1 UU sewer records have identified limited public surface water sewers within the vicinity of site suitable for surface water run-off connections. Should infiltration not be feasible then the surface water flows generated are proposed to discharge into the nearest watercourse or waterbody and not the existing public sewer network in accordance with the drainage hierarchy.

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 updated Climate Change projections provides estimated changes to rainfall intensity (**Table 3**) and based on the design life of the development (100yrs) the "total potential change figures for the 2080's" has been utilised.

PROJECTIONS	TOTAL POTENTIAL CHANGE ANTICIPATED FOR THE 2080'S
Upper End Estimate	40%
Central Change Factor	20%

Table 3: Change to Extreme Rainfall Intensity Compared to 1961-1990 Baseline (Environment Agency, 2016)

6.0 FOUL WATER MANAGEMENT

6.1 Review of the UU sewer records identify there to be existing public sewer infrastructure located onsite. The nearest foul water compatible public sewer is a public foul water sewer within Cherryfield Crescent in the northern parcel, and within Bewley Drive to the south of the site (refer to sewer records within **Appendix C**).

6.2 As the site is developed it is assumed that there are currently foul water flows entering the public sewer network. Further investigation of any existing drainage infrastructure serving the site will be required in due course to confirm the exact location, routing and condition of these existing drainage systems onsite, should they be re-used to serve for the new development proposals.

6.3 Based on the proposals for the construction of 730no. residential dwellings the approximate peak foul water flows generated by the site have been calculated at 33.80l/s, based on 4000 litres per dwelling per 24 hours as per the guidance contained within Sewers for Adoption.

6.3 The proposals for foul water management as shown within Coopers sustainable drainage management strategy, will be to connect foul water flows from the northern parcel into the nearest public foul water sewer (225mm dia.) within Elton Head Road and flows from the southern parcel into the public foul water sewer (225mm dia.) within Bewley Drive. New formal connections may be required, subject to formal consent and agreement from UU. Detailed design will also be required to confirm feasibility of the strategy and to confirm whether a full gravity connection can be achieved.

6.4 Early consultation with UU is recommended to identify any additional constraints and their preferred point(s) of connection. A pre-development enquiry has been undertaken by the client with UU; however, a response is currently outstanding (see correspondence within **Appendix C**).

7.0 SUMMARY AND CONCLUSIONS

7.1 This report has been prepared to support a planning application for land located off Cherryfield Drive in Kirkby. The proposals are 'more vulnerable' within the Planning Practice Guidance which supports the National Planning Policy Framework, which is appropriate when located within Flood Zone 1, providing there is no increase in flood risk elsewhere.

Flood Risk

7.2 This report has reviewed all sources of flood risk both to and resulting from the proposed development. Consultation with the Environment Agency, Knowsley Metropolitan Borough Council, and United Utilities have not identified any historical flooding at the site or the wider area. The nearest Main River to site is Kirkby Brook located 53m to the west of the site. The risk to site from Kirkby Brook is understood to be low due to the proximity to site and the surrounding topography.

7.3 In terms of other flood risk sources, the mapping has identified some surface water flood risk onsite associated with areas of hardstanding, and low-lying depressions onsite that are neighboured by elevated land as identified by the topographic survey. This surface water flood risk to site will be reduced and sustainably managed post-development, following the implementation of a sustainable surface water management regime and appropriate levels design.

7.4 To summarise, the proposals are at low flood risk from the flood sources reviewed as part of this assessment. This assessment has been prepared in consultation with the relevant interested parties and the reports is commensurate with the scale and nature of the development proposals. The development proposals can therefore be considered appropriate in accordance with the Planning Practice Guidance.

Drainage Strategy

7.5 Due to the relatively low flood risks identified, the principle focus of this assessment is on the sustainable management of surface water run-off to ensure no increased flood risk results from the development. The surface water discharge options have been assessed in accordance with the sustainable drainage hierarchy. Based on the ground conditions identified by the published online datasets, infiltration will not be able to provide a viable drainage solution for the development due to the impermeable underlying strata.

7.6 As infiltration may not be feasible (subject to onsite testing); this assessment also considered the alternative options. The next method in the sustainable drainage hierarchy is discharge surface water run-off generated by the proposals to a nearby watercourse. The nearest watercourse to the site is Kirkby Brook (Main River) located 53m to the west of the development site.

7.7 A separate sustainable drainage management strategy has been undertaken by Coopers and has been included within this report for completeness. The proposals are therefore to discharge surface water run-off from the site post-development to Kirkby Brook via two outfalls, one for each parcel given the scale and nature of the development proposed.

7.8 Detailed design will also be required to confirm feasibility of the strategy and to confirm whether a full gravity connection can be achieved. Consent and formal agreement will be required from the Environment Agency and the Lead Local Flood Authority for any works to the Main River network, where the surface water outfall locations are proposed. The Lead Local Flood Authority will also need to agree to the proposed rates of discharge. The outfall routing is also located outside of the site area, therefore Third-Party agreements with the adjacent landowners (Highways Authority) will also need to be attained.

7.9 In accordance with the SuDS Manual (CIRIA) and the Non-Technical Standards for SuDS (March 2015) all sites should endeavour to achieve as close to pre-development greenfield rates as is viable. Based on the site area, the pre-development greenfield rate (QBar) has been calculated by Coopers to be 137.5l/s (this equates to 6.0l/s/ha).

7.10 Coopers have however undertaken a more conservative approach and designed the surface water discharge rate to 90.0l/s, as per UU pre-development enquiry. In the northern parcel the discharge rate will be restricted to 30.0l/s, and in the southern parcel this will be restricted to 60.0l/s, flows conveyed by a network of swales to the point of outfall south-west of the site, as shown within Coopers sustainable drainage management strategy.

7.11 Restricting the rate of discharge will generate a requirement to provide onsite stormwater storage for the extreme rainfall events. 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. Detailed design will determine with accuracy the attenuation requirements.

7.12 This 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 For 'more vulnerable' development located within Flood Zone 1, it is typical to set the Finished Floor Levels (FFL) of the proposed buildings, a minimum of 150mm above the existing ground levels. 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 risks.

8.2 Any overland flows generated by the development must be carefully controlled. Safe avenues directing overland flow way from any existing and proposed buildings are advised. It is therefore recommended that an interception drain is designed to intercept any overland flows from the neighbouring undeveloped land before it can impact upon the proposals post-development.

8.3 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 equivalent of the pre-development situation (with betterment where required).

8.4 it is currently understood that some of the site which is currently developed has an existing drainage regime which is understood to either discharge surface water run-off into the public sewer network or the nearby Main River. Details of these existing systems have not yet been provided. Further investigation of any existing drainage infrastructure serving the site will be required in due course to confirm the exact location, routing and condition of these existing drainage systems onsite, should they be re-used to serve for the new development proposals.

8.5 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.

8.6 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 UU or KMBC then an appropriate maintenance regime should be scheduled with a suitably qualified management company for these private drainage systems.

8.7 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 if the capacity of the drainage system is exceeded.

BIBLIOGRAPHY & REFERENCES

Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities – Environment Agency/DEFRA 2016
CIRIA 522: Sustainable urban drainage systems – design manual for England and Wales (2000).
CIRIA 523: Sustainable urban drainage systems – best practice manual (2001).
CIRIA 609: Sustainable drainage systems. Hydraulic, structural and water quality advice (2004).
CIRIA 624: Development and flood risk – guidance for the construction industry (2004).
CIRIA 635: Designing for Exceedance in urban drainage: Good practice (2006).
CIRIA 644: Building Greener (2007).
CIRIA 753: The SUDS manual (2015).
Flood Risk to People – Phase 2 (FD2321/TR2), DEFRA and the Environment Agency (2006).
Flood estimation for small catchments: Institute of Hydrology Report No.124, NERC (1994).
Flood Estimation Handbook, Centre for Ecology and Hydrology (1999).
Planning Policy Statement 25: Development and Flood Risk (2006).
Sewers for Adoption 7th Edition, WRc (2012).
National Planning Policy Framework, Ministry of Housing, Communities and Local Government (2018).

Web-based References

Bingmaps – http://www.bing.com/Maps/
British Geological Survey – http://www.bgs.ac.uk/opengeoscience/home.html
Chronology of British Hydrological Events – www.dundee.ac.uk/
CIRIA – http://www.ciria.org/
Cranfield University – http://www.landis.org.uk/soilscapes/
Environment Agency – www.environment-agency.gov.uk/
FloodProBE – http://www.floodprobe.eu/
Flood Forum – http://www.floodforum.org.uk/
Flood London – http://www.floodlondon.com/
Google Maps – http://maps.google.co.uk/
Streetmap – http://www.streetmap.co.uk/

APPENDIX A: NPPF & PPG EXTRACTS

This page has been left intentionally

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

---

[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.

---

[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

---

[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.

---

[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

This page has been left intentionally blank

Hannah Buchanan

From: Hannah Buchanan
Sent: 10 September 2021 15:37
To: 'Inforequests.gmmc@environment-agency.gov.uk'
Subject: Products 4, 5, 6 and 7
Attachments: Location Plan.pdf

To whom it may concern,

Cherryfield Drive, Kirkby

Please could you confirm whether you have any information (products 4, 5, 6 and 7) that you feel would be valuable to a Flood Risk Assessment and Drainage Management Strategy for the above site (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,

Hannah Buchanan *BSc (Hons)*
Graduate Flood Risk Analyst

BETTS HYDRO
Consulting Engineers

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

hannahbuchanan@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

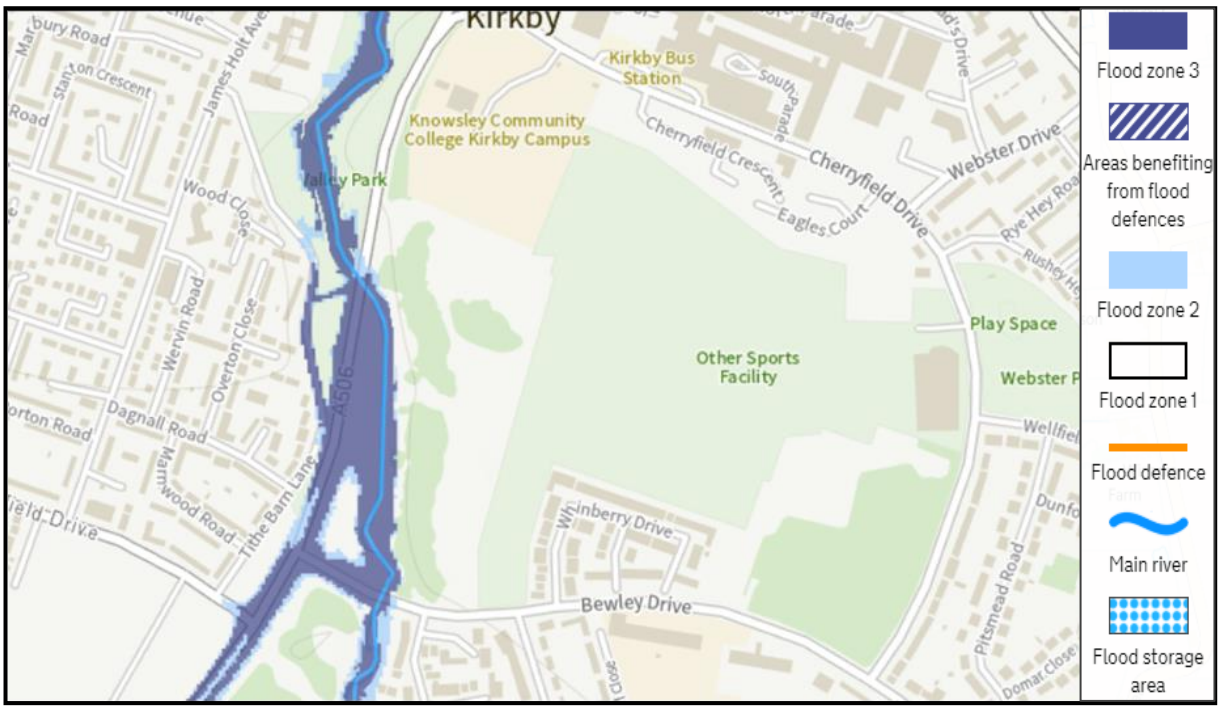
ELECTRONICALLY TRANSMITTED INFORMATION
This electronic transmission is strictly confidential and intended solely for the addressee. It may contain information which is covered by legal, professional or other privilege. If you are not the intended addressee, you must not disclose, copy or take any action in reliance of this transmission. If you have received this transmission in error, please notify us as soon as possible. All emails transmitted by Betts Associates, Betts Geo or Betts Hydro are virus checked. This does not guarantee that transmissions are virus free. Reference should always be made to the hard copy of any electronically transmitted files. Electronic data does not constitute contract documentation. Use of the content of our files is at your own risk. You remain responsible for anything produced using all or part of the data supplied.

Please consider the environment before printing this email

NATIONAL FLOOD MAPPING

BETTS HYDRO
CONSULTING ENGINEERS

Flood Map for Planning



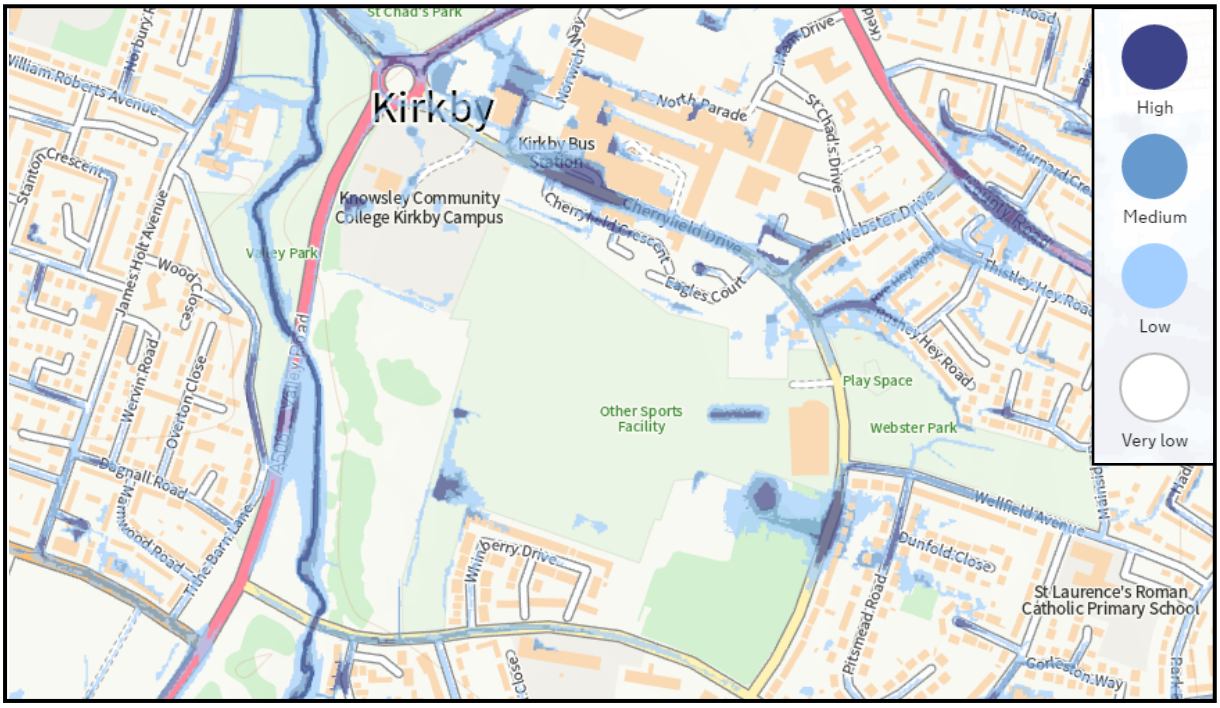
Long Term Flood Risk – Rivers or Sea



NATIONAL FLOOD MAPPING

BETTS HYDRO
CONSULTING ENGINEERS

Long Term Flood Risk – Surface Water



Long Term Flood Risk - Reservoirs



APPENDIX C: UU CORRESPONDENCE

This page has been left intentionally blank

Water for the North West

How to contact us:

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

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Andrew Hutchings

Park House
Sandpiper Court, Chester Business Park
Chester, Cheshire
CH4 9QU

FAO:

Your Ref: 7778
Our Ref: UUPS-ORD-279968
Date: 10/05/2021

Dear Sirs

Location: Cherryfield Drive Kirkby

I acknowledge with thanks your request dated 05/05/2021 for information on the location of our services.

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

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

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

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

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

Yours Faithfully,

Karen McCormack
Property Searches Manager

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

Water for the North West

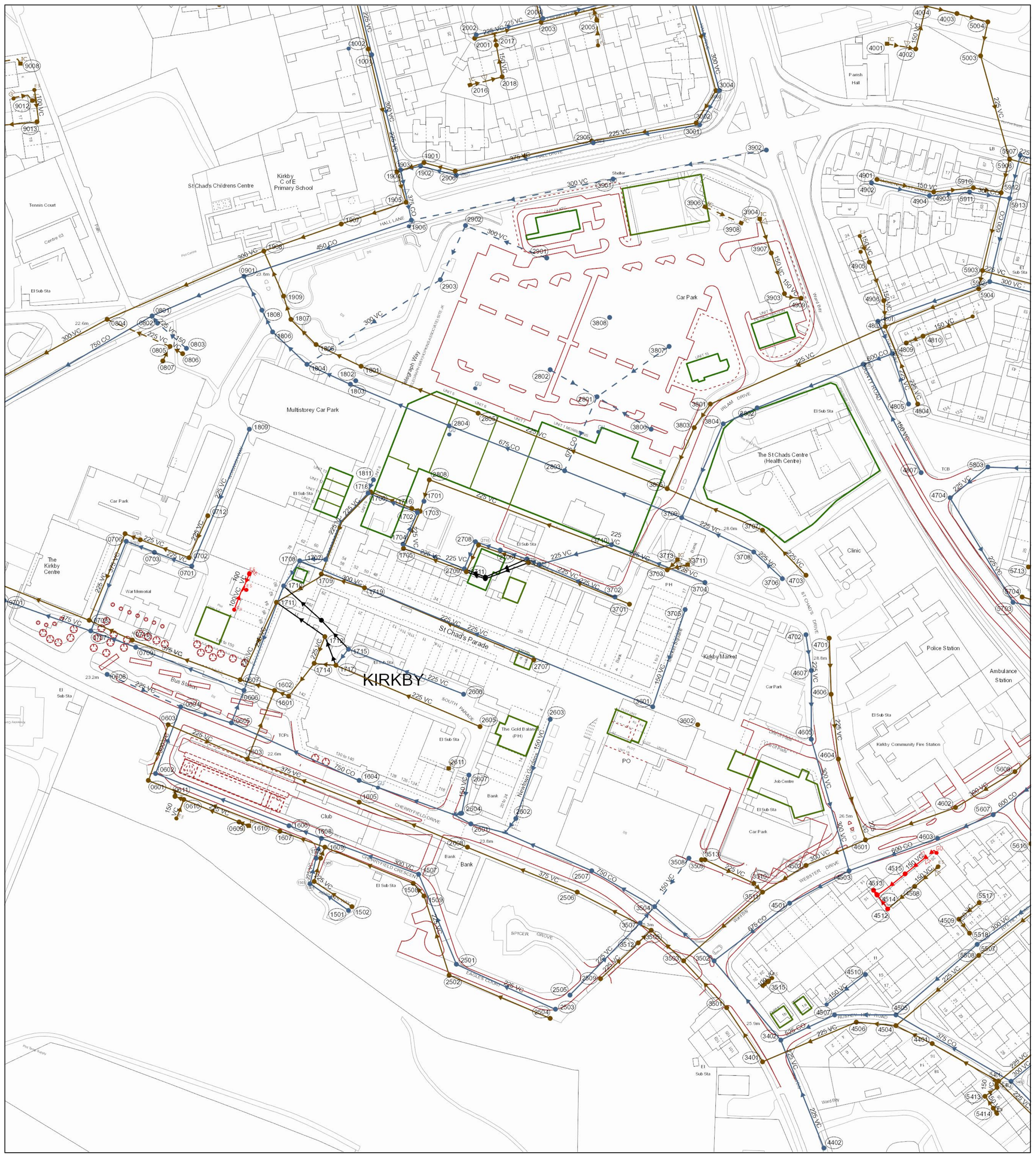
TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

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

TERMS AND CONDITIONS:

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

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



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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0806	24.41	FO	23.02	150			VC	8.062258	1 in 0.37394516
0802	23.02	SW	21.69	225			VC	5	1 in 0.24461839
3507		SW	0	225			VC	12.04159	
3507		SW	0	225			VC	12.04159	
1712	24.54	FO	0	225			VC	16.15549	
4603	26.46	SW	24	600			CO	52.20153	1 in 95
3707	28.43	FO	25.27	225			VC	57.77543	1 in 62
2902	26.22	SW	24.77	300			VC	33.10589	1 in 414
4514		CO		150			VC	3.460564	
4806	28.93	SW	25.66	600			CO	63.69458	1 in 255
3511	25.23	FO	22.4	300			VC	58.13777	1 in 161
4505	25.65	SW	23.41	525			CO	34	
4505	25.65	SW	23.41	525			CO	34	
0709		SW	0	375			VC	26.57066	
2904	26.29	FO	24.96	225			VC	77.609	1 in 125
0607	23.28	FO	19.34	375			VC	63.90618	1 in 142
2606	25.61	SW	23.72	225			VC	68.70953	1 in 64
4704	28.92	SW	27.18	225			VC	67.74216	1 in 104
0702	24.15	FO	21.66	225			VC	28.74572	1 in 87
2506	24.54	FO	21.13	375			VC	65.9242	1 in 108
4906		FO		150			VC	14.50187	
0705	22.81	SW	20.82	375			VC	53.61378	
0705	22.81	SW	20.82	375			VC	53.61378	
1605	23.26	FO	20.14	375			VC	66.48305	1 in 166
0605		SW	0	300			VC	19.31321	
1504	24.3	FO	22.84	225			VC	13.33568	1 in 36
3806		SW	0				UN	34.98571	1 in
2505	25.22	SW	23.48	225			VC	55.86591	
2505	25.22	SW	23.48	225			VC	55.86591	
4512		CO		150			VC	9.601148	
4512		CO		150			VC	9.601148	
1907	24.99	FO	22.56	225			VC	45.54119	
1903	25.43	FO	23.19	225			VC	17.72005	1 in 197
1502	24.65	FO	23.13	225			VC	25.23886	1 in 101
1502	24.65	FO	23.13	225			VC	25.23886	1 in 101
4703	28.56	FO	0	225			VC	34.65545	1 in 141
4604	27.15	FO	24.35	225			VC	47.43417	1 in 51
0901	23.58	SW	0	750			CO	55.54278	
4702	28.44	SW	26.18	225			CO	20.22375	1 in 56
3805	27.77	FO	24.31	225			VC	113.0885	
1607	23.83	FO	21.43	225			VC	78.18568	1 in 200
2710		SW	0	225			VC	16.22126	
1606	23.69	SW	21.92	300			VC	79.47956	1 in 204
2601	23.79	SW	21.16	750			VC	66.59838	1 in 180
4502	25.41	FO	22.62	300			VC	28.30194	1 in 135
1603	26.18	FO	23.28	675			VC	26.40076	1 in 126
3003	27.67	SW	25.29	300			VC	21.9545	1 in 48
5517		FO		150			VC	14.48858	
2707	27.92	FO	25.64	225			VC	102.1507	1 in 409
2605	25.42	FO	23.63	225			VC	86.92525	1 in 69
4606	28	FO	25.21	225			VC	36.22154	1 in 45
0712	24.55	FO	21.98	225			VC	25.53654	1 in 91
4905		FO		150			VC	22.85043	
4003		FO		150			VC	17.79331	
2703	26.92	FO	0	225			VC	29.53362	
3001	27.01	SW	24.79	375			VC	59.84146	1 in 113
2805		FO	0	225			VC	70.00714	
2509	25.28	FO	22.79	225			VC	29	1 in 207
2509	25.28	FO	22.79	225			VC	29	1 in 207
1609	23.65	FO	21.58	225			VC	26.57066	1 in 204
3501	25.8	FO	22.35	225			VC	35.38361	1 in 114
3501	25.8	FO	22.35	225			VC	35.38361	1 in 114
4602	26.78	FO	23.42	300			VC	53.14132	1 in 100
2607	24.68	SW	0	150			VC	21.37756	
1601		FO	0	375			VC	8.449917	
4515		CO		150			VC	19.41033	
2905	26.3	SW	24.25	375			VC	78.10249	1 in 126
2604	23.85	SW	22.3	150			VC	4.123106	
9013		FO		100			VC	28.74175	
9013		FO		100			VC	28.74175	
1501	24.68	SW	22.83	225			VC	25.88046	1 in 96
1501	24.68	SW	22.83	225			VC	25.88046	1 in 96
2501	24.75	SW	22.61	225			VC	54.23099	1 in 258
2501	24.75	SW	22.61	225			VC	54.23099	1 in 258
3515		FO		100			VC	3.102531	
3515		FO		100			VC	3.102531	
5912	50.2	FO	0	225			VC	44.57853	
2001	28.48	FO	26.58	225			VC	38.07887	1 in 423
2906	25.68	FO	23.42	225			VC	17.85651	1 in 223
0703	23.43	SW	21.01	375			VC	16.79079	1 in 105
4004		FO		150			VC	17.72631	
4402	26.21	SW	0	225			VC	64.62198	
4402	26.21	SW	0	225			VC	64.62198	
3510	25.41	FO	22.77	225			VC	7.071068	1 in 39
4601	25.79	FO	22.86	300			VC	35.8469	1 in 149
3505	25.14	FO	21.59	375			VC	46.06517	1 in 105
3505	25.14	FO	21.59	375			VC	46.06517	1 in 105
3706	28.54	SW	26.37	225			VC	21.93171	1 in 122
0706	22.76	FO	20.36	225			VC	52	1 in 84
0706	22.76	FO	20.36	225			VC	52	1 in 84
1801	26.32	FO	22.66	225			VC	27.73085	
1509	24.26	FO	0	225			VC	9.219544	
3513	25.16	FO	22.96	225			VC	2	1 in 200
0707	22.85	SW	0	375			VC	50.92151	
0707	22.85	SW	0	375			VC	50.92151	
3004	27.66	FO	25.14	225			VC	21.09502	1 in 49
1603	22.89	FO	19.71	375			VC	40.8534	1 in 178
5608	27.71	FO	23.84	300			VC	38.58756	1 in 99
3807		SW	0				UN	48.82622	1 in
3901	26.94	SW	25.14	300			VC	114.3372	1 in 85
4701	28.46	FO	25.69	225			VC	31.01612	1 in 67
5713		FO		100			VC	7.781456	
0601	24.23	FO	21.03	225			VC	32.89377	1 in 150
3801	27.59	FO	24.65	225			VC	15.81139	1 in 176
2017		FO		150			VC	6.929872	
3503	25.54	FO	21.88	375			VC	24.75884	1 in 99
3503	25.54	FO	21.88	375			VC	24.75884	1 in 99
5704		FO	0	225			VC	40.5216	
1714	24.08	FO	0	225			VC	22.92787	
5003		FO		225			VC	59.49962	
3902	28.3	SW	26.34	300			VC	86.49277	1 in 73
3701	27.59	FO	0	225			VC	60.53924	
2903	26.39	SW	24.68	300			VC	87.66413	1 in 87
4607	28.22	SW	25.81	225			VC	38	1 in 60
1715	24.87	SW	0	225			VC	11.40175	
0604	23.19	SW	21.1	300			VC	29.41088	
2704	26.68	SW	0	225			VC	15.46924	
2502	24.83	FO	22.36	225			VC	46.17308	
2502	24.83	FO	22.36	225			VC	46.17358	
3702	27.46	SW	0	225			VC	45.69464	
3002	27.02	FO	24.69	225			VC	58.85575	1 in 95
1805		FO	0	225			VC	19.79899	
4503	25.71	SW	23.37	675			CO	37.58989	1 in 171
4903	49.77	FO	47.75	150			VC	22.13801	1 in 117
0708	22.81	FO	18.68	375			VC	61.46544	
0708	22.81	FO	18.68	375			VC	61.46544	
5910	50.02	FO	47.56	150			VC	15.72632	1 in 33
1806	24.95	SW	21.51	675			CO	13.41641	
5004		FO		225			VC	19.23623	
2803		SW	0	675			CO	68.70953	
5903	29.78	FO	25.91	225			VC	10.19804	1 in 170
1909		FO	0	225			VC	27.313	
1608	23.66	SW	21.97	300			CO	19.31321	1 in 386
0801	22.93	SW	20.09	750			CO	108.9082	1 in 84
4510		SW		150			VC	27.2259	
4510		SW		150			VC	27.2259	
4605	27.52	SW	25.09	300			VC	75.96052	1 in 55
3502	25.51	SW	22.58	750			CO	44.59821	1 in 149
3502	25.51	SW	22.58	750			CO	44.59821	1 in 149
1809	24.89	SW	23.19	225			VC	82.46211	1 in 74
1602	23.26	FO	19.47	375			VC	19.92486	1 in 181
5913	50.26	SW	0	600			CO	47.38973	
2801		SW		675			CO	44.77723	1 in
1906	25.35	SW	23.22	450			CO	98.03061	
4401	25.88	FO	23.28	225			VC	22.36068	1 in 224
4401	25.88	FO	23.28	225			VC	22.36068	1 in 224
5911	50.06	SW	47.95	300			CO	22.62254	1 in 51
2804		SW	0	675			CO	59.61543	
3704	27.91	SW	26	225			VC	56.0803	
0606		SW	0	300			VC	64.62198	
2018		FO		150			VC	17.7672	
2002	28.55	SW	26.62	225			VC	38.07887	1 in 200
0608	23.22	SW		225			VC	44.77723	
0608	23.22	SW		225			VC	44.77723	
4002		FO		150			VC	24.57148	
2802	26.4	SW		0			UN	30.01666	1 in
5803	29.13	SW	0	225			VC	27.01851	
3710	27.63	SW	0	225			VC	41.48494	
5507	26.2	SW	23.75	375			CO	59.5483	1 in 198
5507	26.2	SW	23.75	375			CO	59.5483	1 in 198
0701	24.23	SW	22.04	225			VC	22.08522	1 in 79
1807	24.87	FO	20.97	225			VC	13.60147	
0704	23.07	FO	20.49	225			VC	9.110607	1 in 91
0804	23.01	FO	19.16	300			VC	77.7303	1 in 104
0804	23.01	FO	19.16	300			VC	77.7303	1 in 104
3803	27.52	FO	24.55	225			VC	37.16181	1 in 162
1804	25.83	SW	22.55	675			CO	26.1725	1 in 58
3402	25.85	SW	23.18	525			CO	57.48913	1 in 160
3402	25.85	SW	23.18	525			CO	57.48913	1 in 160
2706		SW	0	225			VC	14.67371	
1507	24.1	SW	22.33	300			VC	57.58472	1 in 169
4506	25.71	FO	23.06	225			VC	56.46238	1 in 166
4506	25.71	FO	23.06	225			VC	56.46238	1 in 166
2004	28.22	SW	26.4	225			VC	42.2019	1 in 81
3709	28.01	SW	24.89	675			CO	70.00714	
5906	29.34	FO	26.36	225			VC	19.21028	
0610		FO		225			VC	5.188138	
5907	29.52	SW	26.83	600			CO	24.64533	
1503	24.32	SW	22.53	225			VC	14.62622	1 in 73
0608		FO		225			VC	33.02916	
4904	49.7	SW	48.09	300			CO	22.14019	1 in 185
3703	27.71	FO	25.19	225			VC	141.1524	1 in 77
2705	26.92	SW	25.05	225			VC	7.615773	1 in 76
3802	27.79	SW	25.31	675			CO	21.0238	1 in 526
5508	26.28	FO	23.63	225			VC	60.30754	1 in 137
5508	26.28	FO	23.63	225			VC	60.30754	1 in 137
0611		FO		225			VC	3.06853	
2907	25.68	SW	23.62	375			VC	20.61553	1 in 295
1508	24.19	FO	21.83	225			VC	52.92447	1 in 221
2507	24.58	SW	21.84	750			CO	72.03963	1 in 106
9701		SW	0	825			CO	51.89412	
9701		SW	0	825			CO	51.89412	
1902	25.52	SW	23.53	375			VC	11.18034	1 in 224
1905	25.58	FO	23.08	225			VC	37.94733	1 in 77
1001	27.59	SW	25.05	300			VC	65.96969	1 in 78
1808		SW	0	675			CO	21.47091	
5703	28.82	SW	26.5	225			VC	48.05206	1 in 209
4508		FO		150			VC	19.4759	
4807	29.01	SW	0	150			VC	68	
5902	29.65	SW	26.48	600			CO	65.78754	1 in 153
0807	24.63	FO	22.63	225			VC	8.944272	1 in 0.42349772

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0602	23.96	SW	21.52	300			VC	39.56008	1 in 107
2603		SW	0	150			VC	58.18935	
2504	25.3	FO	22.9	225			VC	60.92619	1 in 124
2504	25.3	FO	22.9	225			VC	60.92619	1 in 124
1604	23.21	SW	20.76	750			CO	77.87811	
3509	25.22	FO	22.94	225			VC	29.96665	1 in 176
0803	24.37	SW	23.25	225			VC	21.26029	1 in 0.96657820
2503	25.16	SW	23.46	225			VC	60.41523	1 in 77
2503	25.16	SW	23.46	225			VC	60.41523	1 in 77
4901	49.47	FO	48.15	150			VC	32.21717	1 in 83
0710	23.49	FO	18.88	375			VC	26.40076	1 in 139
2608	23.81	FO	20.52	375			VC	65	1 in 181
3708	28.42	SW	26.19	225			VC	44.26318	1 in 82
1904	25.46	SW	23.45	375			VC	14.31782	1 in 159
0905	24.13	FO	22.59	225			VC	38.07857	1 in 1.86478284
2602	24.89	SW	22.23	225			VC	10	
1908		FO	0	300			VC	94.93682	
3512	25.23	FO	22.65	225			VC	9.899495	1 in 165
3512	25.23	FO	22.65	225			VC	9.899495	1 in 165
0603	23.14	FO	20.75	225			VC	47.92703	1 in 56
1002	27.66	FO	24.97	225			VC	69.85699	1 in 70
3804	27.51	SW	25.26	675			VC	56.85947	1 in 154
3401	25.99	FO	22.66	225			VC	36.05551	1 in 124
3401	25.99	FO	22.66	225			VC	36.05551	1 in 124
1505	23.94	SW	22.32	225			VC	11.40175	1 in 81
4504	25.76	FO	23.16	225			VC	22.09072	1 in 245
4504	25.76	FO	23.16	225			VC	22.09072	1 in 245
3504	25.09	SW	22.26	750			CO	40.31129	1 in 101
3504	25.09	SW	22.26	750			CO	40.31129	1 in 101
2003	28.18	FO	26.46	225			VC	41.23106	1 in 76
1717	24.46	FO	0	225			VC	12.04159	
3508	25.06	SW	23.75	150			VC	33.01515	1 in 1.53630283
5607	27.14	SW	24.34	600			CO	33.61547	1 in 108
1506	23.94	FO	22.46	225			VC	6.618195	1 in 47
4507	25.65	SW	0	525			CO	33.10589	
4507	25.65	SW	0	525			CO	33.10589	
2901		SW		300			CO	46.46648	
1901	25.5	FO	23.3	225			VC	15.81139	1 in 226
4509		FO		150			VC	9.925402	
4509		FO		150			VC	9.925402	
2708		SW	0	225			VC	16.25275	
4501	25.37	SW	23.09	375			CO	52.80151	1 in 123
5610	26.93	FO	25.14	225			VC	30.61046	1 in 118
4902	49.49	SW	48.34	225			CO	32.09626	1 in 137
3601	26.93	SW	24.52	225			VC	212.0778	1 in 359
1708	26.67	SW	23.84	225			VC	16.64332	1 in 42
4803	29.16	SW	25.85	600			CO	17.08801	1 in 101
5904	29.68	FO	25.85	225			VC	56.0803	1 in 165
1706	24.92	FO	21.73	225			VC	29.87945	1 in 46
1710	26.27	SW	0	225			VC	62.03225	
4805	29.37	SW	27.14	225			VC	29.41088	1 in 72
5414		FO		150			VC	8.140284	
5414		FO		150			VC	8.140284	
3903		FO		150			VC	10.39517	
1811		SW	0	225			VC	7.942931	
2711		FO		225			VC	37.10464	
1704	25.89	SW	23.8	225			VC	19.29978	1 in 69
1718	25.67	FO	22.52	225			VC	54.11544	1 in 77
1702	25.96	SW	23.14	225			VC	29.41966	1 in 64
1707	27.11	SW	24.13	225			VC	14.46983	1 in 33
1703	25.97	FO	23.07	225			VC	4.84376	1 in 81
5412		FO		150			VC	4.731199	
5412		FO		150			VC	4.731199	
5402	26.27	SW	24.29	375			CO	73.92566	1 in 142
5402	26.27	SW	24.29	375			CO	73.92566	1 in 142
1716	25.98	FO	22.99	225			VC	24.56727	1 in 57
1706	25.5	SW	22.63	225			VC	44.59706	1 in 28
1705	26.01	FO	23.34	225			VC	22.61819	1 in 103
5401	26.25	FO	23.83	225			VC	42.54409	1 in 83
5401	26.25	FO	23.83	225			VC	42.54409	1 in 83
4802	29.13	FO	25.51	225			VC	106.1037	1 in 128
4810		FO		150			VC	10.19231	
4801	29.04	SW	26.03	600			CO	19.69772	1 in 131
5413		FO		150			VC	8.312948	
5413		FO		150			VC	8.312948	
2709		SW	0	225			VC	36.61043	
1719	27.37	FO	24.78	300			VC	25.23623	1 in 9
1711	23.97	FO	0	225			VC	47.42362	
4804	29.49	FO	0	225			VC	46.61545	
3705		SW	0	150			VC	56.921	
2808	26.15	FO	23.31	225			VC	18.25668	1 in 166
3907		FO		150			VC	23.74481	

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:

Cherryfield Drive Kirkby,

OS sheet Number: SJ4198NW
Scale: 1:1250 **Date:** 10/05/2021
Nodes: 283
Sheet: 1 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5812		FO		150			VC	16.77481	
9902	22.6	SW	20.09	300			VC	71.09772	1 in 103
6911	21.8	FO	18.5	225			VC	41.70945	1 in 33
6520	22.86	FO	20.35	150			VC	9.55289	1 in 50
6520	22.86	FO	20.35	150			VC	9.55289	1 in 50
6503	20.54	SW	18.74	225			VC	22.34148	1 in 51
6503	20.54	SW	18.74	225			VC	22.34148	1 in 51
0709		SW	0	375			VC	26.57066	
7702	17.62	SW	15.73	450			CO	5.09902	
5704	23.92	SW	0	225			VC	59.80803	
6812		FO		150			VC	6.294525	
5604	23.84	SW	22.06	225			VC	85.18097	1 in 131
0705	22.81	SW	20.82	375			VC	53.61378	
0705	22.81	SW	20.82	375			VC	53.61378	
5403	23	SW	21.53	225			VC	37.32006	1 in 57
5403	23	SW	21.53	225			VC	37.32006	1 in 57
6910	21.8	SW	0	0			UN	0.6740975	
8705		SW	0	1050			CO	62.24147	
5408		FO		150			VC	4.523649	
5408		FO		150			VC	4.523649	
6505	20.89	SW	18.75	225			VC	7.406841	1 in 741
6505	20.89	SW	18.75	225			VC	7.406841	1 in 741
5601	23.27	FO	21.23	225			VC	66.48308	1 in 33
6901	22.18	FO	18.68	225			VC	9.531651	1 in 53
6701	19.83	SW	17.68	375			CO	72.47087	1 in 213
5823	22.08	FO	20.46	225			VC	34.02454	1 in 100
6810	22.7	FO	20.12	225			VC	22.75011	1 in 34
9901	22.5	FO	19.55	150			VC	73.02574	1 in 64
6404	19.12	FO	16.9	225			VC	81.2877	
6404	19.12	FO	16.9	225			VC	81.2877	
8706		FO	0	375			CO	42.75512	
5716		FO		150			VC	9.663721	
4601	24.14	SW	22.01	225			VC	66.7308	
5902	23.03	SW	19.92	300			VC	53.39086	1 in 56
6507	19.45	SW	18.26	225			VC	45.06445	
6507	19.45	SW	18.26	225			VC	45.06445	
6519	20.93	FO	18.34	225			VC	8.970195	1 in 19
6519	20.93	FO	18.34	225			VC	8.970195	1 in 19
6809	21.2	SW	20.5	150			VC	9.041147	1 in 10
5001	22.49	SW	20.6	225			VC	48.8774	1 in 34
6408	23.58	FO	20.99	150			VC	26.68697	1 in 42
6408	23.58	FO	20.99	150			VC	26.68697	1 in 42
5703	22.08	FO	19.1	225			VC	39.44617	1 in 37
7802		FO	0	910			BR	60.67125	
5405	22.53	FO	20.81	225			VC	18.03251	1 in 52
5405	22.53	FO	20.81	225			VC	18.03251	1 in 52
8701	21.05	FO	18.6	225			VC	26.68333	1 in 1.72931485
4515		FO	0	225			VC	28.19652	
4703	24.23	SW	22.21	225			VC	41.4367	
5505	23.15	FO	21.13	150			VC	26.279	1 in 61
5505	23.15	FO	21.13	150			VC	26.279	1 in 61
6509	22.76	SW	20.94	225			VC	15.6484	1 in 104
6509	22.76	SW	20.94	225			VC	15.6484	1 in 104
9013		FO		100			VC	28.74175	
9013		FO		100			VC	28.74175	
6702	19.79	FO	17.12	225			VC	40.89249	1 in 114
5409	21.96	SW	20.2	300			VC	79.05694	1 in 49
5409	21.96	SW	20.2	300			VC	79.05694	1 in 49
7901	18.1	FO	13.69	910			BR	118.8716	
5415	22.19	FO	20.46	225			VC	24.19824	1 in 151
5415	22.19	FO	20.46	225			VC	24.19824	1 in 151
5407		FO		150			VC	4.309632	
5407		FO		150			VC	4.309632	
0703	23.43	SW	21.01	375			VC	16.79079	1 in 105
5702	21.44	SW	20.41	225			VC	41.23106	1 in 159
7705	19.01	FO	13.23	910			BR	119.4194	1 in 341
0706	22.76	FO	20.36	225			VC	52	1 in 84
0706	22.76	FO	20.36	225			VC	52	1 in 84
8703	21.09	FO	16.37	375			CO	57.87054	
6512	22.17	SW	20.4	225			VC	13.05489	1 in 29
6512	22.17	SW	20.4	225			VC	13.05489	1 in 29
6902	21.87	SW	18.97	300			VC	50.51807	1 in 32
0707	22.85	SW	0	375			VC	50.92151	
0707	22.85	SW	0	375			VC	50.92151	
6524		FO		150			VC	4.460397	
6524		FO		150			VC	4.460397	
5821	22.05	SW	19.4	1050			CO	20.16843	1 in 224
8702	21.16	SW	18.74	300			VC	10.19804	1 in 0.63341857
6805	19.07	SW	16.77	450			CO	108.4383	
6406	22.25	FO	19.82	225			VC	24.7074	1 in 17
6406	22.25	FO	19.82	225			VC	24.7074	1 in 17
9903	24.69	SW	22.61	300			VC	37.96553	1 in 15
4501	23.52	SW	21.38	225			VC	6.034103	1 in 34
6516	22.7	FO	20.53	150			VC	13.353	1 in 36
6516	22.7	FO	20.53	150			VC	13.353	1 in 36
4700	24.46	FO	0	225			VC	59.13544	
6403		SW	0	225			VC	79.57646	
6403		SW	0	225			VC	79.57646	
5905		FO		150			VC	34.6611	
6504		FO	0	225			VC	20.71282	
6504		FO	0	225			VC	20.71282	
5002	21.07	SW	19.16	225			VC	93.10747	1 in 62
4600	24.03	SW	22.48	225			VC	65.45992	1 in 205
0708	22.81	FO	18.68	375			VC	61.46544	
0708	22.81	FO	18.68	375			VC	61.46544	
6802	19.47	SW	17.41	375			CO	85.52656	1 in 134
9904	24.69	FO	22.1	150			CO	39.00721	1 in 15
6909		FO		150			VC	27.364	
6601	21.19	FO	19.16	225			VC	57.56735	1 in 115
6908		FO		150			VC	9.183047	
4511		SW	0	600			VC	6.399851	
5701	21.76	SW	19.36	225			VC	42.05948	1 in 22
5714		FO		150			VC	10.8339	
9803	21.38	SW	18.65	750			CO	58.82177	1 in 87
6521	22.83	SW	20.77	225			VC	10.48968	1 in 28
6521	22.83	SW	20.77	225			VC	10.48968	1 in 28
0801	22.93	SW	20.09	750			CO	108.9082	1 in 84
5502		FO	0	225			VC	78.43554	
5502		FO	0	225			VC	78.43554	
5404		FO	0	225			VC	49.46975	
5404		FO	0	225			VC	49.46975	
6703	19.54	FO	16.93	225			VC	39.32555	1 in 94
6801	19.31	FO	17.17	225			VC	59.47586	1 in 114
6502		SW	0	225			VC	32.24656	
6808	21.7	SW	19.55	1050			CO	12.06529	1 in 80
5406	22.54	SW	21.06	225			VC	14.83806	1 in 247
5406	22.54	SW	21.06	225			VC	14.83806	1 in 247
0608	23.22	SW		225			VC	44.77723	
0608	23.22	SW		225			VC	44.77723	
6410		FO		150			VC	25.43255	
6410		FO		150			VC	25.43255	
9805	21.62	SW	19.4	300			VC	18.9349	1 in 25
5605		FO		150			VC	9.539168	
4516		FO		0			VC	8.126231	
4401	22.31	FO	0	225			VC	76.84399	
4401	22.31	FO	0	225			VC	76.84399	
5504	23.49	SW	21.83	225			VC	97.40636	1 in 37
4517		FO		0			VC	6.082153	
6514	21.1	SW	18.92	225			VC	7.594072	1 in 63
6514	21.1	SW	18.92	225			VC	7.594072	1 in 63
6811	22.8	FO	19.47	225			VC	33.22942	1 in 34
5711		FO		150			VC	10.36405	
7703	17.88	SW	15.56	1050			CO	2	1 in 100
4500		FO	0	225			VC	58.18935	
4500		FO	0	225			VC	58.18935	
5503	23.6	SW	20.84	300			VC	77.16217	1 in 124
5503	23.6	SW	20.84	300			VC	77.16217	1 in 124
9001	25.29	FO	22.6	150			VC	35.40596	1 in 71
6513	21.72	SW	19.95	225			VC	12.32329	1 in 12
6513	21.72	SW	19.95	225			VC	12.32329	1 in 12
6517	22.26	FO	20.16	150			VC	13.40746	1 in 17
6517	22.26	FO	20.16	150			VC	13.40746	1 in 17
5903		SW	0	300			VC	19.92486	
0704	23.07	FO	20.49	225			VC	9.110607	1 in 91
5820	22.9	SW	19.5	1050			CO	19.70413	1 in 197
0804	23.01	FO	19.16	300			VC	77.7303	1 in 104
0804	23.01	FO	19.16	300			VC	77.7303	1 in 104
5602	21.68	FO	19.18	225			VC	61.77378	1 in 31
4512		SW	21.35	225			VC	38.75811	1 in 215
6905	19.72	SW	17.66	225			VC	107.5639	1 in 84
9702	22.24	FO	0	375			CO	84.8646	
6515	22.36	FO	20.83	150			VC	14.09279	1 in 108
6515	22.36	FO	20.83	150			VC	14.09279	1 in 108
5418	22.28	SW	21	225			VC	16.58455	1 in 128
5418	22.28	SW	21	225			VC	16.58455	1 in 128
5506	22.81	FO	20.7	150			VC	14.67493	1 in 86
5506	22.81	FO	20.7	150			VC	14.67493	1 in 86
6518	21.76	FO	19.39	150			VC	18.88454	1 in 18
6518	21.76	FO	19.39	150			VC	18.88454	1 in 18
9002	25.29	SW	23.11	300			VC	36.06604	1 in 72
9701		SW	0	825			CO	51.89412	
9701		SW	0	825			CO	51.89412	
6804	19.33	FO	16.93	225			VC	59.80127	
5813		FO		150			VC	11.79737	
7706		FO	0	225			VC	8.391736	
6803	19.55	FO	16.65	225			VC	36.96789	1 in 132
6409	23.56	SW	21.46	225			VC	24.53262	1 in 36
6409	23.56	SW	21.46	225			VC	24.53262	1 in 36
9804	20.3	SW	17.86	825			CO	18.86796	1 in 629
6511	22.64	SW	20.79	225			VC	13.63427	1 in 35
6511	22.64	SW	20.79	225			VC	13.63427	1 in 35
4603	23.88	FO	22.06	225			VC	24.00508	
7601	16.99	FO	12.88	910			BR	137.0912	1 in 415
6501	20.83	FO	18.65	225			VC	37.64306	
6522		FO		150			VC	4.656339	
6522		FO		150			VC	4.656339	
6903	19.57	SW	17.23	225			VC	23.67788	1 in 132
4626		FO		150			VC	20.00388	
4602	23.98	FO	22.35	225			VC	49.33559	1 in 176
4503	23.24	SW	21.13	300			VC	65.45992	1 in 242
4503	23.24	SW	21.13	300			VC	65.45992	1 in 242
5419	22.36	SW	20.87	225			VC	31.4876	1 in 61
5419	22.36	SW	20.87	225			VC	31.4876	1 in 61
7501	16.22	FO	12.55	910			BR	117.0171	1 in 355
7501	16.22	FO	12.55	910			BR	117.0171	1 in 355
5501	23.04	SW	21.12	225			VC	21.43419	1 in 119
5501	23.04	SW	21.12	225			VC	21.43419	1 in 119
5803	23.89	SW	21.77	225			VC	61.98387	1 in 61
0710	23.49	FO	18.88	375			VC	26.40076	1 in 139
9011		FO		100			VC	5.681334	
0805	24.13	FO	22.59	225			VC	38.07887	1 in 1.86478284
6806		FO		150			VC	4.511622	
6704	19.17	SW	17.31	375			CO	31.09512	1 in 155
1908		FO	0	300			VC	94.93682	
9004		FO		100			PE	21.21507	
6602	20.83	SW	19.46	225			VC	62.24147	
9801	20.43	FO	17.33	375			CO	24.69818	1 in 59
6508	22.23	SW	21.07	150			VC	15.24452	1 in 117
6508	22.23	SW	21.07	150			VC	15.24452	1 in 117
6506	19.85	FO	17.85	225			VC	45.90136	1 in 50
6506	19.85	FO	17.85	225			VC	45.90136	1 in 50

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4704	24.28	FO	21.61	225			VC	31.01612	1 in 41
9802	21.67	FO	18.41	300			VC	61.25732	1 in 58
5603	20.74	SW	19.15	225			VC	38.27532	1 in 29
9822	22.15	SW	19.31	1050			CO	72.91094	1 in 251
6523		SW		150			VC	8.434926	
6523		SW		150			VC	8.434926	
5801	23.83	SW	21.78	225			VC	83.48653	
5804	24.02	FO	21.38	225			VC	60.08687	1 in 61
5802	23.94	FO	21.36	225			VC	76.2168	1 in 139
5806		FO		150			VC	11.39515	
6510		SW		150			VC	7.46456	
6510		SW		150			VC	7.46456	
5721		FO		150			VC	51.3605	
9703		SW	0	825			CO	37.16181	
5901	23.14	FO	19.54	225			VC	52.22153	1 in 64
6527		FO		100			PSC	4.290583	
6527		FO		100			PSC	4.290583	
7911		FO		100			VC	2.132697	
6407	22.15	SW	20.61	225			VC	29.20031	1 in 17
6407	22.15	SW	20.61	225			VC	29.20031	1 in 17
5705	23.76	FO	20.75	225			VC	61.68468	1 in 72
5811		FO		150			VC	10.8417	
5904		FO	0	225			VC	17.46425	

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:

Cherryfield Drive Kirkby,

OS sheet Number: SJ4098NE
Scale: 1:1250 **Date:** 10/05/2021
Nodes: 224
Sheet: 2 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4500	19.96	SW	0	1200			CO	83.24062	
1712		SW		150			VC	19.59276	
3504	19.28	SW	16.59	375			CO	33.73426	1 in 147
5708	24.08	FO	22.32	225			VC	33.54102	1 in 54
3603	19.52	FO	17.92	225			VC	95.52486	1 in 329
4701	22.74	FO	19.71	225			VC	69.35416	1 in 151
2408	18.57	SW	16.17	450			CO	25	
3801	22.31	FO	19.92	225			VC	19.41649	1 in 88
2705		FO		150			VC	18.08574	
2103		FO		150			VC	6.185194	
0802		FO		100			VC	18.17804	
3501	19.28	FO	17.67	225			VC	56.60389	1 in 377
9008		FO		150			VC	5.512687	
9008		FO		150			VC	5.512687	
4602	21.43	SW	18.43	825			VC	5.512687	
3900	23.31	SW	21.56	225			CO	67.36468	1 in 94
2702	20.5	FO	17.79	300			VC	28.84441	1 in 170
4005	25.53	FO	0	225			VC	79.07591	1 in 377
4005	25.53	FO	0	225			VC	14.31782	
1801	21.14	FO	19.37	225			VC	14.31782	1 in 72
0803	19.01	FO	17.47	225			VC	54.58937	1 in 169
2404		SW	0	225			VC	52.34501	
3002	24.43	FO	20.56	225			VC	73.34848	
3002	24.43	FO	20.56	225			VC	38.01316	1 in 165
3902	23.45	SW	19.65	600			CO	38.01316	1 in 165
4905	25.11	FO	0	225			VC	60.20797	1 in 123
4905	25.11	FO	0	225			VC	25.4951	
4811		FO		100			VC	25.4951	
2901	23.46	FO	19.93	225			VC	71.13702	
1508		CO		150			VC	67.23094	1 in 210
4504	20.11	SW	17.83	450			VC	11.0006	
4802		SW	0	825			CO	9.219544	1 in 44
3905	24.16	FO	20.3	225			CO	73.24616	
3905	24.16	FO	20.3	225			VC	84.87638	1 in 236
2803	22.06	FO	19.6	225			VC	84.87638	1 in 236
4506	19.71	FO	17.53	375			VC	54.42426	
2604		FO		150			CO	43.13931	1 in 616
4910		FO		150			VC	9.770243	
4910		FO		150			VC	13.74897	
1804	20.23	SW	17.9	225			VC	13.74897	
3904		SW	0	225			VC	64.77654	1 in 154
4004	25.28	SW	0	225			VC	20.24846	
4004	25.28	SW	0	225			VC	37.48333	
2003	24.37	SW	0	300			VC	37.48333	
2003	24.37	SW	0	300			VC	71.56116	
2915		FO		150			VC	71.56116	
2600	20.09	SW	16.15	600			VC	4.930435	
3702	20.23	SW	18.23	300			CO	77.92946	1 in 156
2703	19.86	SW	17.28	600			VC	61.18823	
2801	20.72	FO	18.1	225			CO	38.47077	1 in 120
1806	19.53	SW	17.43	300			VC	82.37718	1 in 1177
2407	18.55	FO	16.91	300			VC	47.67599	
1405		FO		100			VC	40.04997	1 in 667
4906		FO		150			CO	10.85356	
0701	19.13	FO	17.71	225			CO	20.6228	
3700	22.01	SW	0	225			VC	53.25411	1 in 254
5003	25.26	FO	0	225			VC	49.81968	
5003	25.26	FO	0	225			VC	42.72002	
3906	24.49	SW	0	600			VC	42.72002	
3906	24.49	SW	0	600			CO	90.13878	
5507	20.93	FO	19.07	225			CO	90.13878	
0702	19.24	SW	17.12	300			VC	36.4683	1 in 148
9905		FO		150			VC	53.00943	
9905		FO		150			VC	16.69388	
9905		FO		150			VC	16.69388	
4804	24.67	SW	23.18	225			VC	25.01999	1 in 74
1700	19.42	SW	17.43	225			VC	38.91015	1 in 162
2502	19.45	SW	16.35	375			CO	30.26549	
1703	19.5	FO	0	225			VC	66.85058	
4006	25.41	SW	23.78	225			VC	23.08679	
4006	25.41	SW	23.78	225			VC	23.08679	
2805		FO		150			VC	9.225553	
4801	23.37	FO	20.53	225			VC	84.48077	1 in 107
1505	18.27	SW	0	225			VC	8.544003	
2601	19.93	FO	17.55	300			VC	58.69412	1 in 279
5512		SW	0	450			CO	21.93171	
2517		FO		150			CO	10.40455	
4510		FO		100			VC	7.383563	
3519		FO		150			VC	11.56958	
4700	22.66	SW	19.06	825			CO	69.46222	1 in 114
1404		FO		100			VC	16.22241	
0902	19.31	SW	16.63	225			CO	43.38202	
2004	24.31	FO	0	225			VC	71.28114	
2004	24.31	FO	0	225			VC	71.28114	
3800	22.2	SW	19.77	225			VC	16.27882	
3907	23.65	FO	21.81	225			VC	30.36445	1 in 76
3907	23.65	FO	21.81	225			VC	30.36445	1 in 76
5515	21.79	SW	19.64	450			CO	8.544003	
2403	19.04	FO	17.25	225			VC	55.9017	1 in 243
5902	24.89	FO	22.83	225			VC	29.06888	1 in 97
5902	24.89	FO	22.83	225			VC	29.06888	1 in 97
3707	20.27	FO	18.57	225			VC	30.26549	1 in 108
2804	21.13	SW	0	300			VC	49.64877	
9903		FO		150			VC	17.82229	
9903		FO		150			VC	17.82229	
9903		FO		150			VC	17.82229	
2507		CO		150			VC	8.459571	
4604		SW	0	640			VC	38.62642	
1504		SW	0	300			VC	10.29563	
3506	19.68	SW	17.51	300			VC	51.0392	1 in 134
2705	20.02	SW	17.92	225			VC	34.48188	1 in 73
4503	20.09	FO	18.07	225			VC	43.82921	1 in 110
2405	18.5	FO	0	300			VC	27.29469	
9800	19.04	SW	0	225			CO	69.28925	
3508	19.19	SW	17.88	225			VC	43.73785	1 in 199
3004	25.31	FO	21	225			VC	78.54935	1 in 192
0900	20.82	SW	18.42	225			VC	87.93179	
0900	20.82	SW	18.42	225			VC	87.93179	
3507	19.72	FO	18.15	225			VC	43.28972	1 in 180
4903	24.06	FO	0	225			VC	46.87217	
3511		FO		150			VC	10.18705	
5505	21.01	SW	19.57	225			VC	27.01851	1 in 150
3509	19.42	SW	17.65	225			VC	28	1 in 200
3502	19.36	SW	17.12	300			VC	37.33631	1 in 133
2800	20.76	SW	17.7	600			CO	38.63936	1 in 94
0901	20.82	FO	18.72	225			VC	75.28612	1 in 46
0901	20.82	FO	18.72	225			VC	75.28612	1 in 46
0901	20.82	FO	18.72	225			VC	75.28612	1 in 46
1601	20.12	FO	18.15	225			VC	55.58474	1 in 150
4706		FO		150			VC	9.940351	
3512		FO		150			VC	17.46942	
4501	19.84	FO	17.6	375			CO	40	1 in 667
2414	18.33	SW	14.96	750			CO	13.15295	
3802	22.45	SW	20.55	225			VC	70.45566	1 in 92
3703	22.14	FO	19.7	225			VC	16.03122	1 in 123.317073
4907	24.57	FO	22.81	225			VC	50.15974	1 in 238.855927
4907	24.57	FO	22.81	225			VC	50.15974	1 in 238.855927
2515		FO		150			VC	5.529795	
4001		FO		100			VC	3.128462	
4001		FO		100			VC	3.128462	
2411	18.89	SW	17.03	300			VC	32.01562	1 in 41
5517		CO		150			VC	4.530738	
4705	23.31	FO	21.75	225			VC	50.69517	1 in 91
2413	18.33	FO	17.05	225			VC	21.0238	
2704	20.68	SW	0	600			CO	80.23092	
3903		SW	0	225			VC	36.35932	
3903		SW	0	225			VC	36.35932	
2706	20.77	SW	0	225			VC	51.97115	
2912		FO		150			VC	11.16195	
4908	24.57	SW	21.29	825			CO	34.48188	1 in 128
4607		FO		100			VC	28.00716	
3601	20.1	FO	18.43	225			VC	61.0082	1 in 226
1803	20.95	FO	19.16	225			VC	42.42641	1 in 61
2501	19.34	FO	17.32	300			VC	97.67292	1 in 95
4605		SW	0	250			CO	32.57299	
4902	23.44	SW	20.63	825			CO	11.31371	
3400		SW	0	225			VC	44.94441	
3708	20.96	SW	19.14	225			VC	37.33631	1 in 46
4603	21.55	FO	19.26	225			VC	66.48308	
1807	19.37	FO	17.91	225			VC	45.70558	1 in 381
3505	19.42	FO	18.16	225			VC	30.80584	1 in 83
4805	24.44	SW	22.81	225			VC	69.12308	1 in 73
4906	25.08	SW	0	300			VC	84.30895	
4906	25.08	SW	0	300			CO	84.30895	
4703	23.49	FO	21.7	225			VC	68.35934	1 in 94
3001	24.34	SW	20.22	600			CO	41.04875	
3001	24.34	SW	20.22	600			CO	41.04875	
2417		FO		0			VC	9.033066	
4502	20.02	SW	17.05	900			CO	42.99011	
3602	19.46	SW	18.02	300			VC	91.41116	1 in 62
4810		FO		100			VC	9.751995	
0700	19.13	FO		300			VC	18.86796	
3803	22.37	FO	20.54	225			VC	63.28507	1 in 104
3500	19.18	SW	16.83	375			CO	34.17601	1 in 142
1604		FO		0			VC	1.271742	
4008	25.66	SW	0	225			VC	42.72002	
3705	20.14	FO	18.28	225			VC	54.91812	1 in 122
3001	18.93	FO	16.83	225			VC	17.88854	1 in 1789
5511	21.58	SW	19.05	300			VC	24.59675	
5510	21.59	FO	18.7	225			VC	28.63564	1 in 151
2002	24.02	SW	21.56	300			VC	75.58439	
2002	24.02	SW	21.56	300			VC	75.58439	
3003	25.31	SW	0	600			CO	68.24222	
2511		CO		150			VC	22.78255	
2418		FO		0			VC	8.235988	
5513	20.94	SW	18.68	375			CO	18.78829	1 in 47
3402	19.27	SW	17.63	225			VC	38.23534	1 in 107
4003	25.4	FO	23.17	225			VC	37.64306	
4003	25.4	FO	23.17	225			VC	37.64306	
4904	24.27	SW	20.96	825			CO	34.71311	1 in 116
2406	18.81	SW	16.77	225			VC	39.31921	1 in 106
3908	24.1	SW	22.05	225			VC	40.24922	
3908	24.1	SW	22.05	225			VC	40.24922	
2903	23.84	FO	22.12	150			VC	22.4722	1 in 51
2903	23.84	FO	22.12	150			VC	22.4722	1 in 51
4704	23.23	SW	21.65	225			VC	58.69412	1 in 77
1800	21.07	SW	19.22	225			VC	53.93515	1 in 45
2410	18.27	SW	0	1900			CO	54.58937	
2509		CO		150			VC	13.37144	
2802	22.42	SW	18.62	600			CO	57.77543	1 in 98
2902	24.27	SW	21.88	225			VC	45.80393	1 in 170
2902	24.27	SW	21.88	225			VC	45.80393	1 in 170
0002	21.19	SW	0	225			VC	75.28612	
0002	21.19	SW	0	225			VC	75.28612	
0002	21.19	SW	0	225			VC	75.28612	
5004	25.26	SW	0	300			CO	44.77723	
5004	25.26	SW	0	300			CO	44.77723	
0800	18.82	SW	0	300			VC	53.85165	
2516		FO		150			VC	21.97748	
4900		SW	0	225			VC	26.30589	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0804	18.85	FO	17.12	225			VC	51.62364	1 in 184
5604	21.95	FO	20.22	225			VC	15.81139	1 in 28
4800	23.64	SW	19.76	825			CO	68.35934	1 in 102
4809		FO		100			VC	17.58333	
1709		FO		150			VC	6.211524	
1600	20.12	SW	17.93	225			VC	65.9242	1 in 103
2402	18.97	SW	14.53	1700			CO	82.29824	
5901	24.66	SW	21.55	900			CO	13	1 in 118
2510		CO		150			VC	21.67963	
5506	20.95	SW	19.31	300			VC	35.60899	1 in 297
0001	21.14	FO	19.41	225			VC	74.04053	1 in 112
0001	21.14	FO	19.41	225			VC	74.04053	1 in 112
0001	21.14	FO	19.41	225			VC	74.04053	1 in 112
4812		FO		100			VC	22.68055	
1708		FO		150			VC	8.098558	
1503	18.46	SW		1800				510.01179	
4601	20.69	FO	18.23	225			VC	52.49762	1 in 2625
2709		FO		150			VC	18.1102	
2701	20.17	SW	16.96	225			CO	23.19463	
4909	24.35	FO	22.52	225			VC	45.88028	
0801	20.42	FO	18.6	225			VC	56.88585	1 in 73
5516		CO		150			VC	5.913386	
3709	20.99	FO	19.3	225			VC	41.59327	1 in 42
5709	23.86	SW	21.86	300			VC	29.42788	1 in 74
3910	24.26	SW	22.23	225			VC	24.08319	1 in 161
3910	24.26	SW	22.23	225			VC	24.08319	1 in 161
4808		FO		100			VC	25.5267	
3706	20.98	FO	19.3	225			VC	37.21559	1 in 52
4911		FO		150			VC	16.70142	
4911		FO		150			VC	16.70142	
4007	25.75	FO	23.59	225			VC	49.0408	1 in 545
5606	22.85	SW	20.72	300			VC	66.85058	1 in 64
1501	19.39	FO	17.78	225			VC	66.91039	1 in 156
4803	24.93	SW	23.49	225			VC	27.29469	1 in 88
1502		SW	0	225			VC	39.45884	
1502	19.34	SW	17.29	225			VC	60.82763	
3901	23.55	FO	21.74	225			CO	31.62278	1 in 96
1704	19.99	FO	18.33	225			VC	25.31798	1 in 87
1701	19.23	FO	17.78	225			VC	9.219544	1 in 184
5607	22.93	FO	21.18	225			VC	64.07808	1 in 67
3401		SW	0	225			VC	14.76482	
3503	19.48	FO	17.87	225			VC	43.68066	1 in 273
9902	19.09	FO	16.79	225			VC	55.65968	1 in 199
4507		FO		100			VC	11.54247	
5806	24.61	FO	22.98	225			CO	64.53681	1 in 98
4600	20.68	SW	17.51	825			CO	56.64804	1 in 126
5603	21.56	FO	18.51	225			VC	74.73286	1 in 178
1702	19.56	SW	0	225			VC	35.73514	
1805	20.35	FO	18.46	225			VC	64.93843	1 in 125
1809		CO		150			VC	2.90014	
2700	20.32	FO	17.99	300			CO	43.56604	1 in 272
1500	18.72	FO	17.12	225			VC	13.92839	1 in 199
2605		FO		150			VC	8.433094	
4702	23.38	SW	21.45	300			VC	54.23099	1 in 77
3704	20.69	SW	19.14	225			VC	60.40695	1 in 67
4709		FO		100			VC	15.66359	
4707		FO		150			VC	16.62323	
0903	19.36	FO	17.35	225			VC	33.54102	1 in 70
1900	20.36	SW	18	225			VC	56.71861	1 in 50
3701	21.68	FO	19.56	225			VC	97.49359	
3909	24.06	FO	22.18	225			VC	31.40064	1 in 92
3909	24.06	FO	22.18	225			VC	31.40064	1 in 92
1707		FO		150			VC	9.092465	
2503		FO		150			VC	14.14074	
4406	20.8	SW	18.83	150			UN	6.99723	1 in 4
5622		FO		150			VC	3.510266	
5814		FO		100			VC	5.187243	
3608		FO		150			VC	41.0243	
3605		FO		150			VC	14.03212	
2429		FO		100			PSC	3.184592	
3600	20.06	SW	18.23	225			VC	63.07139	1 in 90
4405	20.6	SW	18.85	150			UN	7.521817	1 in 5
3611		FO		150			VC	40.29043	
4608		FO		150			VC	3.562907	
5403	20.55	FO	17.88	225			VC	58.34529	
0905	19.71	FO	17.74	225			VC	22.56103	1 in 63
2504		SW	0	375			CO	14.31782	
5620		FO		150			VC	4.737236	
5411	21.07	SW	17.33	1200			CO	25.38174	1 in 363
5005		FO		100			VC	18.94909	
5005		FO		100			VC	18.94909	
4901	23.21	SW	21.33	225			VC	68.26419	1 in 85
4403	20.64	SW	17.23	1200			CO	13.95338	1 in 465
2503	19.34	FO	17.61	225			VC	37.65634	
4613		FO		150			VC	9.564805	
4609		FO		150			VC	9.813664	
3806		FO		150			VC	9.569093	
4411	20.42	FO	19.17	150			VC	55.9928	1 in 100
3406		FO		450			VC	42.75314	
2400	19.14	SW	0	375			CO	53.15073	
4409	20.5	FO	19.27	150			VC	8.027886	1 in 80
4401	19.32	FO	17.45	375			CO	58.64339	1 in 533
5412	20.79	SW	17.26	1200			CO	12.49217	1 in 416
4404	20.52	SW	17.2	1200			CO	55.77468	1 in 398
3606		FO		150			VC	11.87089	
4410	20.45	FO	19.26	150			VC	9.205499	1 in 103
0904	19.72	SW	16.86	225			VC	29.61419	1 in 141
2401		FO		225			VC	39.31921	
2500	19.29	SW	15.65	600			CO	82.03658	1 in 155
4400	19.49	SW	15.86	1200			CO	61.94986	1 in 111
3807		FO		150			VC	0.4517692	
3405	19.21	FO	17.59	225			VC	57.80138	1 in 170

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
- Pumping Station
- 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:

Cherryfield Drive Kirkby,

OS sheet Number: SJ4197NW
Scale: 1:1250 **Date:** 10/05/2021
Nodes: 303
Sheet: 3 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.



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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Refno	Cover	Func	Invert	Size x	Matl	Length	Grad
5204	19.38	FO	16.81	225	VC	70.5195	1 in 50
7906		FO	0	225	VC	11.56307	
0205		FO		100	VC	9.266712	
0205		FO		100	VC	9.266712	
0201	23.25	SW	20.48	900	CO	24.85441	1 in 355
0201	23.25	SW	20.48	900	CO	24.85441	1 in 355
5203	17.97	SW	15.99	300	VC	10.19804	1 in 146
6205	16.96	SW	15.4	225	VC	60.63827	1 in 189
5201	17.72	SW	15.76	375	CO	57.42822	1 in 302
6302	18.01	SW	15.06	225	VC	11.42362	1 in 104
6520	22.86	FO	20.35	150	VC	9.55289	1 in 50
6520	22.86	FO	20.35	150	VC	9.55289	1 in 50
6304	21.52	SW	18.54	225	VC	37.02042	
0101	21.7	FO	19.04	225	VC	47.40314	1 in 50
0101	21.7	FO	19.04	225	VC	47.40314	1 in 50
7401	15.81	FO	12.22	910	BR	126.7754	1 in 396
6503	20.54	SW	18.74	225	VC	22.34148	1 in 51
6503	20.54	SW	18.74	225	VC	22.34148	1 in 51
4301		FO	0	225	VC	58.09763	
8006		SW	0	225	VC	26.45282	
9008		FO		150	VC	5.512687	
9008		FO		150	VC	5.512687	
9008		FO		150	VC	5.512687	
6301	17.07	FO	14.98	225	VC	68.79884	1 in 197
5109		CO		150	VC	24.48997	
0202	23.15	FO	20.34	150	VC	24.47534	1 in 117
0202	23.15	FO	20.34	150	VC	24.47534	1 in 117
6104		FO	0	910	BR	23.76973	
4211		CO		150	VC	12.56196	
5403	23	SW	21.53	225	VC	37.32006	1 in 57
5403	23	SW	21.53	225	VC	37.32006	1 in 57
8902		SW	0	225	VC	26.91446	
7402		SW	0	375	VC	51.20302	
8005		SW	0	225	VC	29.28992	
5408		FO		150	VC	4.523649	
5408		FO		150	VC	4.523649	
6101	17.34	FO	14.59	225	VC	64.89993	
6505	20.89	SW	18.75	225	VC	7.406841	1 in 741
6505	20.89	SW	18.75	225	VC	7.406841	1 in 741
9005	20.86	SW	18.38	375	CO	50.29066	1 in 48
8009		FO	0	150	VC	9.898221	
6404	19.12	FO	16.9	225	VC	81.2877	
6404	19.12	FO	16.9	225	VC	81.2877	
5117		SW		150	VC	25.10333	
6507	19.45	SW	18.26	225	VC	45.06445	
6507	19.45	SW	18.26	225	VC	45.06445	
6519	20.93	FO	18.34	225	VC	8.970195	1 in 19
6519	20.93	FO	18.34	225	VC	8.970195	1 in 19
9202	22.94	SW	20.32	900	CO	51.34215	1 in 223
9202	22.94	SW	20.32	900	CO	51.34215	1 in 223
4300	20.46	SW	18.19	375	CO	45.31562	1 in 78
5305	20.12	FO	18.11	225	VC	29.73214	1 in 1.88059060
0114	22.76	FO	21.16	150	VC	16.87868	1 in 89
0114	22.76	FO	21.16	150	VC	16.87868	1 in 89
5104	17.44	SW	15.57	375	CO	54.64456	1 in 321
6310	21.61	FO	19.36	150	VC	30.58447	1 in 9
6408	23.58	FO	20.99	150	VC	26.68697	1 in 42
6408	23.58	FO	20.99	150	VC	26.68697	1 in 42
8910		FO	0	150	VC	26.73522	
5001		FO	0	225	VC	40.80441	
9105	22.36	FO	19.45	150	VC	24.06766	1 in 120
5405	22.53	FO	20.81	225	VC	18.03251	1 in 52
5405	22.53	FO	20.81	225	VC	18.03251	1 in 52
9107	21.48	FO	19.07	150	VC	16.19218	1 in 20
9201	22.99	SW	20.41	900	CO	20.27381	1 in 225
9201	22.99	SW	20.41	900	CO	20.27381	1 in 225
4515		FO	0	225	VC	28.19652	
5505	23.15	FO	21.13	150	VC	26.279	1 in 61
5505	23.15	FO	21.13	150	VC	26.279	1 in 61
6401	18.67	FO	0	225	VC	32.8387	
9905		FO		150	VC	16.69388	
9905		FO		150	VC	16.69388	
9905		FO		150	VC	16.69388	
9905		FO		150	VC	16.69388	
6509	22.76	SW	20.94	225	VC	15.6484	1 in 104
6509	22.76	SW	20.94	225	VC	15.6484	1 in 104
7004		FO	0	225	VC	58.18075	
5216		FO		150	VC	8.031899	
5409	21.96	SW	20.2	300	VC	79.05694	1 in 49
5409	21.96	SW	20.2	300	VC	79.05694	1 in 49
5415	22.19	FO	20.46	225	VC	24.19824	1 in 151
5415	22.19	FO	20.46	225	VC	24.19824	1 in 151
5210		CO		150	VC	8.858676	
5407		FO		150	VC	4.309632	
5407		FO		150	VC	4.309632	
6902		FO	0	225	VC	74.08526	
0113	22.73	FO	20.97	150	VC	43.63806	1 in 118
0113	22.73	FO	20.97	150	VC	43.63806	1 in 118
0206		FO		100	VC	6.666505	
0206		FO		100	VC	6.666505	
6308	21.55	SW	19.9	225	VC	30.78919	1 in 9
6512	22.17	SW	20.4	225	VC	13.05489	1 in 29
6512	22.17	SW	20.4	225	VC	13.05489	1 in 29
6214		CO		150	VC	2.726131	
8012		FO	0	150	VC	19.12839	
6524		FO		150	VC	4.460397	
6524		FO		150	VC	4.460397	
5901	16.05	FO	11.22	1050	BR	134.9978	1 in 900
5402	21.83	SW	20.33	225	VC	63.4486	1 in 34
0106	23.41	SW	20.61	900	CO	23.49919	1 in 181
8004		SW	0	225	VC	13.42338	
8011		FO	0	150	VC	25.37531	
9001	20.03	FO	15.81	225	VC	69.399	
6406	22.25	FO	19.82	225	VC	24.7074	1 in 17
6406	22.25	FO	19.82	225	VC	24.7074	1 in 17
7103		FO	0	910	BR	47.88528	
5102	16.79	SW		675	CO	91.63558	
6402		SW	0	300	VC	39.99874	
7003	17.05	SW	13.35	450	CO	24.04163	1 in 267
5307	19.38	SW	17.53	300	VC	30.36445	1 in 202
8912		FO	0	150	VC	15.34931	
9903		FO		150	VC	17.82229	
9903		FO		150	VC	17.82229	
9903		FO		150	VC	17.82229	
6516	22.7	FO	20.53	150	VC	13.353	1 in 36
6516	22.7	FO	20.53	150	VC	13.353	1 in 36
6203	17.7	SW	15.91	300	VC	83.48653	1 in 190
6403		SW	0	225	VC	79.57646	
6403		SW	0	225	VC	79.57646	
5205	19.5	SW	17.34	300	VC	54.40588	1 in 42
7201	15.56	FO	11.9	910	BR	135.4179	1 in 451
6504		FO	0	225	VC	20.71282	
6504		FO	0	225	VC	20.71282	
9800	19.04	SW	0	225	VC	69.28925	
9103	21.65	SW	18.88	225	CO	0.8975996	1 in 15
6001		FO	0	1050	BR	5.385165	
6105		CO		150	VC	10.59632	
7904		FO	0	225	VC	32.29662	
5401	22.41	FO	20.3	225	VC	22.7178	
0900	20.82	SW	18.42	225	VC	87.93179	
0900	20.82	SW	18.42	225	VC	87.93179	
5204	19.38	FO		150	PP	10.00348	
8010		FO	0	150	VC	29.62984	
5108		CO		150	VC	6.733204	
5312		CO		150	VC	2.475984	
5118		CO		150	VC	8.484854	
9102	22.16	SW	19.83	900	CO	13.89657	1 in 15
0901	20.82	FO	18.72	225	VC	75.28612	1 in 46
0901	20.82	FO	18.72	225	VC	75.28612	1 in 46
0901	20.82	FO	18.72	225	VC	75.28612	1 in 46
7102		SW	0	939	CO	21.9545	
8903		SW	0	225	VC	15.67083	
6521	22.83	SW	20.77	225	VC	10.48968	1 in 28
6521	22.83	SW	20.77	225	VC	10.48968	1 in 28
6204	17.82	FO	15.41	225	VC	83.23461	1 in 111
0204		FO		100	VC	6.454139	
0204		FO		100	VC	6.454139	
8008		SW	0	300	VC	16.5395	
9006	20.66	FO	18.1	225	VC	34.99492	1 in 44
8001	18.12	SW	14.79	525	CO	46.32494	1 in 97
0112	23.39	FO	20.6	150	VC	28.36487	1 in 109
5502		FO	0	225	VC	78.43554	
5502		FO	0	225	VC	78.43554	
5404		FO	0	225	VC	49.46975	
5404		FO	0	225	VC	49.46975	
5101		SW	0	675	CO	63.24555	
6303	18.37	SW	0	225	VC	9	
6306	18.19	FO	13.86	225	VC	45.48759	
8007		SW	0	300	VC	20.75578	
6307	22.14	SW	20.05	225	VC	21.689	1 in 145
6502		SW	0	225	VC	32.24656	
5212		FO		150	VC	4.918268	
9002	19.72	SW	15.49	525	CO	46.17358	
9204	22.91	FO	19.92	150	VC	55.4274	1 in 118
9204	22.91	FO	19.92	150	VC	55.4274	1 in 118
6002	16.36	FO	11.39	1050	BR	132.28	1 in 778
6106		CO		150	VC	1.857603	
5406	22.54	SW	21.06	225	VC	14.83806	1 in 247
5406	22.54	SW	21.06	225	VC	14.83806	1 in 247
6410		FO		150	VC	25.43255	
6410		FO		150	VC	25.43255	
7007		SW	0	300	VC	21.0148	
4102	17.79	SW	0	675	CO	55.9464	
9203	22.89	FO	20.13	150	VC	20.43148	1 in 97
9203	22.89	FO	20.13	150	VC	20.43148	1 in 97
6103	16.45	FO	11.6	910	BR	102.2008	1 in 487
5208	19.64	FO	17.33	225	VC	41.14608	1 in 61.4120615
4401	22.31	FO	0	225	VC	76.84399	
4401	22.31	FO	0	225	VC	76.84399	
5301	20.46	FO	18.03	225	VC	47.4343	1 in 49
6514	21.1	SW	18.92	225	VC	7.594972	1 in 63
6514	21.1	SW	18.92	225	VC	7.594972	1 in 63
0108	22.57	SW	21.11	900	CO	31.63319	1 in 264
0108	22.57	SW	21.11	900	CO	31.63319	1 in 264
5202	18.03	FO	15.36	225	VC	65.45992	1 in 182
4500		FO	0	225	VC	58.18935	
4500		FO	0	225	VC	58.18935	
5503	23.6	SW	20.84	300	VC	77.16217	1 in 124
5503	23.6	SW	20.84	300	VC	77.16217	1 in 124
6311	19.76	FO	15.85	225	VC	9.623513	1 in 5
0003	21.62	SW	19.23	375	CO	39.53049	1 in 47
0003	21.62	SW	19.23	375	CO	39.53049	1 in 47
7907		FO	0	225	VC	53.09887	
5316		FO		100	PP	16.90009	
6210		CO		150	VC	19.05923	
6513	21.72	SW	19.95	225	VC	12.32329	1 in 12
6513	21.72	SW	19.95	225	VC	12.32329	1 in 12
5102	16.79	SW	14.15	675	CO	82.61998	
6517	22.26	FO	20.16	150	VC	13.40746	1 in 17
6517	22.26	FO	20.16	150	VC	13.40746	1 in 17
9101	22.44	SW	20.09	900	CO	27.62738	1 in 106
6309	19.62	SW	16.47	225	VC	10.98022	1 in 5

Refno	Cover	Func	Invert	Size x	Matl	Length	Grad
5317		FO		150	VC	5.037714	
5318		FO		150	VC	21.91154	
9900	19.24	FO	16.48	225	VC	56.61272	
4512		SW	21.38	225	VC	38.75811	1 in 215
5324		FO		150	VC	16.91735	
5308		SW	0	225	VC	5.478248	
6515	22.36	FO	20.83	150	VC	14.09279	1 in 108
6515	22.36	FO	20.83	150	VC	14.09279	1 in 108
0102	22.66	FO	0	225	VC	58.07825	
5418	22.28	SW	21	225	VC	16.58455	1 in 128
5418	22.28	SW	21	225	VC	16.58455	1 in 128
6901		FO	0	225	VC	74.11856	
5317		FO		150	VC	10.6676	
7905		FO	0	225	VC	35.80689	
5209	19.61	SW	17.93	225	VC	47.92703	1 in 2.92773535
0004	22.73	SW	0	300	VC	65.00769	
8003		SW	0	525	CO	43.18565	
5506	22.81	FO	20.7	150	VC	14.67493	1 in 86
5506	22.81	FO	20.7	150	VC	14.67493	1 in 86
8002	18.68	FO	0	225	VC	62.80127	
8013		FO	0	150	VC	20.45618	
8911		FO	0	150	VC	28.2784	
5413		FO		225	VC	69.17343	
6305	18.08	SW	14.16	375	CO	56.76622	
6518	21.76	FO	19.39	150	VC	18.88454	1 in 18
6518	21.76	FO	19.39	150	VC	18.88454	1 in 18
7902		SW	0	525	CO	30.48128	
8014		FO	0	150	VC	19.76345	
4103	17.75	FO	0	225	VC	54.12024	
5105		FO	0	225	VC	66.28725	
0002	21.19	SW	0	225	VC	75.28612	
0002	21.19	SW	0	225	VC	75.28612	
0002	21.19	SW	0	225	VC	75.28612	
6209		CO		150	VC	8.739662	
6409	23.56	SW	21.46	225	VC	24.53262	1 in 36
6409	23.56	SW	21.46	225	VC	24.53262	1 in 36
7901		SW	0	525	CO	31.75527	
6511	22.64	SW	20.79	225	VC	13.63427	1 in 35
6511	22.64	SW	20.79	225	VC	13.63427	1 in 35
7601	16.99	FO	12.88	910	BR	137.0912	1 in 415
5306	21.26	SW	19.81	225	VC	64.51357	1 in 35
6501	20.83	FO	18.65	225	VC	37.64306	
7101		SW	0	939	CO	49.39635	
4208	18.17	FO	17.11	150	VC	20.70366	1 in 115
6522		FO		150	VC	4.656339	
6522		FO		150	VC	4.656339	
5206	19.44	FO	16.99	225	VC	21.84033	1 in 137
0001	21.14	FO	19.41	225	VC	74.04053	1 in 112
0001	21.14	FO	19.41	225	VC	74.04053	1 in 112
0001	21.14	FO	19.41	225	VC	74.04053	1 in 112
5103	17.55	FO	15	225	VC	64.89993	1 in 175
4205	18.22	SW	17.26	225	VC	21.143	1 in 163
4503	23.24	SW	21.13	300	VC	65.45992	1 in 242
4503	23.24	SW	21.13	300	VC	65.45992	1 in 242
5419	22.36	SW	20.87	225	VC	31.4876	1 in 61
5419	22.36	SW	20.87	225	VC	31.4876	1 in 61
6318		FO		100	PVC	11.53221	
9003	19.62	SW	15.73	525	CO	66.76077	1 in 334
7501	16.22	FO	12.55	910	BR	117.0171	1 in 355
7501	16.22	FO	12.55	910	BR	117.0171	1 in 355
5501	23.04	SW	21.12	225	VC	21.43419	1 in 119
5501	23.04	SW	21.12	225	VC	21.43419	1 in 119
7006	15.78	SW	13.27	675	CO	5.830952	
9901	19.29	SW	0	525	CO	68.00735	
9106	22.13	FO	19.25	150	VC	17.25553	1 in 96
6405	22.34	SW	20.92	225	VC	66.7308	1 in 62
5302	20.35	SW	18.46	225	VC	41.07877	1 in 46
6102	17.32	SW	15.34	375	CO	58.24946	1 in 124
9902	19.09	FO	16.79	225	VC	55.65968	1 in 199
5303		FO	0	225	VC	9.406052	
5311		CO		150	VC	12.55598	
6508	22.23	SW	21.07	150	VC	15.24452	1 in 117
6508	22.23	SW	21.07	150	VC	15.24452	1 in 117
9104	21.62	SW	18.82	225	CO	26.91472	1 in 73
5314		FO		150	VC	44.20868	
0107	22.7	SW	20.99	900	CO	40.50263	1 in 145
0107	22.7	SW	20.99	900	CO	40.50263	1 in 145
4210		CO		150	VC	14.12785	
6506	19.85	FO	17.85	225	VC	45.90136	1 in 50
6506	19.85	FO	17.85	225	VC	45.90136	1 in 50
8901		SW	0	150	VC	23.60361	
4303	19.68	SW	17.61	375	CO	51.76683	
6218		FO		150	VC	19.58758	
6523		SW		150	VC	8.434926	
6523		SW		150	VC	8.434926	
6201	18.7	FO	16.66	225	VC	71.28114	1 in 58
8909		SW	0	525	CO	23.89675	
8908		SW	0	300	VC	13.9736	
8916		FO	0	150	VC	13.6018	
9004		FO	0	225	VC	84.72832	
8919		FO		100	PVC	7.67836	
8920		FO		100	PVC	16.95652	
8917		FO	0	225	VC	26.08633	
6527		FO		100	PSC	4.290583	
6527		FO		100	PSC	4.290583	
6202	18.55	SW	16.98	225	VC	64.63745	1 in 64
8913		FO	0	150	VC	25.38795	
5219		CO		150	VC	24.29667	
8904		SW	0	300	VC	25.83297	
6407	22.15	SW	20.61	225	VC	29.20031	1 in 17
6407	22.15	SW	20.61	225	VC	29.20031	1 in 17
6319		CO		150	VC	4.656257	
6510		SW		150	VC	7.46456	
6510		SW		150	VC	7.46456	

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:

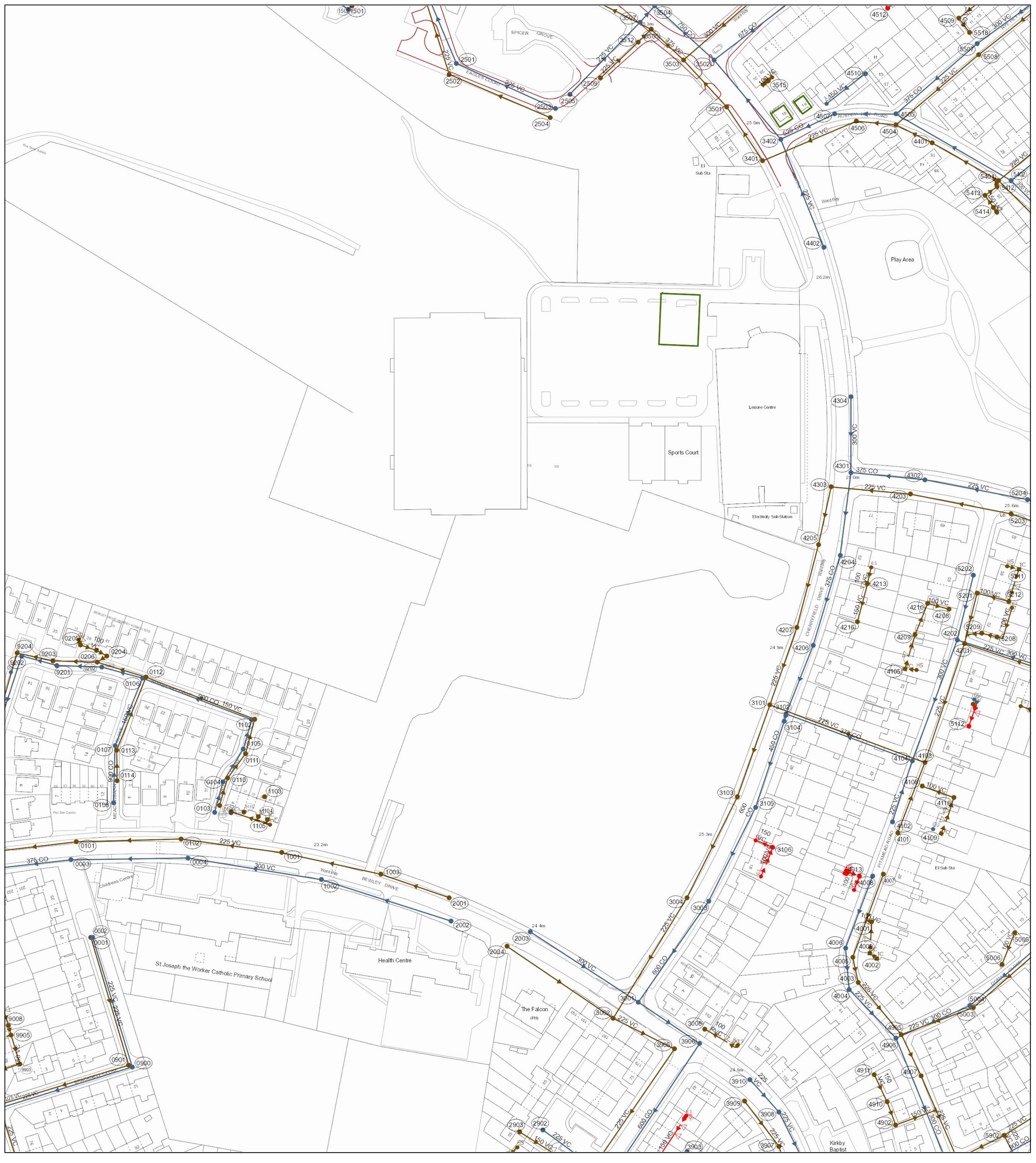
Cherryfield Drive Kirkby,

OS sheet Number: SJ4098SE
Scale: 1:1250 **Date:** 10/05/2021
Nodes: 305
Sheet: 4 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0901	20.82	FO	18.72	225			VC	75.28612	1 in 46
0901	20.82	FO	18.72	225			VC	75.28612	1 in 46
0901	20.82	FO	18.72	225			VC	75.28612	1 in 46
4101	25.87	FO	22.91	225			VC	41.78516	1 in 82
3507		SW	0	225			VC	12.04159	
3507		SW	0	225			VC	12.04159	
0205		FO		100			VC	9.266712	
0205		FO		100			VC	9.266712	
2001	23.95	FO	0	225			VC	40.16217	
0201	23.25	SW	20.48	900			CO	24.85441	1 in 355
0201	23.25	SW	20.48	900			CO	24.85441	1 in 355
0204		FO		100			VC	6.454139	
0204		FO		100			VC	6.454139	
4510		SW		150			VC	27.2259	
4510		SW		150			VC	27.2259	
0101	21.7	FO	19.04	225			VC	47.40314	1 in 50
0101	21.7	FO	19.04	225			VC	47.40314	1 in 50
3106		CO		150			VC	10.16738	
0112	23.39	FO	20.6	150			VC	28.36487	1 in 109
3502	25.51	SW	22.58	750			CO	44.59821	1 in 149
3502	25.51	SW	22.58	750			CO	44.59821	1 in 149
4907	24.57	FO	22.81	225			VC	50.15974	1 in 238.855927
4907	24.57	FO	22.81	225			VC	50.15974	1 in 238.855927
4001		FO		100			VC	3.128462	
4001		FO		100			VC	3.128462	
3511	25.23	FO	22.4	300			VC	58.13777	1 in 161
4505	25.65	SW	23.41	525			CO	34	
4505	25.65	SW	23.41	525			CO	34	
5212		FO		100			VC	18.25716	
3104	24.42	SW	0	450			CO	50.59644	
9204	22.91	FO	19.92	150			VC	55.4274	1 in 118
9204	22.91	FO	19.92	150			VC	55.4274	1 in 118
3903		SW	0	225			VC	36.35932	
3903		SW	0	225			VC	36.35932	
9008		FO		150			VC	5.512687	
9008		FO		150			VC	5.512687	
9008		FO		150			VC	5.512687	
4401	25.88	FO	23.28	225			VC	22.36068	1 in 224
4401	25.88	FO	23.28	225			VC	22.36068	1 in 224
0202	23.15	FO	20.34	150			VC	24.47534	1 in 117
0202	23.15	FO	20.34	150			VC	24.47534	1 in 117
1001	23.14	FO	0	225			VC	56.42298	
4301	24.96	SW	21.63	375			CO	46.38965	
4213		FO		100			VC	1.970724	
5201	25.25	FO	23.26	225			VC	28.86174	1 in 160
4005	25.53	FO	0	225			VC	14.31782	
4005	25.53	FO	0	225			VC	14.31782	
2505	25.22	SW	23.48	225			VC	55.86591	
2505	25.22	SW	23.48	225			VC	55.86591	
9203	22.89	FO	20.13	150			VC	20.43148	1 in 97
9203	22.89	FO	20.13	150			VC	20.43148	1 in 97
4102	25.8	SW	0	225			VC	35.73514	
4512		CO		150			VC	9.601148	
4512		CO		150			VC	9.601148	
3101	24.37	FO	21.55	225			VC	54.08327	1 in 235
4205	24.21	FO	22.04	225			VC	47.53946	
4207	23.92	FO	0	225			VC	45.54119	
0108	22.57	SW	21.11	900			CO	31.63319	1 in 264
0108	22.57	SW	21.11	900			CO	31.63319	1 in 264
1502	24.65	FO	23.13	225			VC	25.23886	1 in 101
1502	24.65	FO	23.13	225			VC	25.23886	1 in 101
3102	24.42	SW	21.06	450			CO	4.123106	
0003	21.62	SW	19.23	375			CO	39.53049	1 in 47
0003	21.62	SW	19.23	375			CO	39.53049	1 in 47
5507	26.2	SW	23.75	375			CO	59.5483	1 in 198
5507	26.2	SW	23.75	375			CO	59.5483	1 in 198
5203	25.64	FO	0	225			VC	57.07013	
3002	24.43	FO	20.56	225			VC	38.01316	1 in 165
3002	24.43	FO	20.56	225			VC	38.01316	1 in 165
4905	25.11	FO	0	225			VC	25.4951	
4905	25.11	FO	0	225			VC	25.4951	
1003	23.58	FO	0	225			VC	56.29387	
4906	25.08	SW	0	300			CO	84.30895	
4906	25.08	SW	0	300			CO	84.30895	
4304	25.97	SW	0	300			VC	42	
1002	23.39	SW	0	300			VC	74.96666	
3001	24.34	SW	20.22	600			CO	41.04875	
3001	24.34	SW	20.22	600			CO	41.04875	
3402	25.85	SW	23.18	525			CO	57.48913	1 in 160
3402	25.85	SW	23.18	525			CO	57.48913	1 in 160
3905	24.16	FO	20.3	225			VC	84.87638	1 in 236
3905	24.16	FO	20.3	225			VC	84.87638	1 in 236
5209		FO		100			VC	8.350906	
0105	23.82	SW	21.15	900			CO	16.91698	1 in 242
5517		FO		150			VC	14.48858	
4008	25.66	SW	0	225			VC	42.72002	
4506	25.71	FO	23.06	225			VC	56.46238	1 in 166
4506	25.71	FO	23.06	225			VC	56.46238	1 in 166
2002	24.02	SW	21.56	300			VC	75.58439	
2002	24.02	SW	21.56	300			VC	75.58439	
4206	23.97	SW	0	450			CO	40.8534	
0102	22.66	FO	0	225			CO	58.07825	
3003	25.31	SW	0	600			CO	68.24222	
4910		FO		150			VC	13.74897	
4910		FO		150			VC	13.74897	
3904		SW	0	225			VC	20.24846	
4004	25.28	SW	0	225			VC	37.48333	
4004	25.28	SW	0	225			VC	37.48333	
2003	24.37	SW	0	300			VC	71.56116	
2003	24.37	SW	0	300			VC	71.56116	
9202	22.94	SW	20.32	900			CO	51.34215	1 in 223
9202	22.94	SW	20.32	900			CO	51.34215	1 in 223
3103	25.12	FO	21.29	225			VC	62.60991	1 in 216
0114	22.76	FO	21.16	150			VC	16.87868	1 in 89
0114	22.76	FO	21.16	150			VC	16.87868	1 in 89
4201	25.17	FO	23.05	225			VC	69.57011	1 in 316
0004	22.73	SW	0	300			VC	65.00709	
4003	25.4	FO	23.17	225			VC	37.64306	
4003	25.4	FO	23.17	225			VC	37.64306	
2509	25.28	FO	22.79	225			VC	29	1 in 207
2509	25.28	FO	22.79	225			VC	29	1 in 207
4103	25.64	FO	22.28	225			VC	91.76056	1 in 141
3908	24.1	SW	22.05	225			VC	40.24922	
3908	24.1	SW	22.05	225			VC	40.24922	
3501	25.8	FO	22.35	225			VC	35.38361	1 in 114
3501	25.8	FO	22.35	225			VC	35.38361	1 in 114
5508	26.28	FO	23.63	225			VC	60.30754	1 in 137
5508	26.28	FO	23.63	225			VC	60.30754	1 in 137
2903	23.84	FO	22.12	150			VC	22.4722	1 in 51
2903	23.84	FO	22.12	150			VC	22.4722	1 in 51
9201	22.99	SW	20.41	900			CO	20.27381	1 in 225
9201	22.99	SW	20.41	900			CO	20.27381	1 in 225
5003	25.26	FO	0	225			VC	42.72002	
5003	25.26	FO	0	225			VC	42.72002	
3906	24.49	SW	0	600			CO	90.13878	
3906	24.49	SW	0	600			CO	90.13878	
2902	24.27	SW	21.88	225			VC	45.80393	1 in 170
2902	24.27	SW	21.88	225			VC	45.80393	1 in 170
0002	21.19	SW	0	225			VC	75.28612	
0002	21.19	SW	0	225			VC	75.28612	
0002	21.19	SW	0	225			VC	75.28612	
9905		FO		150			VC	16.69388	
9905		FO		150			VC	16.69388	
9905		FO		150			VC	16.69388	
5208		FO		100			VC	8.656141	
5004	25.26	SW	0	300			CO	44.77723	
5004	25.26	SW	0	300			CO	44.77723	
1501	24.68	SW	22.83	225			VC	25.88046	1 in 96
1501	24.68	SW	22.83	225			VC	25.88046	1 in 96
2501	24.75	SW	22.61	225			VC	54.23099	1 in 258
2501	24.75	SW	22.61	225			VC	54.23099	1 in 258
3515		FO		100			VC	3.102531	
3515		FO		100			VC	3.102531	
4110		FO		100			VC	18.543	
4902		FO		150			VC	23.84196	
4902		FO		150			VC	23.84196	
4508		FO		150			VC	19.4759	
4302	25.17	SW	0	375			CO	41.19466	
4402	26.21	SW	0	225			VC	64.62198	
4402	26.21	SW	0	225			VC	64.62198	
4202	25.12	SW	0	300			VC	71.51224	
0113	22.73	FO	20.97	150			VC	43.63806	1 in 118
0113	22.73	FO	20.97	150			VC	43.63806	1 in 118
4006	25.41	SW	23.78	225			VC	23.08679	
4006	25.41	SW	23.78	225			VC	23.08679	
3505	25.14	FO	21.59	375			VC	46.06517	1 in 105
3505	25.14	FO	21.59	375			VC	46.06517	1 in 105
5202	25.2	SW	0	300			VC	37.10795	
0206		FO		100			VC	6.666505	
0206		FO		100			VC	6.666505	
0110	23.62	FO	22.11	150			VC	16.88582	1 in 113
0001	21.14	FO	19.41	225			VC	74.04053	1 in 112
0001	21.14	FO	19.41	225			VC	74.04053	1 in 112
0001	21.14	FO	19.41	225			VC	74.04053	1 in 112
2504	25.3	FO	22.9	225			VC	60.92619	1 in 124
2504	25.3	FO	22.9	225			VC	60.92619	1 in 124
1102	23.69	FO	21.81	150			VC	64.71152	1 in 122
2503	25.16	SW	23.46	225			VC	60.41523	1 in 77
2503	25.16	SW	23.46	225			VC	60.41523	1 in 77
0106	23.41	SW	20.61	900			CO	23.49919	1 in 181
4209		FO		100			VC	18.65866	
4204	24.17	SW	0	375			CO	52.20153	
4210		FO		100			VC	12.11263	
3503	25.54	FO	21.88	375			VC	24.75884	1 in 99
3503	25.54	FO	21.88	375			VC	24.75884	1 in 99
2004	24.31	FO	0	225			VC	71.28114	
2004	24.31	FO	0	225			VC	71.28114	
3910	24.26	SW	22.23	225			VC	24.08319	1 in 161
3910	24.26	SW	22.23	225			VC	24.08319	1 in 161
4911		FO		150			VC	16.70142	
4911		FO		150			VC	16.70142	
3907	23.65	FO	21.81	225			VC	30.36445	1 in 76
3907	23.65	FO	21.81	225			VC	30.36445	1 in 76
4013		CO		100			VC	8.399384	
4007	25.75	FO	23.59	225			VC	49.0408	1 in 545
5902	24.89	FO	22.83	225			VC	29.06888	1 in 97
5902	24.89	FO	22.83	225			VC	29.06888	1 in 97
1101	23.7	SW	21.08	900			CO	64.85111	1 in 259
5204	25.69	SW	0	225			VC	58.0517	
9903		FO		150			VC	17.82229	
9903		FO		150			VC	17.82229	
9903		FO		150			VC	17.82229	
3512	25.23	FO	22.65	225			VC	9.899495	1 in 165
3512	25.23	FO	22.65	225			VC	9.899495	1 in 165
2502	24.83	FO	22.36	225			VC	46.17358	
2502	24.83	FO	22.36	225			VC	46.17358	
5902	19.09	FO	16.79	225			VC	55.65968	1 in 199
0104	23.59	SW	21.25	900			CO	21.5074	1 in 215
3401	25.99	FO	22.66	225			VC	36.05551	1 in 124
3401	25.99	FO	22.66	225			VC	36.05551	1 in 124
4104	25.51	SW	22.64	375			CO	74.67262	1 in 146

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4504	25.76	FO	23.16	225			VC	22.09072	1 in 245
4504	25.76	FO	23.16	225			VC	22.09072	1 in 245
4203	25.12	FO	0	225			VC	44.18144	
3004	25.31	FO	21	225			VC	78.54935	1 in 192
3105	25.25	SW	0	600			CO	58.13777	
3504	25.09	SW	22.26	750			CO	40.31129	1 in 101
3504	25.09	SW	22.26	750			CO	40.31129	1 in 101
0111	23.8	FO	21.96	150			VC	19.7691	1 in 132
0107	22.7	SW	20.99	900			CO	40.50263	1 in 145
0107	22.7	SW	20.99	900			CO	40.50263	1 in 145
3508	25.06	SW	23.75	150			CO	33.01515	1 in 1.53630283
0900	20.82	SW	18.42	225			VC	87.93179	
0900	20.82	SW	18.42	225			VC	87.93179	
4507	25.65	SW	0	525			CO	33.10589	
4507	25.65	SW	0	525			CO	33.10589	
4509		FO		150			VC	9.825402	
4509		FO		150			VC	9.825402	
4501	25.37	SW	23.09	675			CO	52.80151	1 in 123
3909	24.06	FO	22.18	225			VC	31.40064	1 in 92
3909	24.06	FO	22.18	225			VC	31.40064	1 in 92
4303	24.91	FO	22.28	225			VC	32.75668	1 in 182
5412		FO		150			VC	4.731199	
5412		FO		150			VC	4.731199	
5402	26.27	SW	24.29	375			CO	73.92566	1 in 142
5402	26.27	SW	24.29	375			CO	73.92566	1 in 142
0103	23.36	SW	21.9	225			VC	17.58393	1 in 135
5401	26.25	FO	23.83	225			VC	42.54409	1 in 83
5401	26.25	FO	23.83	225			VC	42.54409	1 in 83
5413		FO		150			VC	8.312948	
5413		FO		150			VC	8.312948	
5414		FO		150			VC	8.140284	
5414		FO		150			VC	8.140284	
5005		FO		100			VC	18.94909	
5005		FO		100			VC	18.94909	
0109	23.38	FO	22.32	150			VC	15.83737	1 in 75

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:

Cherryfield Drive Kirkby,

OS sheet Number: SJ4198SW
Scale: 1:1250 **Date:** 10/05/2021
Nodes: 236
Sheet: 5 of 5

Printed by: Property Searches

SEWER RECORDS

United Utilities
Water for the North West

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.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Hannah Buchanan

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 14 September 2021 18:33
To: Hannah Buchanan
Cc: Wastewater Developer Services
Subject: Pre Development Enquiry for : Cherry Tree Drive L32 8SF UU reference Number : 4200043471

Good afternoon,

Pre Development Enquiry for: Cherry Tree Drive L32 8SF UU Reference Number : 4200043471

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

If your investigations require access to our public sewer network, we ask that you contact our network engineers with a request for an access certificate via our main contact telephone number 0345 3723223 or refer to the link below:

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

Foul Water

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

Our preferred point of discharge would be to the 910 x 1375mm diameter public foul sewer in Valley Road near Bewley Drive located to the West of your proposed development at an unrestricted rate.

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

Surface Water

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

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

1. **into the ground (infiltration);**
2. **to a surface waterbody;**
3. **to a surface water sewer or highway drain;**
4. **to a combined sewer.**

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

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

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

Infiltration

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

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

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

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

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

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

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

Waterbody

If an evidence based assessment has been carried out and confirms that infiltration is not feasible, we recommend that you contact the Lead Local Flood Authority and/or Environment Agency to discuss a point of discharge to the watercourse Kirkby Brook located in the site boundary East of the proposed site.

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

Highway Drainage

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

Levels

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

Land drainage / Overland flows / track drainage

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

Sewer Adoptions

United Utilities assess adoption applications based on the current Design & Construction Guidance and local practices which have now replaced 'Sewers For Adoption 6th Edition'.

We recommend that you submit a pre design assessment to the sewer adoption mailbox (SewerAdoptions@uuplc.co.uk) stating pre design assessment in the title

Please refer to links below to obtain further guidance:

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

Site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

If you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements set out in the Design & Construction Guidance. The proposed design should give consideration to long term operability and give United Utilities a safe and cost effective proposal for the lifetime of the assets. In these cases, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 application, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.

SuDS

If your development proposal incorporates any SuDS component(s) which interact with a sewer network you plan on offering for adoption to United Utilities; contact should be made with our technical team at your earliest convenience, please complete the 'Section 104 pre-application form : ' and include as much relevant detail as you can. These discussions can help prevent delays later in the development process.

Section 104 Pre application form (1b)

As per the sewerage sector guidance, all SuDS should be designed in accordance with the standards within the Design & construction guidance & the CIRIA SuDS manual (C753)

Codes For Adoption

The new Codes for Adoption are outlined on the Water UK Website. The link below takes you to their webpage:

https://www.water.org.uk/technical-guidance/developers-services/codes-for-adoption/

A free copy of the new Design & Construction Guidance can be downloaded via the link below**:**

https://www.water.org.uk/wp-content/uploads/2020/03/SSG-App-C-Des-Con-Guide-v-2-100320-C.pdf

Existing Water Assets Crossing the Site

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

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

Connection Application

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

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

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

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

Kind regards,

Kind regards

United Utilities
Water for the North West

Mike Duckworth
Developer Services Engineer
Developer Services & Metering
Customer Services
T: 07768702161
unitedutilities.com

APPENDIX D: LPA/LLFA CORRESPONDENCE

This page has been left intentionally blank

Hannah Buchanan

From: Hannah Buchanan
Sent: 10 September 2021 15:35
To: 'LLFA@Knowsley.gov.uk'
Subject: Historic Flood Risk Information
Attachments: Location Plan.pdf

To whom it may concern,

Cherryfield Drive, Kirkby

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 above site (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,

Hannah Buchanan *BSc (Hons)*
Graduate Flood Risk Analyst

BETTS HYDRO
Consulting Engineers

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

hannahbuchanan@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

ELECTRONICALLY TRANSMITTED INFORMATION
This electronic transmission is strictly confidential and intended solely for the addressee. It may contain information which is covered by legal, professional or other privilege. If you are not the intended addressee, you must not disclose, copy or take any action in reliance of this transmission. If you have received this transmission in error, please notify us as soon as possible. All emails transmitted by Betts Associates, Betts Geo or Betts Hydro are virus checked. This does not guarantee that transmissions are virus free. Reference should always be made to the hard copy of any electronically transmitted files. Electronic data does not constitute contract documentation. Use of the content of our files is at your own risk. You remain responsible for anything produced using all or part of the data supplied.

Please consider the environment before printing this email

APPENDIX E: LOCATION PLAN

This page has been left intentionally blank

LOCATION PLAN

Cherryfield Drive, Kirkby



OS X (Eastings)	340947
OS Y (Northings)	398414
Nat Grid	SJ409984 / SJ4094798414
Nearest Post Code	L32 8SF
Lat (OSGB36)	N53:28:44 (53.478881473555425)
Long (OSGB36)	W2:53:24 (-2.8899113336165216)
Lat, Long (OSGB36)	53.478881473555425, -2.8899113336165216
Lat (WGS84)	N53:28:45 (53.479120820518204)
Long (WGS84)	W2:53:29 (-2.891272383250872)
Lat, Long (WGS84)	53.479120820518204, -2.891272383250872

APPENDIX F: TOPOGRAPHIC SURVEY

This page has been left intentionally blank

Survey OPERATIONS

Smith Street, Swanscombe, Lancs. NW8 8LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@surveyops.co.uk – www.surveyops.co.uk

Client

Rowsley Metropolitan Borough Council

Drawing Title

Topographical Survey of Land at:
Former All Saints School Cherryfield Drive
Rowsley
Sheet 2 of 2

Scale(s)	1:500	Surveyor	CA
Date	JULY 14	Drawn	PM
Job Number	14F063	Checked	MH

Sheet Size & Drg Number & Revision

A0 14F063/002

© Survey Operations Limited 2014
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey Operations Limited.

Notes:

The survey is plotted on a plane local Grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for mapping purposes only and should not be used for construction without the written approval of Survey Operations Ltd.

SURVEY STATIONS

Name	Eastings	Northings	Height
CA1	341551.16	398369.87	23.78
CA2	341551.83	398327.70	24.07
CA3	341541.78	398277.45	24.14
CA4	341504.30	398188.40	24.78
CA5	341316.15	398270.87	24.18
CA6	341231.04	398327.54	24.07
CA7	341284.82	398145.06	24.14
CA8	341300.20	398188.40	24.78
CA9	341316.15	398270.87	24.18
CA10	341231.04	398327.54	24.07
CA11	341284.82	398145.06	24.14
CA12	341300.20	398188.40	24.78
SO01	341316.15	398270.87	24.18
SO02	341231.04	398327.54	24.07
SO03	341284.82	398145.06	24.14
SO04	341302.15	398010.50	24.43
SO05	341013.15	398107.50	23.98
SO06	341227.04	398056.19	24.13
SO07	341284.82	398145.06	24.14
SO08	341302.15	398010.50	24.43
SO09	341013.15	398107.50	23.98
SO10	341227.04	398056.19	24.13
SO11	341284.82	398145.06	24.14
SO12	341302.15	398010.50	24.43
SO13	341013.15	398107.50	23.98
SO14	341227.04	398056.19	24.13
SO15	341284.82	398145.06	24.14
SO16	341302.15	398010.50	24.43
SO17	341013.15	398107.50	23.98
SO18	341227.04	398056.19	24.13
SO19	341284.82	398145.06	24.14
SO20	341302.15	398010.50	24.43
SO21	341013.15	398107.50	23.98
SO22	341227.04	398056.19	24.13
SO23	341284.82	398145.06	24.14
SO24	341302.15	398010.50	24.43
SO25	341013.15	398107.50	23.98
SO26	341227.04	398056.19	24.13
SO27	341284.82	398145.06	24.14
SO28	341302.15	398010.50	24.43
SO29	341013.15	398107.50	23.98
SO30	341227.04	398056.19	24.13
SO31	341284.82	398145.06	24.14
SO32	341302.15	398010.50	24.43
SO33	341013.15	398107.50	23.98
SO34	341227.04	398056.19	24.13
SO35	341284.82	398145.06	24.14
SO36	341302.15	398010.50	24.43
SO37	341013.15	398107.50	23.98
SO38	341227.04	398056.19	24.13
SO39	341284.82	398145.06	24.14
SO40	341302.15	398010.50	24.43
SO41	341013.15	398107.50	23.98
SO42	341227.04	398056.19	24.13
SO43	341284.82	398145.06	24.14
SO44	341302.15	398010.50	24.43
SO45	341013.15	398107.50	23.98
SO46	341227.04	398056.19	24.13
SO47	341284.82	398145.06	24.14
SO48	341302.15	398010.50	24.43
SO49	341013.15	398107.50	23.98
SO50	341227.04	398056.19	24.13
SO51	341284.82	398145.06	24.14
SO52	341302.15	398010.50	24.43
SO53	341013.15	398107.50	23.98
SO54	341227.04	398056.19	24.13
SO55	341284.82	398145.06	24.14
SO56	341302.15	398010.50	24.43
SO57	341013.15	398107.50	23.98
SO58	341227.04	398056.19	24.13
SO59	341284.82	398145.06	24.14
SO60	341302.15	398010.50	24.43
SO61	341013.15	398107.50	23.98
SO62	341227.04	398056.19	24.13
SO63	341284.82	398145.06	24.14
SO64	341302.15	398010.50	24.43
SO65	341013.15	398107.50	23.98
SO66	341227.04	398056.19	24.13
SO67	341284.82	398145.06	24.14
SO68	341302.15	398010.50	24.43
SO69	341013.15	398107.50	23.98
SO70	341227.04	398056.19	24.13
SO71	341284.82	398145.06	24.14
SO72	341302.15	398010.50	24.43
SO73	341013.15	398107.50	23.98
SO74	341227.04	398056.19	24.13
SO75	341284.82	398145.06	24.14
SO76	341302.15	398010.50	24.43
SO77	341013.15	398107.50	23.98
SO78	341227.04	398056.19	24.13
SO79	341284.82	398145.06	24.14
SO80	341302.15	398010.50	24.43
SO81	341013.15	398107.50	23.98
SO82	341227.04	398056.19	24.13
SO83	341284.82	398145.06	24.14
SO84	341302.15	398010.50	24.43
SO85	341013.15	398107.50	23.98
SO86	341227.04	398056.19	24.13
SO87	341284.82	398145.06	24.14
SO88	341302.15	398010.50	24.43
SO89	341013.15	398107.50	23.98
SO90	341227.04	398056.19	24.13
SO91	341284.82	398145.06	24.14
SO92	341302.15	398010.50	24.43
SO93	341013.15	398107.50	23.98
SO94	341227.04	398056.19	24.13
SO95	341284.82	398145.06	24.14
SO96	341302.15	398010.50	24.43
SO97	341013.15	398107.50	23.98
SO98	341227.04	398056.19	24.13
SO99	341284.82	398145.06	24.14
SO100	341302.15	398010.50	24.43

STANDARD REFERENCE & ABBREVIATIONS

Aa ..... Ash Tree
Ab ..... Apple Tree
Ac ..... Acacia Tree
Ad ..... Alder Tree
Ae ..... Alder Stump
Af ..... Ash Tree
Ag ..... Ash Stump
Ah ..... Alder Tree (Multi)
Ai ..... Alder Stump (Multi)
Aj ..... Ash Tree
Ak ..... Ash Stump
Al ..... Ash Tree (Multi)
Am ..... Ash Stump (Multi)
An ..... Ash Tree
Ao ..... Ash Stump
Ap ..... Ash Tree
Aq ..... Ash Stump
Ar ..... Ash Tree
As ..... Ash Stump
At ..... Ash Tree
Au ..... Ash Stump
Av ..... Ash Tree
Aw ..... Ash Stump
Ax ..... Ash Tree
Ay ..... Ash Stump
Az ..... Ash Tree
Ba ..... Ash Stump
Bb ..... Ash Tree
Bc ..... Ash Stump
Bd ..... Ash Tree
Be ..... Ash Stump
Bf ..... Ash Tree
Bg ..... Ash Stump
Bh ..... Ash Tree
Bi ..... Ash Stump
Bj ..... Ash Tree
Bk ..... Ash Stump
Bl ..... Ash Tree
Bm ..... Ash Stump
Bn ..... Ash Tree
Bo ..... Ash Stump
Bp ..... Ash Tree
Bq ..... Ash Stump
Br ..... Ash Tree
Bs ..... Ash Stump
Bt ..... Ash Tree
Bu ..... Ash Stump
Bv ..... Ash Tree
Bw ..... Ash Stump
Bx ..... Ash Tree
By ..... Ash Stump
Bz ..... Ash Tree
Ca ..... Ash Stump
Cb ..... Ash Tree
Cc ..... Ash Stump
Cd ..... Ash Tree
Ce ..... Ash Stump
Cf ..... Ash Tree
Cg ..... Ash Stump
Ch ..... Ash Tree
Ci ..... Ash Stump
Cj ..... Ash Tree
Ck ..... Ash Stump
Cl ..... Ash Tree
Cm ..... Ash Stump
Cn ..... Ash Tree
Co ..... Ash Stump
Cp ..... Ash Tree
Cq ..... Ash Stump
Cr ..... Ash Tree
Cs ..... Ash Stump
Ct ..... Ash Tree
Cu ..... Ash Stump
Cv ..... Ash Tree
Cw ..... Ash Stump
Cx ..... Ash Tree
Cy ..... Ash Stump
Cz ..... Ash Tree
Da ..... Ash Stump
Db ..... Ash Tree
Dc ..... Ash Stump
Dd ..... Ash Tree
De ..... Ash Stump
Df ..... Ash Tree
Dg ..... Ash Stump
Dh ..... Ash Tree
Di ..... Ash Stump
Dj ..... Ash Tree
Dk ..... Ash Stump
Dl ..... Ash Tree
Dm ..... Ash Stump
Dn ..... Ash Tree
Do ..... Ash Stump
Dp ..... Ash Tree
Dq ..... Ash Stump
Dr ..... Ash Tree
Ds ..... Ash Stump
Dt ..... Ash Tree
Du ..... Ash Stump
Dv ..... Ash Tree
Dw ..... Ash Stump
Dx ..... Ash Tree
Dy ..... Ash Stump
Dz ..... Ash Tree
Ea ..... Ash Stump
Eb ..... Ash Tree
Ec ..... Ash Stump
Ed ..... Ash Tree
Ee ..... Ash Stump
Ef ..... Ash Tree
Eg ..... Ash Stump
Eh ..... Ash Tree
Ei ..... Ash Stump
Ej ..... Ash Tree
Ek ..... Ash Stump
El ..... Ash Tree
Em ..... Ash Stump
En ..... Ash Tree
Eo ..... Ash Stump
Ep ..... Ash Tree
Eq ..... Ash Stump
Er ..... Ash Tree
Es ..... Ash Stump
Et ..... Ash Tree
Eu ..... Ash Stump
Ev ..... Ash Tree
Ew ..... Ash Stump
Ex ..... Ash Tree
Ey ..... Ash Stump
Ez ..... Ash Tree
Fa ..... Ash Stump
Fb ..... Ash Tree
Fc ..... Ash Stump
Fd ..... Ash Tree
Fe ..... Ash Stump
Ff ..... Ash Tree
Fg ..... Ash Stump
Fh ..... Ash Tree
Fi ..... Ash Stump
Fj ..... Ash Tree
Fk ..... Ash Stump
Fl ..... Ash Tree
Fm ..... Ash Stump
Fn ..... Ash Tree
Fo ..... Ash Stump
Fp ..... Ash Tree
Fq ..... Ash Stump
Fr ..... Ash Tree
Fs ..... Ash Stump
Ft ..... Ash Tree
Fu ..... Ash Stump
Fv ..... Ash Tree
Fw ..... Ash Stump
Fx ..... Ash Tree
Fy ..... Ash Stump
Fz ..... Ash Tree
Ga ..... Ash Stump
Gb ..... Ash Tree
Gc ..... Ash Stump
Gd ..... Ash Tree
Ge ..... Ash Stump
Gf ..... Ash Tree
Gg ..... Ash Stump
Gh ..... Ash Tree
Gi ..... Ash Stump
Gj ..... Ash Tree
Gk ..... Ash Stump
Gl ..... Ash Tree
Gm ..... Ash Stump
Gn ..... Ash Tree
Go ..... Ash Stump
Gp ..... Ash Tree
Gq ..... Ash Stump
Gr ..... Ash Tree
Gs ..... Ash Stump
Gt ..... Ash Tree
Gu ..... Ash Stump
Gv ..... Ash Tree
Gw ..... Ash Stump
Gx ..... Ash Tree
Gy ..... Ash Stump
Gz ..... Ash Tree
Ha ..... Ash Stump
Hb ..... Ash Tree
Hc ..... Ash Stump
Hd ..... Ash Tree
He ..... Ash Stump
Hf ..... Ash Tree
Hg ..... Ash Stump
Hh ..... Ash Tree
Hi ..... Ash Stump
Hj ..... Ash Tree
Hk ..... Ash Stump
Hl ..... Ash Tree
Hm ..... Ash Stump
Hn ..... Ash Tree
Ho ..... Ash Stump
Hp ..... Ash Tree
Hq ..... Ash Stump
Hr ..... Ash Tree
Hs ..... Ash Stump
Ht ..... Ash Tree
Hu ..... Ash Stump
Hv ..... Ash Tree
Hw ..... Ash Stump
Hx ..... Ash Tree
Hy ..... Ash Stump
Hz ..... Ash Tree
Ia ..... Ash Stump
Ib ..... Ash Tree
Ic ..... Ash Stump
Id ..... Ash Tree
Ie ..... Ash Stump
If ..... Ash Tree
Ig ..... Ash Stump
Ih ..... Ash Tree
Ii ..... Ash Stump
Ij ..... Ash Tree
Ik ..... Ash Stump
Il ..... Ash Tree
Im ..... Ash Stump
In ..... Ash Tree
Io ..... Ash Stump
Ip ..... Ash Tree
Iq ..... Ash Stump
Ir ..... Ash Tree
Is ..... Ash Stump
It ..... Ash Tree
Iu ..... Ash Stump
Iv ..... Ash Tree
Iw ..... Ash Stump
Ix ..... Ash Tree
Iy ..... Ash Stump
Iz ..... Ash Tree
Ja ..... Ash Stump
Jb ..... Ash Tree
Jc ..... Ash Stump
Jd ..... Ash Tree
Je ..... Ash Stump
Jf ..... Ash Tree
Jg ..... Ash Stump
Jh ..... Ash Tree
Ji ..... Ash Stump
Jj ..... Ash Tree
Jk ..... Ash Stump
Jl ..... Ash Tree
Jm ..... Ash Stump
Jn ..... Ash Tree
Jo ..... Ash Stump
Jp ..... Ash Tree
Jq ..... Ash Stump
Jr ..... Ash Tree
Js ..... Ash Stump
Jt ..... Ash Tree
Ju ..... Ash Stump
Jv ..... Ash Tree
Jw ..... Ash Stump
Jx ..... Ash Tree
Jy ..... Ash Stump
Jz ..... Ash Tree
Ka ..... Ash Stump
Kb ..... Ash Tree
Kc ..... Ash Stump
Kd ..... Ash Tree
Ke ..... Ash Stump
Kf ..... Ash Tree
Kg ..... Ash Stump
Kh ..... Ash Tree
Ki ..... Ash Stump
Kj ..... Ash Tree
Kk ..... Ash Stump
Kl ..... Ash Tree
Km ..... Ash Stump
Kn ..... Ash Tree
Ko ..... Ash Stump
Kp ..... Ash Tree
Kq ..... Ash Stump
Kr ..... Ash Tree
Ks ..... Ash Stump
Kt ..... Ash Tree
Ku ..... Ash Stump
Kv ..... Ash Tree
Kw ..... Ash Stump
Kx ..... Ash Tree
Ky ..... Ash Stump
Kz ..... Ash Tree
La ..... Ash Stump
Lb ..... Ash Tree
Lc ..... Ash Stump
Ld ..... Ash Tree
Le ..... Ash Stump
Lf ..... Ash Tree
Lg ..... Ash Stump
Lh ..... Ash Tree
Li ..... Ash Stump
Lj ..... Ash Tree
Lk ..... Ash Stump
Ll ..... Ash Tree
Lm ..... Ash Stump
Ln ..... Ash Tree
Lo ..... Ash Stump
Lp ..... Ash Tree
Lq ..... Ash Stump
Lr ..... Ash Tree
Ls ..... Ash Stump
Lt ..... Ash Tree
Lu ..... Ash Stump
Lv ..... Ash Tree
Lw ..... Ash Stump
Lx ..... Ash Tree
Ly ..... Ash Stump
Lz ..... Ash Tree
Ma ..... Ash Stump
Mb ..... Ash Tree
Mc ..... Ash Stump
Md ..... Ash Tree
Me ..... Ash Stump
Mf ..... Ash Tree
Mg ..... Ash Stump
Mh ..... Ash Tree
Mi ..... Ash Stump
Mj ..... Ash Tree
Mk ..... Ash Stump
Ml ..... Ash Tree
Mm ..... Ash Stump
Mn ..... Ash Tree
Mo ..... Ash Stump
Mp ..... Ash Tree
Mq ..... Ash Stump
Mr ..... Ash Tree
Ms ..... Ash Stump
Mt ..... Ash Tree
Mu ..... Ash Stump
Mv ..... Ash Tree
Mw ..... Ash Stump
Mx ..... Ash Tree
My ..... Ash Stump
Mz ..... Ash Tree
Na ..... Ash Stump
Nb ..... Ash Tree
Nc ..... Ash Stump
Nd ..... Ash Tree
Ne ..... Ash Stump
Nf ..... Ash Tree
Ng ..... Ash Stump
Nh ..... Ash Tree
Ni ..... Ash Stump
Nj ..... Ash Tree
Nk ..... Ash Stump
Nl ..... Ash Tree
Nm ..... Ash Stump
Nn ..... Ash Tree
No ..... Ash Stump
Np ..... Ash Tree
Nq ..... Ash Stump
Nr ..... Ash Tree
Ns ..... Ash Stump
Nt ..... Ash Tree
Nu ..... Ash Stump
Nv ..... Ash Tree
Nw ..... Ash Stump
Nx ..... Ash Tree
Ny ..... Ash Stump
Nz ..... Ash Tree
Oa ..... Ash Stump
Ob ..... Ash Tree
Oc ..... Ash Stump
Od ..... Ash Tree
Oe ..... Ash Stump
Of ..... Ash Tree
Og ..... Ash Stump
Oh ..... Ash Tree
Oi ..... Ash Stump
Oj ..... Ash Tree
Ok ..... Ash Stump
Ol ..... Ash Tree
Om ..... Ash Stump
On ..... Ash Tree
Oo ..... Ash Stump
Op ..... Ash Tree
Oq ..... Ash Stump
Or ..... Ash Tree
Os ..... Ash Stump
Ot ..... Ash Tree
Ou ..... Ash Stump
Ov ..... Ash Tree
Ow ..... Ash Stump
Ox ..... Ash Tree
Oy ..... Ash Stump
Oz ..... Ash Tree
Pa ..... Ash Stump
Pb ..... Ash Tree
Pc ..... Ash Stump
Pd ..... Ash Tree
Pe ..... Ash Stump
Pf ..... Ash Tree
Pg ..... Ash Stump
Ph ..... Ash Tree
Pi ..... Ash Stump
Pj ..... Ash Tree
Pk ..... Ash Stump
Pl ..... Ash Tree
Pm ..... Ash Stump
Pn ..... Ash Tree
Po ..... Ash Stump
Pp ..... Ash Tree
Pq ..... Ash Stump
Pr ..... Ash Tree
Ps ..... Ash Stump
Pt ..... Ash Tree
Pu ..... Ash Stump
Pv ..... Ash Tree
Pw ..... Ash Stump
Px ..... Ash Tree
Py ..... Ash Stump
Pz ..... Ash Tree
Qa ..... Ash Stump
Qb ..... Ash Tree
Qc ..... Ash Stump
Qd ..... Ash Tree
Qe ..... Ash Stump
Qf ..... Ash Tree
Qg ..... Ash Stump
Qh ..... Ash Tree
Qi ..... Ash Stump
Qj ..... Ash Tree
Qk ..... Ash Stump
Ql ..... Ash Tree
Qm ..... Ash Stump
Qn ..... Ash Tree
Qo ..... Ash Stump
Qp ..... Ash Tree
Qq ..... Ash Stump
Qr ..... Ash Tree
Qs ..... Ash Stump
Qt ..... Ash Tree
Qu ..... Ash Stump
Qv ..... Ash Tree
Qw ..... Ash Stump
Qx ..... Ash Tree
Qy ..... Ash Stump
Qz ..... Ash Tree
Ra ..... Ash Stump
Rb ..... Ash Tree
Rc ..... Ash Stump
Rd ..... Ash Tree
Re ..... Ash Stump
Rf ..... Ash Tree
Rg ..... Ash Stump
Rh ..... Ash Tree
Ri ..... Ash Stump
Rj ..... Ash Tree
Rk ..... Ash Stump
Rl ..... Ash Tree
Rm ..... Ash Stump
Rn ..... Ash Tree
Ro ..... Ash Stump
Rp ..... Ash Tree
Rq ..... Ash Stump
Rr ..... Ash Tree
Rs ..... Ash Stump
Rt ..... Ash Tree
Ru ..... Ash Stump
Rv ..... Ash Tree
Rw ..... Ash Stump
Rx ..... Ash Tree
Ry ..... Ash Stump
Rz ..... Ash Tree
Sa ..... Ash Stump
Sb ..... Ash Tree
Sc ..... Ash Stump
Sd ..... Ash Tree
Se ..... Ash Stump
Sf ..... Ash Tree
Sg ..... Ash Stump
Sh ..... Ash Tree
Si ..... Ash Stump
Sj ..... Ash Tree
Sk ..... Ash Stump
Sl ..... Ash Tree
Sm ..... Ash Stump
Sn ..... Ash Tree
So ..... Ash Stump
Sp ..... Ash Tree
Sq ..... Ash Stump
Sr ..... Ash Tree
Ss ..... Ash Stump
St ..... Ash Tree
Su ..... Ash Stump
Sv ..... Ash Tree
Sw ..... Ash Stump
Sx ..... Ash Tree
Sy ..... Ash Stump
Sz ..... Ash Tree
Ta ..... Ash Stump
Tb ..... Ash Tree
Tc ..... Ash Stump
Td ..... Ash Tree
Te ..... Ash Stump
Tf ..... Ash Tree
Tg ..... Ash Stump
Th ..... Ash Tree
Ti ..... Ash Stump
Tj ..... Ash Tree
Tk ..... Ash Stump
Tl ..... Ash Tree
Tm ..... Ash Stump
Tn ..... Ash Tree
To ..... Ash Stump
Tp ..... Ash Tree
Tq ..... Ash Stump
Tr ..... Ash Tree
Ts ..... Ash Stump
Tt ..... Ash Tree
Tu ..... Ash Stump
Tv ..... Ash Tree
Tw ..... Ash Stump
Tx ..... Ash Tree
Ty ..... Ash Stump
Tz ..... Ash Tree
Ua ..... Ash Stump
Ub ..... Ash Tree
Uc ..... Ash Stump
Ud ..... Ash Tree
Ue ..... Ash Stump
Uf ..... Ash Tree
Ug ..... Ash Stump
Uh ..... Ash Tree
Ui ..... Ash Stump
Uj ..... Ash Tree
Uk ..... Ash Stump
Ul ..... Ash Tree
Um ..... Ash Stump
Un ..... Ash Tree
Uo ..... Ash Stump
Up ..... Ash Tree
Uq ..... Ash Stump
Ur ..... Ash Tree
Us ..... Ash Stump
Ut ..... Ash Tree
Uu ..... Ash Stump
Uv ..... Ash Tree
Uw ..... Ash Stump
Ux ..... Ash Tree
Uy ..... Ash Stump
Uz ..... Ash Tree
Va ..... Ash Stump
Vb ..... Ash Tree
Vc ..... Ash Stump
Vd ..... Ash Tree
Ve ..... Ash Stump
Vf ..... Ash Tree
Vg ..... Ash Stump
Vh ..... Ash Tree
Vi ..... Ash Stump
Vj ..... Ash Tree
Vk ..... Ash Stump
Vl ..... Ash Tree
Vm ..... Ash Stump
Vn ..... Ash Tree
Vo ..... Ash Stump
Vp ..... Ash Tree
Vq ..... Ash Stump
Vr ..... Ash Tree
Vs ..... Ash Stump
Vt ..... Ash Tree
Vu ..... Ash Stump
Vv ..... Ash Tree
Vw ..... Ash Stump
Vx ..... Ash Tree
Vy ..... Ash Stump
Vz ..... Ash Tree
Wa ..... Ash Stump
Wb ..... Ash Tree
Wc ..... Ash Stump
Wd ..... Ash Tree
We ..... Ash Stump
Wf ..... Ash Tree
Wg ..... Ash Stump
Wh ..... Ash Tree
Wi ..... Ash Stump
Wj ..... Ash Tree
Wk ..... Ash Stump
Wl ..... Ash Tree
Wm ..... Ash Stump
Wn ..... Ash Tree
Wo ..... Ash Stump
Wp ..... Ash Tree
Wq ..... Ash Stump
Wr ..... Ash Tree
Ws ..... Ash Stump
Wt ..... Ash Tree
Wu ..... Ash Stump
Wv ..... Ash Tree
Ww ..... Ash Stump
Wx ..... Ash Tree
Wy ..... Ash Stump
Wz ..... Ash Tree
Xa ..... Ash Stump
Xb ..... Ash Tree
Xc ..... Ash Stump
Xd ..... Ash Tree
Xe ..... Ash Stump
Xf ..... Ash Tree
Xg ..... Ash Stump
Xh ..... Ash Tree
Xi ..... Ash Stump
Xj ..... Ash Tree
Xk ..... Ash Stump
Xl ..... Ash Tree
Xm ..... Ash Stump
Xn ..... Ash Tree
Xo ..... Ash Stump
Xp ..... Ash Tree
Xq ..... Ash Stump
Xr ..... Ash Tree
Xs ..... Ash Stump
Xt ..... Ash Tree
Xu ..... Ash Stump
Xv ..... Ash Tree
Xw ..... Ash Stump
Xx ..... Ash Tree
Xy ..... Ash Stump
Xz ..... Ash Tree
Ya ..... Ash Stump
Yb ..... Ash Tree
Yc ..... Ash Stump
Yd ..... Ash Tree
Ye ..... Ash Stump
Yf ..... Ash Tree
Yg ..... Ash Stump
Yh ..... Ash Tree
Yi ..... Ash Stump
Yj ..... Ash Tree
Yk ..... Ash Stump
Yl ..... Ash Tree
Ym ..... Ash Stump
Yn ..... Ash Tree
Yo ..... Ash Stump
Yp ..... Ash Tree
Yq ..... Ash Stump
Yr ..... Ash Tree
Ys ..... Ash Stump
Yt ..... Ash Tree
Yu ..... Ash Stump
Yv ..... Ash Tree
Yw ..... Ash Stump
Yx ..... Ash Tree
Yy ..... Ash Stump
Yz ..... Ash Tree
Za ..... Ash Stump
Zb ..... Ash Tree
Zc ..... Ash Stump
Zd ..... Ash Tree
Ze ..... Ash Stump
Zf ..... Ash Tree
Zg ..... Ash Stump
Zh ..... Ash Tree
Zi ..... Ash Stump
Zj ..... Ash Tree
Zk ..... Ash Stump
Zl ..... Ash Tree
Zm ..... Ash Stump
Zn ..... Ash Tree
Zo ..... Ash Stump
Zp ..... Ash Tree
Zq ..... Ash Stump
Zr ..... Ash Tree
Zs ..... Ash Stump
Zt ..... Ash Tree
Zu ..... Ash Stump
Zv ..... Ash Tree
Zw ..... Ash Stump
Zx ..... Ash Tree
Zy ..... Ash Stump
Zz ..... Ash Tree

Survey OPERATIONS
Smith Street, Skehmersdale, Lancs. WN8 6LN
Tel: 01695 725662 Fax: 01695 51816
Email: mail@surveyops.co.uk - www.surveyops.co.uk

Client
Rowsley Metropolitan Borough Council

Drawing Title
Topographical Survey of Land at:
Former All Saints School Cherryfield Drive
Rowsley
Sheet 1 of 2

Scale(s)	Surveyor
1:500	CA
Date	Drawn
JULY 14	PM
Job Number	Checked
14FO63	MH

Sheet Size & Dig Number & Revision
A0 14FO63/001

STANDARD REFERENCE & ABBREVIATIONS

(ab) ..... Asbestos Duct	(i) ..... Invert (use)
AP ..... Air point	BP ..... Boiler Point
B ..... Bollard	BT ..... Letter Box
BH ..... Borehole	CP ..... Cover Point
CH ..... Chimney	CT ..... Cable TV
D ..... Drain	DP ..... Down Pipe
EL ..... Electric	F ..... Fence
FB ..... Flood Light	FH ..... Fire Hydrant
G ..... Gully	GP ..... Gate Post
GV ..... Gas Valve	H ..... Hedge
HR ..... Hand Rail	HT ..... Height
K ..... Kerb	LP ..... Lamp Post
M ..... Manhole	MB ..... Marker Post
MH ..... Mast	MP ..... Meter Point
O ..... Overhead	OHL ..... Overhead Electric Wire
P ..... Post	PB ..... Post & Board
PC ..... Post & Chain	PR ..... Post & Rail
PW ..... Post & Wire	R ..... Rail
RE ..... Road Sign	RG ..... Rodding Eye
RM ..... Rain Water Pipe	S ..... Stream
SC ..... Soil Vent Pipe	SP ..... Service Point
SV ..... Stop Valve	T ..... Tree
TB ..... Telephone Call Box	TC ..... Traffic Control Box
TL ..... Traffic Light	TP ..... Telegraph Pole
TR ..... Traffic Signal	TS ..... Transformer Station
W ..... Water	WC ..... Water Course
WM ..... Water Meter	WT ..... Water Tap
WV ..... Water Valve	

SURVEY STATIONS			
Name	Eastings	Northings	Heights
CA1	341000.00	340950.00	24.00
CA2	341077.23	340977.23	24.50
CA3	341106.18	340951.47	24.61
CA4	341218.10	340927.49	24.18
CA5	341237.45	340927.76	23.67
CA6	341284.42	340914.58	24.74
CA7	341300.20	340918.49	24.73
SS04	341013.15	340910.76	24.80
SS05	341237.24	340908.18	24.13
SS06	341306.19	340914.19	24.51
SS07	341306.19	340910.96	24.51
SS08	341306.19	340914.87	24.62

Survey control markers established for mapping purposes only and should not be used for construction without the written approval of Survey Operations Ltd.

Notes:
The survey is plotted on a plane local grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

© Survey Operations Limited 2014
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey Operations Limited.

This page has been intentionally left blank

APPENDIX G: PROPOSED PLANNING LAYOUT

This page has been left intentionally blank

Disclaimer

Images, layouts and plans are intended for illustrative purposes only and should be treated as general guidance only.

Plans and layouts including parking arrangements, social / affordable housing, community buildings, play areas and public open spaces may change to reflect changes in the planning permission for the development. Please speak to your Solicitor to whom fulls details of any planning consents including layouts and plans will be available.

Plans, layouts and landscaping are not intended to form part of any contract or warranty unless specifically incorporated in writing into the contract.

The name of this development is a marketing name only and may not be the designated postal address, which may be determined by The Post Office.

LEGEND

- Site Boundary
- Private Housetypes
- Affordable Housetypes
- Proposed Trees
- Landscape Buffer
- Focal Plot
- Area of play
- Footpath Links
- Vision Line Direction

A506

Existing tree belt

Footpath links to existing woodland and footpaths

P.O.S

Existing Woodland area

P.O.S

Possible SUDS ponds

DWH proposed scheme

P.O.S

Exising Bus Station

Proposed footpath link in line with existing pedestrian crossing

CHERRYFIELDS DRIVE

Exising Bank

Exisitng shops

Car parking

Proposed footpath link to existing shops

Car Parking (~100 spces)

Proposed footpath link to Webster Park

Possible OAP Accommodation

Kirby Leisure Centre

N

Scale Bar

0m 5m 10m 15m 20m 25m 30m 35m 40m 45m 50m 60m 70m 80m 90m 100m

Rev	Description	Date	Drawn	Chk'd

Urban Design
Barratt House
Forest Business Park
Bardon Hill
Leicestershire
LE67 1UB

01530 276276

Project
Kirby
Cherryfields Drive

Drawing Title
Feasibility Plan
Barratt (north parcel)

Scale
1:500 @ A0

Date
07 May 2021

Drawn By
BG / SW

NW-23-03

* When printing to scale, please ensure that your printer settings are set to Page Scaling = None. Do not allow any 'fit to page' settings as this will alter the scale of the drawing. You can use the scale bar or grid to check the printed drawing.

Disclaimer

Images, layouts and plans are intended for illustrative purposes only and should be treated as general guidance only.

Plans and layouts including parking arrangements, social / affordable housing, community buildings, play areas and public open spaces may change to reflect changes in the planning permission for the development. Please speak to your Solicitor to whom fulls details of any planning consents including layouts and plans will be available.

Plans, layouts and landscaping are not intended to form part of any contract or warranty unless specifically incorporated in writing into the contract.

The name of this development is a marketing name only and may not be the designated postal address, which may be determined by The Post Office.

Existing Woodland area

Footpath links to ex. woodland and footpaths

Possible SUDS ponds

WHINEBERRY DRIVE

BEWLEY DRIVE

CHERRYFIELDS DRIVE

Existing Housing Development

Kirby Leisure Centre

P.O.S

P.O.S

P.O.S

LEGEND

- Site Boundary
- Private Housetypes
- Affordable Housetypes
- Proposed Trees
- Landscape Buffer
- Focal Plot
- Area of play
- Footpath Links
- Vision Line Direction

Scale Bar

0m 5m 10m 15m 20m 25m 30m 35m 40m 45m 50m 60m 70m 80m 90m 100m

N

Rev	Description	Date	Drawn	Chk'd

Urban Design
Barratt House
Forest Business Park
Bardon Hill
Leicestershire
LE67 1UB

01530 276276

Project
Kirby
Cherryfields Drive

Drawing Title
Feasibility Plan
DWH (south parcel)

Scale
1:500 @ A0

Date
07 May 2021

Drawn By
BG / SW

NW-23-02

DAVID WILSON HOMES
WHERE QUALITY LIVES

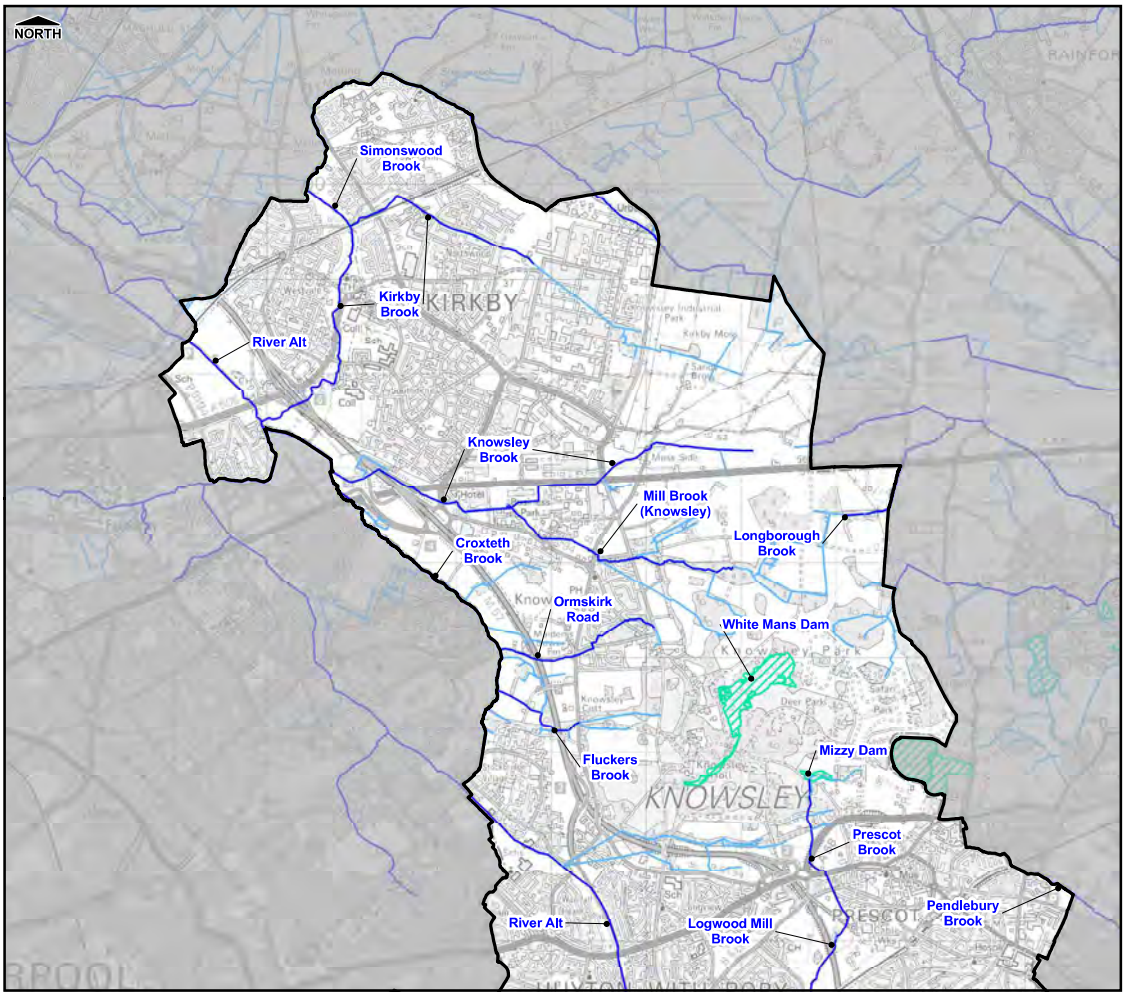
BARRATT HOMES

When printing to scale, please ensure that your printer settings are set to Page Scaling = None. Do not allow any 'fit to page' settings as this will alter the scale of the drawing. You can use the scale bar or grid to check the printed drawing.

This page has been intentionally left blank

APPENDIX H: PFRA/SFRA PLANNING EXTRACTS

This page has been left intentionally blank



Legend

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

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

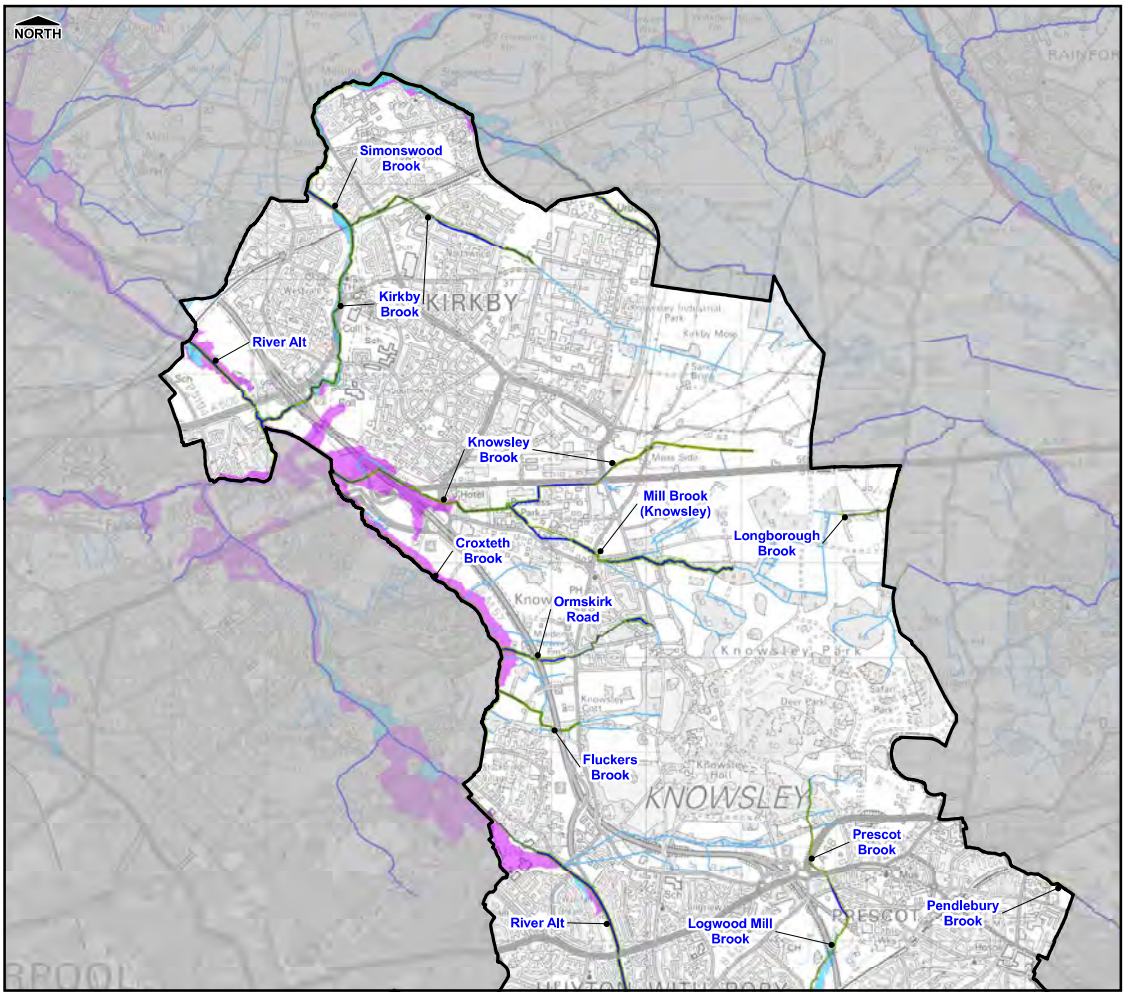
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B1-1-1
Catchment Overview

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B1-1-1	-



Legend

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

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

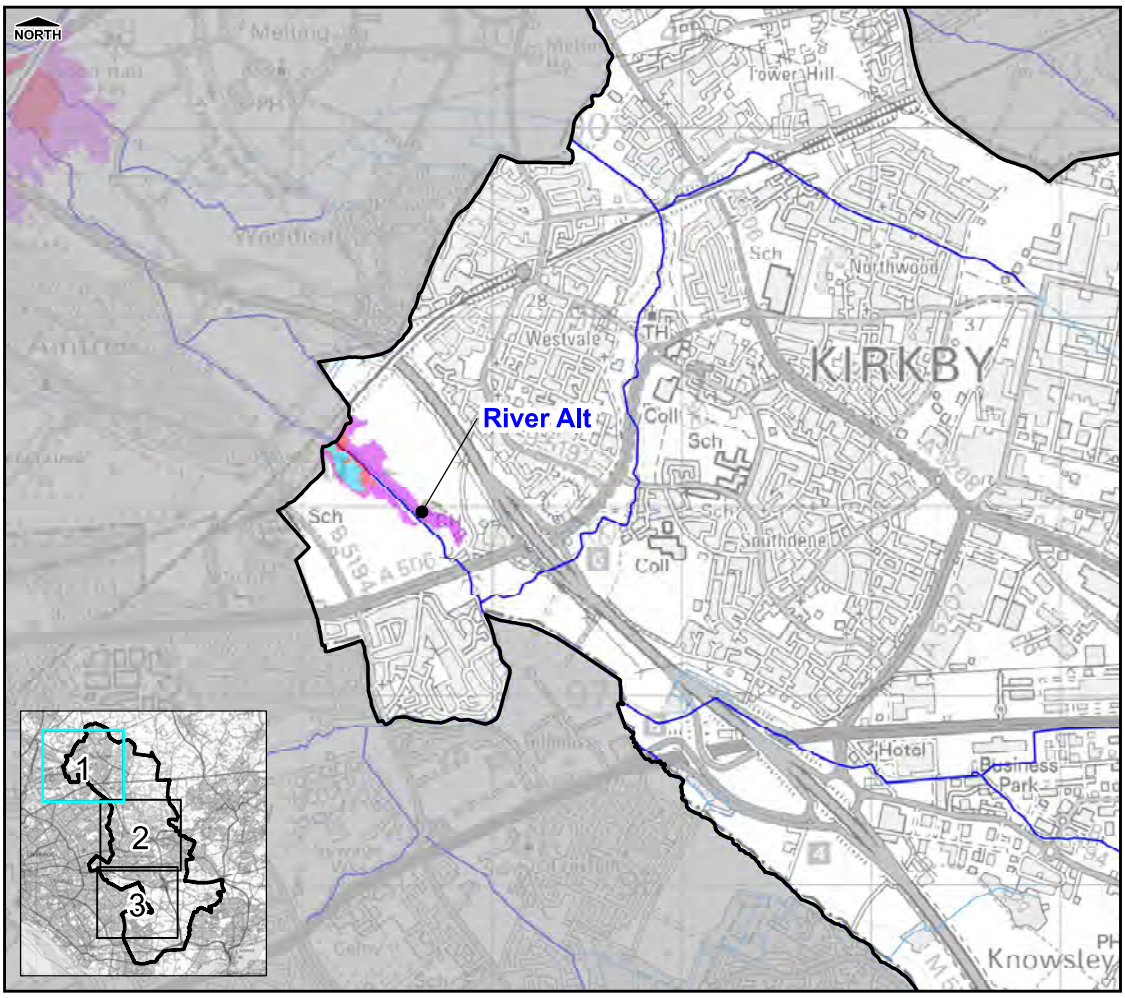
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B2-1
Environment Agency Flood Zones

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B2-1	-



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

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:20,000	Sheffield

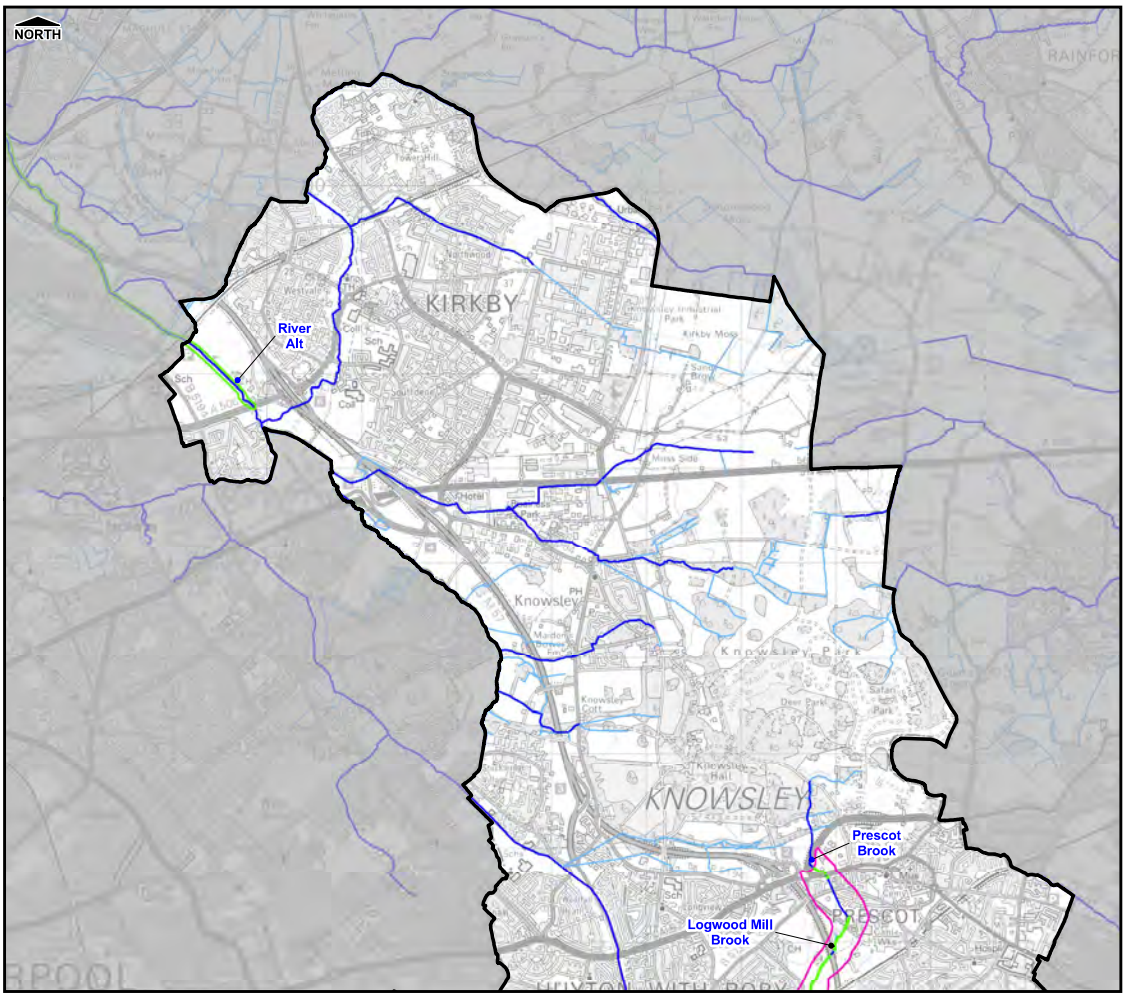
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B3-A-1
Actual Risk
Flood Extent

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B3-A-1	-



Legend

- Borough Administrative Boundary
- 1D Model Boundary
- 2D Model Boundary
- Main River
- Ordinary Watercourse

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

FLOOD ZONE DATA PROVIDED BY THE ENVIRONMENT AGENCY 2012. ALL RIGHTS RESERVED (REF: NE28184BC).

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE, © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

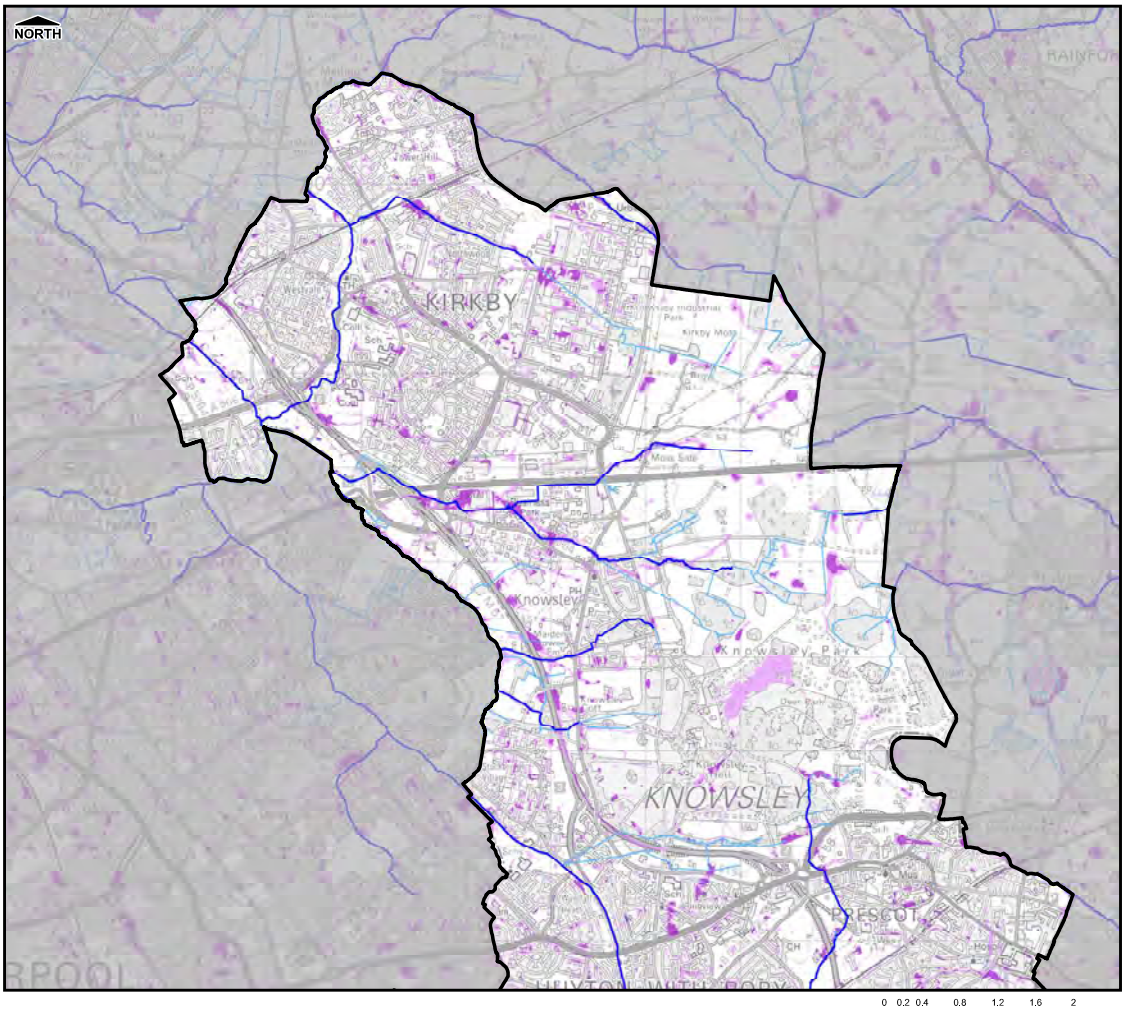
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B4-1
Modelled Watercourses

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B4-1	-



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).

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

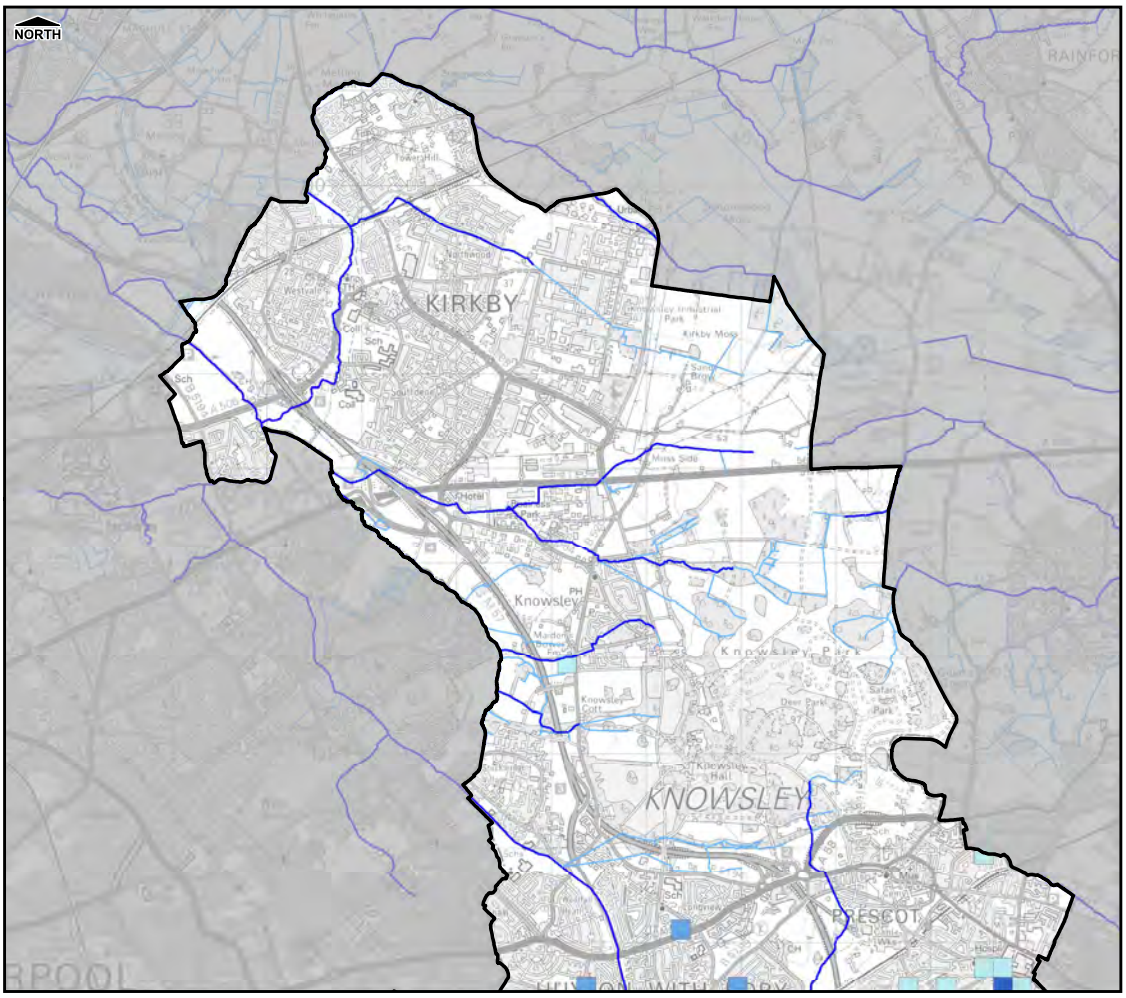
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B5-1
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

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE, © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

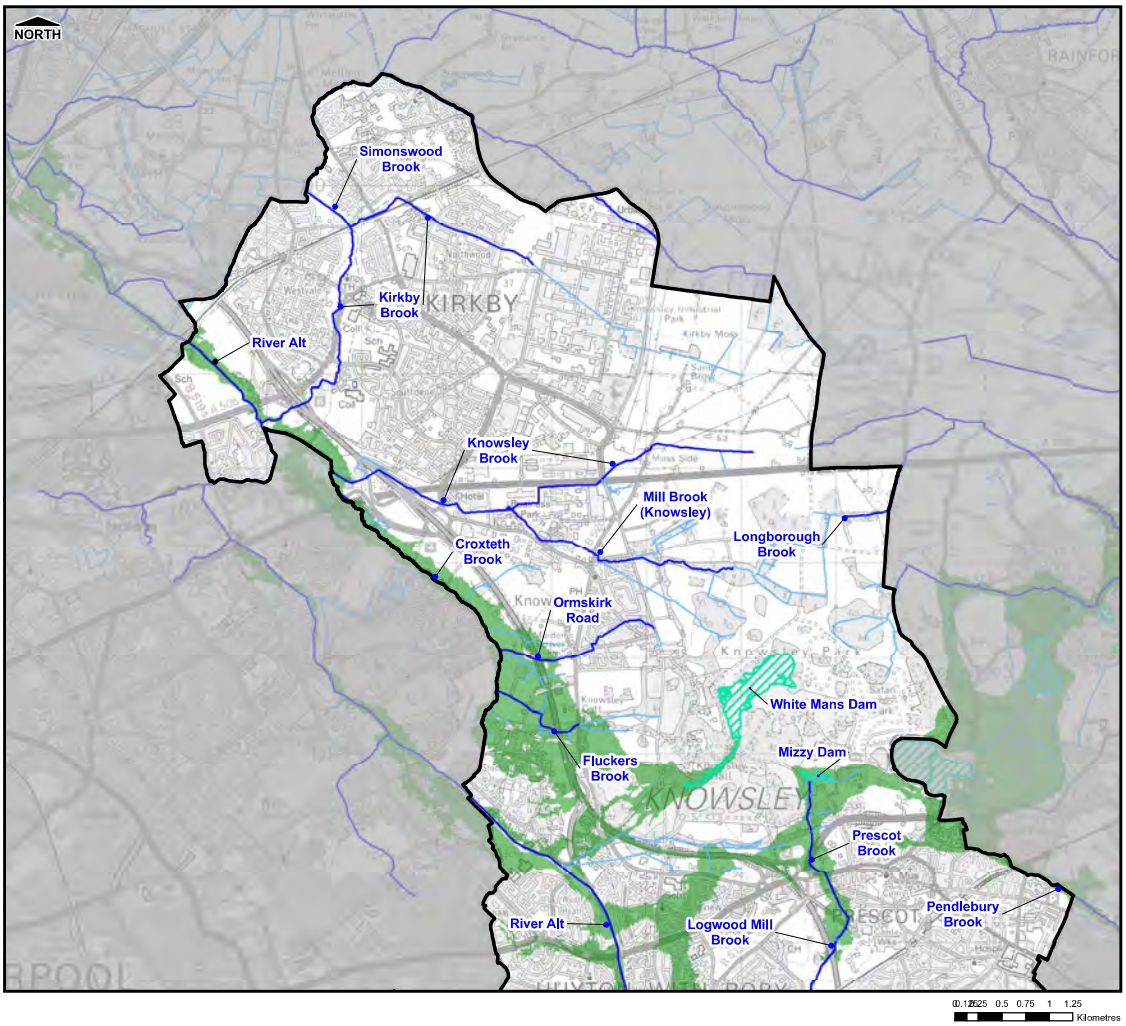
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B6-1
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

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE, © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

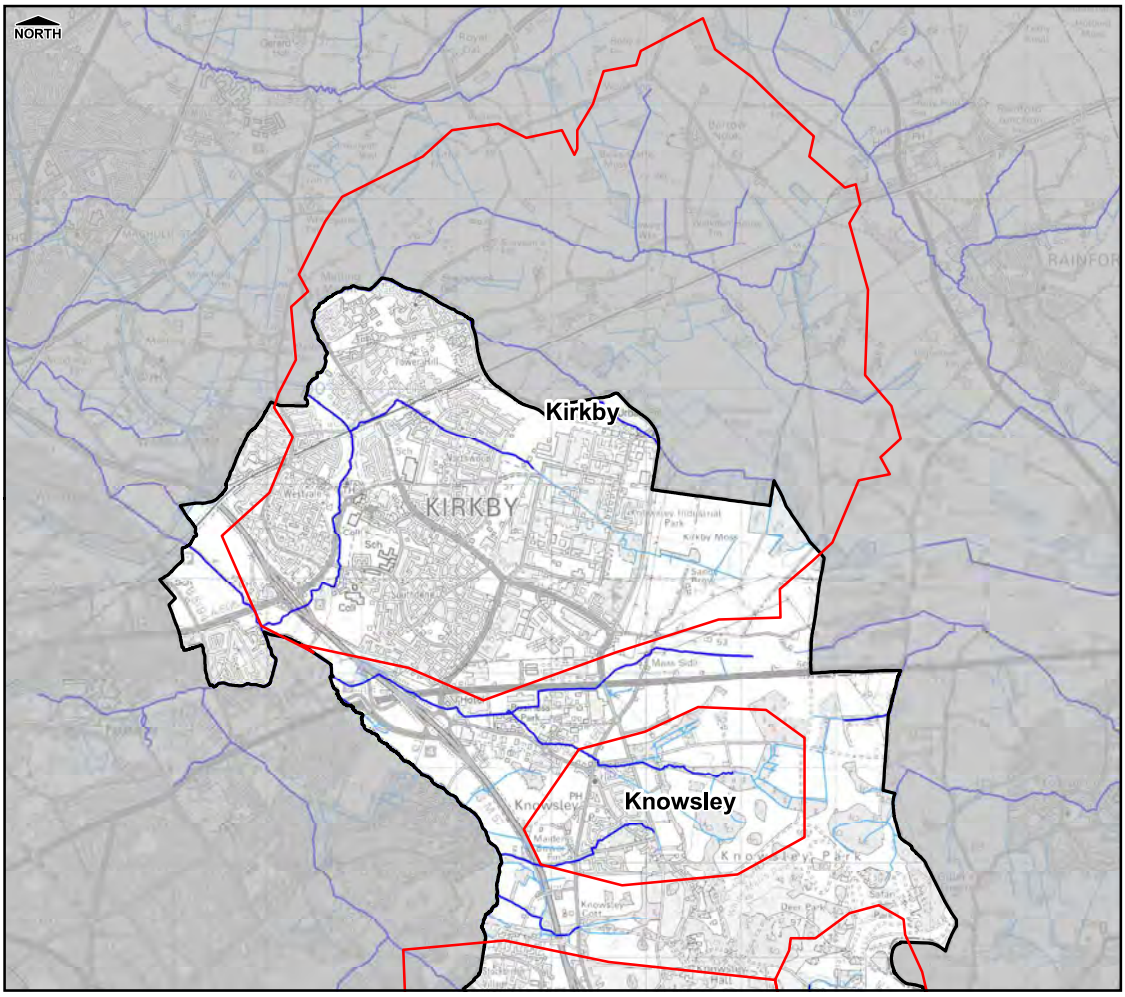
KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B7-1
Reservoir Flooding

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B7-1	-



Legend

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

NOTE THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN CAPITA SYMONDS LIMITED AND MUST NOT BE COPIED OR REPRODUCED IN ANYWAY WITHOUT THEIR WRITTEN CONSENT.

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

REPRODUCED FROM ORDNANCE SURVEY MAPPING WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. © CROWN COPYRIGHT. UNAUTHORISED REPRODUCTION INFRINGES COPYRIGHT AND MAY LEAD TO PROSECUTION OR CIVIL PROCEEDINGS LICENCE NO. 100017655 (2012).

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

SCALE @ A3	ISSUING OFFICE
1:40,000	Sheffield

KNOWSLEY METROPOLITAN BOROUGH COUNCIL
LEVEL 2 STRATEGIC FLOOD RISK ASSESSMENT

Figure B10-1
Critical Drainage Areas

Knowsley Council

CAPITA SYMONDS

DRAWING NUMBER	REV
CS056421/B10-1	-

This page has been intentionally left blank

APPENDIX I: SURFACE WATER RUN-OFF CALCULATIONS

This page has been left intentionally blank

SURFACE WATER RUN-OFF CALCULATION SHEET

Development	Cherryfield Drive, Kirkby
Project No.	HYD665

Revision	A	**Completed by**	HB
Date	27/09/2021	**Checked by**	RDN

Areas

Total Site	22.540	ha	
Development Area[1]	22.540	ha	
Existing Impermeable	3.760	ha	
Existing Impermeable[2]	3.760	ha	
Existing Pervious	18.780	ha	
Existing Pervious[2]	0.000	ha	
Proposed total impermeable	16.800	ha	75%

Catchment Characteristics

SAAR	850	mm
SPR	0.3	
BFI	0.744	

i_1	16.7	mm/hr	d_1	21.1 mm
i_{30}	30.9	mm/hr	d_{30}	47.3 mm
i_{100}	41.0	mm/hr	d_{100}	62.8 mm

Run-off Rates

Pre-development

Impermeable ------	1yr	174.3	l/s
	30yr	322.4	l/s
	100yr	428.2	l/s
	50mm/hr[3]	522.2	l/s
Pervious[4] ------	1yr	119.6	l/s
	30yr	233.7	l/s
	100yr	285.9	l/s
	QBar[5]	137.5	l/s
Total ------	1yr	293.9	l/s
	30yr	556.1	l/s
	100yr	714.1	l/s

Post-development (without control)

Impermeable[6] ------	1yr	778.7	l/s
	30yr	1440.5	l/s
	100yr+40%CC	2678.7	l/s

Volumes

Pre-development

Impermeable ------	1yr	79.4	cu.m
	30yr	177.7	cu.m
	100yr	236.0	cu.m
Pervious[4] ------	1yr	1658.1	cu.m
	30yr	3199.2	cu.m
	100yr	4435.1	cu.m
Total ------	1yr	1737.5	cu.m
	30yr	3376.9	cu.m
	100yr	4671.1	cu.m

Post-development

Impermeable[6] ------	1yr	354.8	cu.m
	30yr	793.8	cu.m
	100yr+40%CC	1054.4	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)

Megan Berry

From: Andy Jones <ajones@coopers.co.uk>
Sent: 28 May 2021 11:05
To: Willmott, Katy
Cc: Jonathan Rattigan
Subject: Cherryfield Drive, Kirkby Drainage Appraisal

7778 Cherryfield Drive, Kirkby Drainage Appraisal

Hi Katy

Please use link below to download the drainage strategy for the Kirby site. We have designed the strategy based on the UU wastewater response provided which had single points of connection for surface water and foul for the entire development flows. This has resulted in some sections of deep drainage, but potentially as there are sewers present throughout Cherryfield Drive there may be opportunities to discuss additional connection points with UU so split the development drainage and reduce sewer depths. The sewers in Cherryfield Drive to the SE of the site presumably will have served the former school in the past and as these are large sewers they may have additional capacity.

https://we.tl/t-rBi5nZaGG3

Please note this link will expire in 7 days

We have also purchased the detailed UU sewer records so we can review the depths of the surrounding existing sewers. These are also included in the link.

We have designed the surface water to a maximum flow rate of 90 l/s as per UU pre-development enquiry. However this is only relevant if connecting into the surface water sewer network. Flow rates will need to agreed with LLFA and as we are currently proposing a single discharge POC into the watercourse flows should be restricted to greenfield run-off rate.

The greenfield run-off rate calculation considers location and also soil type. The Default setting for this site location is type 2 which would indicate a permeable site with underlying sands / gravels. However the SI information provided does not correspond and has mainly identified made ground over clays. The following greenfield run-off rates have been calculated based on a site area of 22.5ha:

Soil Type 2 (Default) QBAR = 51.9 l/s (permeable sands / gravels)
Soil Type 3 (Edited) QBAR = 81.8 l/s (mixed areas of permeable / impermeable)
Soil Type 4 (Edited) QBAR = 137.5 l/s (Impermeable clay)

Should you be successful with this bid we suggest trying to agree a flow rate of 137.5 l/s with LLFA at an early stage as this will provide betterment on the currently design (90l/s).

The top NW portion of the site is not covered by any topographical information provided, so we have used LIDAR data to obtain approximate levels in this area.

Attenuation is provided using a number of flow controls in conjunction with oversized pipes and on-line SUDS basins / swales. The design will no longer be in accordance with SfA6 as this has now been superseded by DCG standards which promote the use of SUDS. The design should incorporate SUDS

throughout the development with consideration to permeable paving, bioretention areas and other source control components. We have undertaken this preliminary design based on the layout provided but recommend early discussions with UU and LLFA which may require revisiting the masterplan to incorporate additional SUDS features such as more roadside SUDS corridors for the inclusion of shallow swales, filter drains, underdrains and bioretention areas, tree pits etc.

Some of the swales we are providing are deep and will need some form of retention (gabions) of the side slopes. These will need to be considered further to ensure there are no health and safety issues and if there is any impact on highway adoptions (AIPs?). If we can split the networks and agree additional POC's for the surface water we can potentially reduce these depths.

We have also included surface water allowances of 5l/s for the car parking area and 5l/s for the possible OAP accommodation. This is designed as a base flow only so the on-site attenuation of these areas will need to be considered and will be an additional construction cost. We suggest considering a tanked permeable paving which will satisfy the SUDS Requirement.

I am on annual leave next week so please copy Jon into any emails should your require any additional information next week.

Regards

Andy Jones
Senior Infrastructure Engineer
COOPERS
Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU

☎: (01244) 684910 ☎: Direct Dial No. (01244) 684933
🖷: (01244) 684911
✉: ajones@coopers.co.uk
Web: http://www.coopers.co.uk

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Andy Jones
Site name:	Cherryfield Drive
Site location:	Kirby

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

Site Details

Latitude:	53.47890° N
Longitude:	2.88968° W
Reference:	651434023
Date:	Apr 28 2021 08:22

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 22.5

Methodology

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

Soil characteristics

	Default	Edited
SOIL type:	2	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.3	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	856	856
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

Notes

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

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

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

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

(3) Is SPR/SPRHOST ≤ 0.3?

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

Greenfield runoff rates

	Default	Edited
Q_{BAR} (l/s):	51.89	137.46
1 in 1 year (l/s):	45.14	119.59
1 in 30 years (l/s):	88.21	233.68
1 in 100 year (l/s):	107.93	285.91
1 in 200 years (l/s):	122.97	325.77

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

Greenfield Runoff Volume

FSR Data

Return Period (years)	100
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.390
Areal Reduction Factor	1.00
Area (ha)	22.540
SAAR (mm)	834
CWI	118.988
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	32.28
Greenfield Runoff Volume (m^3)	4435.074

©1982-2020 Innovyze

Greenfield Runoff Volume

FSR Data

Return Period (years)	30
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.390
Areal Reduction Factor	1.00
Area (ha)	22.540
SAAR (mm)	834
CWI	118.988
Urban	0.000
SPR	30.000

Results

Percentage Runoff (%)	30.24
Greenfield Runoff Volume (m^3)	3199.214

©1982-2020 Innovyze

Greenfield Runoff Volume

FSR Data

Return Period (years)	2
Storm Duration (mins)	360
Region	England and Wales
M5-60 (mm)	19.200
Ratio R	0.390
Areal Reduction Factor	1.00
Area (ha)	22.540
SAAR (mm)	834
CWI	118.988
Urban	0.000
SPR	30.000

Results

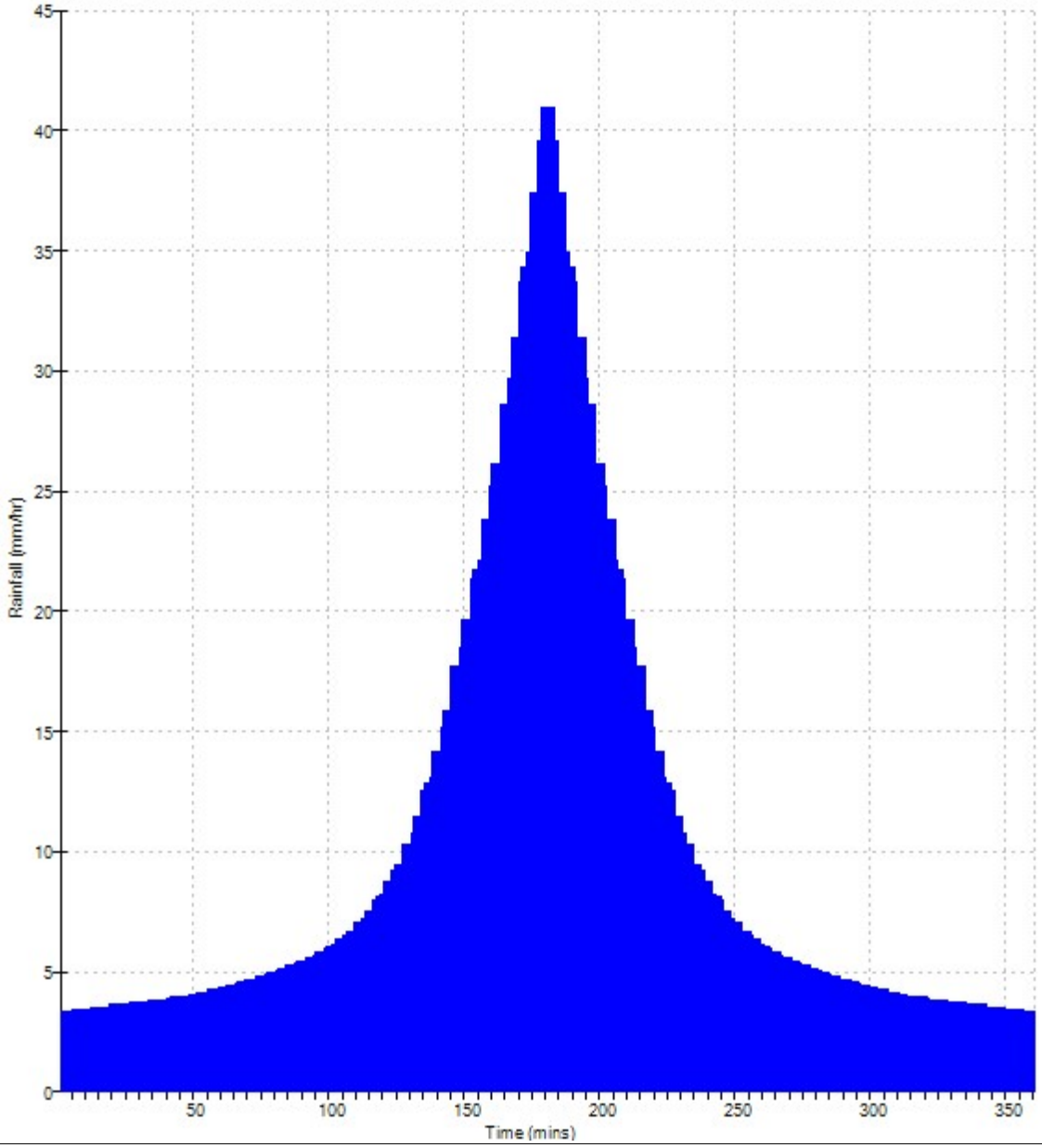
Percentage Runoff (%)	28.50
Greenfield Runoff Volume (m^3)	1658.126

©1982-2020 Innovyze

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 340969 398371 SJ 40969 98371
Data Type	Point
Peak Intensity (mm/hr)	41.000
Ave. Intensity (mm/hr)	10.459
Return Period (years)	100.0

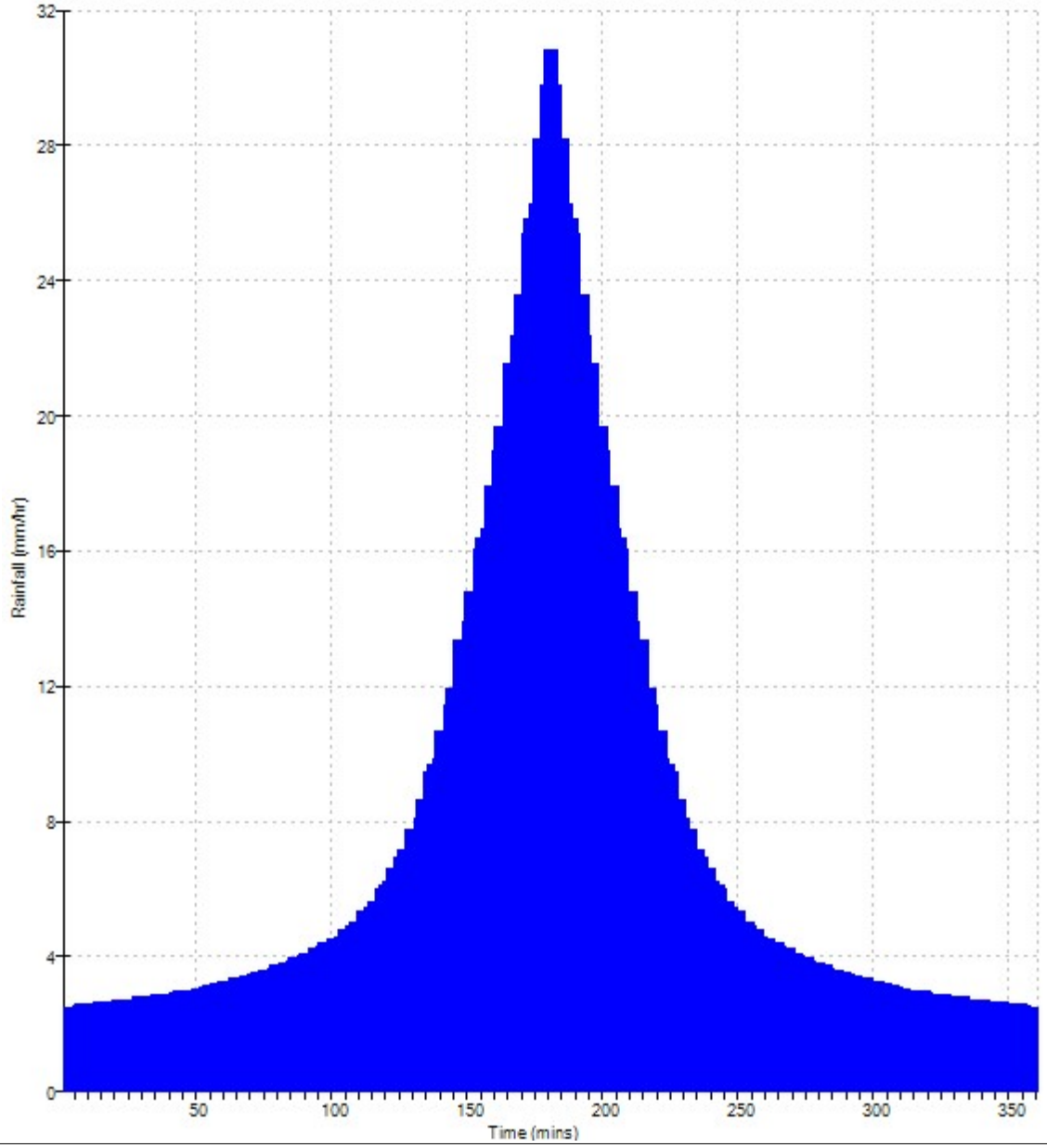


©1982-2020 Innovyze

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 340969 398371 SJ 40969 98371
Data Type	Point
Peak Intensity (mm/hr)	30.867
Ave. Intensity (mm/hr)	7.874
Return Period (years)	30.0

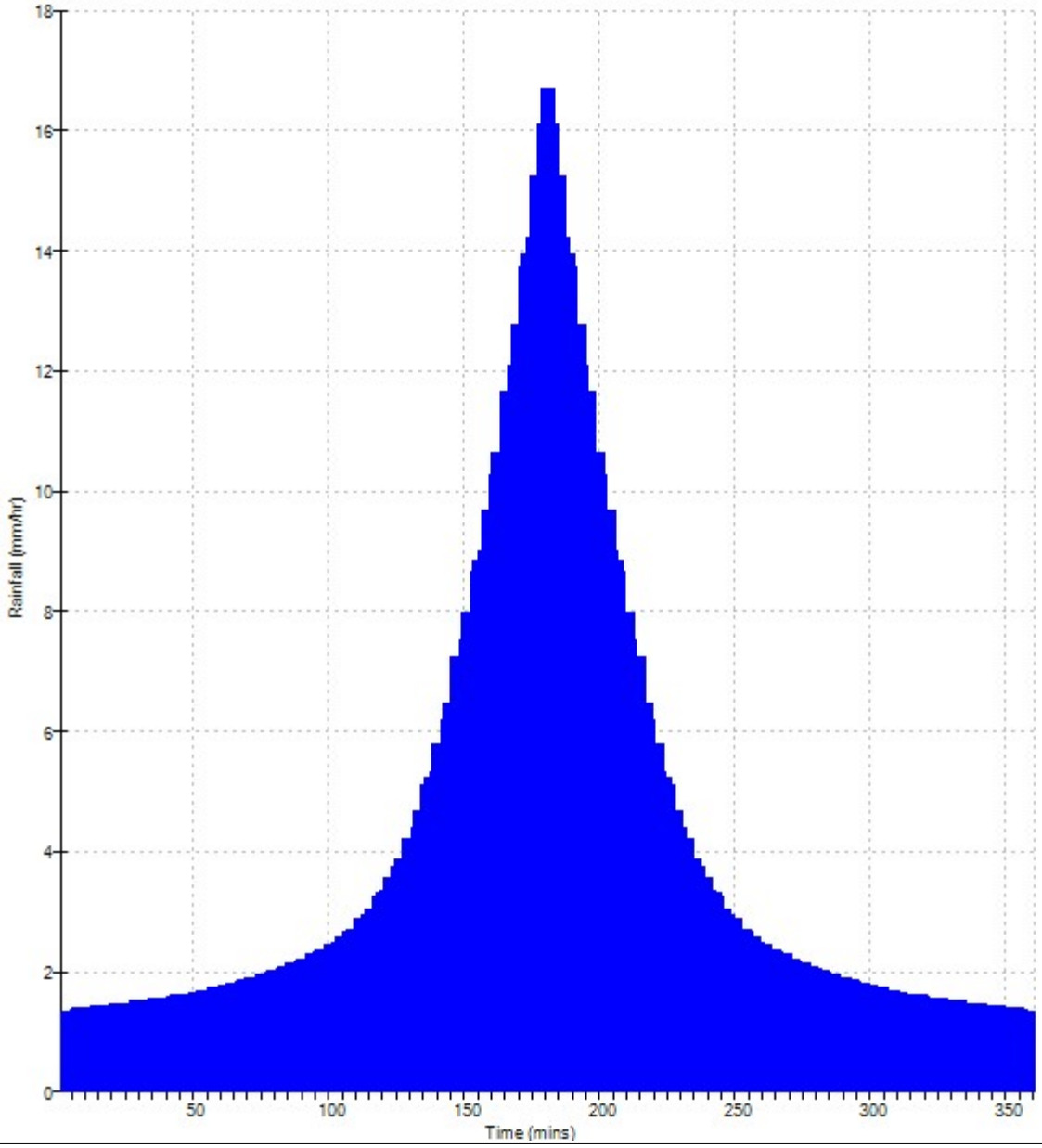


©1982-2020 Innovyze

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 340969 398371 SJ 40969 98371
Data Type	Point
Peak Intensity (mm/hr)	16.687
Ave. Intensity (mm/hr)	4.257
Return Period (years)	2.0



©1982-2020 Innovyze

This page has been intentionally left blank

APPENDIX J: COOOPER'S DRAINAGE STRATEGY PLAN

This Page Has Been Left Intentionally Blank

DO NOT SCALE

NORTH

STORM Network 1

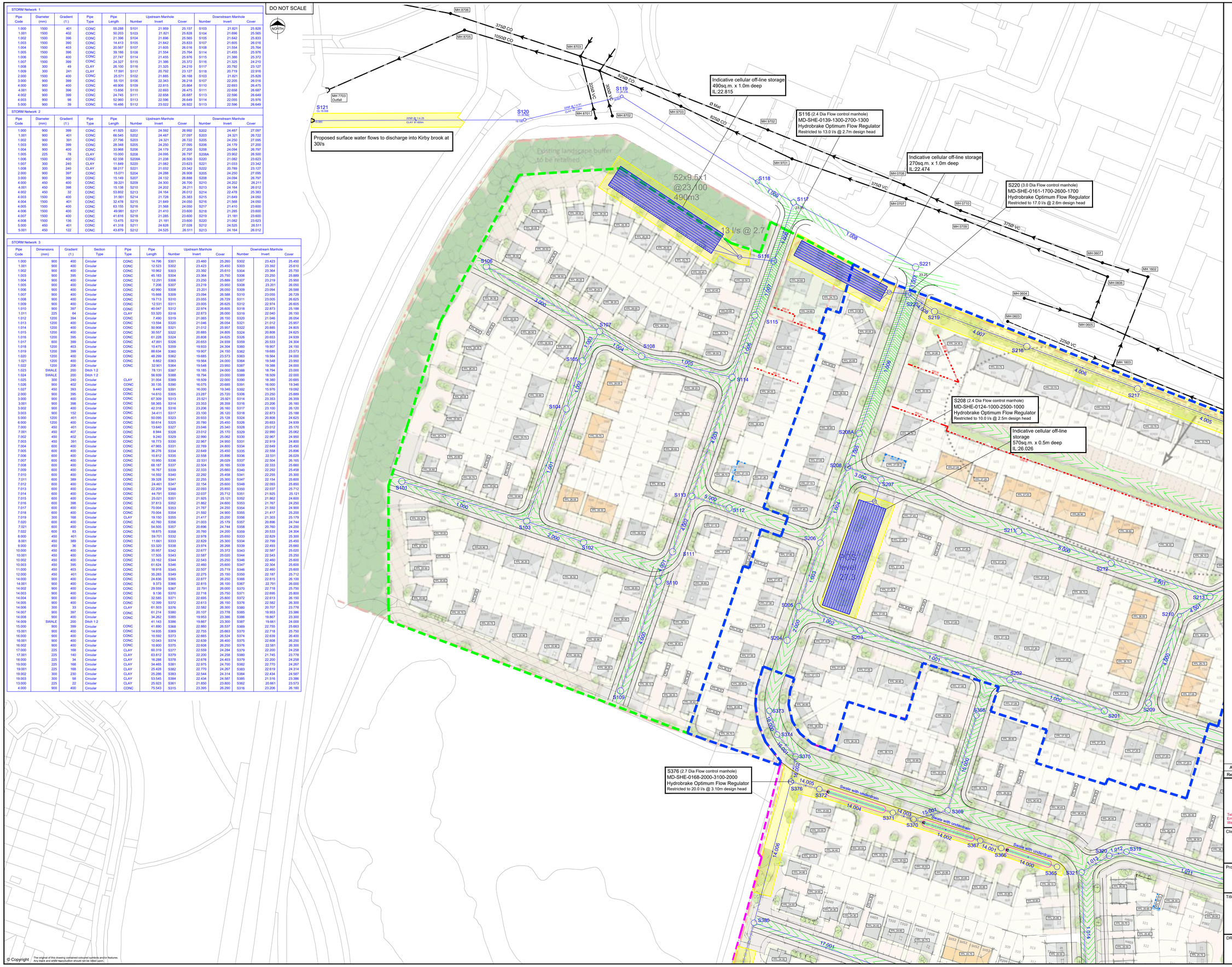
Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	1500	401	CONC	55.288	S101	21.959	25.157	S103	21.821	25.828
1.001	1500	402	CONC	50.203	S103	21.821	25.828	S104	21.696	25.565
1.002	1500	396	CONC	21.396	S104	21.696	25.565	S105	21.642	25.833
1.003	1500	390	CONC	14.413	S105	21.642	25.833	S107	21.605	26.016
1.004	1500	403	CONC	20.567	S107	21.605	26.016	S108	21.554	25.764
1.005	1500	396	CONC	39.186	S108	21.554	25.764	S114	21.455	25.976
1.006	1500	400	CONC	27.747	S114	21.455	25.976	S115	21.386	25.372
1.007	1500	399	CONC	24.327	S115	21.386	25.372	S116	21.325	24.210
1.008	300	49	CLAY	26.100	S116	21.325	24.210	S117	20.792	23.127
1.009	300	241	CLAY	17.591	S117	20.792	23.127	S118	20.719	22.916
2.000	1500	400	CONC	25.571	S102	21.885	26.168	S103	21.821	25.828
3.000	900	399	CONC	55.101	S106	22.343	26.218	S107	22.205	26.016
4.000	900	400	CONC	48.906	S109	22.815	25.864	S110	22.693	26.475
4.001	900	396	CONC	13.856	S110	22.693	26.475	S111	22.658	26.687
4.002	900	399	CONC	24.745	S111	22.658	26.687	S113	22.596	26.649
4.003	900	98	CONC	52.960	S113	22.596	26.649	S114	22.055	25.976
5.000	900	39	CONC	16.486	S112	23.022	26.922	S113	22.596	26.649

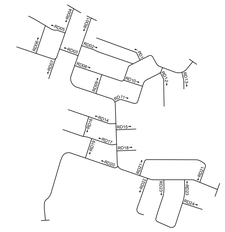
STORM Network 2

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	900	399	CONC	41.925	S201	24.592	26.992	S202	24.487	27.097
1.001	900	401	CONC	66.545	S202	24.487	27.097	S203	24.321	26.722
1.002	900	391	CONC	27.796	S203	24.321	26.722	S205	24.250	27.095
1.003	900	399	CONC	28.348	S205	24.250	27.095	S206	24.179	27.200
1.004	900	400	CONC	33.968	S206	24.179	27.200	S208	24.094	26.797
1.005	225	78	CLAY	15.000	S208	24.095	26.797	S208A	23.902	26.500
1.006	1500	400	CONC	62.338	S208A	21.238	26.500	S220	21.082	23.623
1.007	300	240	CLAY	11.849	S220	21.082	23.623	S221	21.033	23.342
1.008	300	240	CLAY	58.217	S221	21.032	23.342	S222	20.789	23.127
2.000	900	397	CONC	15.071	S204	24.288	26.908	S205	24.250	27.095
3.000	900	399	CONC	15.149	S207	24.132	26.888	S208	24.094	26.797
4.000	450	400	CONC	39.221	S209	24.300	26.700	S210	24.202	26.211
4.001	450	398	CONC	15.138	S210	24.202	26.211	S213	24.164	26.012
4.002	450	32	CONC	53.802	S213	24.164	26.012	S214	22.478	25.383
4.003	1500	400	CONC	31.561	S214	21.728	25.383	S215	21.649	24.050
4.004	1500	401	CONC	32.478	S215	21.649	24.050	S216	21.568	24.050
4.005	1500	400	CONC	63.155	S216	21.568	24.050	S217	21.410	23.600
4.006	1500	400	CONC	49.981	S217	21.410	23.600	S218	21.285	23.600
4.007	1500	400	CONC	41.616	S218	21.285	23.600	S219	21.181	23.600
4.008	1500	136	CONC	13.475	S219	21.181	23.600	S220	21.082	23.623
5.000	450	401	CONC	41.318	S211	24.628	27.028	S212	24.525	26.511
5.001	450	122	CONC	43.879	S212	24.525	26.511	S213	24.164	26.012

STORM Network 3

Pipe Code	Dimensions (mm)	Gradient (1:)	Section Type	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	900	400	Circular	CONC	14.796	S301	23.460	25.260	S302	23.423	25.450
1.001	900	400	Circular	CONC	12.523	S302	23.423	25.450	S303	23.392	25.610
1.002	900	400	Circular	CONC	10.962	S303	23.392	25.610	S304	23.364	25.750
1.003	900	395	Circular	CONC	45.183	S304	23.364	25.750	S306	23.250	25.889
1.004	900	400	Circular	CONC	12.291	S306	23.250	25.889	S307	23.219	25.950
1.005	900	400	Circular	CONC	7.206	S307	23.219	25.950	S308	23.201	26.050
1.006	900	400	Circular	CONC	42.990	S308	23.201	26.050	S309	23.094	26.588
1.007	900	400	Circular	CONC	15.668	S309	23.094	26.588	S310	23.055	26.729
1.008	900	400	Circular	CONC	19.713	S310	23.055	26.729	S311	23.005	26.625
1.009	900	400	Circular	CONC	12.531	S311	23.005	26.625	S312	22.974	26.605
1.010	900	397	Circular	CONC	40.047	S312	22.974	26.605	S318	22.873	25.188
1.011	225	64	Circular	CLAY	53.320	S318	22.873	26.000	S319	22.040	26.150
1.012	1200	394	Circular	CONC	7.490	S319	21.065	26.150	S320	21.046	26.054
1.013	1200	400	Circular	CONC	13.594	S320	21.046	26.054	S321	21.012	25.957
1.014	1200	400	Circular	CONC	50.908	S321	21.012	25.957	S322	20.885	24.805
1.015	1200	400	Circular	CONC	30.557	S322	20.885	24.805	S324	20.808	24.625
1.016	1200	395	Circular	CONC	61.228	S324	20.808	24.625	S326	20.653	24.939
1.017	600	399	Circular	CONC	47.891	S326	20.653	24.939	S359	20.533	24.304
1.018	1200	403	Circular	CONC	10.475	S359	19.933	24.304	S360	19.907	24.150
1.019	1200	399	Circular	CONC	68.634	S360	19.907	24.150	S362	19.685	23.573
1.020	1200	400	Circular	CONC	48.299	S362	19.685	23.573	S363	19.564	24.000
1.021	1200	400	Circular	CONC	6.662	S363	19.564	24.000	S364	19.548	23.950
1.022	1200	206	Circular	CONC	32.901	S364	19.548	23.950	S387	19.388	24.000
1.023	SWALE	200	Ditch 1:2		78.131	S387	19.185	24.000	S388	18.794	23.000
1.024	SWALE	200	Ditch 1:2		56.939	S388	18.794	23.000	S389	18.509	22.000
1.025	300	240	Circular	CLAY	31.004	S389	18.509	22.000	S390	18.360	20.685
1.026	900	402	Circular	CONC	30.135	S390	16.075	20.685	S391	16.000	19.346
1.027	450	393	Circular	CONC	9.440	S391	16.000	19.346	S392	15.976	19.092
2.000	900	395	Circular	CONC	14.610	S305	23.287	25.720	S306	23.250	25.889
3.000	900	400	Circular	CONC	67.309	S313	23.521	25.921	S314	23.353	26.359
3.001	900	398	Circular	CONC	56.365	S314	23.353	26.359	S316	23.206	26.160
3.002	900	400	Circular	CONC	42.318	S316	23.206	26.160	S317	23.100	26.120
3.003	900	152	Circular	CONC	34.411	S317	23.100	26.120	S318	22.873	25.188
5.000	1200	401	Circular	CONC	50.095	S323	20.933	25.128	S324	20.808	24.625
6.000	1200	400	Circular	CONC	50.614	S325	20.780	25.450	S326	20.653	24.939
7.000	450	401	Circular	CONC	13.640	S327	23.046	25.340	S328	23.012	25.170
7.001	450	407	Circular	CONC	8.944	S328	23.012	25.170	S329	22.990	25.062
7.002	450	402	Circular	CONC	9.240	S329	22.990	25.062	S330	22.967	24.950
7.003	450	391	Circular	CONC	18.773	S330	22.967	24.950	S331	22.919	24.800
7.004	600	400	Circular	CONC	47.965	S331	22.769	24.800	S334	22.649	25.450
7.005	600	400	Circular	CONC	36.276	S334	22.649	25.450	S335	22.558	25.896
7.006	600	400	Circular	CONC	10.812	S335	22.558	25.896	S336	22.531	26.029
7.007	600	400	Circular	CONC	10.950	S336	22.531	26.029	S337	22.504	26.165
7.008	600	400	Circular	CONC	68.187	S337	22.504	26.165	S339	22.333	25.660
7.009	600	400	Circular	CONC	16.767	S339	22.333	25.660	S340	22.292	25.458
7.010	600	400	Circular	CONC	14.592	S340	22.292	25.458	S341	22.255	25.300
7.011	600	389	Circular	CONC	39.328	S341	22.255	25.300	S347	22.154	25.600
7.012	600	400	Circular	CONC	24.461	S347	22.154	25.600	S348	22.093	25.850
7.013	600	400	Circular	CONC	22.209	S348	22.093	25.850	S350	22.037	25.712
7.014	600	400	Circular	CONC	44.791	S350	22.037	25.712	S351	21.925	25.121
7.015	600	400	Circular	CONC	25.021	S351	21.925	25.121	S352	21.862	24.600
7.016	600	398	Circular	CONC	37.813	S352	21.862	24.600	S353	21.767	24.250
7.017	600	400	Circular	CONC	70.004	S353	21.767	24.250	S354	21.592	24.900
7.018	600	400	Circular	CONC	70.004	S354	21.592	24.900	S355	21.417	25.200
7.019	300	168	Circular	CLAY	19.150	S355	21.417	25.200	S356	21.303	25.179
7.020	600	400	Circular	CONC	42.760	S356	21.003	25.179	S357	20.896	24.744
7.021	600	400	Circular	CONC	54.505	S357	20.896	24.744	S358	20.760	24.200
7.022	600	83	Circular	CONC	18.875	S358	20.760	24.200	S359	20.533	24.304
8.000	450	401	Circular	CONC	59.751	S332	22.978	25.650	S333	22.829	25.300
8.001	450	389	Circular	CONC	11.661	S333	22.829	25.300	S334	22.799	25.450
9.000	450	36	Circular	CONC	53.320	S338	23.974	26.268	S339	22.493	25.660
10.000	450	400	Circular	CONC	35.957	S342	22.677	25.372	S343	22.587	25.020
10.001	450	400	Circular	CONC	17.505	S343	22.587	25.020	S344	22.543	25.250
10.002	450	400	Circular	CONC	33.162	S344	22.543	25.250	S346	22.460	25.600
10.003	450	395	Circular	CONC	61.624	S346	22.460	25.600	S347	22.304	25.600
11.000	450	403	Circular	CONC	18.918	S345	22.507	25.719	S346	22.460	25.600
12.000	450	401	Circular	CONC	35.283	S349	22.275	25.150	S350	22.187	25.712
14.000	900	400	Circular	CONC	24.836	S365	22.677	26.250	S366	22.615	26.100
14.001	900	400	Circular	CONC	9.373	S366	22.815	26.100	S367	22.791	26.000
14.002	900	400	Circular	CONC	29.559	S367	22.791	26.000	S370	22.718	25.750
14.003	900	400	Circular	CONC	9.136	S370	22.718	25.750	S371	22.695	25.800
14.004	900	400	Circular	CONC	32.585	S371	22.695	25.800	S372	22.613	26.150
14.005	900	400	Circular	CONC	12.399	S372	22.613	26.150	S376	22.582	26.300
14.006	300	33	Circular	CLAY	61.503	S376	22.582	26.300	S380	20.707	23.778
14.007	900	397	Circular	CONC	61.214	S380	20.107	23.778	S385	19.953	23.386
14.008	900	400	Circular	CONC	34.262	S385	19.953	23.386	S386	19.867	23.300
14.009	SWALE	200	Ditch 1:2		41.143	S386	19.867	23.300	S387	19.661	24.000
15.000	900	399	Circular	CONC	41.890	S368	22.860	26.537	S369	22.755	25.663
15.001	900	400	Circular	CONC	14.935	S369	22.755	25.663	S370	22.718	25.750
16.000	900	400	Circular	CONC	10.592	S373	22.665	26.524	S374	22.639	26.400
16.001	900	400	Circular	CONC	12.043	S374	22.639	26.400	S375	22.608	26.250
16.002	900	400	Circular	CONC	10.800	S375	22.608	26.250	S376	22.581	26.300
17.000	225	168	Circular	CLAY	60.319	S377	22.559	24.284	S379	22.200	24.258
17.001	225	140	Circular	CLAY	63.812	S379	22.200	24.258	S380	21.745	23.778
18.000	225	34	Circular	CLAY	16.288	S378	22.678	24.403	S379	22.200	24.258
19.000	225	168	Circular	CLAY	34.465	S381	22.975	24.700	S382	22.770	24.267
19.001	225	168	Circular	CLAY	25.428	S382	22.770	24.267	S383	22.619	24.314
19.002	300	230	Circular	CLAY	25.286	S383	22.544	24.314	S384	22.434	24.587
19.003	300	58	Circular	CLAY	53.545	S384	22.434	24.587	S385	21.516	23.386
13.000	225	22	Circular	CLAY	25.923	S361	21.850	23.800	S362	20.661	23.573
4.000	900	400	Circular	CONC	75.543	S315	23.395	26.290	S316	23.206	26.160





KEY PLAN

Notes

1. Setting out shall be undertaken using only the information given. Distances should not be scaled from this drawing.
2. All sewers shall be constructed in accordance with Design and Construction Guidance (DCG) Standards and United Utilities Details & Guidelines.
3. The minimum gravity pipe diameter under adoptable highways shall be 150mm
4. It is the responsibility of the Contractor to verify all information given with regards to existing services and drainage connections etc. prior to commencing the works. The rates shall include for hand dig around services where necessary. The Contractor shall adhere to the CDM Regulations at all times
8. All materials to bear the relevant B.S. Kitemark and comply fully with the specifications. All concrete & concrete products must use Sulphate resistant cement to withstand Class 3 condition (unless the site investigation report proves that sulphate attack from soils and groundwater will not occur).
9. All opening notices etc. as required under Highways Acts etc. are to be obtained prior to commencement of works. All works are to be inspected by L.A., NHBC or the Network Operator as applicable.
10. Where structured wall UPVC pipes (or similar approved) are used in adoptable drainage they shall be handled and laid in accordance with the manufacturers instructions and will be subject to post installation deformation testing prior to adoption.
    A Class S Bed and Surround must be used for structured wall pipes
11. Trench backfill in highways to within 1m of highway shall, as directed by the Highway Authority be a suitable granular material all in accordance with Design and Construction Guidance (DCG) Standards.
12. Slab levels shall not be varied without reference to the Engineer for guidance.
13. Pipes have not been designed to accommodate construction traffic loading. The contractor is responsible for providing adequate protection to the pipes during construction.

Design based on Layouts:
Kirkby, Cherryfield Drive, Feasability Plan (South Parcel)
Dwg No. NW-23-02, Dated 13 Sep 2021
Rev: -

Kirkby, Cherryfield Drive, Feasability Plan (North Parcel)
Dwg No. NW-23-03, Dated 13 Sep 2021
Rev: -

Grid/Level datum based on Topos:
Cherryfield Drive, Kirkby.
Topographical Land Survey.
Dwg No. DWH.TS.04 Sheets 1 to 3, Dated 27.04.21
Rev: -

Topographical Land Survey.
Former All Saints School Cherryfield Drive, Knowsley.
Dwg No. A0 14F063/001 Sheets 1 & 2, Dated July '14
Rev: -

Legend

- SW — Existing Surface Water Sewer (Recently constructed for Phase1)
- FW — Existing Foul Water Sewer (Recently constructed for Phase1)
- S101 — Adoptable Surface Water Sewer
- Adoptable Foul Sewer
- FC — Flow Control Manhole
- FFL xx.xx — Plot Slab Level
- Sewer Easement
- WALL — Retaining Wall/Feature (300mm or above only)
- UD UB — Underbuild 300mm or above

STRATEGY

Rev.	Date	Revision	By	Appd.
A	16.11.21	Revised to latest planning layout	JAR	AJ

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

DRAFT

Client: DAVID WILSON HOMES

Project: CHERRYFIELD DRIVE, KIRKBY.

Title: Drainage Strategy Sheet 4 of 4 (SW Only)

DRAWING NUMBER	SCALE at A0	1:500	
7778 / SK01-4	DATE	May '21	REVISION
	DRAWN	JAR	A
	CHECKED	AJ	

© Copyright The original of this drawing contained coloured symbols and/or features. Any black and white reproduction should not be relied upon.

DO NOT SCALE

NORTH

PLEASE NOTE: Due to the lack of POS in this area the 1.5m dia pipes have had to be used for storage - We can not use the rear car park for storage due to the levels and limited access for a outfall in between properties etc due to easement widths

1500mmDia pipe used as storage for SW Net 2 - 10m easement required to pipe - Plot within easement to be reconsidered

S208 (2.4 Dia Flow control manhole)
MD-SHE-0124-1000-2500-1000
Hydrobrake Optimum Flow Regulator
Restricted to 10.0 l/s @ 2.5m design head

Indicative cellular off-line storage
570sq.m. x 0.5m deep
IL:26.026

Additional 5l/s added to simulation to take account for future development

Additional 5l/s added to simulation to take account for future development

S318 (2.7 Dia Flow control manhole)
MD-SHE-0177-2000-2500-2000
Hydrobrake Optimum Flow Regulator
Restricted to 20.0 l/s @ 2.5m design head

Online attenuation basin
Base area = 70 sq.m.
Base level = 22.873
TOB = 26.000
TWL = 25.076
Side slopes = 1:3

S326 (2.7 Dia Flow control manhole)
MD-SHE-0215-3000-2500-3000
Hydrobrake Optimum Flow Regulator
Restricted to 30.0 l/s @ 2.5m design head

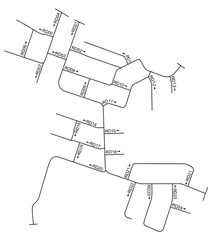
Flow control manhole)
8-2000-3100-2000
Optimum Flow Regulator
0 l/s @ 3.10m design head

SW NET 1 =
30,980 / 60% =
18,588 + 10% =
20,400 / 16 = 1270

SW NET 2 =
37,634 / 60% =
22,580 + 10% =
22,800 / 20 =
1140

SW NET 3 =
138,876 / 60% =
83,325 + 10% =
91,000 / 91 =
1.000

© Copyright The original of this drawing contained coloured symbols and/or features. Any black and white reproduction should not be relied upon.



KEY PLAN

Notes

1. Setting out shall be undertaken using only the information given. Distances should not be scaled from this drawing.
2. All sewers shall be constructed in accordance with Design and Construction Guidance (DCG) Standards and United Utilities Details & Guidelines.
3. The minimum gravity pipe diameter under adoptable highways shall be 150mm
4. It is the responsibility of the Contractor to verify all information given with regards to existing services and drainage connections etc. prior to commencing the works. The rates shall include for hand dig around services where necessary. The Contractor shall adhere to the CDM Regulations at all times
8. All materials to bear the relevant B.S. Kitemark and comply fully with the specifications. All concrete & concrete products must use Sulphate resistant cement to withstand Class 3 condition (unless the site investigation report proves that sulphate attack from soils and groundwater will not occur).
9. All opening notices etc. as required under Highways Acts etc. are to be obtained prior to commencement of works. All works are to be inspected by L.A., NHBC or the Network Operator as applicable.
10. Where structured wall UPVC pipes (or similar approved) are used in adoptable drainage they shall be handled and laid in accordance with the manufacturers instructions and will be subject to post installation deformation testing prior to adoption.
A Class S Bed and Surround must be used for structured wall pipes
11. Trench backfill in highways to within 1m of highway shall, as directed by the Highway Authority be a suitable granular material all in accordance with Design and Construction Guidance (DCG) Standards.
12. Slab levels shall not be varied without reference to the Engineer for guidance.
13. Pipes have not been designed to accommodate construction traffic loading. The contractor is responsible for providing adequate protection to the pipes during construction.

Design based on Layouts:
Kirkby, Cherryfield Drive, Fesability Plan (South Parcel)
Dwg No. NW-23-02, Dated 13 Sep 2021
Rev: -

Kirkby, Cherryfield Drive, Fesability Plan (North Parcel)
Dwg No. NW-23-03, Dated 13 Sep 2021
Rev: -

Grid/Level datum based on Topos:
Cherryfield Drive, Kirkby.
Topographical Land Survey.
Dwg No. DWH.TS.04 Sheets 1 to 3, Dated 27.04.21
Rev: -

Topographical Land Survey.
Former All Saints School Cherryfield Drive, Knowsley.
Dwg No. A0 14F063/001 Sheets 1 & 2, Dated July '14
Rev: -

Legend

- Existing Surface Water Sewer (Recently constructed for Phase1)
- Existing Foul Water Sewer (Recently constructed for Phase1)
- Adoptable Surface Water Sewer
- Adoptable Foul Sewer
- Flow Control Manhole
- Plot Slab Level
- Sewer Easement
- Retaining Wall/Feature (300mm or above only)
- Underbuild 300mm or above

STRATEGY

Rev.	Date	Revision	By	Appd.
A	16.11.21	Revised to latest planning layout	JAR	AJ

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client: DAVID WILSON HOMES

Project: CHERRYFIELD DRIVE, KIRKBY.

Title: Drainage Strategy
Sheet 3 of 4
(SW Only)

DRAFT

DRAWING NUMBER	SCALE at A0	1:500	
7778 / SK01-3	DATE	May '21	REVISION
	DRAWN	JAR	A
	CHECKED	AJ	

DO NOT SCALE

NORTH

S318 (2.7 Dia Flow control manhole)
MD-SHE-0177-2000-2500-2000
Hydrobrake Optimum Flow Regulator
Restricted to 20.0 l/s @ 2.5m design head

Online attenuation basin
Base area = 70 sq.m.
Base level = 22.873
TOB = 26.000
TWL = 25.076
Side slopes = 1:3

SW NET 1 =
30,980 / 60% =
18,588 + 10% =
20,400 / 16 = 1270

SW NET 2 =
37,634 / 60% =
22,580 + 10% =
22,800 / 20 =
1140

SW NET 3 =
138,876 / 60% =
83,325 + 10% =
91,000 / 91 =
1.000

S326 (2.7 Dia Flow control manhole)
MD-SHE-0215-3000-2500-3000
Hydrobrake Optimum Flow Regulator
Restricted to 30.0 l/s @ 2.5m design head

S355 (2.7 Dia Flow control manhole)
MD-SHE-0116-1000-3300-1000
Hydrobrake Optimum Flow Regulator
Restricted to 10.0 l/s @ 3.30m design head

Indicative cellular online storage
1215sq.m. x 2.0m deep
IL:21.417

PLEASE NOTE: The open swale has been replaced with a tank system due to the reduction in width of the POS. It is no longer possible to get the required banking grades and depths in this area

footpath / cycle link to Webster Park

Proposed LEAP Area

P.O.S

alt access

STORM Network 1

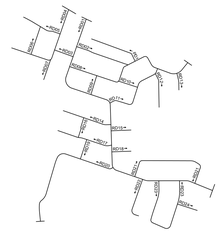
Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	1500	401	CONC	55.288	S101	21.959	25.157	S103	21.821	25.828
1.001	1500	402	CONC	50.203	S103	21.821	25.828	S104	21.696	25.565
1.002	1500	396	CONC	21.396	S104	21.696	25.565	S105	21.642	26.833
1.003	1500	390	CONC	14.413	S105	21.642	25.833	S107	21.605	26.016
1.004	1500	403	CONC	20.587	S107	21.605	26.016	S108	21.554	25.764
1.005	1500	396	CONC	39.186	S108	21.554	25.764	S114	21.455	25.976
1.006	1500	400	CONC	27.747	S114	21.455	25.976	S115	21.386	25.372
1.007	1500	399	CONC	24.327	S115	21.386	25.372	S116	21.325	24.210
1.008	300	49	CLAY	26.100	S116	21.325	24.210	S117	20.792	23.127
1.009	300	241	CLAY	17.591	S117	20.792	23.127	S118	20.719	22.916
2.000	1500	400	CONC	25.571	S102	21.885	26.168	S103	21.821	25.828
3.000	900	399	CONC	55.101	S106	22.343	26.218	S107	22.205	26.016
4.000	900	400	CONC	48.906	S109	22.815	25.864	S110	22.693	26.475
4.001	900	396	CONC	13.856	S110	22.693	26.475	S111	22.658	26.687
4.002	900	399	CONC	24.745	S111	22.658	26.687	S113	22.596	26.649
4.003	900	98	CONC	52.960	S113	22.596	26.649	S114	22.055	25.976
5.000	900	39	CONC	16.486	S112	23.022	26.922	S113	22.596	26.649

STORM Network 2

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	900	399	CONC	41.925	S201	24.592	26.992	S202	24.487	27.097
1.001	900	401	CONC	66.545	S202	24.487	27.097	S203	24.321	26.722
1.002	900	391	CONC	27.796	S203	24.321	26.722	S205	24.250	27.095
1.003	900	399	CONC	28.348	S205	24.250	27.095	S206	24.179	27.200
1.004	900	400	CONC	33.968	S206	24.179	27.200	S208	24.094	26.797
1.005	225	78	CLAY	15.000	S208	24.095	26.797	S208A	23.902	26.500
1.006	1500	400	CONC	62.338	S208A	21.238	26.500	S220	21.082	23.623
1.007	300	240	CLAY	11.849	S220	21.082	23.623	S221	21.033	23.342
1.008	300	240	CLAY	58.217	S221	21.032	23.342	S222	20.789	23.127
2.000	900	397	CONC	15.071	S204	24.288	26.908	S205	24.250	27.095
3.000	900	399	CONC	15.149	S207	24.132	26.888	S208	24.094	26.797
4.000	450	400	CONC	39.221	S209	24.300	26.700	S210	24.202	26.211
4.001	450	398	CONC	15.138	S210	24.202	26.211	S213	24.164	26.012
4.002	450	32	CONC	53.802	S213	24.164	26.012	S214	22.478	25.383
4.003	1500	400	CONC	31.561	S214	21.728	25.383	S215	21.649	24.050
4.004	1500	401	CONC	32.478	S215	21.649	24.050	S216	21.568	24.050
4.005	1500	400	CONC	63.155	S216	21.568	24.050	S217	21.410	23.600
4.006	1500	400	CONC	49.981	S217	21.410	23.600	S218	21.285	23.600
4.007	1500	400	CONC	41.616	S218	21.285	23.600	S219	21.181	23.600
5.000	1500	136	CONC	13.475	S219	21.181	23.600	S220	21.082	23.623
5.000	450	401	CONC	41.318	S211	24.628	27.028	S212	24.525	26.511
5.001	450	122	CONC	43.879	S212	24.525	26.511	S213	24.164	26.012

STORM Network 3

Pipe Code	Dimensions (mm)	Gradient (1:)	Section Type	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	900	400	Circular	CONC	14.796	S301	23.460	25.260	S302	23.423	25.450
1.001	900	400	Circular	CONC	12.523	S302	23.423	25.450	S303	23.392	25.610
1.002	900	400	Circular	CONC	10.962	S303	23.392	25.610	S304	23.364	25.750
1.003	900	395	Circular	CONC	45.183	S304	23.364	25.750	S306	23.250	25.889
1.004	900	400	Circular	CONC	12.291	S306	23.250	25.889	S307	23.219	25.950
1.005	900	400	Circular	CONC	7.206	S307	23.219	25.950	S308	23.201	26.050
1.006	900	400	Circular	CONC	42.990	S308	23.201	26.050	S309	23.094	26.588
1.007	900	400	Circular	CONC	15.668	S309	23.094	26.588	S310	23.055	26.729
1.008	900	400	Circular	CONC	19.713	S310	23.055	26.729	S311	23.005	26.625
1.009	900	400	Circular	CONC	12.531	S311	23.005	26.625	S312	22.974	26.605
1.010	900	397	Circular	CONC	40.047	S312	22.974	26.605	S318	22.873	25.188
1.011	225	64	Circular	CLAY	53.320	S318	22.873	26.000	S319	22.040	26.150
1.012	1200	394	Circular	CONC	7.490	S319	21.065	26.150	S320	21.046	26.054
1.013	1200	400	Circular	CONC	13.594	S320	21.046	26.054	S321	21.012	25.957
1.014	1200	400	Circular	CONC	50.908	S321	21.012	25.957	S322	20.885	24.805
1.015	1200	400	Circular	CONC	30.557	S322	20.885	24.805	S324	20.808	24.625
1.016	1200	395	Circular	CONC	61.228	S324	20.808	24.625	S326	20.653	24.939
1.017	600	399	Circular	CONC	47.891	S326	20.653	24.939	S359	20.533	24.304
1.018	1200	403	Circular	CONC	10.475	S359	19.933	24.304	S360	19.907	24.150
1.019	1200	399	Circular	CONC	58.634	S360	19.907	24.150	S362	19.685	23.573
1.020	1200	400	Circular	CONC	48.299	S362	19.685	23.573	S363	19.564	24.000
1.021	1200	400	Circular	CONC	6.662	S363	19.564	24.000	S364	19.548	23.950
1.022	1200	206	Circular	CONC	32.901	S364	19.548	23.950	S387	19.388	24.000
1.023	SWALE	200	Ditch 1:2		78.131	S387	19.185	24.000	S388	18.794	23.000
1.024	SWALE	200	Ditch 1:2		56.939	S388	18.794	23.000	S389	18.509	22.000
1.025	300	240	Circular	CLAY	31.004	S389	18.509	22.000	S390	18.380	20.685
1.026	900	402	Circular	CONC	30.135	S390	16.075	20.685	S391	16.000	19.346
1.027	450	393	Circular	CONC	9.440	S391	16.000	19.346	S392	15.976	19.092
2.000	900	395	Circular	CONC	14.610	S305	23.287	25.720	S306	23.250	25.889
3.000	900	400	Circular	CONC	67.309	S313	23.521	25.921	S314	23.353	26.359
3.001	900	398	Circular	CONC	58.365	S314	23.353	26.359	S316	23.206	26.160
3.002	900	400	Circular	CONC	42.318	S316	23.206	26.160	S317	23.100	26.120
3.003	900	152	Circular	CONC	34.411	S317	23.100	26.120	S318	22.873	25.188
5.000	1200	401	Circular	CONC	50.095	S323	20.933	25.128	S324	20.808	24.625
6.000	1200	400	Circular	CONC	50.614	S325	20.780	25.450	S326	20.653	24.939
7.000	450	401	Circular	CONC	13.640	S327	23.046	25.340	S328	23.012	25.170
7.001	450	407	Circular	CONC	8.944	S328	23.012	25.170	S329	22.990	25.062
7.002	450	402	Circular	CONC	9.240	S329	22.990	25.062	S330	22.967	24.950
7.003	450	391	Circular	CONC	18.773	S330	22.967	24.950	S331	22.919	24.800
7.004	600	400	Circular	CONC	47.965	S331	22.769	24.800	S334	22.649	25.450
7.005	600	400	Circular	CONC	36.276	S334	22.649	25.450	S335	22.558	25.896
7.006	600	400	Circular	CONC	10.812	S335	22.558	25.896	S336	22.531	26.029
7.007	600	400	Circular	CONC	10.950	S336	22.531	26.029	S337	22.504	26.165
7.008	600	400	Circular	CONC	68.187	S337	22.504	26.165	S339	22.333	25.660
7.009	600	400	Circular	CONC	16.767	S339	22.333	25.660	S340	22.292	25.458
7.010	600	400	Circular	CONC	14.592	S340	22.292	25.458	S341	22.255	25.300
7.011	600	389	Circular	CONC	39.328	S341	22.255	25.300	S347	22.154	25.600
7.012	600	400	Circular	CONC	24.461	S347	22.154	25.600	S348	22.093	25.850
7.013	600	400	Circular	CONC	22.209	S348	22.093	25.850	S350	22.037	25.712
7.014	600	400	Circular	CONC	44.791	S350	22.037	25.712	S351	21.925	25.121
7.015	600	400	Circular	CONC	25.021	S351	21.925	25.121	S352	21.862	24.600
7.016	600	400	Circular	CONC	37.813	S352	21.862	24.600	S353	21.767	24.250
7.017	600	400	Circular	CONC	70.004	S353	21.767	24.250	S354	21.592	24.900
7.018	600	400	Circular	CONC	70.004	S354	21.592	24.900	S355	21.417	25.200
7.019	300	168	Circular	CLAY	19.150	S355	21.417	25.200	S356	21.303	25.179
7.020	600	400	Circular	CONC	42.760	S356	21.003	25.179	S357	20.896	24.744
7.021	600	400	Circular	CONC	54.505	S357	20.896	24.744	S358	20.760	24.200
7.022	600	83	Circular	CONC	18.875	S358	20.760	24.200	S359	20.533	24.304
8.000	450	401	Circular	CONC	59.751	S332	22.978	25.650	S333	22.829	25.300
8.001	450	389	Circular	CONC	11.661	S333	22.829	25.300	S334	22.799	25.450
9.000	450	36	Circular	CONC	53.320	S338	23.974	26.268	S339	22.493	25.660
10.000	450	400	Circular	CONC	35.957	S342	22.677	25.372	S343	22.587	25.020
10.001	450	400	Circular	CONC	17.505	S343	22.587	25.020	S344	22.543	25.250
10.002	450	400	Circular	CONC	33.162	S344	22.543	25.250	S346	22.460	25.600
10.003	450	395	Circular	CONC	61.624	S346	22.460	25.600	S347	22.304	25.600
11.000	450	403	Circular	CONC	18.918	S345	22.507	25.719	S346	22.460	25.600
12.000	450	401	Circular	CONC	35.283	S349	22.275	25.150	S350	22.187	25.712
14.000	900	400	Circular	CONC	24.836	S365	22.877	26.250	S366	22.815	26.100
14.001	900	400	Circular	CONC	9.373	S366	22.815	26.100	S367	22.791	26.000
14.002	900	400	Circular	CONC	29.559	S367	22.791	26.000	S370	22.718	25.750
14.003	900	400	Circular	CONC	9.136	S370	22.718	25.750	S371	22.695	25.800
14.004	900	400	Circular	CONC	32.585	S371	22.695	25.800	S372	22.613	26.150
14.005	900	400	Circular	CONC	12.399	S372	22.613	26.150	S376	22.582	26.300
14.006	300	33	Circular	CLAY	61.503	S376	22.582	26.300	S380	20.707	23.778
14.007	900	397	Circular	CONC	61.214	S380	20.107	23.778	S385	19.953	23.386
14.008	900	400	Circular	CONC	34.262	S385	19.953	23.386	S386	19.867	23.300
14.009	SWALE	200	Ditch 1:2		41.143	S386	19.867	23.300	S387	19.661	24.000
15.000	900	399	Circular	CONC	41.890	S368	22.660	26.537	S369	22.755	25.663
15.001	900	400	Circular	CONC	14.935	S369	22.755	25.663	S370	22.718	25.750
16.000	900	400	Circular	CONC	10.592	S373	22.665	26.524	S374	22.639	26.400
16.001	900	400	Circular	CONC	12.043	S374	22.639	26.400	S375	22.608	26.250
16.002	900	400	Circular	CONC	10.800	S375	22.608	26.250	S376	22.581	26.300
17.000	225	168	Circular	CLAY	60.319	S377	22.559	24.284	S379	22.200	24.258
17.001	225	140	Circular	CLAY	63.812	S379	22.200	24.258	S380	21.745	23.778
18.000	225	34	Circular	CLAY	16.288	S378	22.678	24.403	S379	22.200	24.258
19.000	225	168	Circular	CLAY	34.485	S381	22.975	24.700	S382	22.770	24.267
19.001	225	168	Circular	CLAY	25.428	S382	22.770	24.267	S383	22.619	24.314
19.002	300	230	Circular	CLAY	25.286	S383	22.544	24.314	S384	22.434	24.587
19.003	300	58	Circular	CLAY	53.545	S384	22.434	24.587	S385	21.516	23.386
13.000	225	22	Circular	CLAY	25.923	S361	21.850	23.800	S362	20.661	23.573
4.000	900	400	Circular	CONC	75.543	S315	23.395	26.290	S316	23.206	26.160



KEY PLAN

Notes

1. Setting out shall be undertaken using only the information given. Distances should not be scaled from this drawing.
2. All sewers shall be constructed in accordance with Design and Construction Guidance (DCG) Standards and United Utilities Details & Guidelines.
3. The minimum gravity pipe diameter under adoptable highways shall be 150mm
4. It is the responsibility of the Contractor to verify all information given with regards to existing services and drainage connections etc. prior to commencing the works. The rates shall include for hand dig around services where necessary. The Contractor shall adhere to the CDM Regulations at all times
8. All materials to bear the relevant B.S. Kitemark and comply fully with the specifications. All concrete & concrete products must use Sulphate resistant cement to withstand Class 3 condition (unless the site investigation report proves that sulphate attack from soils and groundwater will not occur).
9. All opening notices etc. as required under Highways Acts etc. are to be obtained prior to commencement of works. All works are to be inspected by L.A., NHBC or the Network Operator as applicable.
10. Where structured wall UPVC pipes (or similar approved) are used in adoptable drainage they shall be handled and laid in accordance with the manufacturers instructions and will be subject to post installation deformation testing prior to adoption.
A Class S Bed and Surround must be used for structured wall pipes
11. Trench backfill in highways to within 1m of highway shall, as directed by the Highway Authority be a suitable granular material all in accordance with Design and Construction Guidance (DCG) Standards.
12. Slab levels shall not be varied without reference to the Engineer for guidance.
13. Pipes have not been designed to accommodate construction traffic loading. The contractor is responsible for providing adequate protection to the pipes during construction.

Design based on Layouts:
Kirkby, Cherryfield Drive, Feasability Plan (South Parcel)
Dwg No. NW-23-02, Dated 13 Sep 2021
Rev: -

Kirkby, Cherryfield Drive, Feasability Plan (North Parcel)
Dwg No. NW-23-03, Dated 13 Sep 2021
Rev: -

Grid/Level datum based on Topos:
Cherryfield Drive, Kirkby.
Topographical Land Survey.
Dwg No. DWH.TS.04 Sheets 1 to 3, Dated 27.04.21
Rev: -

Topographical Land Survey.
Former All Saints School Cherryfield Drive, Knowsley.
Dwg No. A0 14F063/001 Sheets 1 & 2, Dated July '14
Rev: -

Legend

- SW — Existing Surface Water Sewer (Recently constructed for Phase1)
- FW — Existing Foul Water Sewer (Recently constructed for Phase1)
- S101 — Adoptable Surface Water Sewer
- Adoptable Foul Sewer
- FC — Flow Control Manhole
- FFL xx.xx — Plot Slab Level
- Sewer Easement
- WALL — Retaining Wall/Feature (300mm or above only)
- UB — Underbuild 300mm or above

STRATEGY

Rev.	Date	Revision	By	Appd.
A	16.11.21	Revised to latest planning layout	JAR	AJ

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client: DAVID WILSON HOMES

Project: CHERRYFIELD DRIVE, KIRKBY.

Title: Drainage Strategy Sheet 2 of 4 (SW Only)

DRAFT

DRAWING NUMBER	SCALE at A0	1:500	
7778 / SK01-2	DATE	May '21	REVISION
	DRAWN	JAR	A
	CHECKED	AJ	

© Copyright The original of this drawing contained coloured symbols and/or features. Any black and white reproduction should not be relied upon.

DO NOT SCALE

NORTH

STORM Network 1

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	1500	401	CONC	55.288	S101	21.959	25.157	S103	21.821	25.828
1.001	1500	402	CONC	50.203	S103	21.821	25.828	S104	21.696	25.565
1.002	1500	396	CONC	21.396	S104	21.696	25.565	S105	21.642	25.833
1.003	1500	390	CONC	14.413	S105	21.642	25.833	S107	21.605	26.016
1.004	1500	403	CONC	20.567	S107	21.605	26.016	S108	21.554	25.764
1.005	1500	396	CONC	39.186	S108	21.554	25.764	S114	21.455	25.976
1.006	1500	400	CONC	27.747	S114	21.455	25.976	S115	21.386	25.372
1.007	1500	399	CONC	24.327	S115	21.386	25.372	S116	21.325	24.210
1.008	300	49	CLAY	26.100	S116	21.325	24.210	S117	20.792	23.127
1.009	300	241	CLAY	17.591	S117	20.792	23.127	S118	20.719	22.916
2.000	1500	400	CONC	25.571	S102	21.885	26.168	S103	21.821	25.828
3.000	900	399	CONC	55.101	S106	22.343	26.218	S107	22.205	26.016
4.000	900	400	CONC	48.906	S109	22.815	25.864	S110	22.693	26.475
4.001	900	396	CONC	13.856	S110	22.693	26.475	S111	22.658	26.687
4.002	900	399	CONC	24.745	S111	22.658	26.687	S113	22.596	26.649
4.003	900	98	CONC	52.960	S113	22.596	26.649	S114	22.055	25.976
5.000	900	39	CONC	16.486	S112	23.022	26.922	S113	22.596	26.649

STORM Network 2

Pipe Code	Diameter (mm)	Gradient (1:)	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	900	399	CONC	41.925	S201	24.592	26.992	S202	24.487	27.097
1.001	900	401	CONC	66.545	S202	24.487	27.097	S203	24.321	26.722
1.002	900	391	CONC	27.796	S203	24.321	26.722	S205	24.250	27.095
1.003	900	399	CONC	26.348	S205	24.250	27.095	S206	24.179	27.200
1.004	900	400	CONC	33.968	S206	24.179	27.200	S208	24.094	26.797
1.005	225	78	CLAY	15.000	S208	24.095	26.797	S208A	23.902	26.500
1.006	1500	400	CONC	62.338	S208A	21.238	26.500	S220	21.082	23.623
1.007	300	240	CLAY	11.849	S220	21.082	23.623	S221	21.033	23.342
1.008	300	240	CLAY	58.217	S221	21.032	23.342	S222	20.789	23.127
2.000	900	397	CONC	15.071	S204	24.288	26.908	S205	24.250	27.095
3.000	900	399	CONC	15.149	S207	24.132	26.888	S208	24.094	26.797
4.000	450	400	CONC	39.221	S209	24.300	26.700	S210	24.202	26.211
4.001	450	398	CONC	15.138	S210	24.202	26.211	S213	24.164	26.012
4.002	450	32	CONC	53.802	S213	24.164	26.012	S214	22.478	25.383
4.003	1500	400	CONC	31.561	S214	21.728	25.383	S215	21.649	24.050
4.004	1500	401	CONC	32.478	S215	21.649	24.050	S216	21.568	24.050
4.005	1500	400	CONC	63.155	S216	21.568	24.050	S217	21.410	23.600
4.006	1500	400	CONC	49.981	S217	21.410	23.600	S218	21.285	23.600
4.007	1500	400	CONC	41.616	S218	21.285	23.600	S219	21.181	23.600
4.008	1500	136	CONC	13.475	S219	21.181	23.600	S220	21.082	23.623
5.000	450	401	CONC	41.318	S211	24.628	27.028	S212	24.525	26.511
5.001	450	122	CONC	43.879	S212	24.525	26.511	S213	24.164	26.012

STORM Network 3

Pipe Code	Dimensions (mm)	Gradient (1:)	Section Type	Pipe Type	Pipe Length	Upstream Manhole Number	Upstream Manhole Invert	Upstream Manhole Cover	Downstream Manhole Number	Downstream Manhole Invert	Downstream Manhole Cover
1.000	900	400	Circular	CONC	14.796	S301	23.460	25.260	S302	23.423	25.450
1.001	900	400	Circular	CONC	12.523	S302	23.423	25.450	S303	23.392	25.610
1.002	900	400	Circular	CONC	10.962	S303	23.392	25.610	S304	23.364	25.750
1.003	900	395	Circular	CONC	45.183	S304	23.364	25.750	S306	23.250	25.889
1.004	900	400	Circular	CONC	12.291	S306	23.250	25.889	S307	23.219	25.950
1.005	900	400	Circular	CONC	7.206	S307	23.219	25.950	S308	23.201	26.050
1.006	900	400	Circular	CONC	42.990	S308	23.201	26.050	S309	23.094	26.588
1.007	900	400	Circular	CONC	15.668	S309	23.094	26.588	S310	23.055	26.729
1.008	900	400	Circular	CONC	19.713	S310	23.055	26.729	S311	23.005	26.625
1.009	900	400	Circular	CONC	12.531	S311	23.005	26.625	S312	22.974	26.605
1.010	900	397	Circular	CONC	40.047	S312	22.974	26.605	S318	22.873	25.188
1.011	225	64	Circular	CLAY	53.320	S318	22.873	26.000	S320	22.040	26.150
1.012	1200	394	Circular	CONC	7.490	S319	21.065	26.150	S320	21.046	26.054
1.013	1200	400	Circular	CONC	13.594	S320	21.046	26.054	S321	21.012	25.957
1.014	1200	400	Circular	CONC	50.908	S321	21.012	25.957	S322	20.885	24.805
1.015	1200	400	Circular	CONC	30.557	S322	20.885	24.805	S324	20.808	24.625
1.016	1200	395	Circular	CONC	61.228	S324	20.808	24.625	S326	20.653	24.939
1.017	600	399	Circular	CONC	47.891	S326	20.653	24.939	S359	20.533	24.304
1.018	1200	403	Circular	CONC	10.475	S359	19.933	24.304	S360	19.907	24.150
1.019	1200	399	Circular	CONC	88.634	S360	19.907	24.150	S362	19.685	23.573
1.020	1200	400	Circular	CONC	48.299	S362	19.685	23.573	S363	19.564	24.000
1.021	1200	400	Circular	CONC	6.662	S363	19.564	24.000	S364	19.548	23.950
1.022	1200	206	Circular	CONC	32.901	S364	19.548	23.950	S387	19.388	24.000
1.023	SWALE	200	Ditch 1:2		78.131	S387	19.185	24.000	S388	18.794	23.000
1.024	SWALE	200	Ditch 1:2		56.939	S388	18.794	23.000	S389	18.509	22.000
1.025	300	240	Circular	CLAY	31.004	S389	18.509	22.000	S390	18.380	20.685
1.026	900	402	Circular	CONC	30.135	S390	16.075	20.685	S391	16.000	19.346
1.027	450	393	Circular	CONC	9.440	S391	16.000	19.346	S392	15.976	19.092
2.000	900	395	Circular	CONC	14.610	S305	23.287	25.720	S306	23.250	25.889
3.000	900	400	Circular	CONC	67.309	S313	23.521	25.921	S314	23.353	26.359
3.001	900	398	Circular	CONC	58.365	S314	23.353	26.359	S316	23.206	26.160
3.002	900	400	Circular	CONC	42.318	S316	23.206	26.160	S317	23.100	26.120
3.003	900	152	Circular	CONC	34.411	S317	23.100	26.120	S318	22.873	25.188
5.000	1200	401	Circular	CONC	50.095	S323	20.933	25.128	S324	20.808	24.625
6.000	1200	400	Circular	CONC	50.614	S325	20.780	25.450	S326	20.653	24.939
7.000	450	401	Circular	CONC	13.640	S327	23.046	25.340	S328	23.012	25.170
7.001	450	407	Circular	CONC	8.944	S328	23.012	25.170	S329	22.990	25.062
7.002	450	402	Circular	CONC	9.240	S329	22.990	25.062	S330	22.967	24.950
7.003	450	391	Circular	CONC	18.773	S330	22.967	24.950	S331	22.919	24.800
7.004	600	400	Circular	CONC	47.965	S331	22.769	24.800	S334	22.649	25.450
7.005	600	400	Circular	CONC	36.276	S334	22.649	25.450	S335	22.558	25.896
7.006	600	400	Circular	CONC	10.812	S335	22.558	25.896	S336	22.531	26.029
7.007	600	400	Circular	CONC	10.950	S336	22.531	26.029	S337	22.504	26.165
7.008	600	400	Circular	CONC	68.187	S337	22.504	26.165	S339	22.333	25.660
7.009	600	400	Circular	CONC	16.767	S339	22.333	25.660	S340	22.292	25.458
7.010	600	400	Circular	CONC	14.592	S340	22.292	25.458	S344	22.255	25.300
7.011	600	389	Circular	CONC	39.328	S341	22.255	25.300	S347	22.154	25.600
7.012	600	400	Circular	CONC	24.461	S347	22.154	25.600	S348	22.093	25.850
7.013	600	400	Circular	CONC	22.209	S348	22.093	25.850	S350	22.037	25.712
7.014	600	400	Circular	CONC	44.791	S350	22.037	25.712	S351	21.925	25.121
7.015	600	400	Circular	CONC	25.021	S351	21.925	25.121	S352	21.862	24.600
7.016	600	398	Circular	CONC	37.813	S352	21.862	24.600	S353	21.767	24.250
7.017	600	400	Circular	CONC	70.004	S353	21.767	24.250	S354	21.592	24.900
7.018	600	400	Circular	CONC	70.004	S354	21.592	24.900	S355	21.417	25.200
7.019	300	168	Circular	CLAY	19.150	S355	21.417	25.200	S356	21.303	25.179
7.020	600	400	Circular	CONC	42.760	S356	21.003	25.179	S357	20.896	24.744
7.021	600	400	Circular	CONC	54.505	S357	20.896	24.744	S358	20.760	24.200
7.022	600	83	Circular	CONC	18.875	S358	20.760	24.200	S359	20.533	24.304
8.000	450	401	Circular	CONC	59.751	S332	22.978	25.650	S333	22.829	25.300
8.001	450	389	Circular	CONC	11.661	S333	22.829	25.300	S334	22.799	25.450
9.000	450	36	Circular	CONC	53.320	S338	23.974	26.268	S339	22.493	25.660
10.000	450	400	Circular	CONC	35.957	S342	22.677	25.372	S343	22.587	25.020
10.001	450	400	Circular	CONC	17.505	S343	22.587	25.020	S344	22.543	25.250
10.002	450	400	Circular	CONC	33.162	S344	22.543	25.250	S346	22.460	25.600
10.003	450	395	Circular	CONC	61.624	S346	22.460	25.600	S347	22.304	25.600
11.000	450	403	Circular	CONC	18.918	S345	22.507	25.719	S346	22.460	25.600
12.000	450	401	Circular	CONC	35.283	S349	22.275	25.150	S350	22.187	25.712
14.000	900	400	Circular	CONC	24.836	S365	22.877	26.250	S366	22.815	26.100
14.001	900	400	Circular	CONC	9.373	S366	22.815	26.100	S367	22.791	26.000
14.002	900	400	Circular	CONC	29.559	S367	22.791	26.000	S370	22.718	25.750
14.003	900	400	Circular	CONC	9.136	S370	22.718	25.750	S371	22.695	25.800
14.004	900	400	Circular	CONC	32.585	S371	22.695	25.800	S372	22.613	26.150
14.005	900	400	Circular	CONC	12.399	S372	22.613	26.150	S376	22.582	26.300
14.006	300	33	Circular	CLAY	61.503	S376	22.582	26.300	S380	20.707	23.778
14.007	900	397	Circular	CONC	61.214	S380	20.107	23.778	S385	19.953	23.386
14.008	900	400	Circular	CONC	34.262	S385	19.953	23.386	S386	19.867	23.300
14.009	SWALE	200	Ditch 1:2		41.143	S386	19.867	23.300	S387	19.661	24.000
15.000	900	399	Circular	CONC	41.890	S368	22.860	26.537	S369	22.755	25.663
15.001	900	400	Circular	CONC	14.935	S369	22.755	25.663	S370	22.718	25.750
16.000	900	400	Circular	CONC	10.592	S373	22.665	26.524	S374	22.639	26.400
16.001	900	400	Circular	CONC	12.043	S374	22.639	26.400	S375	22.608	26.250
16.002	900	400	Circular	CONC	10.800	S375	22.608	26.250	S376	22.581	26.300
17.000	225	168	Circular	CLAY	60.319	S377	22.559	24.384	S379	22.200	24.258
17.001	225	140	Circular	CLAY	63.812	S379	22.200	24.258	S380	21.745	23.778
18.000	225	34	Circular	CLAY	16.288	S378	22.678	24.403	S379	22.200	24.258
19.000	225	168	Circular	CLAY	34.465	S381	22.975	24.700	S382	22.770	24.267
19.001	225	168	Circular	CLAY	25.428	S382	22.770	24.267	S383	22.619	24.314
19.002	300	230	Circular	CLAY	25.286	S383	22.544	24.314	S384	22.434	24.587
19.003	300	56	Circular	CLAY	53.545	S384	22.434	24.587	S385	21.516	23.386
13.000	225	22	Circular	CLAY	25.923	S361	21.850	23.800	S362	20.661	23.573
4.000	900	400	Circular	CONC	75.543	S315	23.395	26.290	S316	23.206	26.160

Swale 1
TOB = 23.90m
Base Width = 5.0m
Base level = 19.661m
Base length = 31.7m
TWL = 21.461m
Side slope = 1:2

S387 (2.7 Dia Flow control manhole)
Orifice Plate - 171mm
Restricted to 80.0 l/s

Swale 2
TOB = 23.00m
Base Width = 5.0m
Base level = 18.794m
Base length = 60.7m
TWL = 20.324m
Side slope = 1:2

PLEASE NOTE: Due to reduction in POS areas to utilize surface water attenuation the 3No swales designed have had to be designed deep. Please see the draft sections for depths and levels required. The swales currently do not meet adoptable standards and will require highway retention along the eastern banks - Further consideration into POS areas and the required surface water storage volumes is advisable.

Swale 3
TOB = 22.30m
Base Width = 6.0m
Base level = 18.509m
Base length = 32.9m
TWL = 20.324m
Side slope = 1:2

S389 (2.7 Dia Flow control manhole)
Orifice Plate - 171mm
Restricted to 85.0 l/s

Number	Pipe Diameter (mm)	Pipe Length	Invert	Cover
S392	450	28.687	15.98	19.08
S393	450	28.407	15.81	18.63
S394	456	48.262	15.64	18.15
S395	450	18.320	15.35	17.00
S396			13.35	

S391 (2.7 Dia Flow control manhole)
MD-SHE-0296-6000-2600-6000
Hydrobrake Optimum Flow Regulator
Restricted to 60.0 l/s @ 2.60m design head

S115 - Surface water outfall location as stipulated within the UU pre-dev enquiry - Levels to be confirmed prior to final design stage

KEY PLAN

Notes

1. Setting out shall be undertaken using only the information given. Distances should not be scaled from this drawing.
2. All sewers shall be constructed in accordance with Design and Construction Guidance (DCG) Standards and United Utilities Details & Guidelines.
3. The minimum gravity pipe diameter under adoptable highways shall be 150mm
4. It is the responsibility of the Contractor to verify all information given with regards to existing services and drainage connections etc. prior to commencing the works. The rates shall include for hand dig around services where necessary. The Contractor shall adhere to the CDM Regulations at all times
8. All materials to bear the relevant B.S. Kitemark and comply fully with the specifications. All concrete & concrete products must use Sulphate resistant cement to withstand Class 3 condition (unless the site investigation report proves that sulphate attack from soils and groundwater will not occur).
9. All opening notices etc. as required under Highways Acts etc. are to be obtained prior to commencement of works. All works are to be inspected by L.A., NHBC or the Network Operator as applicable.
10. Where structured wall UPVC pipes (or similar approved) are used in adoptable drainage they shall be handled and laid in accordance with the manufacturers instructions and will be subject to post installation deformation testing prior to adoption.
    A Class S Bed and Surround must be used for structured wall pipes
11. Trench backfill in highways to within 1m of highway shall, as directed by the Highway Authority be a suitable granular material all in accordance with Design and Construction Guidance (DCG) Standards.
12. Slab levels shall not be varied without reference to the Engineer for guidance.
13. Pipes have not been designed to accommodate construction traffic loading. The contractor is responsible for providing adequate protection to the pipes during construction.

Design based on Layouts:
Kirkby, Cherryfield Drive, Feasibility Plan (South Parcel)
Dwg No. NW-23-02, Dated 13 Sep 2021
Rev: -

Kirkby, Cherryfield Drive, Feasibility Plan (North Parcel)
Dwg No. NW-23-03, Dated 13 Sep 2021
Rev: -

Grid/Level datum based on Topos:
Cherryfield Drive, Kirkby.
Topographical Land Survey.
Dwg No. DWH.TS.04 Sheets 1 to 3, Dated 27.04.21
Rev: -

Topographical Land Survey.
Former All Saints School Cherryfield Drive, Knowsley.
Dwg No. A0 14F063/001 Sheets 1 & 2, Dated July '14
Rev: -

Legend

- Existing Surface Water Sewer (Recently constructed for Phase1)
- Existing Foul Water Sewer (Recently constructed for Phase1)
- S101 — Adoptable Surface Water Sewer
- Adoptable Foul Sewer
- FC — Flow Control Manhole
- FFL xx.xx — Plot Slab Level
- Sewer Easement
- WALL — Retaining Wall/Feature (300mm or above only)
- UB — Underbuild 300mm or above

STRATEGY

Rev.	Date	Revision	By	Appd.
B	16.11.21	Revised to latest planning layout	JAR	AJ
A	10.06.21	Included Outfall Manhole Details	PW	AJ

coopers
chartered consulting engineers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU
Tel: 01244 684910
Email: admin@coopers.co.uk
Web: http://coopers.co.uk

Client: DAVID WILSON HOMES

Project: CHERRYFIELD DRIVE, KIRKBY, .

Title: Drainage Strategy
Sheet 1 of 4
(SW Only)

DRAWING NUMBER: 7778 / SK01-1

SCALE at A0	1:500	
DATE	May '21	REVISION
DRAWN	JAR	B
CHECKED	AJ	

DRAFT

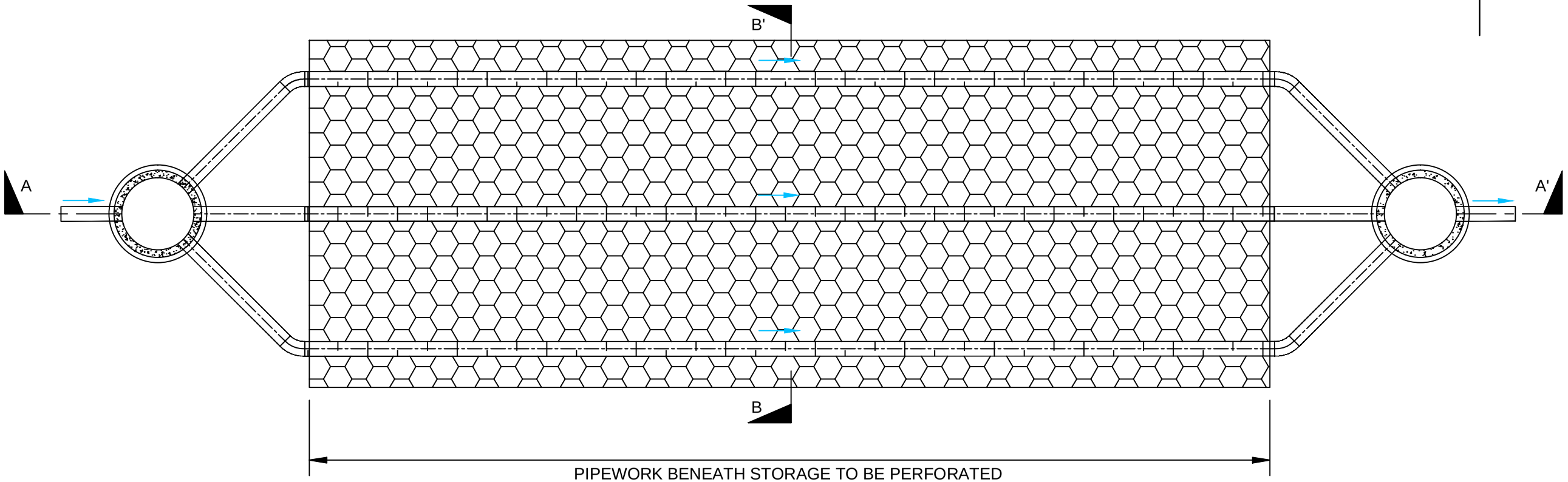
© Copyright The original of this drawing contained coloured symbols and/or features. Any black and white reproduction should not be relied upon.

This page has been intentionally left blank

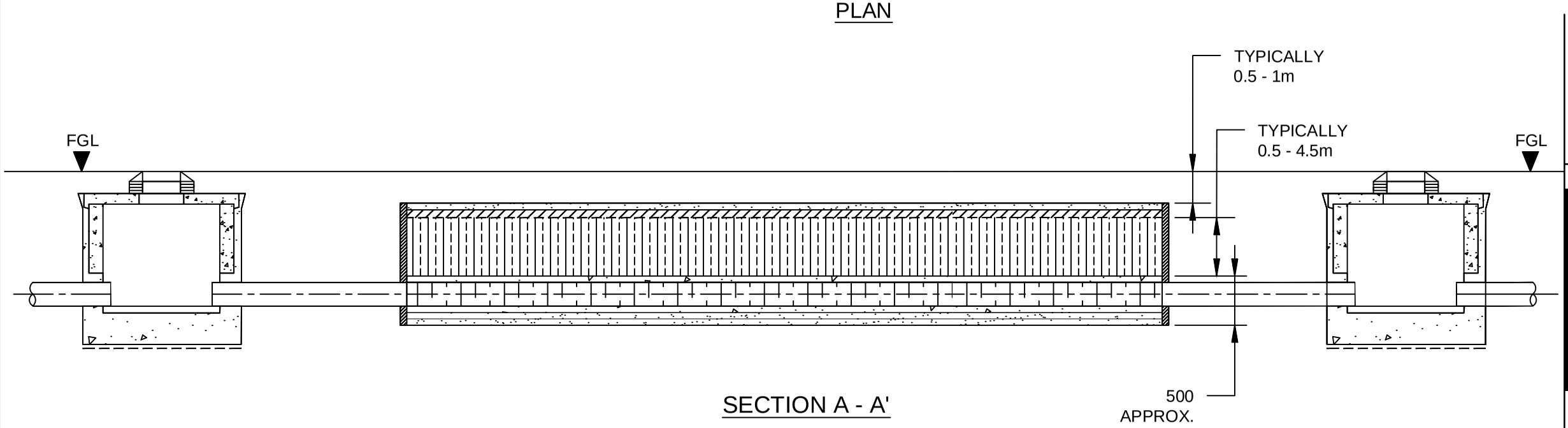
APPENDIX K: TYPICAL SUDS DETAILS

This page has been left intentionally blank

DO NOT SCALE

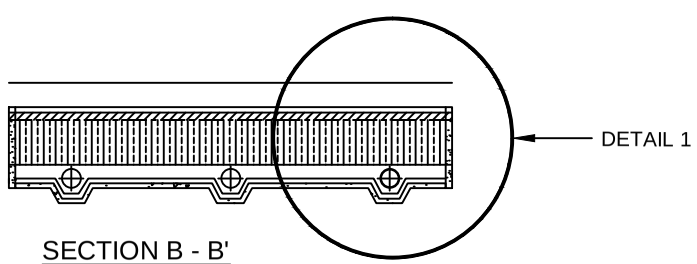


PLAN

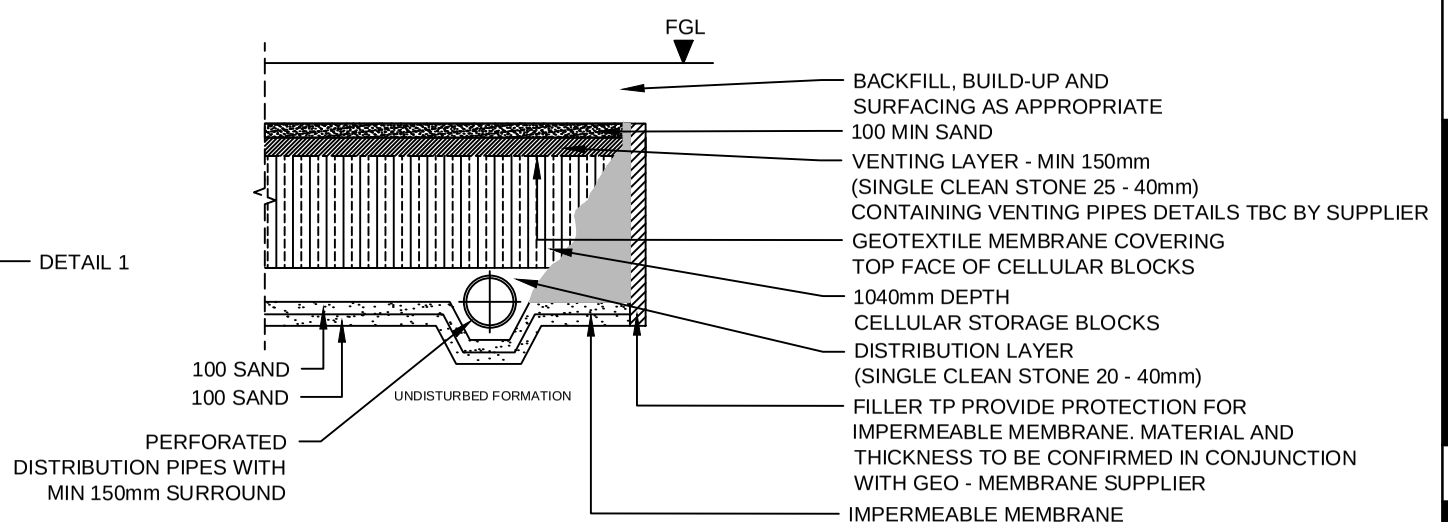


SECTION A - A'

ALL DIMENSIONS AND DEPTHS DEPENDENT ON REQUIRED VOLUME AND LOCAL GROUND CONDITIONS



SECTION B - B'



DETAIL 1

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

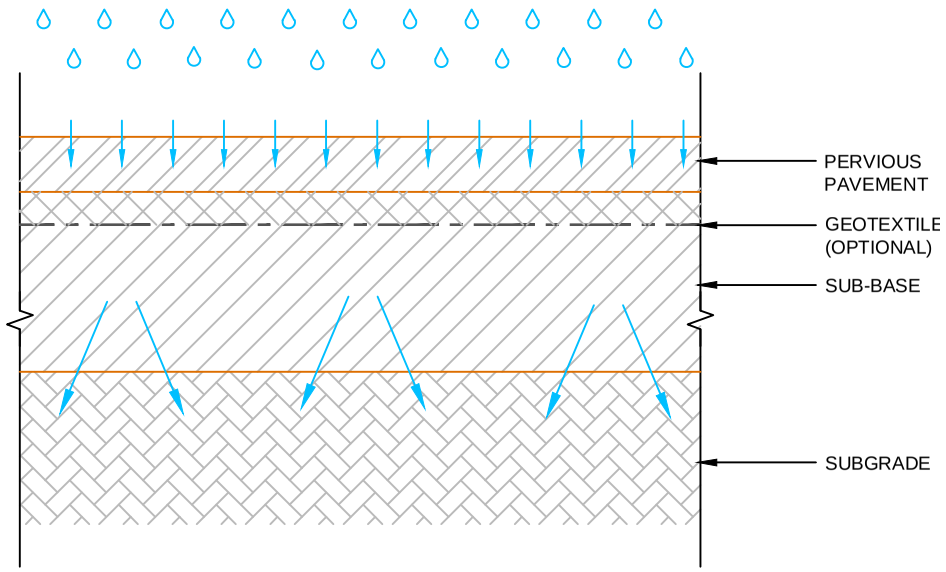
PROJECT: TYPICAL SUDS DETAIL

TITLE: CELLULAR STORAGE

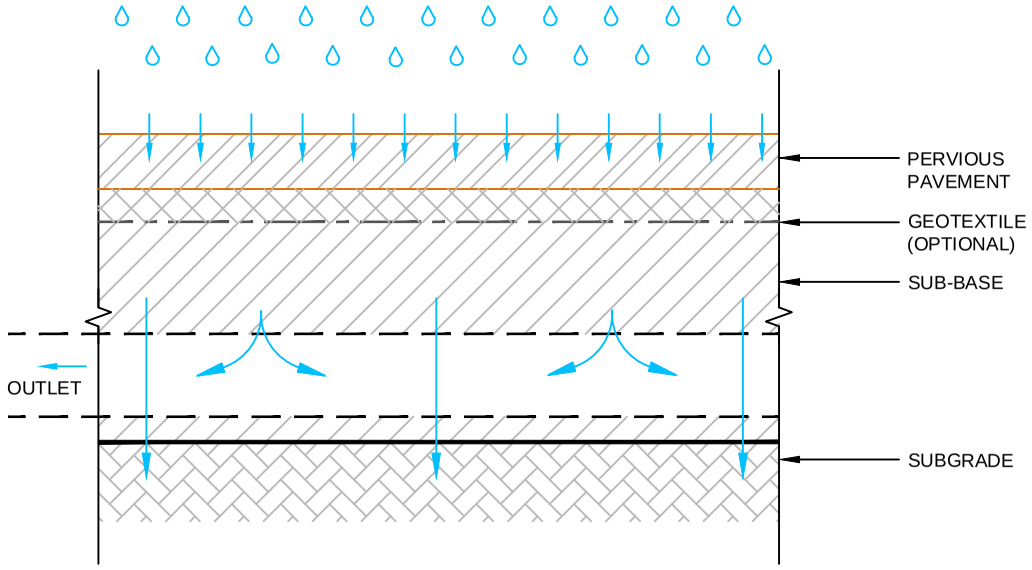
DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
SEP 2014	@ A3	CP	RDN

PROJECT No:	DRAWING No:	REV:
BETTS	113	A

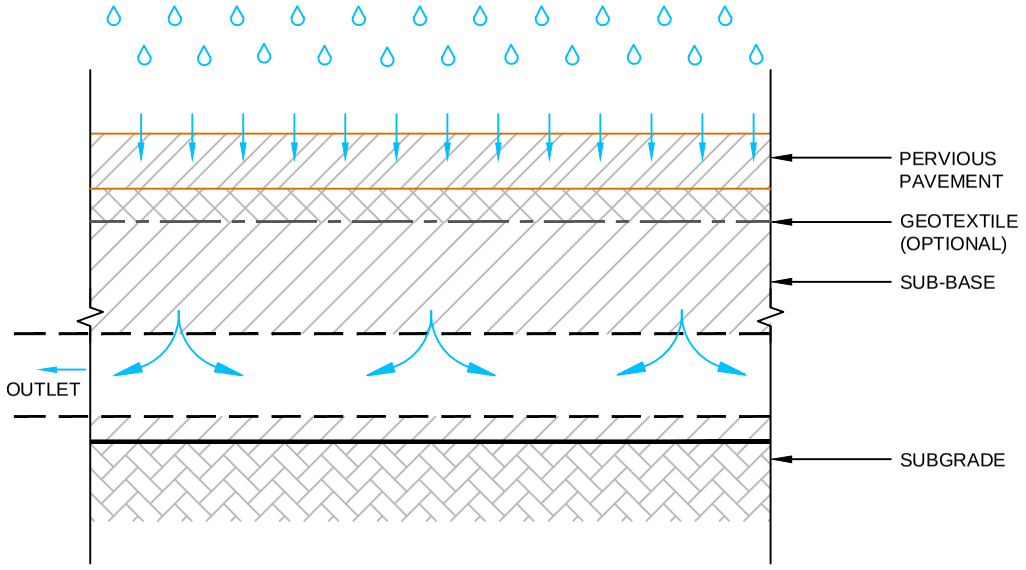
DO NOT SCALE



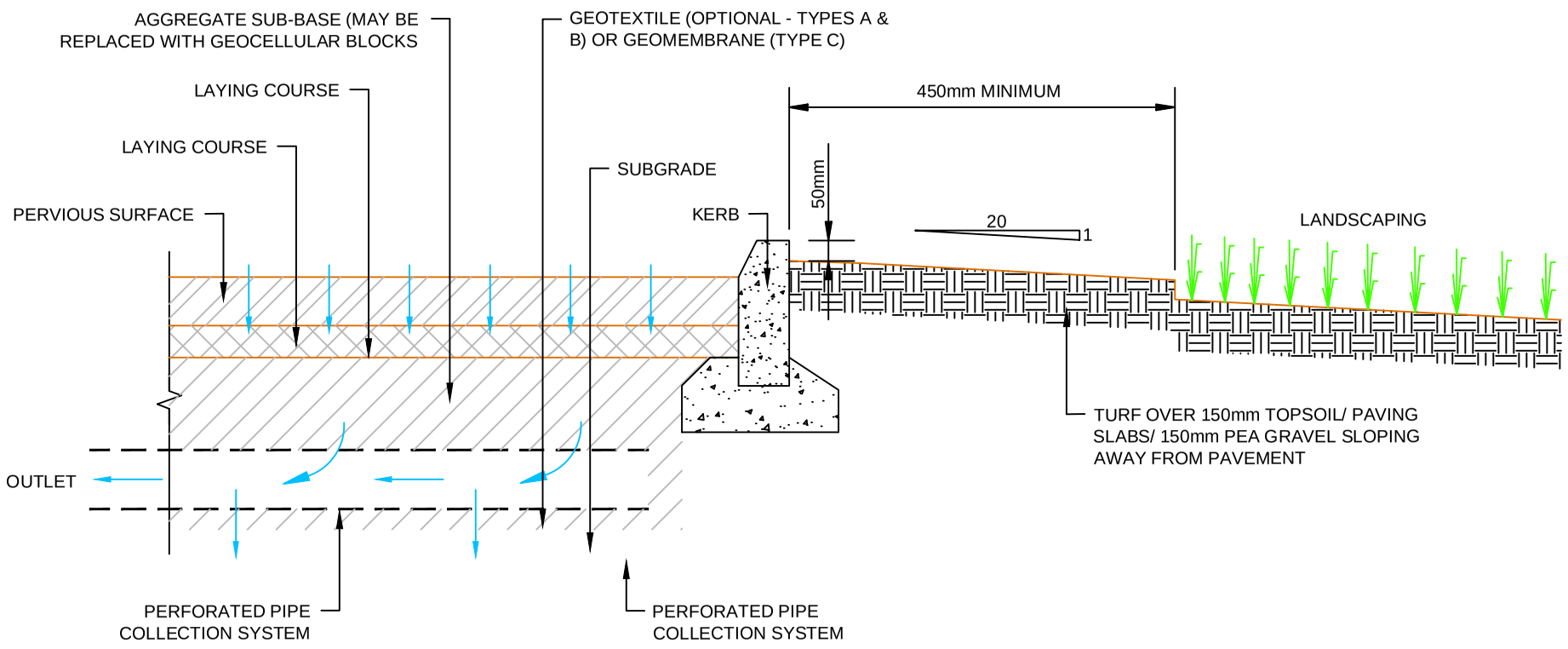
TYPE A: TOTAL INFILTRATIPN



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

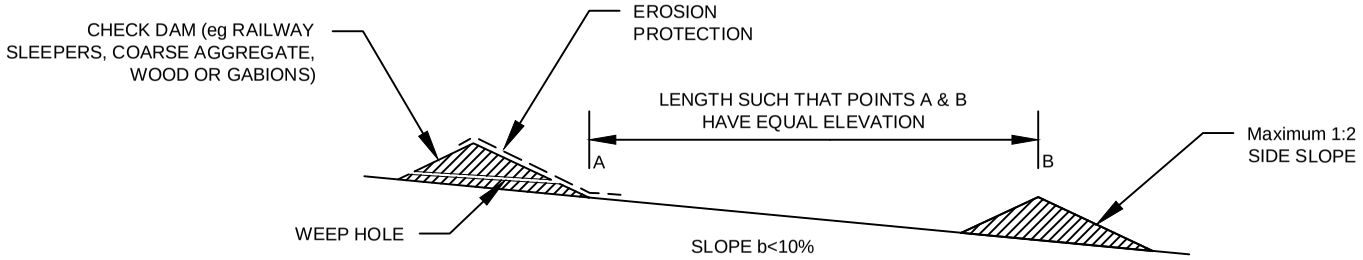
PROJECT: TYPICAL SUDS DETAIL

TITLE: PERVIOUS PAVEMENTS

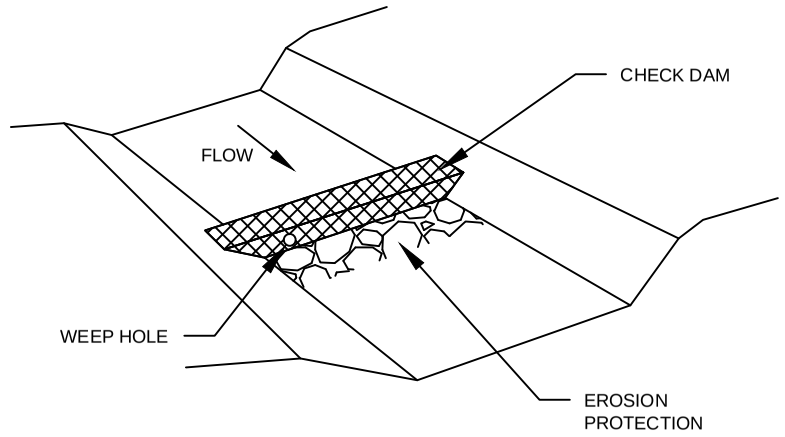
DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
SEP 2014	@ A3	CP	RDN

PROJECT No:	DRAWING No:	REV:
BETTS	105	A

DO NOT SCALE

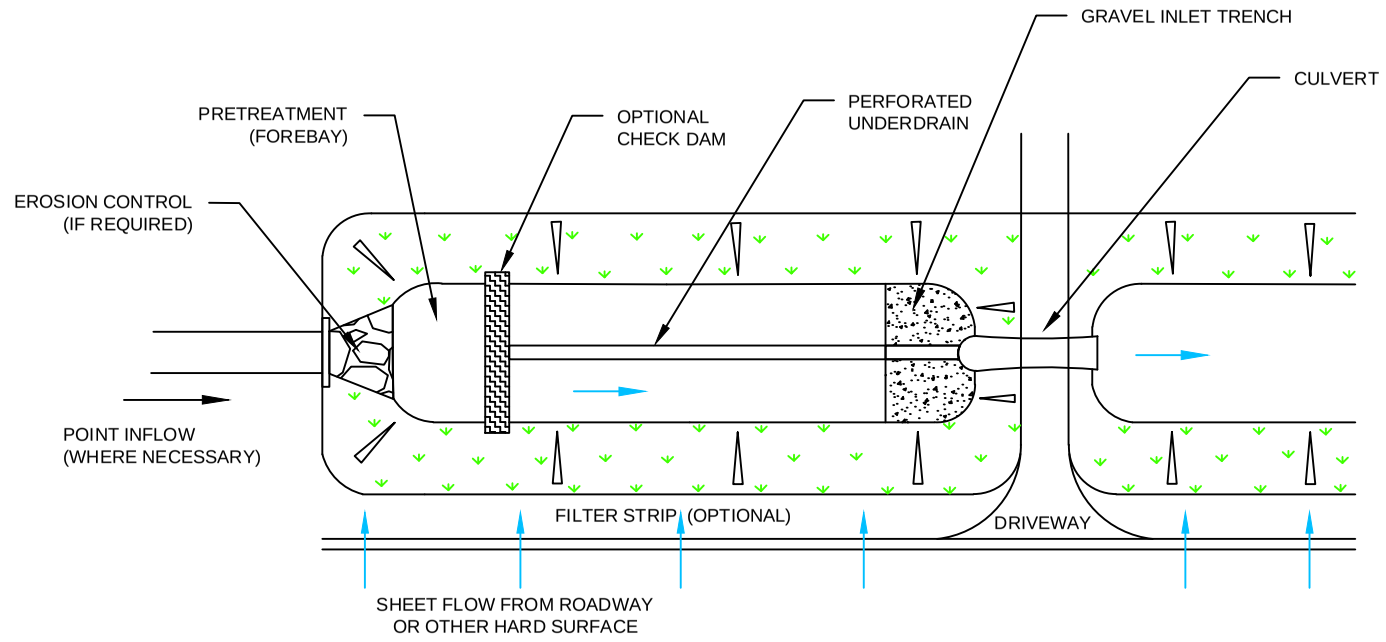


ELEVATION



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

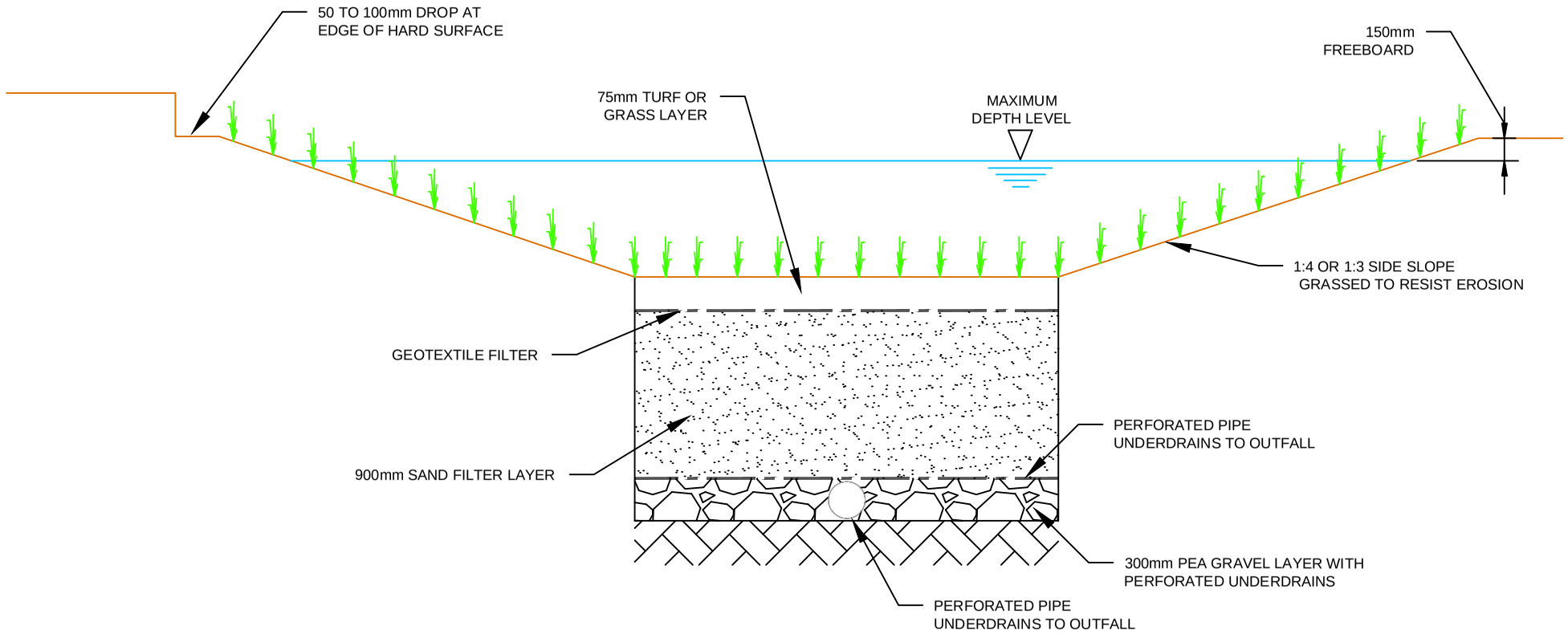
PROJECT: TYPICAL SUDS DETAIL

TITLE: SWALES (2 of 2)

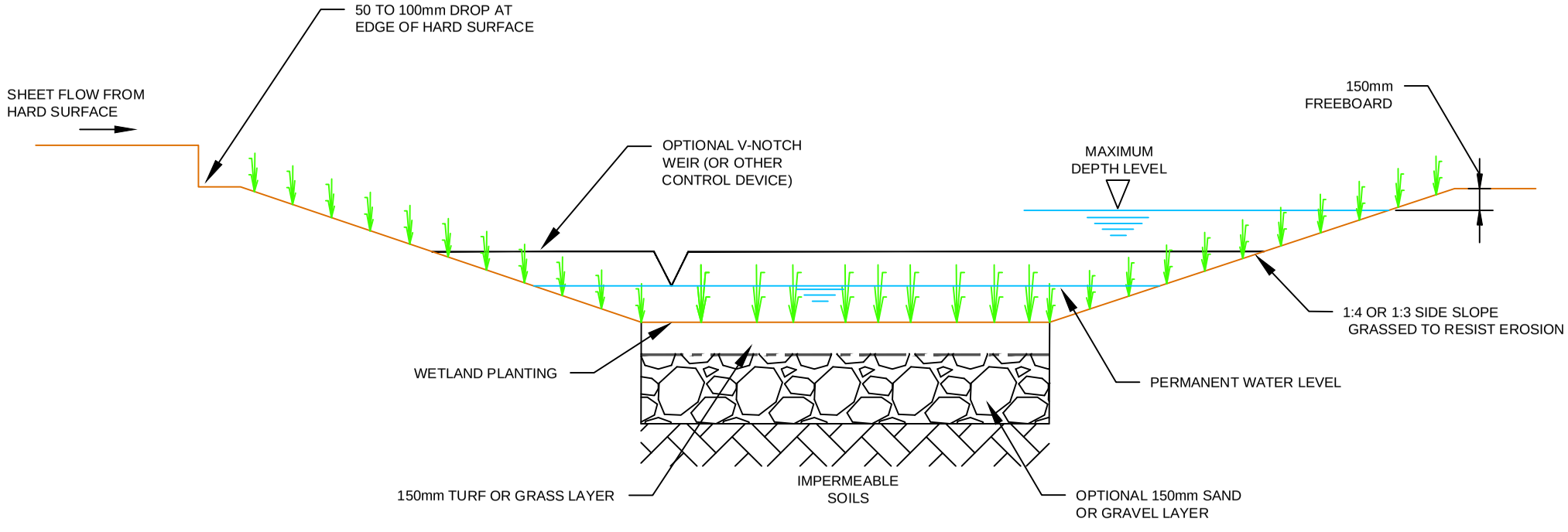
DATE:	SCALE @ SIZE:	DRAWN:	CHECKED:
SEP 2014	@ A3	CP	RDN

PROJECT No:	DRAWING No:	REV:
BETTS	104	A

DO NOT SCALE



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

PROJECT: TYPICAL SUDS DETAIL

TITLE: SWALES (1 of 2)

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

PROJECT No:	DRAWING No:	REV:
BETTS	103	A

APPENDIX L: 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.

This report was prepared by Betts Hydro Ltd for the sole and exclusive use of the titled client in response to particular instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

This document has been prepared for the titled project only and should any third party wish to use or rely upon the contents of the report, written approval from Betts Hydro Ltd must be sought.

Betts Hydro Ltd accepts no responsibility or liability for the consequences of this document being used for the purpose other than that for which it was commissioned and for this document to any other party other than the person by whom it was commissioned.