

ENVIRONMENT

Wilson Bowden Developments Ltd

Plot L

Kingsway

Flood Risk Assessment

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Kingsway
Flood Risk Assessment

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EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. It has been produced on behalf of Wilson Bowden Developments Ltd in respect of a planning application for an industrial/warehouse development at Plot L, Kingsway Business Park (approximate grid reference: SD913116).

This report demonstrates that the proposed development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented.

The site is located entirely in Flood Zone 1 and is raised above the 1 in 100-year + 35% flood levels associated with the Stanney Brook and Sudden Brook. Modelling of the Unnamed Ordinary Watercourse (UOW) through the centre of the site has confirmed the site is at risk in all baseline modelled events from the 1 in 30-year to 1 in 1000-year event, including the 1 in 100-year + 35% climate change design event.

The proposals include for the diversion of the UOW through the site in accordance with the alignment utilised for other development plots upstream of Plot L and within the wider Kingsway Business Park. Modelling of the proposed diversion (subject to detailed design) has identified that it has carrying capacity for events up to, and including, the 1 in 100-year + 35% climate change design event.

Ground levels should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.

The site is at low to high risk of flooding from surface water sources. The proposed development layout should incorporate surface water flow routes. Profiling of the ground will also provide mitigation for pluvial flood risk.

Appropriate design and mitigation will be put in place to manage groundwater. During the construction phase, particularly during excavations, groundwater levels will be monitored, and dewatering should be undertaken as required.

The site has been assessed against other sources including coastal/tidal, canal, reservoirs and sewers. None of these sources were found to preclude the proposed development.

The development will discharge surface and foul water in accordance with the site-wide approved drainage strategy. Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement, reference PLK-BWB-ZZ-XX-RP-CD-0001_SDS.

In compliance with the requirements of the NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the site.

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1. INTRODUCTION

- 1.1 This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. The FRA has been produced on behalf of Wilson Bowden Developments Ltd in respect of a planning application for an industrial/warehouse development at Plot L, Kingsway Business Park.
- 1.2 Plot L is located within the Kingsway Business Park which received outline planning permission in August 2014 under planning reference 14/00542/OUT. The application was supported by a site-wide FRA prepared by BWB Consulting (Reference: MCT/2014/FRA) and the principles agreed within the 2014 FRA are retained for this full planning application.
- 1.3 This FRA is intended to support a full planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage. Summary information is included as **Table 1.1**.

Table 1.1: Site Summary

Site Name	Plot L
Location	Kingsway
NGR (approx.)	SD913116
Application Site Area (ha)	3.7 (Approximately)
Development Type	Industrial
Flood Zone Classification	Flood Zone 1
NPPF Vulnerability	Less Vulnerable
Anticipated Development Lifetime	75 years
Environment Agency Office	Greater Manchester, Merseyside and Cheshire
Lead Local Flood Authority	Rochdale Borough Council
Local Planning Authority	Rochdale Borough Council
Outline Planning Application for Kingsway Business Park	14/00542/OUT

Sources of Data

- i. Topographical Survey by BWB Consulting, Reference: PLK-BWB-00-ZZ-DR-G-0001-Existing Site Plan
- ii. Environment Agency (EA) consultation
- iii. Lead Local Flood Authority (LLFA) consultation
- iv. EA 1m Light Detection and Ranging (LiDAR), 2022 dataset
- v. EA Risk of Flooding from Surface Water Data
- vi. Hydraulic Modelling of the Unnamed Ordinary Watercourse (UOW) within the Site by BWB Consulting
- vii. Greater Manchester Level 1 Strategic Flood Risk Assessment
- viii. Greater Manchester Level 2 Strategic Flood Risk Assessment
- ix. Rochdale Preliminary Flood Risk Assessment and Addendum
- x. Rochdale Local Flood Risk Management Strategy
- xi. North West River Basin Flood Risk Management Plan
- xii. Greater Manchester Surface Water Management Plan
- xiii. Rochdale Local Plan
- xiv. United Utilities Sewer Records
- xv. British Geological Survey (BGS) Drift & Geology Maps
- xvi. Ground Investigations by BWB Consulting (Reference: PLK-BWB-ZZ-XX-RP-YE-0003_Ph2)
- xvii. Canal and River Trust (CRT) consultation

Existing Site

- 1.4 The site is located within the Kingsway Business Park, approximately 2.2km southeast of Rochdale town centre. It is bound to the north by an Unnamed Ordinary Watercourse (UOW) and residential dwellings on Neston Road, to the east by John Milne Avenue, to the south by a cycle way and the wider Business Park and to the west by residential development on Wrenbury Drive. It is currently greenfield land and entirely undeveloped.
- 1.5 The UOW is mapped from around the M62, approximately 620m southeast of the study site. A culvert is understood to be present beneath the M62, conveying flows in a northerly direction, towards the site. The UOW is understood to have been historically diverted around the currently operational plot directly to the north of the M62 and is culverted beneath access roads and the cycle way which lies adjacent to the southern boundary of the study site. The UOW traverses the study site in a north easterly direction before dog legging into a silted channel to the rear of properties on Neston Road.
- 1.6 The site topographical survey is included as **Appendix 1**. The site generally falls from south to north with a high point of approximately 152 metres Above Ordnance Datum (m AOD) in the southeast and a low point of approximately 147m AOD in the north.

- 1.7 A raised area is present adjacent to the northwest of the site with levels of up to approximately 152.27m AOD. The survey also indicates an informal ditch on the site side toe of this raised area suggesting this is a land drainage feature. A further informal ditch is present in the northeast of the site; however, there are no surveyed connections to the UOW and watershed analysis appears to suggest this forms part of a separate catchment to the northeast.
- 1.8 The site's location is illustrated within **Figure 1.1**.

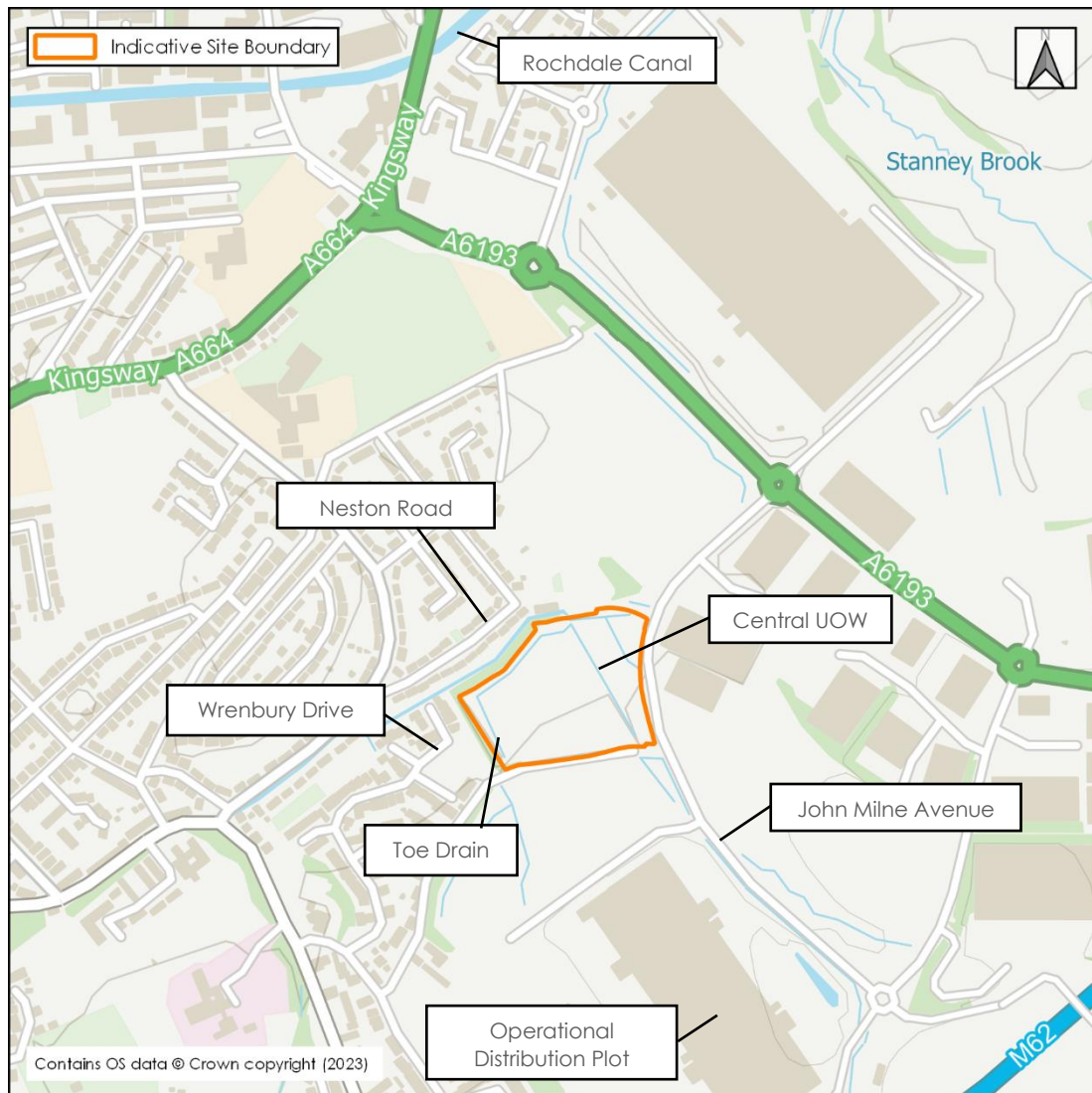


Figure 1.1: Site Location

Proposed Development

- 1.9 The proposals are for the:

Erection of four industrial units/warehouses (Classes E(g)(iii), B2 and B8) with ancillary office space, new access, car parking, servicing, boundary treatments, hard and soft landscaping, drainage works and other associated development.

- 1.10 Access will be taken from John Milne Avenue on the eastern site boundary. The proposed layout plan is Drawing Reference: KPL-DLA-LS-XX-DR-A-90002.

2. FLOOD RISK PLANNING POLICY & GUIDANCE

National Planning Policy Framework

- 2.1 The NPPF¹ sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. The Planning Practice Guidance is also available online².
- 2.2 The Planning Practice Guidance sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.
- 2.3 The Planning Practice Guidance also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing a FRA.
- 2.4 The Planning Practice Guidance includes a series of tables that define Flood Zones (Table 1), the flood risk vulnerability classification of development land uses (Table 2) and 'compatibility' of development within the defined Flood Zones (Table 3). Table 2 and Table 3 are recreated within **Appendix 2** of this report for reference.
- 2.5 This FRA is written in accordance with the NPPF and the Planning Practice Guidance.

Flood Map for Planning

- 2.6 With particular reference to planning and development, the Flood Map for Planning identifies Flood Zones in accordance with Table 1 of the Planning Practice Guidance. Further details on the Flood Zone classifications are outlined in **Table 2.1**.

Table 2.1: Flood Zone Classifications

Flood Zone	Description
Flood Zone 1 (Low Probability)	Land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability). All land outside of Flood Zone 2 and 3.
Flood Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).
Flood Zone 3a (High Probability)	Land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.
Flood Zone 3b (The Functional Floodplain)	Flood Zone 3b (The Functional Floodplain) is defined as land where water must flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

¹ Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, amended 2021

² Planning Practice Guidance: <https://www.gov.uk/government/collections/planning-practice-guidance>

2.7 The site is shown to be located within Flood Zone 1, as shown in **Figure 2.1**.

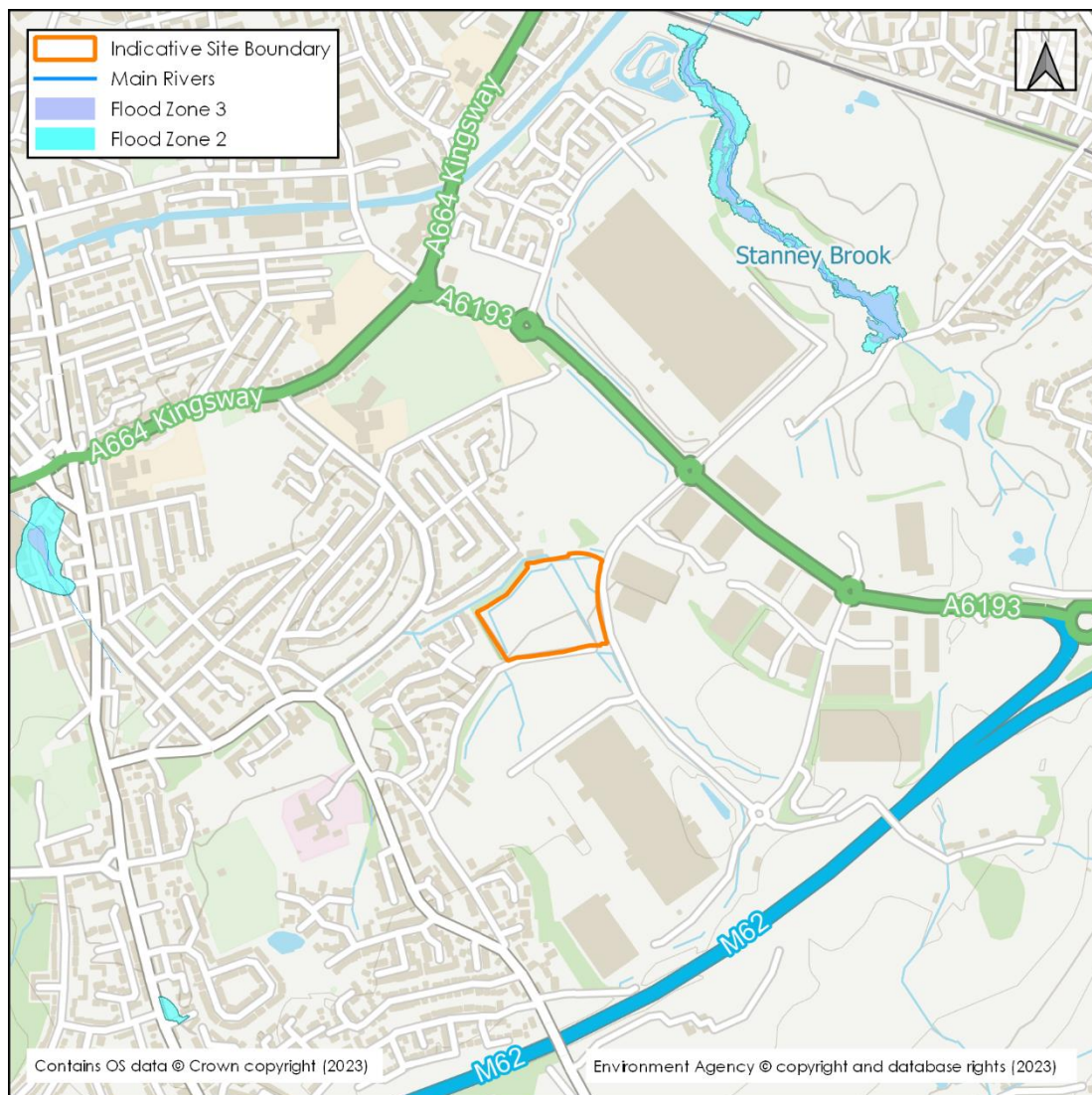


Figure 2.1: EA Flood Map for Planning

The Design Flood

- 2.8 The Planning Practice Guidance identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.
- 2.9 This is a flood event of a given annual flood probability, which is generally taken as fluvial (river) and surface water (pluvial) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or tidal flooding with a 0.5% annual probability (1 in 200 chance each year), against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Climate Change

- 2.10 Predicted future changes in peak river flows caused by climate change are provided by the EA³, with a range of projections applied to regionalised 'River Basin Districts', which are further subdivided into Management Catchments.
- 2.11 The site falls within the Irwell Management Catchment of the North West River Basin District. **Table 2.2** identifies the relevant peak river flow climate change allowances from this Management Catchment.

Table 2.2: Peak River Flow Climate Change Allowances for the Irwell Management Catchment within the North West River Basin District

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2125)
Upper End	24%	43%	75%
Higher Central	15%	26%	46%
Central	12%	19%	35%

- 2.12 When determining the appropriate allowance for use in a FRA the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the development should be considered. **Table 2.3** provides a matrix summarising the EA's guidance on determining the appropriate allowance(s).

Table 2.3: Application of Appropriate Peak River Flow Climate Change Allowances

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Use the central allowance where a location may fall within Flood Zone 2 or 3 in the future.				
2	Use the higher central allowance	Use the central allowance			
3a	Use the higher central allowance	Development should not be permitted	Use the central allowance		
3b	Use the higher central allowance	Development should not be permitted			Use the central allowance
If development is considered appropriate by the local authority when not in accordance with Flood Zone vulnerability categories, then it would be appropriate to use the higher central allowance.					

³ Environment Agency, Flood risk assessments: climate change allowances: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>. Last Accessed March 2023

- 2.13 The site is located entirely within Flood Zone 1, the proposed development is classified as 'Less Vulnerable', and it has an anticipated lifespan of 75 years. Therefore, the Central allowance for the '2080s' epoch should be used if the site may fall within Flood Zone 2 or 3 in the future. Due to the presence of the unrepresented UOW, the Central allowance will be considered within this report.
- 2.14 Therefore, to ensure the development is designed adequately for its lifetime an allowance of 35% will be applied to the design flood to identify mitigation measures.

Strategic Flood Risk Assessment

- 2.15 A Strategic Flood Risk Assessment (SFRA) is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.
- 2.16 The Level 1 SFRA for Greater Manchester - Update⁴ has been reviewed in the production of this FRA. The SFRA provides information specific to the site location in the form of fluvial and surface water flood risk mapping, as well as records of historical flooding. The SFRA mapping identifies the site to be located within the '*Rochdale Opportunity Area for Further Critical Drainage Management*' which have been delineated as part of the SFRA based on United Utilities data, surface water flood hotspots and historical surface water flooding data. It also includes flood risk policy and guidance for the area. Information from the Level 1 SFRA will be referenced within **Section 3** where applicable.
- 2.17 The Greater Manchester Level 2 Hybrid SFRA⁵ was produced to facilitate the application of Sequential and Exception Tests to screen allocated development sites. The proposed application site is not referenced within the Level 2 SFRA.

Preliminary Flood Risk Assessment

- 2.18 A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the LLFAs.
- 2.19 The Rochdale Metropolitan Borough Council PFRA⁶ considers flooding from surface water runoff, groundwater, ordinary watercourses and canals. Information from the PFRA will be referenced within **Section 3** where applicable.
- 2.20 An Addendum⁷ to the PFRA was published in December 2017; however, it did not include any new information in relation to past or future flood risk at the site.

⁴ Level 1 Strategic Flood Risk Assessment for Greater Manchester - Update (Greater Manchester Combined Authority, March 2019)

⁵ Level 2 Strategic Flood Risk Assessment (Greater Manchester Combined Authority, October 2020)

⁶ Preliminary Flood Risk Assessment (Rochdale Metropolitan Borough Council, May 2011)

⁷ Preliminary Flood Risk Assessment Addendum (Rochdale Metropolitan Borough Council, December 2017)

Local Flood Risk Management Strategy

- 2.21 A Local Flood Risk Management Strategy (LFRMS) is prepared by an LLFA to help understand and manage flood risk at a local level.
- 2.22 The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so that they can be better managed. The LFRMS also aims to promote sustainable development and environmental protection.
- 2.23 The Rochdale Borough's Strategy for Flood Risk Management⁸ has been reviewed and will be referenced within this report where applicable.

River Basin Flood Risk Management Plan

- 2.24 Flood Risk Management Plans (FRMPs) explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs. FRMPs set out how risk management authorities will work with communities to manage flood and coastal risk. Risk management authorities include the EA, Natural Resources Wales, local councils, internal drainage boards, Highways England and LLFAs.
- 2.25 The first FRMPs were published in March 2016. They describe actions to manage flood risk across England between 2015 to 2021. The latest revisions were published at the end of 2022 and cover the period 2021 to 2027.
- 2.26 The site is located within the North West River Basin District, and the North West FRMP⁹ has been reviewed and the relevant site scale objectives have been considered in **Section 4** of this report.

Surface Water Management Plan

- 2.27 Surface Water Management Plan (SWMPs) are non-statutory plans which preceded the introduction of the Flood and Water Management Act 2010. They can provide an important evidence base of local flood risk issues which can include surface water drains, groundwater and small watercourses.
- 2.28 The Greater Manchester SWMP¹⁰ plan has been reviewed and information on the existing flood risk to the site is referenced within **Section 3**.

Local Plan

- 2.29 The Rochdale Local Plan Adopted Core Strategy¹¹ has been reviewed in relation to the proposed development. The Core Strategy includes mapping showing the Kingsway Business Park as an economic growth corridor.

⁸ Local Flood Risk Management Strategy (Rochdale Borough Council, March 2014)

⁹ North West River Basin District Flood Risk Management Plan 2021 to 2027 (Environment Agency, December 2022)

¹⁰ Greater Manchester Surface Water Management Plan (Greater Manchester Authorities, January 2012)

¹¹ Adopted Core Strategy (Rochdale Borough Council, October 2016)

2.30 In the context of flood risk and drainage, the Core Strategy includes 'Policy G8 – Managing Water Resources and Flood Risk' which states that Rochdale Borough Council (the LLFA) will require:

- Compliance with a 'sequential' approach to new development and flood risk, directing development away from areas of high risk in line with the NPPF.
- Compliance with advice from the EA and objectives for flood risk management set out in the LFRMS.
- Regard for the evidence of local flood risk included within the SFRA and SWMP.
- Incorporation of appropriate measures for surface water management including provision of Sustainable Drainage Systems (SuDS).

Other Relevant Policy and Guidance

2.31 This FRA has considered the following documents when assessing sources of flood risk and when recommending mitigation and resilience measures.

Flood Risk to People and New Developments

2.32 The Flood Risk to People (FD2321/TR1)¹² document was prepared as a research project considering flood hazard and factors that affect it.

2.33 Flood Risk Assessment Guidance for New Development (FD2320/TR2)¹³ provides a framework and guidance for assessing and managing flood risks for new developments and sets flood hazard thresholds.

2.34 Hazard ratings are derived using the following equation in line with the above:

$$\text{Hazard Rating} = D * (V+0.5) + DF$$

Where:

D = depth

V = velocity

DF = debris factor

2.35 A supplementary note¹⁴ provides clarification of the hazard rating thresholds which should be used for development planning and control use. **Table 2.4** identifies the thresholds of the flood hazard categories.

¹² Flood Risk to People Methodology (FD2321/TR1), Defra/Environment Agency, 2006

¹³ Flood Risk Assessment Guidance for New Development (FD2320/TR2), Defra/Environment Agency, 2005

¹⁴ Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purpose – Clarification of the Table 13.1 of FD2320/TR2 and Figure 3.2 of FD2321/TR1. (http://randd.defra.gov.uk/Document.aspx?Document=FD2321_7400_PR.pdf)

Table 2.4: Hazard to People¹⁵

Threshold for Flood Hazard Rating	Degree of Flood Hazard	Description
< 0.75	Low	Caution "Flood zone with shallow flowing water or deep standing water"
0.75 - 1.25	Moderate	Danger for some (i.e.: children, the elderly and the infirm) "Danger: Flood Zone with deep or fast flowing water"
1.25 - 2.0	Significant	Danger for most (includes the general public) "Danger: Flood Zone with deep fast flowing water"
2.0 >	Extreme	Danger for all (includes the emergency services) "Extreme Danger: Flood Zone with deep fast flowing water"

Development and Flood Risk – Guidance for the construction industry

- 2.36 The Development and Flood Risk guidance document¹⁶ was prepressed to advise on best practise in the assessment and management of flood risk as part of the development process, the document promotes sustainable development in terms of flood risk.
- 2.37 While many of the polices referenced in the document have been superseded, the principles of assessing and managing flood risk sustainably remain the same.

¹⁵ 2008, DEFRA, Supplementary Note on Flood Hazard Ratings and Thresholds for Development Planning and Control Purposes.

¹⁶ C624 Development and Flood Risk – Guidance for the construction industry, CIRIA, 2004

3. POTENTIAL SOURCES OF FLOOD RISK

- 3.1 Flooding can occur from a variety of sources, or combination of sources, which may be natural or artificial. **Table 3.1** below identifies the potential sources of flood risk to the site in its current condition, and the impacts which the development could have in the wider catchment, prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 4**.

Table 3.1: Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial			X		The site is located in Flood Zone 1 according to EA mapping.
	X				There are areas of low to high surface water flood risk, indicating a potential risk associated with the UOW. Hydraulic modelling has shown the site is at risk in the baseline scenario including in the 1 in 100-year + 35% climate change design event.
Coastal				X	The site is removed from the area at coastal flood risk.
Canals			X		The Rochdale Canal is located 750m northwest of the site; however, LiDAR data shows that there is intervening topography raised at least 6m above the canal.
Groundwater		X			The site is shown to fall within an area predicted to be at a medium susceptibility to groundwater flooding.
Reservoirs and waterbodies				X	The site is shown to fall outside of the area at risk of reservoir failure.
Pluvial runoff	X				The site is at very low to high risk of surface water flooding according to the EA mapping.
Sewers			X		Sewer exceedance flows are expected to be conveyed away from the site in accordance with local topography.

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Effect of Development on Wider Catchment	X				Development could result in displacement of floodplain and/or impedance of flow routes if left unmitigated.
		X			The development will increase the area of impermeable surfaces leading to a potential increase in runoff.

Fluvial Flood Risk

- 3.2 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

Recorded Flood Outlines

- 3.3 There are no recorded flood outlines at the site according to the EA mapping. The EA and LLFA do not hold any records of flooding at the site; however, this does not necessarily mean flooding has not occurred.
- 3.4 The Level 1 SFRA mapping does not indicate any historical flooding at the site.
- 3.5 During consultations with the LLFA (Rochdale Borough Council) in relation to the proposed development, it was identified that flooding has occurred downstream of the proposed development site. However, the LLFA stated that the historical instances of flooding have not been due to overland flow routes through the site and downstream, but instead have been as a result of a lack of maintenance of the downstream trash screens and sewer network surcharge.

Main Rivers

- 3.6 The site is located in Flood Zone 1 according to the EA Flood Map for Planning. The nearest EA Main Rivers are the Stanney Brook and Sudden Brook located 700m east and 720m west of the site respectively.
- 3.7 The EA provided modelled flood level information for these watercourses which is included as **Appendix 3**.
- 3.8 The site is raised at least 6m above the 1 in 100-year + 35% flood levels within the Sudden Brook and at least 2.5m above the 1 in 100-year + 35% flood levels within the Stanney Brook. Therefore, the site is considered to be at low risk from Main Rivers.

Ordinary Watercourses

- 3.9 The topographical survey indicated an informal ditch on the site side toe of the raised area in the northwest of the site suggesting this is a land drainage feature. A further informal ditch is present in the northeast of the site; however, there are no surveyed connections to the UOW and the watershed analysis appears to suggest this forms part of a separate catchment to the northeast.
- 3.10 The central UOW has been excluded from the national scale Flood Map for Planning due to its catchment being less than 3km². Therefore, a hydraulic modelling exercise was undertaken to assess the flood risk at the site from this source. Peak flows were obtained from ReFH2 for events ranging from the 1 in 30-year to 1 in 1000-year. In the baseline scenario, the site is partially at risk in all modelled events up to, and including, the 1 in 1000-year as shown in **Figure 3.1**.
- 3.11 The UOW exceeds its capacity in all modelled events with pooling in the north eastern part of the site and adjacent to the raised feature present in the north western part of the site. For events greater than the 1 in 30-year, the modelled results also indicate a flow route from surcharging of the culvert at the downstream extent of the operational distribution plot. This flow route overtops the right bank of the UOW and is conveyed in a northerly and easterly direction by John Milne Avenue. In events greater than the 1 in 100-year + 35%, flows from this route encroach into the eastern portion of the development site.

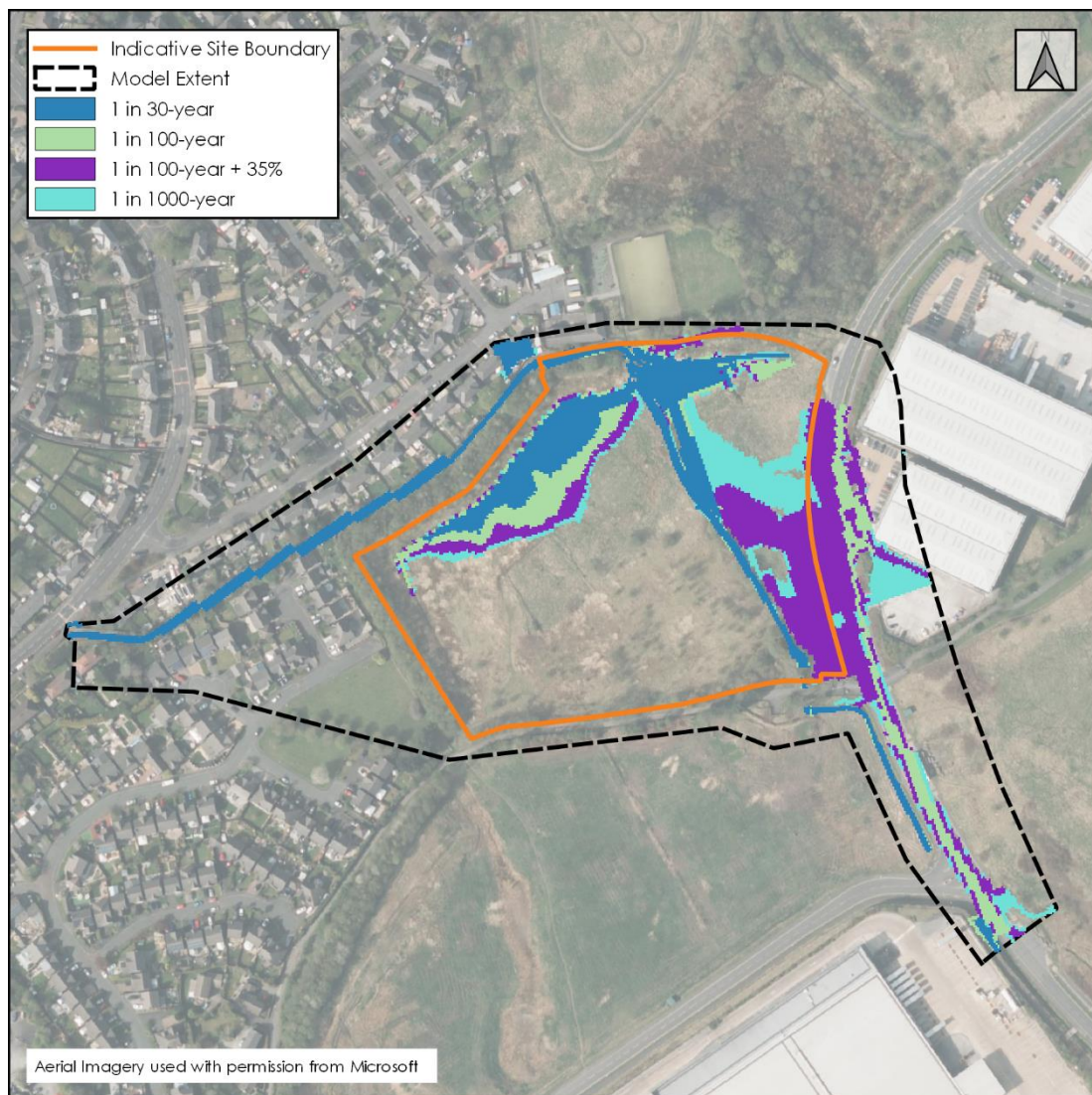


Figure 3.1: Baseline Floodplain Extents

- 3.12 Therefore, the site is considered to be high risk of flooding from the UOW in the baseline condition. Mitigation measures for this risk are outlined in **Section 4**.

Pluvial Flood Risk

- 3.13 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.
- 3.14 Risk of Flooding from Surface Water (RoFSW) mapping has been collated and published by the EA, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 3.2**.

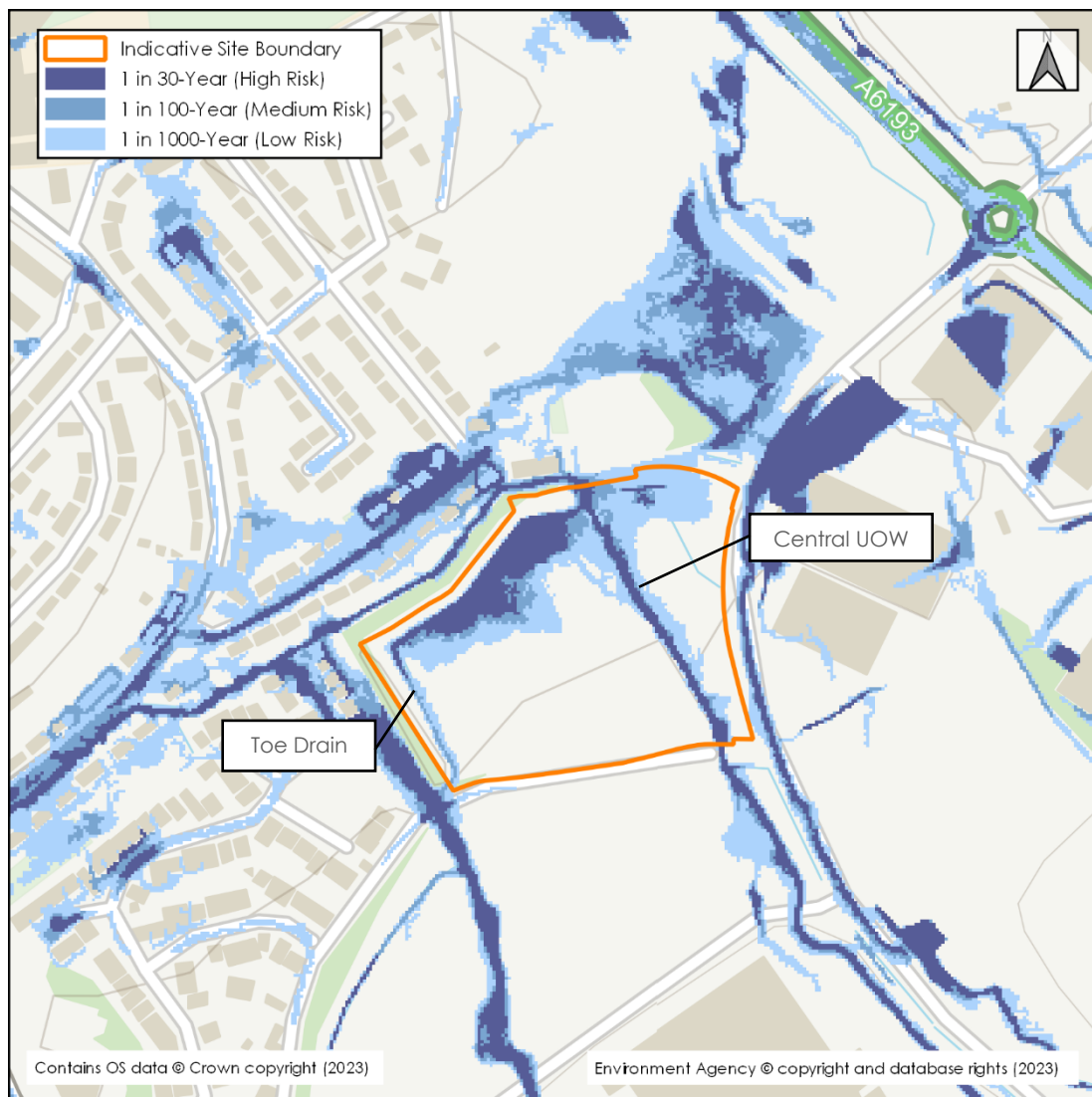


Figure 3.2: EA RoFSW Mapping

- 3.15 The mapping shows a low to high risk flow route aligned with the UOW which is predominately relatively confined to areas close to the channel. Where the RoFSW mapping suggests pooling of flows, for example around the northern boundary of the site, this appears to correlate with the baseline modelled floodplain extents shown in **Figure 3.1**.
- 3.16 A second area of low to high risk is located around the northern and western boundaries and appears to be associated with ponding of surface water at the toe of the raised area shown in the site topographical survey (**Appendix 1**). In the 1 in 100-year design event, surface water depths of up to 900mm are shown in this part of the north and west of the site. There is also a Low to Significant hazard rating (**Section 2**) shown in this part of the site in the 1 in 100-year design event.
- 3.17 The site access and egress route onto John Milne Avenue to the east is at low to high risk of surface water flooding. The risk is likely to be overemphasised as the RoFSW mapping does not consider the existing highway drainage. A review of the detailed mapping indicates depths of 300mm from the proposed access and continuing to the

south in the 1 in 100-year design event. The hazard rating is Low to Moderate (**Section 2**) from the proposed access and along the highway to south in the 1 in 100-year design event.

- 3.18 The Level 1 SFRA mapping does not indicate any historical flooding or surface water hotspots at the site.
- 3.19 Therefore, overall the site is considered to be at high risk of flooding from pluvial sources. Mitigation measures are summarised in **Section 4**.

Flood Risk from Canals

- 3.20 The CRT generally maintains canal levels using reservoirs, feeders and boreholes and manages water levels by transferring it within the canal system.
- 3.21 Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.
- 3.22 Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.
- 3.23 The Rochdale Canal is located approximately 750m northwest of the site. EA LiDAR data shows the site is raised at least 2m above the canal; however intervening topography between the site and the Rochdale Canal is located 6m above the waterway.
- 3.24 The CRT noted two overtopping events in vicinity of the site at Wellith Lane Bridge and Lock 51 which are located 1.2km northwest and 3.1km southwest of the site. The Level 1 SFRA mapping does not indicate any canal overtopping or breach events within the vicinity of the site.
- 3.25 Therefore, the site is considered to be at low risk from canal sources.

Groundwater Flood Risk

- 3.26 Groundwater flooding occurs when the water table rises above ground elevations, or it rises to depths containing basement level development. It is most likely to happen in low lying areas underlain by permeable geology. This is most common on regional scale chalk aquifers, but there may also be a risk on sandstone and limestone aquifers or on thick deposits of sands and gravels underlain by less permeable strata such as that in a river valley.
- 3.27 The BGS mapping shows the site is underlain by Milnrow Sandstone (Sandstone) in the southwest and Pennine Lower Coal Measures (Mudstone, Siltstone and Sandstone) in the northeast. The site is also expected to be underlain predominantly by Peat

superficial deposits with Hummocky (Moundy) Glacial Deposits (Devensian – Diamicton) in the south and southeast.

- 3.28 The EA classifies the bedrock and superficial deposit layers as Secondary A aquifers which are comprised of permeable layers that can support local water supplies and may form an important source of base flow to rivers.
- 3.29 The online BGS borehole logs of previous excavations include a record of a borehole excavated in the southern portion of the site (ref: SD91SW227), the log does not include any information pertaining to groundwater levels or the depth of the borehole.
- 3.30 Site-specific ground investigations and monitoring have been undertaken by BWB Consulting (Reference: PLK-BWB-ZZ-XX-RP-YE-0003_Ph2). During the excavation of a series of exploratory holes, groundwater was identified in all excavations. This was shown to range between 2.8m below ground level (bgl) to 3.50 m bgl. It is noted that groundwater levels are expected to be seasonal and therefore groundwater levels may be higher at certain times of the year. This is reflected by previous excavations in the area which encountered groundwater at shallow depths of less than 1m bgl.
- 3.31 The Rochdale PFRA and LFRMS include coarse mapping showing the site to be within an area at medium ($\geq 50\% < 75\%$) susceptibility to groundwater flooding.
- 3.32 Therefore, the site is considered at medium risk of flooding from groundwater sources. Appropriate mitigation measures are outlined in **Section 4**.

Flood Risk from Reservoirs & Large Waterbodies

- 3.33 Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.
- 3.34 To help identify this risk, reservoir failure flood risk mapping has been prepared, this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map, **Figure 3.3**, displays a worst-case scenario and is only intended as a guide.
- 3.35 There are two flooding scenarios shown on the reservoir flood maps: a 'dry-day' and a 'wet-day'. The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The 'wet-day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme flood.

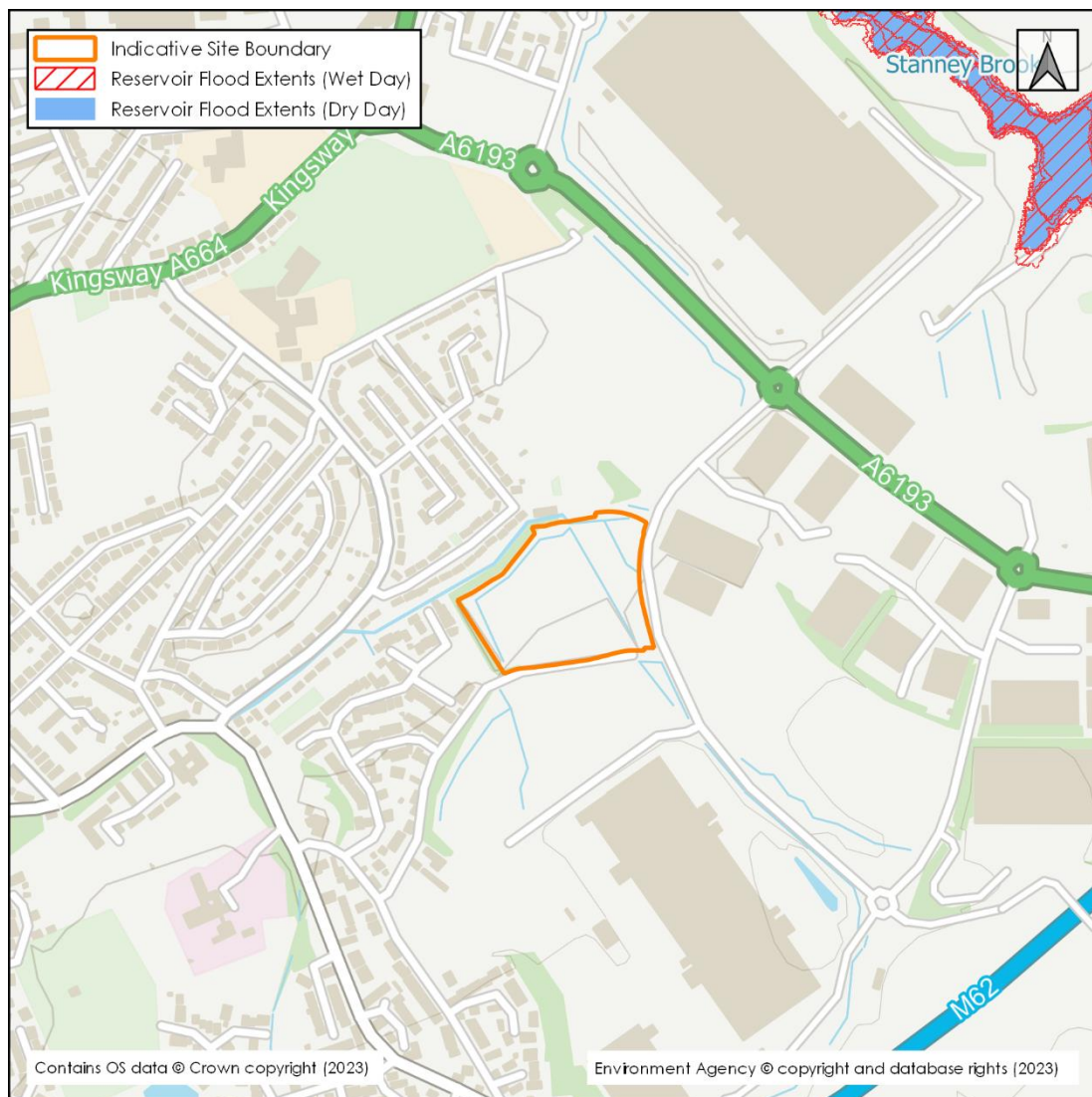


Figure 3.3: Maximum Area at Risk of Flooding in Reservoir Failure Scenario

- 3.36 The site is located more than 600m from the nearest reservoir failure extents and is therefore not considered to be at risk from this source.

Flood Risk from Sewers

- 3.37 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.
- 3.38 United Utilities are the local sewerage undertaker and a copy of their asset records is included as **Appendix 4**. According to the records there are no public sewers within the site boundary. The nearest sewer network is on John Milne Avenue to the east of the site. This includes a 300mm diameter foul water sewer and a 1200mm diameter surface water sewer; however, there is no depth to invert level information for the network in proximity to the site.

- 3.39 The Greater Manchester SWMP includes mapping of the United Utilities DG5 register properties at risk or previously flooded by sewers. The site is located in an area with 11-20 properties on the DG5 register; however, the site is not specifically referenced. The Level 1 SFRA does not indicate any incidents of sewer flooding within the site, there is one reported incident within the nearby residential area, located approximately 400m west of the site. The PFRA mapping of United Utilities DG5 incidents does not include any records within the site itself.
- 3.40 In the event of exceedance of the sewer network in John Milne Avenue, flows are expected to be routed in a north easterly direction, following the local topography. Where levels within the site are lower than John Milne Avenue, there may be a residual risk posed by the source.
- 3.41 Therefore, the site is considered to be at low risk of sewer flooding. Mitigation measures for the residual risk are outlined in **Section 4**.

Effect of Development on Wider Catchment

Impedance of Flood Flows

- 3.42 Prior to mitigation, the proposed development has the potential to displace the floodplain and impede the flow routes at the site. Appropriate mitigation measures are discussed in **Section 4**.

Development Land Use/Drainage Considerations

- 3.43 The proposed development will increase the impermeable area of the site and subsequently surface water run-off which could increase flood risk elsewhere prior to mitigation. Appropriate surface water management is discussed in **Section 4**.

4. FLOOD RISK MITIGATION

- 4.1 **Section 3** has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Sequential Arrangement

- 4.2 The site is sequentially located entirely within Flood Zone 1 according to the EA Flood Map for Planning.

Development and External Levels

- 4.3 The ground should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.
- 4.4 There are areas of low to high surface water flood risk within the site which appear to be partially associated with ponding at the toe of the raised area in the northwest. The proposed development layout should appropriately account for exceedance paths for the surface water flow routes shown to be present on site.

UOW Diversion

- 4.5 The proposals include for the diversion of the UOW through the site. Consultation was undertaken with Rochdale Borough Council as LLFA based on the initial design principles. The LLFA accepted the need to divert the UOW and noted that culverting should be minimised. The plot is part of the wider Kingsway Business Park which received outline planning permission in August 2014 under planning reference 14/00542/OUT. The outline planning application parameters plan defined the extent of development at Plot L. Given the planning history for the site and its location in Flood Zone 1, there is no requirement to offset flood volume.
- 4.6 Hydraulic modelling of the proposed diversion (subject to detailed design) has been undertaken. In summary, the proposals are for the realignment of the existing UOW around the eastern and northern perimeters of the site which is consistent with the approach to the UOW diversion on upstream plots located within the wider Kingsway Business Park. The UOW will enter the site at the south eastern extent within a new culvert (part of an adjoining development) and continue to the existing alignment on the northern site boundary. A new culvert is required for access purposes on the eastern boundary. Sufficient space for maintenance access and vehicles will be provided, including from John Milne Avenue on the eastern boundary.
- 4.7 The post-development modelling has informed the channel geometry for the proposed UOW diversion to ensure that it has the carrying capacity for all modelled events up to the 1 in 100-year + 35% climate change design event. The proposals account for a 600mm freeboard above the 1 in 100-year + 35% climate change design event in all open channel sections to act as additional mitigation for the development plots. The post-development floodplain extents are provided in **Figure 4.1**.

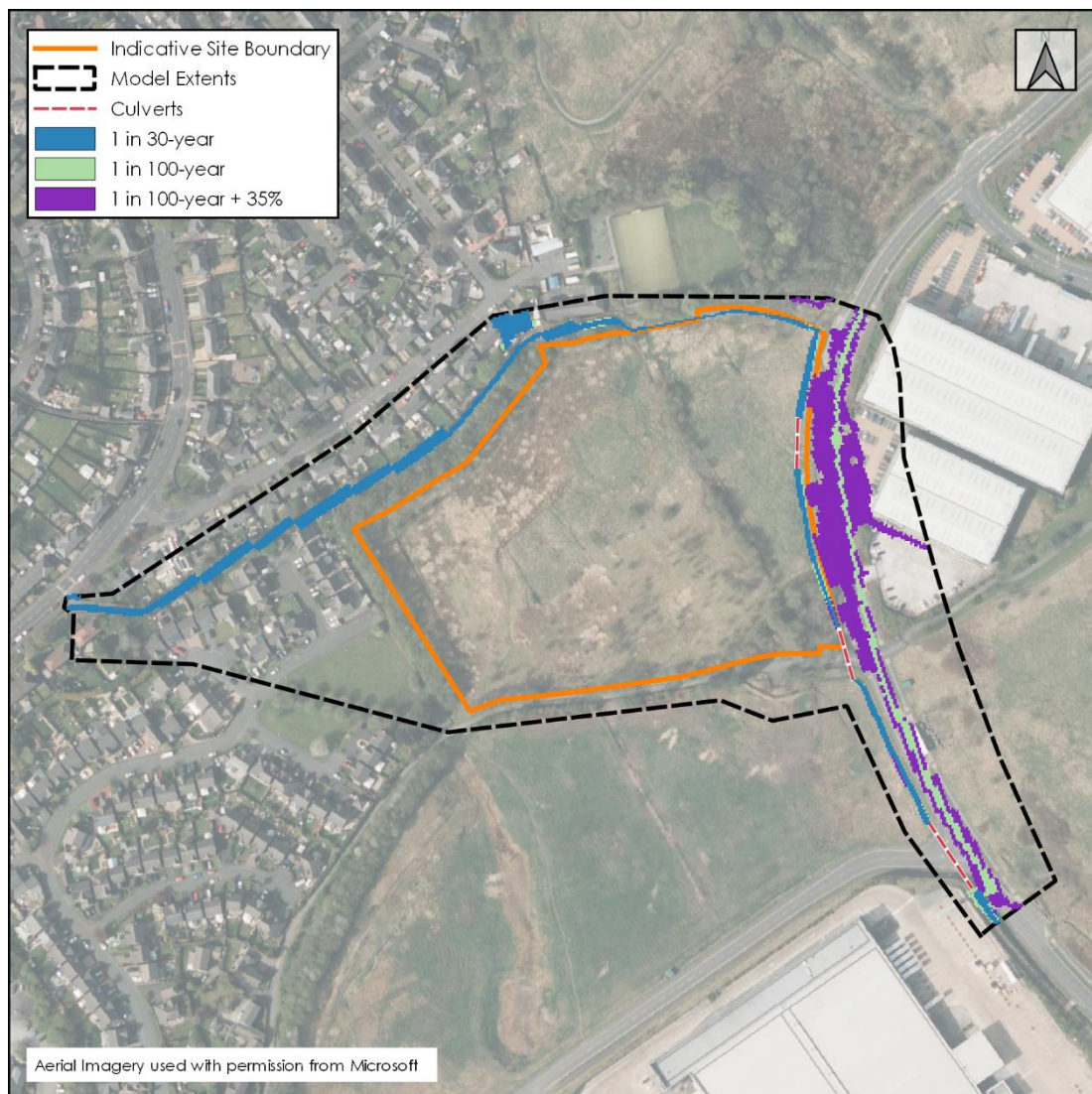


Figure 4.1: Post-Development Floodplain Extents

Safe Access and Egress

- 4.8 The proposed route onto John Milne Avenue to the east of the site is located in Flood Zone 1. There is a low to high risk of surface water flooding around the proposed access and egress; however, in the 1 in 100-year design event depths are less than 300mm and the hazard rating is predominately Low as per the criteria defined within **Section 2** of the report.

Groundwater Considerations

- 4.9 Appropriate design and mitigation will be put in place to manage groundwater. During the construction phase, particularly during excavations, groundwater levels will be monitored, and dewatering should be undertaken as required.

Surface Water Drainage

- 4.10 To mitigate the development's impact on the current runoff regime it is proposed to incorporate surface water management as part of the development proposals.
- 4.11 Further information on the drainage approach, including the North West SuDS Pro Forma, is provided within the accompanying Sustainable Drainage Statement, reference PLK-BWB-ZZ-XX-RP-CD-0001_SDS.
- 4.12 In brief, the development will discharge surface water in accordance with the site-wide approved drainage strategy.
- 4.13 The development should be designed with exceedance in mind and the road network should be used to convey excess overland flows towards the attenuation points.

Foul Water Drainage

- 4.14 It is proposed to drain used water from the development separately to surface water.
- 4.15 Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement, reference PLK-BWB-ZZ-XX-RP-CD-0001_SDS.

5. CONCLUSIONS AND RECOMMENDATIONS

- 5.1 This FRA has been prepared in accordance with requirements set out in the NPPF and the associated Planning Practice Guidance. The FRA has been produced on behalf of Wilson Bowden Developments Ltd in respect of a planning application for an industrial/warehouse development at Plot L, Kingsway Business Park.
- 5.2 This FRA is intended to support a full planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage.
- 5.3 This report demonstrates that the proposed development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented. The identified risks and mitigation measures are summarised within **Table 5.1**:

Table 5.1: Summary of Flood Risk Assessment

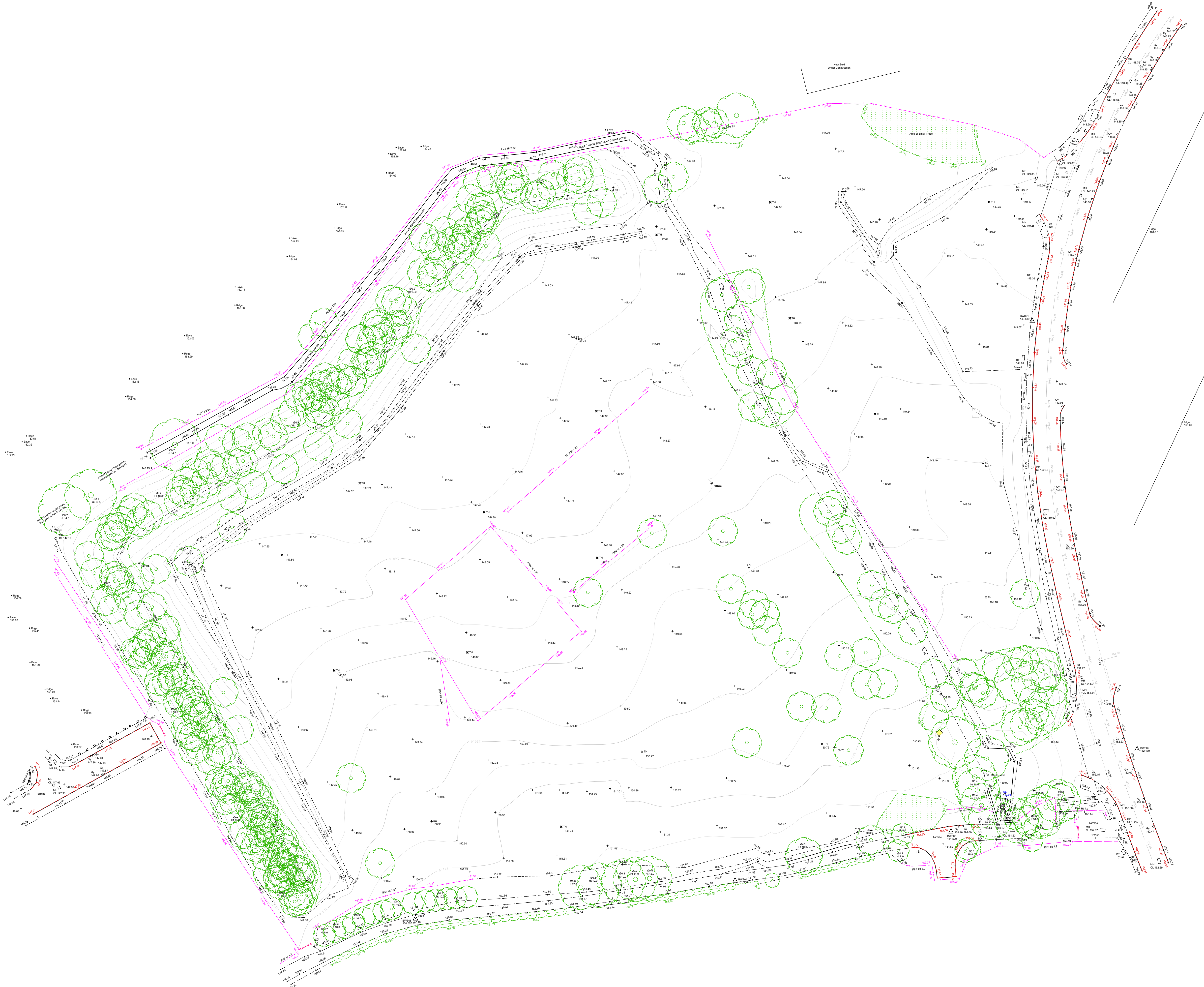
Flood Source	Risk & Proposed Mitigation Measures
Fluvial	The site is located entirely in Flood Zone 1 and is raised above the 1 in 100-year + 35% flood levels associated with the Stanney Brook and Sudden Brook. Hydraulic modelling has shown the site is at risk in the baseline scenario including in the 1 in 100-year + 35% climate change design event. Ground levels should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.
Groundwater	Variations in groundwater level are expected to be influenced by seasonal change. Appropriate design and mitigation will be put in place to manage groundwater. During the construction phase, particularly during excavations, groundwater levels will be monitored, and dewatering should be undertaken as required.
Pluvial runoff	The site is at low to high risk of flooding from surface water sources. The proposed development layout should incorporate exceedance paths for surface water flow routes. The ground should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point.
Other Sources	The site has been assessed against other sources including coastal/tidal, canal, reservoirs and sewers. None of these sources were found to preclude the proposed development and were not considered to require specific mitigation.

Flood Source	Risk & Proposed Mitigation Measures
Impact of the Development	The proposals include for the diversion of the UOW through the site. The proposed modelling has outlined the parameters for the UOW channel design which is designed with carrying capacity for the 1 in 100-year + 35% climate change design event. The proposed development layout should appropriately incorporate exceedance paths for surface water flow routes. Sufficient space for maintenance access and vehicles will be provided, including from John Milne Avenue on the eastern boundary. The development will discharge surface and foul water in accordance with the site wide approved drainage strategy. Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement, reference PLK-BWB-ZZ-XX-RP-CD-0001_SDS.
This summary should be read in conjunction with BWB's full report. It reflects an assessment of the Site based on information received by BWB at the time of production.	

- 5.4 In compliance with the requirements of the NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the site.

APPENDICES

Appendix 1: Topographical Survey



- Notes**
1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
 2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
 3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
 4. Any discrepancies noted on site are to be reported to the engineer immediately.
 5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
 6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
 7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
 8. OS license number: 100022432

Legend

OS Buildings	Contour Lines
Surveyed Buildings	Inspection Chamber
Building	Flow direction and pipe diameter
Wall	Station and Name
Kerb Channel Line	BH 1
Top of Kerb	Monitoring Borehole
Edge of Surface	Tree / Bush / Sapling
Top of Bank	Area of Vegetation/ Canopy / Overhang
Bottom of Bank	Hedge
Overhang	Body of Water
Line Marking	Body of Water from OS
Centre Line	Spot Level
Watercourse	Assumed Surface
Centre Line	Water Drainage Line
Barrier	
Fence	
Gate	
Overhead Powerline	
Overhead Utilities	

AP Anchor Point
BG Back Gully
BO Bollard
BS Bus Stop
BT British Telecom
C Crest
CL Cover Level
CMP Cable Marker
Post
CCTV Security Camera
CTV Cable TV
DC Drainage
DK Drop Kerb
DP Down Pipe
Elec Electric
EP Electricity Post
ER Earth Rod
FH Fire Hydrant
FL Floodlight

FBW Fence Barbed Wire
FCB Fence Closed Board
FCL Fence Chain Link
FEL Fence Electric
FMP Fence Metal Panel
FMR Fence Metal Railing
FOB Fence Open Board
FPW Fence Post & Wire
FSP Fence Steel Palisade
FWM Fence Wire Mesh
FFL Finished Floor Level
FP Flagpole
Gas Gas
GV Gas Valve
GY Gully
Ht Height
IC Inspection Chamber
IFL Internal Floor Level
IL Invert Level
(as a reduced level)

LB Litter Bin
LP Lamp Post
MH Manhole
Mtr Service Marker
PB Post Box
PT Post
RE Rodding Eye
SP Sign Post
ST Stop Tap
SV Stop Valve
TCB Telephone
Call Box
THL Threshold Level
TL Traffic Light
TP Telegraph Post
TS Traffic Signal
UTS Unable to Survey
WVL Water Level
WM Water Meter
WO Wash Out

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	391454.861	411706.756	149.589
BWB02	391482.874	411592.411	152.139
BWB03	391433.218	411570.488	151.520
BWB04	391375.614	411557.371	151.956
BWB05	391290.356	411547.259	150.507

P1	20.02.23	First Issue	DS	SS
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

BWB
A CAF GROUP COMPANY

■ Birmingham | 0121 233 3322
□ Leeds | 0113 233 8000
□ London | 020 7407 3879
□ Manchester | 0161 233 4260
□ Nottingham | 0115 924 1100
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Client

**Wilson Bowden
Developments Ltd**

Project Title

**Plot L Kingsway,
Rochdale**

Drawing Title

Existing Site 2D Model

Drawn:	D.Smith	Reviewed:	S.Shreeves
BWB Ref:	222009	Date:	20.02.23
Scale@A1:	1:500		
Infomation			
Project - Originator - Zone - Level - Type - Role - Number	Status	Rev	
PLK-BWB-00-ZZ-DR-G-0001	S2	P1	

Appendix 2: NPPF Flood risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classifications (recreated from the NPPF Planning Practise Guidance)

Vulnerability Classification	Description
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 infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood. • Wind turbines. • Solar farms.
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. • Car parks.
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 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.

Flood Zone Compatibility (recreated from the NPPF Planning Practise Guidance)

Flood Zone	Vulnerability Classification				
	Essential infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 1 (Low Probability)	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate
Flood Zone 2 (Medium Probability)	Development is appropriate	To be deemed appropriate an exception test is required to demonstrate: - The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk - the sustainability benefits of the development to the community outweigh the flood risk.	Development is appropriate	Development is appropriate	Development is appropriate
Flood Zone 3a (High Probability)	To be deemed appropriate an exception test is required to demonstrate: The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk the sustainability benefits of the development to the community outweigh the flood risk. Additionally, essential infrastructure should be designed and constructed to remain operational and safe in times of flood.	Development should not be permitted	To be deemed appropriate an exception test is required to demonstrate: - The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk - the sustainability benefits of the development to the community outweigh the flood risk.	Development is appropriate	Development is appropriate

Flood Zone	Vulnerability Classification				
	Essential infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Flood Zone 3b (The Functional Floodplain)	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk. Additionally, development 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.	Development should not be permitted	Development should not be permitted	Development should not be permitted	Development is appropriate if 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.

Appendix 3: EA Product 4 Information

Detailed Flood Map Centred on Lower Lane, Rochdale, OL16 4RR. Created 13/02/2023 [GMMC298018JP]



1:10,001



Legend

- Site Location
- Rochdale & Littleborough 2013
- Sudden Brook 2007
- Main River
- Flood Zone 3
- Flood Zone 2

Map Reference	Model Node Reference	Easting	Northing	Data	Undertended						Defended							
					5 % AEP (1 in 20 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)	5 % AEP (1 in 20 year)	1.33 % AEP (1 in 75 year)	1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.5 % AEP (1 in 200 year)	0.1 % AEP (1 in 1000 year)
1	ea013_0180_STAY_0915	392049	412197	Modelled Water Level (m aodN)	144.57	144.60	144.61	144.63	144.65	144.63	144.76	144.57	144.60	144.61	144.63	144.65	144.63	144.76
				Modelled Flow (cumecs)	2.06	3.00	3.30	4.08	5.13	4.03	7.98	2.06	3.00	3.30	4.08	5.13	4.03	7.99
2	ea013_0180_STAY_0619	391860	412360	Modelled Water Level (m aodN)	142.25	142.36	142.39	142.47	142.54	142.47	142.67	142.25	142.36	142.39	142.47	142.54	142.47	142.67
				Modelled Flow (cumecs)	2.03	2.80	3.03	3.56	4.27	3.54	6.32	2.03	2.80	3.03	3.55	4.26	3.53	6.49
3	ea013_0180_STAY_0346	391716	412535	Modelled Water Level (m aodN)	140.21	140.26	140.27	140.29	140.31	140.29	140.41	140.21	140.26	140.27	140.29	140.31	140.29	140.42
				Modelled Flow (cumecs)	1.97	2.60	2.76	3.20	3.61	3.11	4.78	1.97	2.60	2.76	3.20	3.60	3.11	4.76

Model data taken from Rochdale and Littlebough 2013

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

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

Map Reference	Model Node Reference	Easting	Northing	Data	Undertended			
					1 % AEP (1 in 100 year)	1 % AEP (1 in 100 year) + 35% increase in flow	1 % AEP (1 in 100 year) + 70% increase in flow	0.1 % AEP (1 in 1000 year)
4	ea013_Model_SUDX02_00012	390480	411347	Modelled Water Level (m aodN)	140.06	140.28	140.47	140.55
				Modelled Flow (cumecs)	4.78	6.45	8.11	9.25
5	ea013_Model_SUDX02_00017	390492	411526	Modelled Water Level (m aodN)	136.38	136.75	137.76	138.57
				Modelled Flow (cumecs)	4.79	6.45	8.08	9.12
6	ea013_Model_SUDX02_00018	390382	411692	Modelled Water Level (m aodN)	134.88	135.88	136.81	137.34
				Modelled Flow (cumecs)	4.77	6.33	7.89	9.04

Model data taken from Sudden Brook 2007

AEP - Annual Exceedence Probability

m aodN - metres above ordnance datum Newlyn

cumecs - cubic metres per second

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

Appendix 4: United Utilities Sewer Records

BWB Consulting Limited

**35
Station Street,
Nottingham, Nottinghamshire
NG2 3DQ**

FAO:

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

**Your Ref: LDA2943
Our Ref: UUPS-ORD-255717
Date: 08/03/2021**

Dear Sirs

Location: Plot J2 Kingsway Business Park

I acknowledge with thanks your request dated 02/03/2021 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,



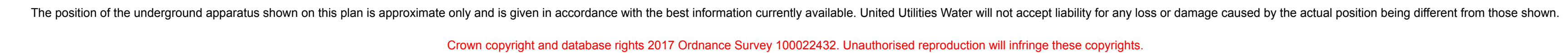
Karen McCormack
Property Searches Manager

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)".

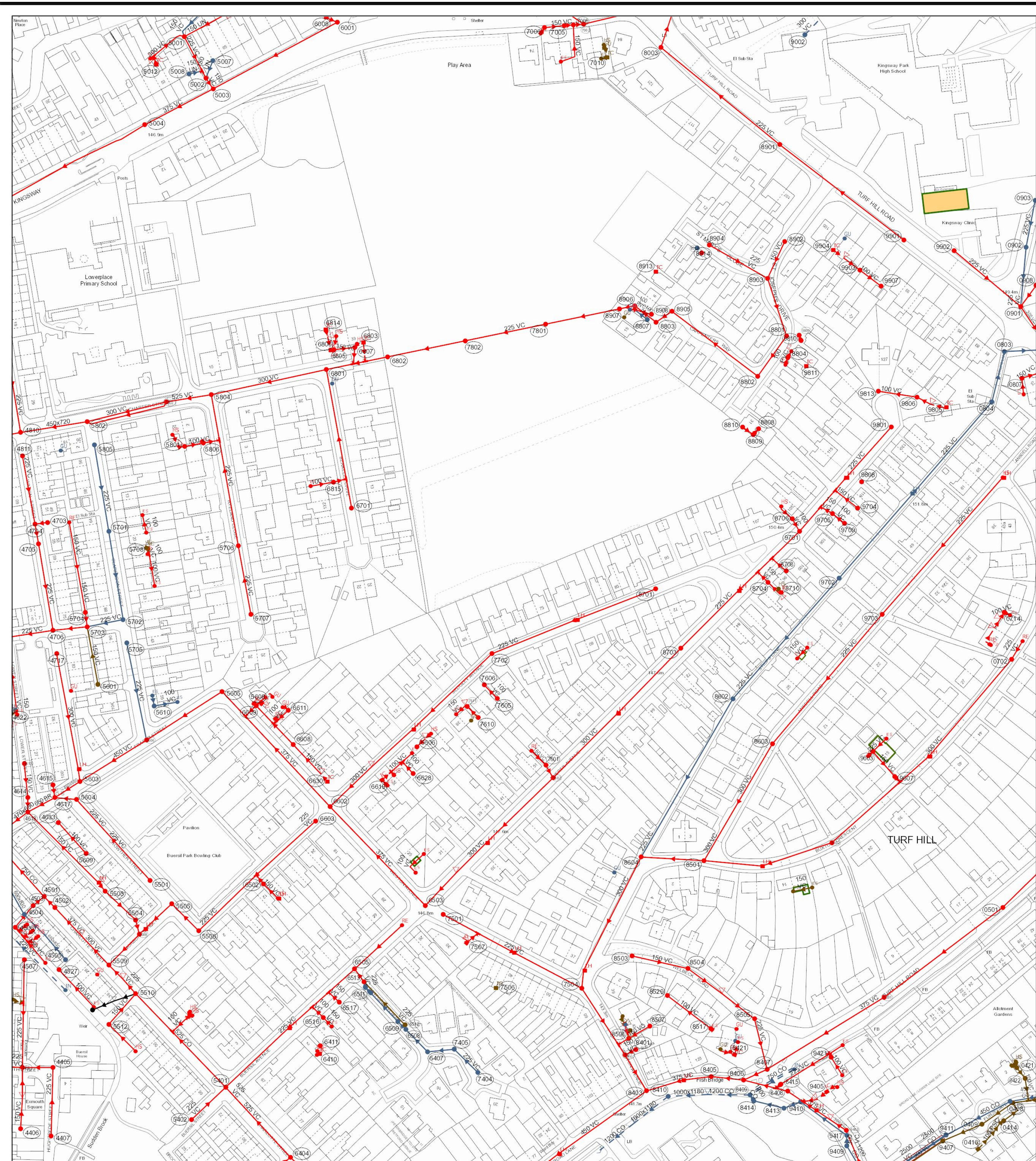
TERMS AND CONDITIONS:

- 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.

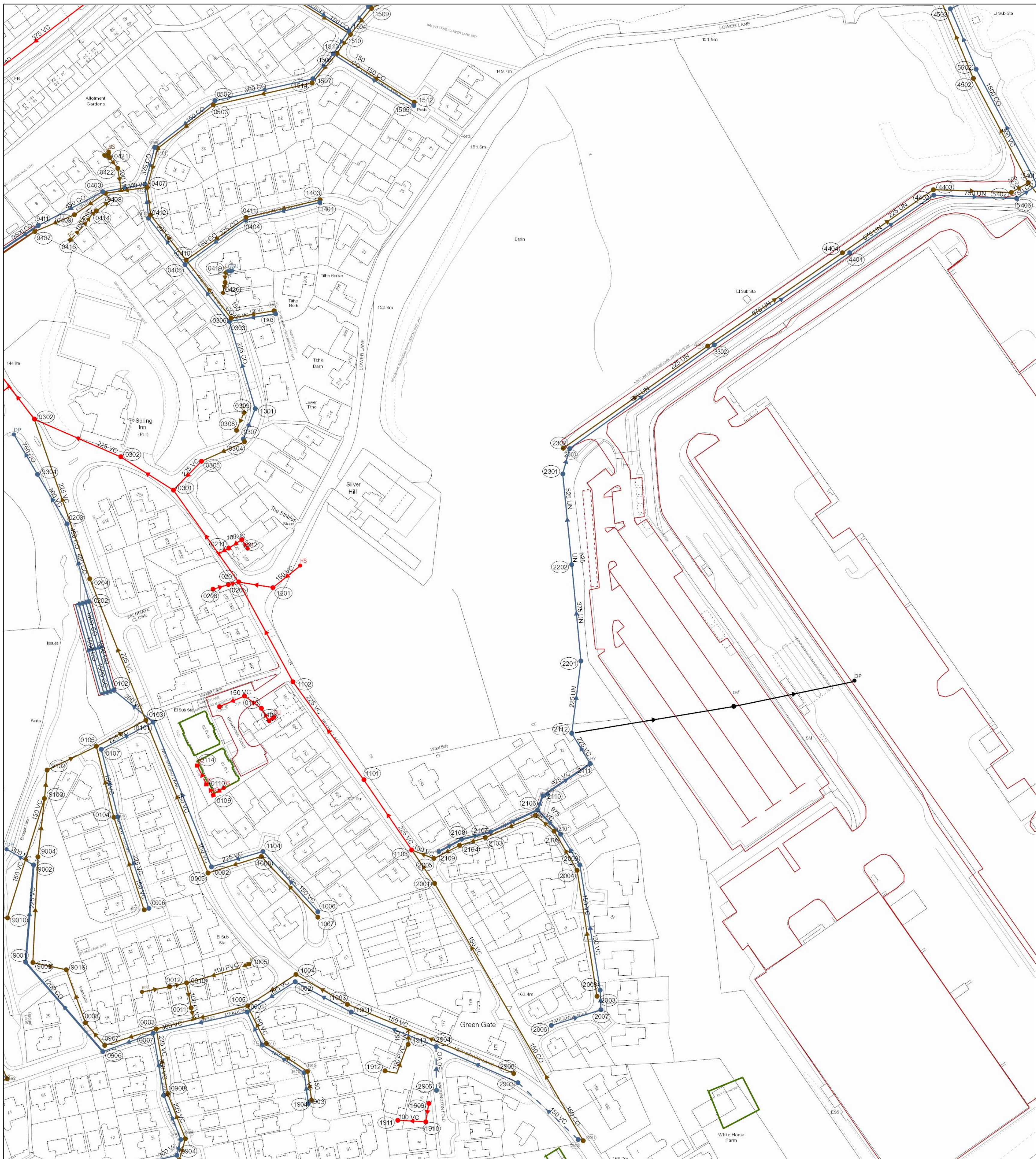


**SEWER
RECORDS**

 **United
Utilities**



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7602	148.02	CO	144.92	300			VC	75.66527	1 in 81
7405		SW	0	225			VC	14.83008	
7405		VC	0	225			VC	14.83008	
9406		SW	140.93	1200			CO	25.04032	1 in 235
6509		CO	0	150			VC	21.94175	
6509		SW	0	1200			CO	21.94175	
7008		SW	0	150			CO	6.764916	
6511		SW	0	225			VC	3.354311	
8402		CO	0	300			VC	23.32381	
8402		CO	0	300			VC	23.32381	
8602	150.25	VC	148.16	225			VC	101.7104	1 in 1271
0807		CO	0	150			VC	10.5209	
0807		VC	0	150			VC	10.5209	
8801	148.12	CO	143.84	225			VC	27.47803	1 in 98
8607		SW	0	150			VC	4.148784	
8705		CO	0	150			VC	7.595233	
6602	145.82	CO	142.62	375			VC	67.72685	1 in 33
8701	150.42	VC	147.39	225			VC	92.5384	1 in 80
8902	148.27	CO	146.8	150			VC	22.6324	1 in 8
9417		CO	0	150			VC	31.54424	1 in 210
9417		SW	140.8	1200			CO	31.54424	1 in 210
5510	140.52	VC	138.61	225			VC	10.63015	1 in 39
5510	140.52	VC	138.61	225			VC	10.63015	1 in 39
9703	152.82	CO	149.56	225			VC	84.36631	1 in 41
6609		SW	0	150			VC	8.449615	
6407		SW	0	225			VC	17.36787	
8505	144.26	CO	140.7	225			VC	28.86174	1 in 66
8505	144.26	CO	140.7	225			VC	28.86174	1 in 66
0414		FO	0	100			PVC	14.58884	
0414		FO	0	100			PVC	14.58884	
0414		FO	0	100			PVC	14.58884	
0414		FO	0	100			PVC	14.58884	
0908		CO	0	150			PVC	14.58884	
0908		CO	0	150			PVC	14.58884	
8517		CO	0	100			VC	30.31561	
8517		CO	0	100			VC	30.31561	
8507	149.52	SW	147.22	150			UN	10.41356	1 in 118
6603	145.46	CO	142.31	225			VC	89.15154	1 in 27
8603	146.78	VC	143.59	375			VC	76.39062	1 in 81
8806		CO	0	150			VC	21.74045	
8806		CO	0	150			VC	21.74045	
8803	145.22	CO	142.76	225			VC	15.02855	1 in 63
3703	143.37	CO	142.1	300			VC	101.1212	1 in 79
4810	140.95	CO	136.69	470			BR	21.37756	
0408		FO	0	100			VC	20.84793	1 in 149
0408		FO	0	100			VC	20.84793	1 in 149
0408		FO	0	100			VC	20.84793	1 in 149
0408		FO	0	100			VC	20.84793	1 in 149
9409		SW	140.82	300			VC	5.90783	1 in 295
9409		SW	140.82	300			VC	5.90783	1 in 295
9801	151.39	CO	148.8	225			VC	77.23551	1 in 58
7811		VC	0	150			VC	1.042587	
6811		CO	0	100			VC	11.12245	
0902	148.8	SW	145.28	225			VC	33.13068	
0902	148.8	SW	145.28	225			VC	33.13068	
5901	149.12	CO	147.13	225			VC	55.27602	1 in 86
5901	149.12	CO	147.13	225			VC	55.27602	1 in 86
5505	141.61	CO	138.37	225			VC	24.75093	
7605		CO	0	100			VC	10.32885	
0804	150.8	SW	148.48	225			VC	28.86174	1 in 43
8803	141.64	CO	138.14	300			VC	40.32416	1 in 73
7605		CO	0	100			VC	10.32885	
6502	143.93	CO	142.82	150			VC	4.03124	1 in 3
8413		FO	0	100			VC	17.25203	1 in 246
0402		FO	0	100			VC	12.55899	
0402		FO	0	100			VC	12.55899	
0402		FO	0	100			VC	12.55899	
0402		FO	0	100			VC	12.55899	
5004	146.77	CO	143.63	375			VC	101.2279	1 in 32
8803	146.37	CO	143.63	375			VC	101.2279	1 in 32
4404	139.3	CO	136.75	225			VC	20.02486	1 in 167
4404	139.3	CO	136.75	225			VC	20.02486	1 in 167
0402		SW	143.16	450			CO	23.65433	1 in 394
0402		SW	143.16	450			CO	23.65433	1 in 394
6508		SW	0	300			VC	6.229615	
6508		SW	0	300			VC	6.229615	
6508		SW	0	300			VC	6.229615	
8602	143.59	CO	141.22	225			VC	34.79742	1 in 39
8706		CO	0	100			VC	8.005173	
4503	138.68	CO	136.9	100			VC	7.81025	
5001	150.36	CO	148.34	225			VC	25.94224	1 in 22
8906	145.14	CO	142.82	225			VC	8.64521	
7610		CO	0	100			VC	8.793706	
0501	144.25	CO	141.35	375			VC	82.80086	1 in 45
0501	144.25	CO	141.35	375			VC	82.80086	1 in 45
4406	139.56	CO	136.9	100			VC	17.02939	1 in 30
4406	139.56	CO	136.9	100			VC	17.02939	1 in 30
8504	145.01	CO	142.13	150			VC	17.02939	1 in 30
8504	145.01	CO	142.13	150			VC	17.02939	1 in 30
9403	143.17	CO	140.33	300			VC	23.00885	1 in 62
9403	143.17	CO	140.33	300			VC	23.00885	1 in 62
7504	143.57	CO	140.33	300			VC	10.37707	1 in 43
7504	143.57	CO	140.33	300			VC	10.37707	1 in 43
4405	139.31	CO	136.93	225			VC	44.10215	
4405	139.31	CO	136.93	225			VC	44.10215	
4405	139.31	CO	136.93	225			VC	44.10215	
4405	139.31	CO	136.93	225			VC	44.10215	
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
0403		SW	143.1	450			CO	40.11459	1 in 401
4717	139.15	CO	136.75	300			VC	72.18355	1 in 71
8409	142.21	SW	140.27	1200			VC	23.56172	1 in 337
8409	142.21	SW	140.27	1200			VC	23.56172	1 in 337
7601	145.15	VC	146.93	150			VC	8.602589	1 in 5
8003	148.03	CO	146.11	225			VC	22.13594	1 in 89
8407	145.89	SW	137.59	150			VC	20.39698	
6807		VC	0	150			VC	9.191045	
6305		CO	0	525			VC	77.55431	
8604		CO	0	150			VC	80.71154	
5512		CO	0	150			VC	22.67157	
5512		CO	0	150			VC	22.67157	
8807		SW	140.65	1200			PVC	9.050379	
9410		SW	140.65	1200			VC	9.050379	1 in 124
9410		SW	140.65	1200			VC	9.050379	1 in 124
9410		SW	140.65	1200			VC	9.050379	1 in 124
4505	139.12	SW	136.23	660			BR	17.02939	1 in 122
4505	139.12	SW	136.23	660			BR	17.02939	1 in 122
0407		FO	0	100			VC	23.24899	1 in 155
0407		FO	0	100			VC	23.24899	1 in 155
0702	151.68	CO	148.89	300			PVC	9.774221	1 in 118
0702	151.68	CO	148.89	300			PVC	9.774221	1 in 118
9608		VC	0	150			VC	29.89898	
5705	140.64	SW	138.8	225			VC	55.10889	1 in 70
5803	141.64	CO	138.14	300			VC	49.99964	1 in 214
0903	140.43	SW	145.82	225			VC	26.4764	1 in 42
0903	140.43	SW	145.82	225			VC	26.4764	1 in 42
5509	139.95	CO	136.31	300			VC	21.53171	1 in 40
5509	139.95	CO	136.31	300			VC	21.53171	1 in 40
5802	141.87	CO	137.52	450			VC	37.43233	1 in 45
0421		FO	0	100			VC	7.49179	
0421		FO	0	100			VC	7.49179	
0421		FO	0	100			VC	7.49179	
0421		FO	0	100			VC	7.49179	
0907		CO	0	150			VC	12.23486	
5604	138.7	CO	136.91	225			PVC	3.152436	
9901	150.27	CO	148.29	225			VC	87.00574	1 in 76
8503	145.32	CO	142.74	150			VC	31.7895	1 in 53
8503	145.32	CO	142.74	150			VC	31.7895	1 in 53
4705	140.11	CO	137.46	225			VC	48.6621	1 in 63
7404		SW	0	225			VC	18.36441	
7404		SW	0	225			VC	18.36441	
5002	148.07	CO	146.84	150			VC	7.211002	
5512		FO	0	225			VC	33.16039	
5512		FO	0	225			VC	33.16039	
8405	142.08	CO	139.48	375			VC	37.00513	1 in 119
8405	142.08	CO	139.48	375			VC	37.00513	1 in 119
5504	140.36	CO	137.79	150			VC	8.246211	
5504	140.36	CO	137.79	150			VC	8.246211	
4615	138.54	CO	136.8	150			VC	7.071068	
4703	140.41	CO	138.79	150			VC	7.071068	
8704		CO	0	100			VC	8.029721	
4502	139.02	CO	135.36	375			VC	8.485281	
8510		SW	0	300			VC	4.151205	
6510		SW	0	300			VC	4.151205	
8401	142.31	CO	140.85	150			VC	6.708204	
8401	142.31	CO	140.85	150	</				



Refo	Cover	Func	Invert	Size x	Size y	Shape	Mat	Length	Grad	Refo	Cover	Func	Invert	Size x	Size y	Shape	Mat	Length	Grad
0902	159.96	SW	157.37	150	150	0	VC	16.88111	1 in 333	4502	FO	157.37	150	150	0	VC	16.88111	1 in 333	
0411	FO	146.08	150	150	0	VC	40.58736	1 in 116	4502	FO	157.37	150	150	0	VC	16.88111	1 in 333		
0411	FO	146.08	150	150	0	VC	40.58736	1 in 116	4502	FO	157.37	150	150	0	VC	16.88111	1 in 333		
1513	FO	144.32	150	150	0	VC	21.407	1 in 143	1007	FO	157.37	150	150	0	VC	16.88111	1 in 333		
1513	FO	144.32	150	150	0	VC	21.407	1 in 143	1007	FO	157.37	150	150	0	VC	16.88111	1 in 333		
1904	FO	150.1	150	150	0	VC	16.033	1 in 203	1101	FO	157.37	150	150	0	VC	16.88111	1 in 333		
0906	SW	154.1	1200	1200	0	VC	65.05999	1 in 203	1007	FO	157.37	150	150	0	VC	16.88111	1 in 333		
0906	SW	154.1	1200	1200	0	VC	65.05999	1 in 203	1007	FO	157.37	150	150	0	VC	16.88111	1 in 333		
8304	SW	0	750	750	0	VC	25.63263	1 in 203	1007	FO	157.37	150	150	0	VC	16.88111	1 in 333		
8304	SW	0	750	750	0	VC	25.63263	1 in 203	1007	FO	157.37	150	150	0	VC	16.88111	1 in 333		
1403	FO	148.08	150	150	0	VC	41.84739	1 in 21	1006	SW	0	225	225	0	VC	16.88111	1 in 333		
1403	FO	148.08	150	150	0	VC	41.84739	1 in 21	1006	SW	0	225	225	0	VC	16.88111	1 in 333		
0307	SW	152.75	225	225	0	VC	17.85656	1 in 31	0204	FO	0	225	225	0	VC	16.88111	1 in 333		
0201	VC	153.029	160	160	0	VC	17.85656	1 in 31	0204	FO	0	225	225	0	VC	16.88111	1 in 333		
0909	SW	152.91	150	150	0	VC	35.07051	1 in 125	1545	SW	150.3	1500	1500	0	VC	16.88111	1 in 333		
1911	FO	144.72	150	150	0	VC	72.75096	1 in 102	1545	SW	150.3	1500	1500	0	VC	16.88111	1 in 333		
2101	SW	158.36	150	150	0	VC	13.28811	1 in 166	0203	SW	0	225	225	0	VC	16.88111	1 in 333		
0003	SW	157.51	225	225	0	VC	29.93069	1 in 36	0203	SW	0	225	225	0	VC	16.88111	1 in 333		
1103	SW	157.78	225	225	0	VC	46.76286	1 in 22	19103	SW	154.45	150	150	0	VC	16.88111	1 in 333		
2005	SW	150.39	150	150	0	VC	24.26135	1 in 11	19103	SW	154.45	150	150	0	VC	16.88111	1 in 333		
0306	FO	150.39	150	150	0	VC	45.76964	1 in 9	4402	SW	151.32	750	750	0	VC	16.88111	1 in 333		
2112	SW	157	225	225	0	VC	40.09301	1 in 40.486458	4402	SW	151.32	750	750	0	VC	16.88111	1 in 333		
0413	FO	144.8	150	150	0	VC	15.32846	1 in 9	4402	SW	151.32	750	750	0	VC	16.88111	1 in 333		
0413	FO	144.8	150	150	0	VC	15.32846	1 in 9	4402	SW	151.32	750	750	0	VC	16.88111	1 in 333		
1504	SW	144.75	300	300	0	VC	15.48764	1 in 258	10116	FO	0	150	150	0	VC	16.88111	1 in 333		
1504	SW	144.75	300	300	0	VC	15.48764	1 in 258	10116	FO	0	150	150	0	VC	16.88111	1 in 333		
1006	SW	0	150	150	0	VC	45.0378	1 in 154	10116	FO	0	150	150	0	VC	16.88111	1 in 333		
1006	SW	0	150	150	0	VC	45.0378	1 in 154	10116	FO	0	150	150	0	VC	16.88111	1 in 333		
1506	SW	144.69	300	300	0	VC	17.76127	1 in 254	1514	FO	144.17	150	150	0	VC	16.88111	1 in 333		
1506	SW	144.69	300	300	0	VC	17.76127	1 in 254	1514	FO	144.17	150	150	0	VC	16.88111	1 in 333		
5403	FO	0	300	300	0	VC	47.72846	1 in 254	1514	FO	144.17	150	150	0	VC	16.88111	1 in 333		
5403	FO	0	300	300	0	VC	47.72846	1 in 254	1514	FO	144.17	150	150	0	VC	16.88111	1 in 333		
1901	SW	0	225	225	0	VC	20.0131	1 in 254	1514	FO	144.17	150	150	0	VC	16.88111	1 in 333		
1901	SW	0	225	225	0	VC	20.0131	1 in 254	1514	FO	144.17	150	150	0	VC	16.88111	1 in 333		
0909	FO	152.61	225	225	0	VC	26.60524	1 in 169.928983	15406	SW	150.81	750	750	0	VC	16.88111	1 in 333		
4404	FO	152.61	225	225	0	VC	11.11433	1 in 169.928983	15406	SW	150.81	750	750	0	VC	16.88111	1 in 333		
1002	SW	159.63	225	225	0	VC	31.34664	1 in 47	10107	SW	0	225	225	0	VC	16.88111	1 in 333		
1003	CO	0	160	160	0	VC	32.92714	1 in 145	10107	SW	0	225	225	0	VC	16.88111	1 in 333		
2102	SW	158.74	150	150	0	VC	30.44789	1 in 145	2111	SW	159.32	SW	0	225	225	0	VC	16.88111	1 in 333
1902	SW	158.74	150	150	0	VC	30.44789	1 in 145	2111	SW	159.32	SW	0	225	225	0	VC	16.88111	1 in 333
1104	SW	0	225	225	0	VC	29.65007	1 in 145	10401	SW	143.32	375	375	0	VC	16.88111	1 in 333		
0405	SW	147.01	300	300	0	VC	22.53988	1 in 17	0421	FO	100	100	100	0	VC	16.88111	1 in 333		
0104	VC	152.21	150	150	0	VC	46.16231	1 in 18	0421	FO	100	100	100	0	VC	16.88111	1 in 333		
0104	VC	152.21	150	150	0	VC	46.16231	1 in 18	0421	FO	100	100	100	0	VC	16.88111	1 in 333		
0302	SW	146.72	225	225	0	VC	51.94846	1 in 18	0206	CO	0	150	150	0	VC	16.88111	1 in 333		
0101	SW	149.26	150	150	0	VC	27.8612	1 in 12	09010	SW	152.83	150	150	0	VC	16.88111	1 in 333		
1505	SW	149.26	150	150	0	VC	52.75459	1 in 12	09010	SW	152.83	150	150	0	VC	16.88111	1 in 333		
1505	SW	149.26	150	150	0	VC	52.75459	1 in 12	09010	SW	152.83	150	150	0	VC	16.88111	1 in 333		
2303	UN	153.15	225	225	0	VC	97.56244	1 in 12	09010	SW	152.83	150	150	0	VC	16.88111	1 in 333		
1401	SW	149.33	225	225	0	VC	42.1358	1 in 21	19001	SW	157.08	SW	153.78	1200	1200	0	VC	16.88111	1 in 333
1401	SW	149.33	225	225	0	VC	42.1358	1 in 21	19001	SW	157.08	SW	153.78	1200	1200	0	VC	16.88111	1 in 333
2302	UN	153.15	225	225	0	VC	97.56244	1 in 12	09010	SW	152.83	150	150	0	VC	16.88111	1 in 333		
1509	SW	144.63	150	150	0	VC	18.38768	1 in 80	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
1509	SW	144.63	150	150	0	VC	18.38768	1 in 80	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0414	FO	147.01	300	300	0	VC	14.58994	1 in 80	09003	FO	0	225	225	0	VC	16.88111	1 in 333		
0414	FO	147.01	300	300	0	VC	14.58994	1 in 80	09003	FO	0	225	225	0	VC	16.88111	1 in 333		
0414	FO	147.01	300	300	0	VC	14.58994	1 in 80	09003	FO	0	225	225	0	VC	16.88111	1 in 333		
0414	FO	147.01	300	300	0	VC	14.58994	1 in 80	09003	FO	0	225	225	0	VC	16.88111	1 in 333		
1903	SW	0	150	150	0	VC	16.99984	1 in 149	09006	SW	148.88	CO	143.85	225	225	0	VC	16.88111	1 in 333
1903	SW	0	150	150	0	VC	16.99984	1 in 149	09006	SW	148.88	CO	143.85	225	225	0	VC	16.88111	1 in 333
5401	VC	0	300	300	0	VC	65.11729	1 in 183	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
5401	VC	0	300	300	0	VC	65.11729	1 in 183	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
5401	VC	0	300	300	0	VC	65.11729	1 in 183	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
5401	VC	0	300	300	0	VC	65.11729	1 in 183	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
2103	SW	158.07	150	150	0	VC	14.63457	1 in 183	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
9102	SW	151.75	225	225	0	VC	30.10442	1 in 188	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
9102	SW	151.75	225	225	0	VC	30.10442	1 in 188	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0105	CO	0	225	225	0	VC	30.80777	1 in 188	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0105	CO	0	225	225	0	VC	30.80777	1 in 188	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0211	CO	0	100	100	0	VC	6.453387	1 in 84	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0202	SW	144.05	300	300	0	VC	41.14147	1 in 64	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0202	SW	144.05	300	300	0	VC	41.14147	1 in 64	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0907	SW	156.88	225	225	0	VC	16.23012	1 in 22	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0907	SW	156.88	225	225	0	VC	16.23012	1 in 22	09002	SW	155.74	SW	0	225	225	0	VC	16.88111	1 in 333
0908	FO	0	225	225	0	VC	36.32224	1 in 22	09002	SW	155.74	SW	0	225	225	0	VC	1	



Rhino	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0903	148.43	SW	145.92	225			VC	26.4764	1 in 42
0903	148.43	SW	145.92	225			VC	26.4764	1 in 42
1805	147.83	SW	145.75	225			VC	58.25805	1 in 100
1514		FO	144.17	150			CO	55.57507	1 in 113
1514		FO	144.17	150			CO	55.57507	1 in 113
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
5406	154.36	SW	150.81	750			CO	13.52622	
2704	147.55	CO	145.14	225			VC	38.28838	1 in 120
0401		SW	143.32	375			CO	21.03662	1 in 234
0401		SW	143.32	375			CO	21.03662	1 in 234
0421		FO	100				VC	7.46179	
0421		FO	100				VC	7.46179	
0421		FO	100				VC	7.46179	
0901	149.75	CO	0	300			VC	28.84441	
0901	149.75	CO	0	300			VC	28.84441	
2801	149.66	CO	148.19	225			VC	16.12452	1 in 67
1710		CO	100				VC	10.97064	
0906		CO	100				VC	17.7427	
1607		CO	150				VC	2.514988	
1601	146	CO	143.06	300			VC	84.477163	1 in 106
1604		CO	150				VC	13.96628	
2703	146.54	CO	143.37	300			VC	71.05113	1 in 237
2803	148.75	CO	145.66	225			VC	65.16202	1 in 56
2703		CO	150				VC	9.220907	
2722		CO	150				VC	12.45645	
0714		CO	100				VC	3.546553	
0714		CO	100				VC	3.546553	
4002		SW	750				CO	26.26324	
4002		SW	750				CO	26.26324	

LEGEND

Abandoned
Foul
Surface Water
Combined

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:

Plot J2 Kingsway Business Park,

OS sheet SD9111NW

Number:

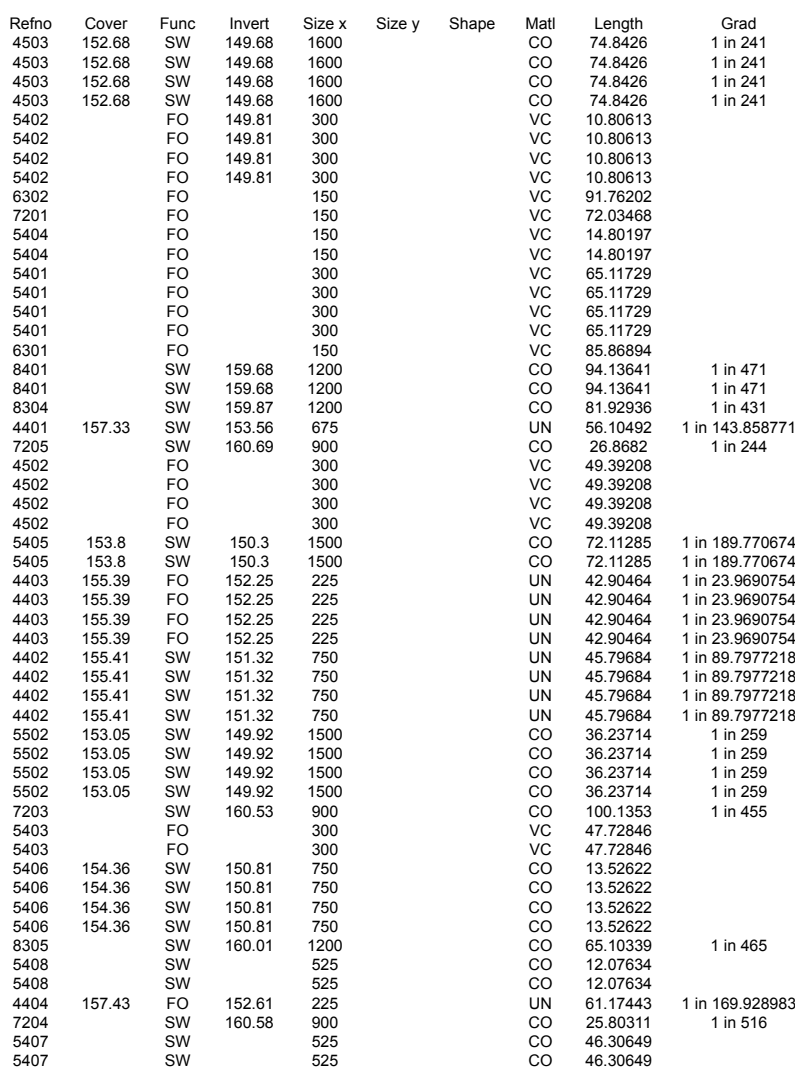
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Nodes: 233

Sheet: 4 of 6

Date: 08/03/2022

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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 | Surfa |
| CO | Comb |
| OV | Overfl |

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:

Plot J2 Kingsway Business Park.

OS sheet SD9111SE
Number:
Scale: 1:1250 Date: 08/03/2021
Nodes: 54
Sheet: 5 of 6

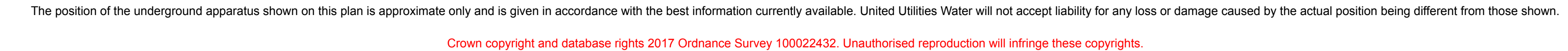
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SEWER RECORDS



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

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United Utilities
Water for the North West

