

ENVIRONMENT

Wilson Bowden Developments Ltd
Plot J2, Kingsway Business Park
Rochdale
Flood Risk Assessment

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Rochdale
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 the erection of two employment buildings with ancillary office space, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works (approximate grid reference: SD 9135 1149).

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 shown by the Environment Agency's (EA) Flood Map for Planning to be located within Flood Zone 1. However, OS Mapping shows that there are three unnamed ordinary watercourses (UOWs) within the site for which there are no Flood Zones. In the absence of Flood Zones, mapping of surface water flood risk has been used to indicate the flood risk posed by these UOWs; the Eastern UOW; Central UOW; and the north-west UOW. An additional ditch is located along the southern boundary. It does not have wider connectivity and is expected to be a redundant feature, therefore posing a low risk to development.

Surface water flood extents do not align with the Eastern UOW, which is understood to be due to the re-alignment of the watercourse as part of proposals for the wider development, as reinforced by observations during a site visit. These realignment activities are understood to have affected the Central UOW, such that the channel no longer conveys flows, with the flood risk it poses originating from potential ponding of surface water within the redundant valley form in the site. Similarly, the flood risk associated with the north-western watercourse is understood to originate on-site.

The Earthworks strategy for the site is expected to provide a level of mitigation to the flood risk posed by the UOWs through the raising of levels along the eastern boundary of at least 3m. This will involve raising the site such that the on-site topographical depressions associated with the north-west UOW and the former channel of the Central UOW are infilled, thus mitigating the flood risk associated with these features. To provide a level of mitigation from the Eastern UOW, a minimum set-back of 8m from top of bank is recommended. A small number of parking spaces are nominally within this zone; however, access will not be impeded. An additional 8m access buffer is available on the other side of the watercourse where no development is located. Furthermore, a degree of hydraulic control is provided by an upstream 600mm culvert before flows are conveyed to a larger downstream culvert just beyond the north-east corner of the site. This is also considered to provide resilience to flood risk posed by a blockage.

A Phase 2 ground investigation undertaken by BWB Consulting has recorded groundwater strikes between 0.80-4.80m below ground level (bgl), which is considered sufficiently shallow to pose a high risk of groundwater emergence. Mitigation is provided through the raising of levels within the site as part of the proposed earthworks strategy. Should shallow groundwater levels be experienced during excavation activities, a groundwater specialist should be consulted, and appropriate dewatering applied as necessary.

The site has been assessed against a range of additional sources of flood risk including pluvial, canals, and sewers. They are considered to pose a low flood risk to the site.

In compliance with the requirements of 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 two warehouse units at Plot J2, Kingsway Business Park, Rochdale. An indicative site layout plan is included as **Appendix 1**.
- 1.2 This FRA is intended to support a full planning application and, as such, the level of detail included is commensurate and subject to the nature of the proposals at planning stage. Summary information is included as **Table 1.1**.
- 1.3 It should be noted that outline planning permission exists for development in Plot J2 (application reference 14/00542/OUT) and the approved parameters plan allows for development across the site in accordance with the approved parameters plan shown at drawing number 2013-233/102 Revision A. A copy of this is included as **Appendix 2**. The only reason that a full planning application is being submitted is because the height of building J2-1 and J2-2 have been increased compared to the approved parameters.
- 1.4 It should also be noted that this report includes minor updates to the original submission in October 2022 (reference 22/01200/FUL). These updates are due to a minor change in the development layout which came as a result of various objections and discussions held at Planning Committee 16/2/23.

Table 1.1: Site Summary

Site Name	Plot J2
Location	Kingsway Business Park
NGR (approx.)	SD 9135 1149
Application Site Area (ha)	5.4 (approx.)
Development Type	Commercial
Flood Zone Classification	Flood Zone 1
NPPF Vulnerability	Less Vulnerable
Anticipated Development Lifetime	100+ years
Environment Agency Office	Greater Manchester, Merseyside and Cheshire
Lead Local Flood Authority	Rochdale Borough Council
Local Planning Authority	Rochdale Borough Council

Sources of Data

- i. Topographical Survey by BWB Consulting Ltd (ref: KBP-BWB-00-ZZ-M2-G-0001)
- ii. OS Explorer Series mapping
- iii. Government Surface Water Flood Risk Maps
- iv. Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update
- v. Greater Manchester Level 2 Hybrid Strategic Flood Risk Assessment
- vi. Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment
- vii. Rochdale Borough's Strategy for Flood Risk Management
- viii. Greater Manchester Surface Water Management Plan
- ix. Rochdale Adopted Core Strategy
- x. Site visit undertaken by BWB Consulting Ltd
- xi. Web Based Soil Mapping
- xii. Phase 2 Ground Investigation Report by BWB Consulting Ltd (ref: KBP-BWB-ZJ-XX-RP-YE-0002_Ph2)
- xiii. United Utilities Sewer Records
- xiv. British Geological Survey Drift & Geology Maps

Existing Site

- 1.5 The greenfield site is located within the wider Kingsway Business Park and is approximately 2.4km south-east from the town of Rochdale. Kingsway Business Park is an allocated employment site within the adopted Rochdale Core Strategy, and it benefits from an extant planning permission for the full range of employment uses within the 'B' Use Class.
- 1.6 The Business Park is already partly constructed which includes the provision of a surface water drainage system. It is understood that flows currently drain across the site towards two detention basins, before discharging into the Stanney Brook at the greenfield (QBAR) rate.
- 1.7 The site is bound by greenfield land to the north and south-west (these areas are also included within the allocated employment land), James Kearne Avenue to the south-east, residential development as part of Rochdale to the west and north-west and John Milne Avenue to the east.
- 1.8 OS Mapping appears to show three Unnamed Ordinary Watercourses (UOW) flowing either through or adjacent to the site. These are termed the North-west, Central and Eastern UOWs. An additional ditch is also located along the southern boundary which does not have connectivity beyond the site into the wider watercourse network.
- 1.9 A topographical survey has been undertaken for the site and is included as **Appendix 3**. The survey demonstrates that levels generally fall towards the northern boundary with levels ranging from 158.2m AOD (Above Ordnance Datum) to 149.9m AOD respectively. However, there are two valley forms towards the centre and along the eastern

boundary which causes the topography to undulate from east to west. The site's location is illustrated within **Figure 1.1**.

- 1.10 A site visit to the wider area was undertaken by a BWB representative on 10/03/21. The photo shown in **Figure 1.2** illustrates the greenfield nature of the site.



Figure 1.1: Site Location



Figure 1.2: Photo showing existing greenfield condition of the site (Taken on: 10/03/21)

Proposed Development

- 1.11 Erection of two employment buildings (Classes E(g)(iii), B2 and B8) with ancillary office space, new access, car parking, servicing, boundary treatments, hard and soft landscaping and other associated works.
- 1.12 Proposed access/egress is shown to be achieved via James Kearns Avenue along the southern boundary. The proposed layout is included within **Appendix 1**.

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. 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 Flood Risk Assessment.
- 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 4** of this report for reference.
- 2.5 This Flood Risk Assessment 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.

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>

Flood Zone	Description
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.

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



Figure 2.1: 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

Peak River Flow

- 2.10 Predicted future changes in peak river flows caused by climate change are provided by the Environment Agency (EA)³, 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 Flood Risk Assessment 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		

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

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
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.					

- 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 100 years. Therefore, the Central allowance for the '2080s' epoch is applicable.
- 2.14 The site is located within Flood Zone 1 and is elevated approximately 15m above the nearest Flood Zones, which are associated with the Sudden Brook 750m to the north-west. As such, a suitable level of protection is considered to be afforded to the site from the effects of climate change from Main River sources. Climate change associated with the UOWs is discussed in **Section 3**.

Peak Rainfall

- 2.15 Predicted future changes in peak rainfall intensity caused by climate change are provided by the EA⁴, with a range of projections applied to River Basin District Management Catchments.
- 2.16 The site falls within the Irwell Management Catchment. **Table 2.4** identifies the relevant peak rainfall climate change allowances from this Management Catchment.

Table 2.4: Peak Rainfall Climate Change Allowances for the Irwell Management Catchment

Allowance Category	Total potential change anticipated for the '2050s' epoch (2022 to 2060)		Total potential change anticipated for the '2070s' epoch (2061 to 2125)	
	1 in 30-Year	1 in 100-Year	1 in 30-Year	1 in 100-Year
Upper End	35%	40%	40%	45%
Central	25%	25%	30%	30%

- 2.17 The future increase in rainfall will need to be considered when designing a development to ensure its drainage system is sufficient to address the local surface water flood risk for its lifetime and that it does not increase flood risk elsewhere. The increase in rainfall may also need to be considered when assessing the flood risk from surface water runoff from surrounding urban and rural catchments where the vulnerability and scale of a development and severity of the present-day flood risk are significant.

⁴ Environment Agency, Flood risk assessments: climate change allowances: Environment Agency, Flood risk assessments: climate change allowances: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

- 2.18 When determining the appropriate allowance to assess the catchment size, catchment urbanisation, and anticipated lifespan of the development should be considered. **Table 2.5** provides a matrix summarising the EA's guidance on determining the appropriate allowance(s).

Table 2.5: Application of Appropriate Peak Rainfall Climate Change Allowances

Area Assessed	Anticipated Development Life Span		
	up to 2060	between 2061 and 2100	up to or beyond 2100*
Development Sites[^] Assess the 1 in 30-year and 1 in 100-year storm events with the respective climate change allowance(s) applied. Development to be designed so that with the climate change allowance applied to the 1 in 100-year storm: • there is no increase in flood risk elsewhere • the development will be safe from surface water flooding	Use the Central Allowance for the 2050s	Use the Central Allowance for the 2070s ⁺	Use the Upper End Allowance for the 2070s ⁺
Urban Catchments Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective allowance(s) applied.			
Rural Catchments <5km² Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective central climate change allowances applied.			
Rural Catchments >5km²	Use the relevant peak river flow climate change allowance		

*includes all residential developments

[^]the Lead Local Flood Authority may have local standards that also need to be considered.

⁺unless the 2050s allowance is greater

- 2.19 The development site has an anticipated lifespan of 100 years. Therefore, the Upper End allowance for the 'Up to or beyond 2100' epoch will need to be considered in the design of the associated drainage infrastructure.
- 2.20 Given that the risk posed from the UOWs has been assessed using the surface water flood maps, and the in absence of further detailed data on this risk, the extreme, 1 in 1000-yr pluvial extents will be used as a proxy for climate change to represent flooding from these sources.

Level 1 Strategic Flood Risk Assessment for Greater Manchester – Update (2019)

- 2.21 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.
- 2.22 The Level 1 SFRA for Greater Manchester - Update⁵ 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. Information from the Level 1 SFRA will be referenced within **Section 3** where applicable.

Greater Manchester Level 2 Hybrid Strategic Flood Risk Assessment (2020)

- 2.23 The Greater Manchester Level 2 Hybrid SFRA⁶ 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.

Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment (2011)

- 2.24 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 Lead Local Flood Authorities (LLFAs).
- 2.25 The Rochdale Metropolitan Borough Council PFRA⁷ considers flooding from surface water runoff, groundwater, ordinary watercourses and canals. It also references the historical river flooding which occurred in the local area in 2004, 2006 and 2008, the latter of which was a fluvial flood event of the River Roch. However, no historical instances of flooding at the site are referenced. Information from the PFRA will be referenced within this report, where applicable.
- 2.26 An addendum to the PFRA⁸ was produced by Rochdale Borough Council in 2017, which provides an update to the understanding of flood risk for the Borough since the production of the original report.
- 2.27 The addendum confirms there have been no further changes to the understanding of flood risk in the local area.

Rochdale Borough's Strategy for Flood Risk Management (2014)

- 2.28 A Local Flood Risk Management Strategy (LFRMS) is prepared by an LLFA to help understand and manage flood risk at a local level.

⁵ Greater Manchester Level 1 Strategic Flood Risk Assessment - Update (Manchester City Council, March 2019)

⁶ Greater Manchester Level 2 Hybrid Level 2 Strategic Flood Risk Assessment (Greater Manchester Combined Authority, October 2020)

⁷ Rochdale Metropolitan Borough Council Preliminary Flood Risk Assessment (Rochdale Metropolitan Borough Council, May 2011)

⁸ Rochdale Preliminary Flood Risk Assessment Addendum (Rochdale Metropolitan Borough Council, December 2017)

- 2.29 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.
- 2.30 The Rochdale Borough's Strategy for Flood Risk Management⁹ (RBSFRM) has been reviewed and will be referenced within this report, where applicable.

Greater Manchester Surface Water Management Plan (2012)

- 2.31 A Surface Water Management Plan (SWMP) sets out how key local partners with a responsibility for surface water and drainage in their area will work together to understand the causes and effects of surface water flooding.
- 2.32 In addition, a SWMP should set out a long-term plan to manage surface water in the area and should influence capital investment, drainage maintenance, public engagement and understanding, land-use planning, emergency planning and future development.
- 2.33 The Greater Manchester SWMP¹⁰ has been reviewed in the production of this report and will be referenced, where applicable.

North West SuDS Pro-Forma v5 (2022)

- 2.34 The North West SuDS Pro-Forma¹¹ contains information and guidance about what developers will require to submit in support of major planning applications, including specific guidance relating to a proposed drainage strategy.
- 2.35 The document has been reviewed and will be referenced within the report where appropriate.

Rochdale Adopted Core Strategy (2016)

- 2.36 The Rochdale Adopted Core Strategy¹² was adopted in October 2016. It sets out a spatial vision and strategy for the sustainable growth of the borough up to 2028.
- 2.37 The Core Strategy includes policies on climate change, flood risk and drainage across the region which include:

DM2 – Delivering Planning Contribution and Infrastructure

- Policy DM2 states that where an FRA deems it necessary, flood mitigation measures will need to be provided to mitigate against the adverse effects of surface water run-off.

⁹ Rochdale Borough's Strategy for Flood Risk Management (Rochdale Borough Council, March 2014)

¹⁰ Greater Manchester Surface Water Management Plan (Rochdale Metropolitan Borough Council, January 2012)

¹¹ The North West SuDS Pro-forma (North West Regional Flood & Coast Committee, May 2022)

¹² Rochdale Adopted Core Strategy (Rochdale Borough Council, October 2016)

G1 – Tackling and Adapting to Climate Change

- New developments are expected to utilise Sustainable Drainage Systems (SuDS) in the management of surface runoff from their respective sites.
- This policy also states that for greenfield sites, runoff must be controlled at the existing greenfield rates.

G8 – Managing Water Resources and Flood Risk

- New developments to ensure that development is at an acceptable level of flood risk, and that flood risk to the wider area is not exacerbated.
- Site-specific FRAs are to be provided where appropriate, and SuDS should be utilised in the management of surface water runoff.

P3 – Improve Design of New Development

- Where possible, new developments are required to utilise SuDS to minimise impact on the environment, as well as addressing the effects of climate change.

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	
Pluvial runoff			X		Not including the flood risk highlighted along the UOWs, mapping of surface water flood risk shows the site is at a very low surface water flood risk.
Fluvial			X		The site is located entirely in Flood Zone 1.
		X			A series of UOWs (North-West, Central and Eastern) are located within the site boundary, which are not included within the Flood Map for Planning but are shown to be associated with a low-high risk of surface water flooding. Whilst the North-West and Central UOWs are not considered to pose a significant flood risk, the Eastern watercourse is considered to pose a medium risk to the site.
Coastal				X	The site is not considered to be tidally influenced.
Canals			X		The Rochdale Canal is located approximately 1km to the north-east; however, water levels within canals are heavily managed and therefore risk is considered to be low.
Groundwater	X				Shallow groundwater levels have been encountered on-site which present a risk to excavation activities. The presence of a seasonal spring has also been noted.
Reservoirs and waterbodies			X		The site is shown to fall outside of the area at risk of reservoir failure.

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Sewers			X		Invert levels of existing sewers are considered deep enough to provide a level of mitigation against exceedance events. Any exceedance flows would be expected to be confined by the surrounding road network before encroaching on-site and be conveyed away from the site in accordance with the surrounding topography.
Effect of Development on Wider Catchment	X				Development would impede the route of the seasonal stream unless suitably managed.
		X			The development will increase the area of impermeable surfaces, leading to a potential increase in runoff rate and volumes.

Pluvial Flood Risk

- 3.2 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.
- 3.3 Risk of flooding from surface water mapping has been prepared 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 3.1**.
- 3.4 The mapping demonstrates that the majority of the site is at a very low risk of surface water flooding. However, there are several overland flow routes shown along the north-west and eastern boundaries, as well as through the centre of the site. These are understood to be associated with UOWs and are further discussed in the following 'Fluvial Flood Risk' section.
- 3.5 Pluvial flood risk is not shown to impede the proposed access/egress to the site via James Kearne Avenue along the southern boundary of the site.

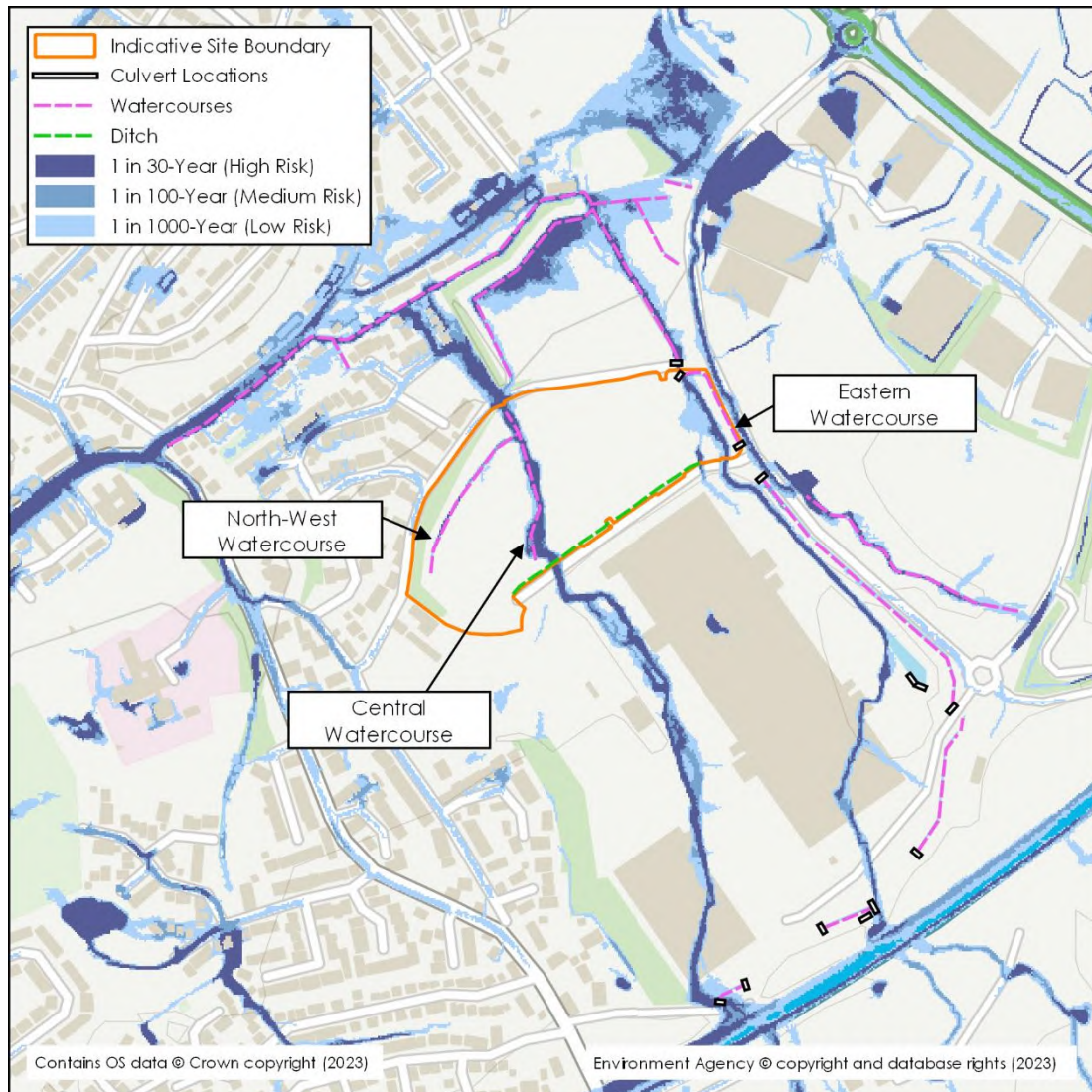


Figure 3.1: EA Mapping of Surface Water Flood Risk

- 3.6 As the predominant surface water flood risk is associated with the UOWs (fluvial sources), with the rest of the pluvial flood risk being associated with low risk mapping extents, the flood risk posed from pluvial sources is considered to be low.
- 3.7 Mitigation of any residual risk posed by surface water flooding is discussed within **Section 4**.

Fluvial Flood Risk

- 3.8 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 Events

- 3.9 The LLFA were consulted to ascertain whether there are any records of flooding on the site. Their correspondence, included as **Appendix 5**, confirms there has been no recorded flood events. Moreover, mapping of historical flood events within the SFRA indicates that there are no recorded incidents of flooding at the site.
- 3.10 Since this last request for information, an additional request has been made to the LLFA. There has been no change in the understanding of flood risk to the site, as shown in **Appendix 5**.

Main Rivers

- 3.11 The EA Flood Map for Planning, included as **Figure 2.1**, shows that the site is located within Flood Zone 1. The nearest EA Main River is the Sudden Brook, which is located roughly 700m to the north-west. The available contour information suggests the site is elevated 15m above this watercourse.
- 3.12 The flood risk posed by Main Rivers is, therefore, considered to be low.

Ordinary Watercourses

- 3.13 OS Mapping also shows that several UOWs are located within the site boundary. Two of these are shown to lie adjacent to the north-west and the east site boundaries, while a third is indicated to flow through the centre of the site.
- 3.14 To obtain further information on the UOWs, a site visit was undertaken by a BWB representative on 10/03/2021. Observations from the visit have been referred to where relevant.
- 3.15 The EA's Flood Map for Planning does not include flood extents for the UOWs within the site boundary as it only includes Flood Zones for watercourses with catchments >3km². It is expected that these watercourses drain too small a catchment to be included.
- 3.16 In the absence of such data, the EA's mapping of surface water flood risk, included as **Figure 3.1**, can be used to provide an indication of the possible flood extents associated with the UOWs.
- 3.17 A further ditch is understood to be located along the southern boundary, running adjacent to James Kearne Avenue. This feature has been picked up in the topographical survey and is understood to be redundant, having no wider connectivity than what was observed. It is therefore deemed to pose a minimal risk to the site.

Eastern UOW

- 3.18 Mapping of surface water flood risk associated with the Eastern UOW shows low to high-risk extents of surface water flooding along the eastern boundary of the site. The mapping demonstrates that the surface water flood extents cut across the existing

development to the south before entering the site and are misaligned with the existing channel.

- 3.19 It is expected that consideration of the presence of this flow route would have been necessary as part of the mitigation proposals for the wider Kingsway Business Park development, including the existing development to the south.
- 3.20 This is supported by a decision notice relating to the planning application for Plot J1 (ref: 11/D54761), understood to be for the aforementioned commercial premises, which refers to an FRA (ref: R/10303/001). The FRA refers to proposals to provide a watercourse re-alignment around the southern boundary of the commercial premises.
- 3.21 To confirm this, the site visit observed the watercourse upstream of the site and verified its route around the southern boundary of the existing commercial premises, as shown in **Figure 3.2**. Furthermore, observations made during the site visit, included as **Figure 3.3**, also show the straight, symmetrical and engineered nature of the watercourse.
- 3.22 It is expected that this watercourse comprises the re-alignment referenced within the FRA for the commercial development to the south. The commercial premises were constructed to completion in 2013, which is of a similar time to the production of the mapping of surface water flood risk. This may be a possible reason for the misalignment between the current channel and surface water flood risk extents.



Figure 3.2: Photo taken south of existing commercial premises to the south of the site, facing north-east. Watercourse understood to be a re-alignment of the Eastern UOW.



Figure 3.3: Photo taken of Eastern UOW, adjacent to the Eastern Boundary of the Site, facing North-East. (Photo taken on 10/03/21)

- 3.23 Both observations from the site visit and the topographical survey demonstrate the watercourse is culverted in several sections upstream of the site, including in two locations along the site's eastern boundary, as shown in **Figure 3.4** and **Figure 3.5**.
- 3.24 The topographical survey shows that the upstream culvert is a 600mm circular culvert, whilst the downstream culvert appears to be a box culvert of a greater width. Hence, the upstream culvert is expected to act as a hydraulic control to flows before flowing through the site, thus providing a degree of management of residual risk presented by a blockage.
- 3.25 The Eastern UOW is, therefore, considered to pose a medium risk to development. Mitigatory measures are further discussed within **Section 4**.



Figure 3.4: Photo taken on downstream end of circular culvert upstream of site, along the eastern boundary. (Photo taken on 10/03/21)



Figure 3.5: Photo taken on downstream end of box culvert downstream of the site, along the eastern boundary. (Photo taken on 10/03/21)

Central UOW

- 3.26 Mapping of surface water flood risk shows surface water flood extents for the Central UOW flow across existing commercial premises to the south of the site and flow through the centre of the site. However, the surface water mapping is thought to be inaccurate in this area as it does not appear to account for the watercourse realignment mitigation proposal for the wider Kingsway Business Park and development to the south.
- 3.27 The site visit confirmed there is no such watercourse present on site, as shown in **Figure 3.6**. Furthermore, the site topographical survey and site visit did not identify any culverts along the southern boundary, therefore suggesting any previous connectivity is no longer present.
- 3.28 As such, the mapping of surface water flood risk is not considered to be reflective of the Central UOWs current route and that its flood risk is confined to within the site boundary where the topographical survey demonstrates there to be a notable depression. As such, the Central UOW is not expected to pose a fluvial flood risk but may pose a low flood risk from potential ponding of surface water in this depression. However, mitigatory measures, discussed within **Section 4**, will address how the residual risk associated with this feature will be addressed.



Figure 3.6: Photo showing the position of Central UOW, facing north-east. (Photo taken 10/03/21)

North-west UOW

- 3.29 OS Mapping highlights the presence of a watercourse along the north-west boundary of the site. The topographical survey indicates that this is a relatively minor feature with a depth of approximately 0.47-0.60m. Both OS Mapping and the topographical survey demonstrate that it originates on-site, suggesting a relatively limited upstream catchment.
- 3.30 Mapping of surface water flood risk shows the feature to be associated with a predominately low-medium risk flow route, with some in-channel pooling associated with a high surface water flood risk.
- 3.31 The mapping further demonstrates that the surface water flood risk appears to be entirely contained within the channel.
- 3.32 The North-West UOW is, therefore, deemed to pose a low flood risk to the site. However, measures to mitigate against the residual flood risk posed will be discussed further in **Section 4**.

Summary

- 3.33 In conclusion, the Eastern UOW poses the most notable flood risk to the site with the Central and North-Western UOWs being associated with residual risks.
- 3.34 Management of flood risk associated with the Eastern UOW and the remaining residual flood risks associated with the Central and North-West UOWs will form part of the flood risk mitigation for the site within **Section 4**.
- 3.35 The ditch along the southern boundary does not possess wider connectivity and is expected to be a redundant feature. It poses a minimal risk to development.
- 3.36 Fluvial flood risk originating from the above UOWs is not expected to impede proposed access/egress to the site via James Kearne Avenue along the southern boundary.

Flood Risk from Canals

- 3.37 The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders and boreholes and manages water levels by transferring it within the canal system.
- 3.38 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.
- 3.39 Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

3.40 The nearest canal is the Rochdale Canal, located approximately 1km to the north of the site. Available LiDAR demonstrates that the site is raised approximately 5m above the canal.

3.41 The flood risk posed by canals is, therefore, considered to be low.

Groundwater Flood Risk

3.42 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.

3.43 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This may be regional scale chalk or sandstone aquifers, or localised deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

3.44 The British Geology Survey (BGS) holds mapping of the bedrock and superficial geology of the UK, an excerpt of which has been prepared for the site as **Figure 3.7**. The mapping demonstrates that the eastern portion of the site is underlain by the Milnrow Sandstone (sandstone), whereas the western portion of the site is underlain by the Pennine Lower Coal Measures Formation (mudstone, siltstone and sandstone).

3.45 The mapping also demonstrates that overlying the bedrock across the entirety of the site is a layer of superficial deposits, which are indicated to be Diamicton glacial deposits.

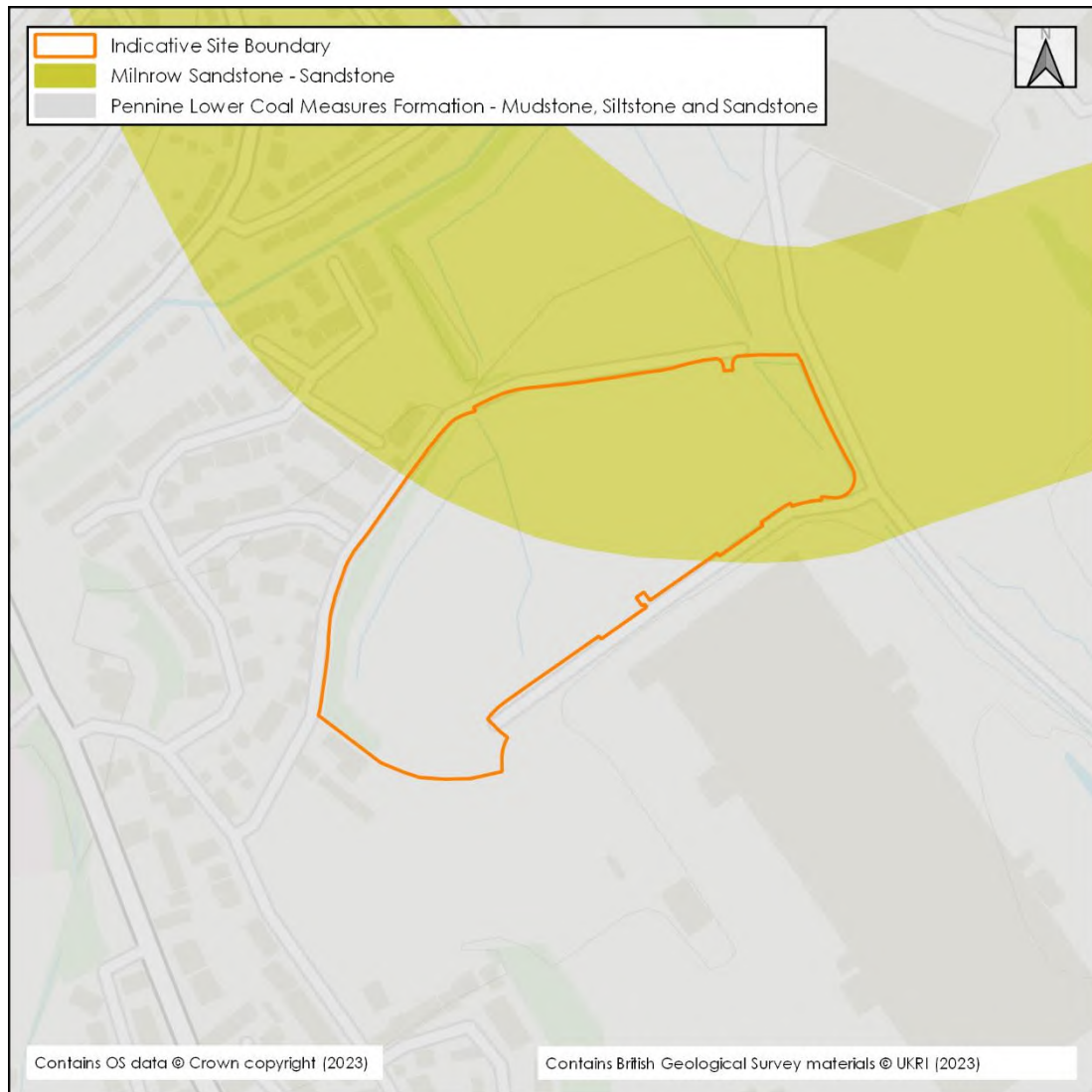


Figure 3.7: BGS Mapping of Bedrock Geology

- 3.46 A previous Phase 2 ground investigation undertaken by BWB Consulting (ref: KBP-BWB-ZJ-XX-RP-YE-0002_Ph2) has confirmed the presence of superficial deposits on-site, although sampling was not taken deep enough to confirm the bedrock lithology. A summary of the ground conditions is provided in **Table 3.2**.

Table 3.2: Summary of Ground Conditions

Stratum	Top Depth (m)		Base Depth (m)		Thickness (m)		SPT 'N' Value	
	Min	Max	Min	Max	Min	Max	Min	Max
Topsoil	0.00		0.25	1.10	0.25	0.80	NR	
Made Ground	0.00		0.25	1.40	0.25	1.40	NR	
Alluvium	0.25	0.80	2.60	3.70	1.80	3.45	NR	
Hummocky Glacial Deposits	0.25	2.60	0.55	10.50	0.90	10.00	4	27
Glacial Till	6.40	10.50	15.00	15.50	4.50	9.50	16	51
Base Unproven								

- 3.47 Both bedrock and superficial deposits are classified as 'Secondary A' aquifers, which are deposits of significant permeability, able to support water supplies at a local scale as well as forming an important source of baseflow to rivers.
- 3.48 The LFRMS contains mapping of the susceptibility to groundwater flooding for the Rochdale Borough, which has been included as **Figure 3.8**.
- 3.49 No key is provided for the mapping, but in the context of the possible risk classification illustrated, it would appear the site is at a moderate susceptibility to groundwater flooding. However, it should be noted that the Groundwater Susceptibility mapping is based on strategic scale mapping. It identifies areas susceptible to flooding from groundwater at a broad scale based on geological and hydrogeological conditions and therefore, the classification could potentially be based on another area within the cell.

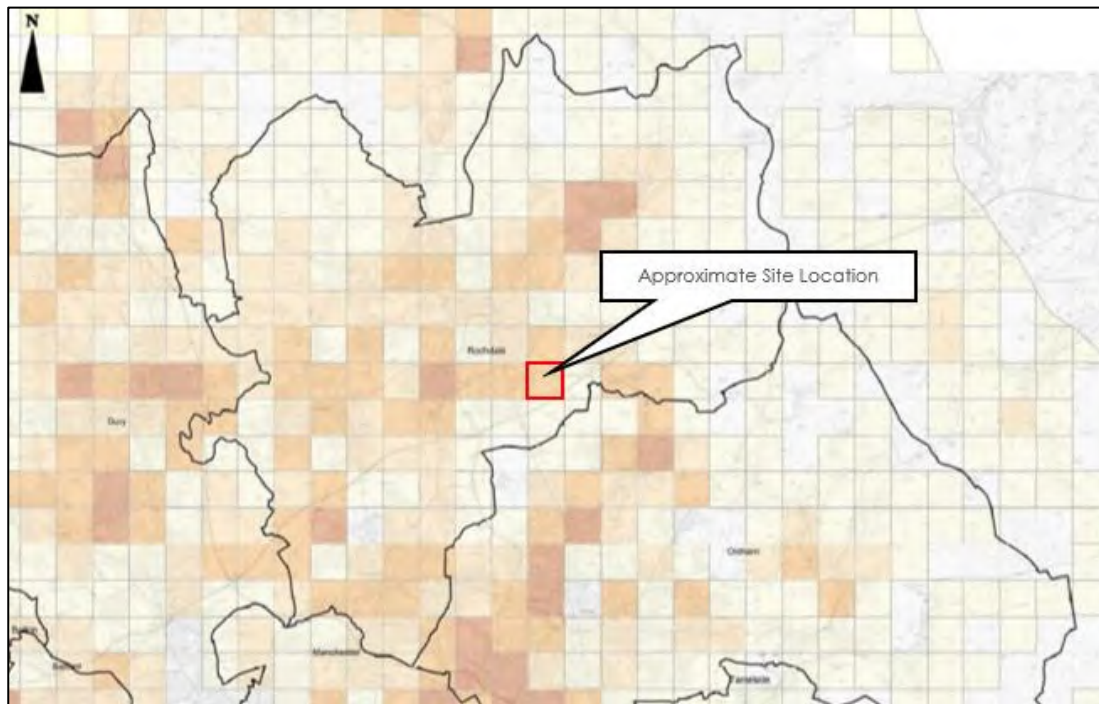


Figure 3.8: LFRMS Mapping of Susceptibility to Groundwater Flooding (Source: Rochdale Borough Strategy for Flood Risk Management)

- 3.50 As part of the Phase 2 ground investigation, groundwater levels across the site were measured. Groundwater levels are shown to range between 0.8m below ground level (bgl) to 4.8m bgl.
- 3.51 In view of the potential for groundwater to be encountered at a shallow depth at the site, groundwater is deemed to pose a high risk to development. Mitigatory actions are further discussed within **Section 4**.

Flood Risk from Reservoirs & Large Waterbodies

- 3.52 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.
- 3.53 To help identify this risk, reservoir failure flood risk mapping has been prepared by the EA. This shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide. An excerpt of the mapping is included as **Figure 3.9**.

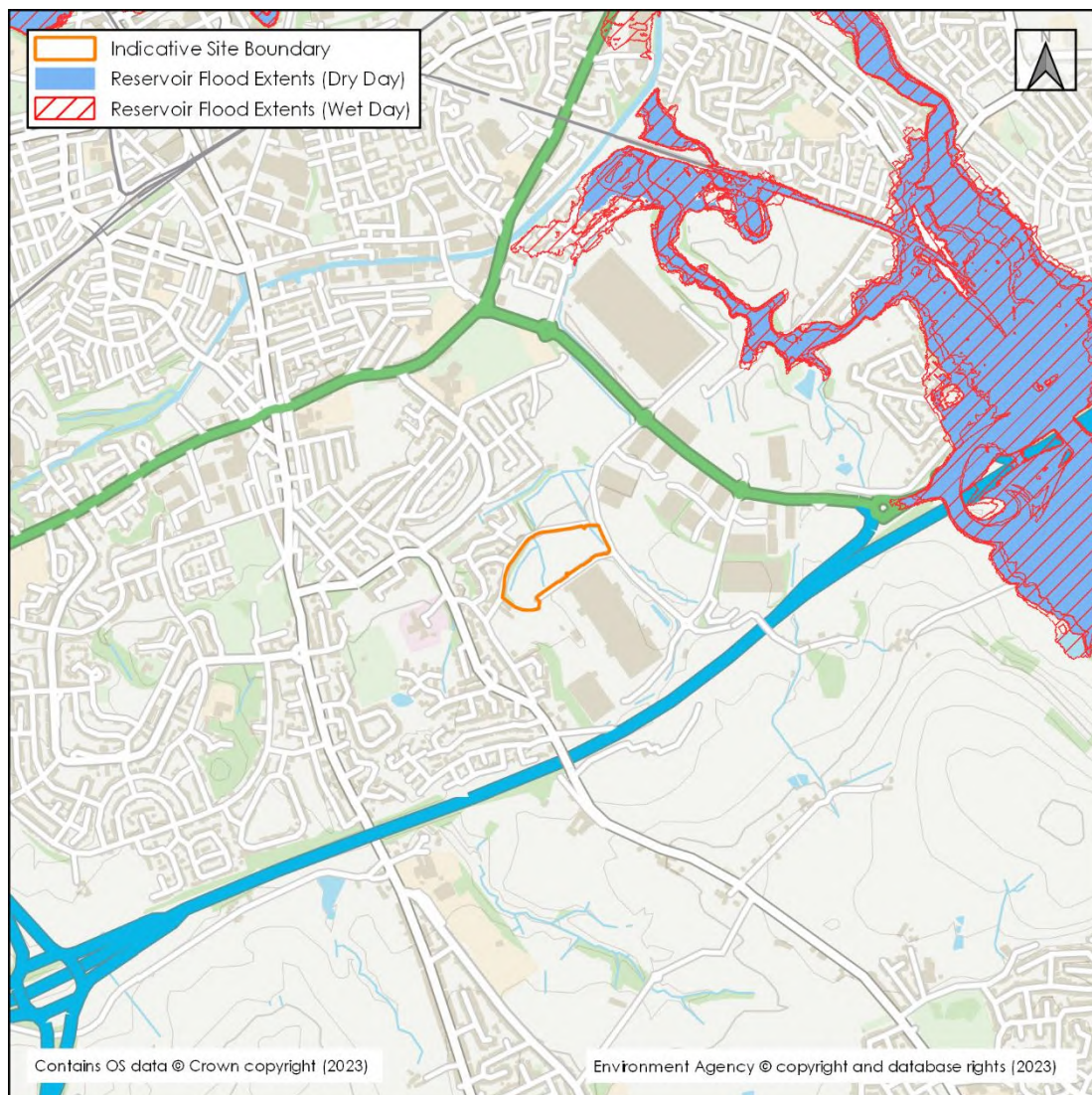


Figure 3.9: EA Mapping of Reservoir Flood Extents

- 3.54 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.
- 3.55 The mapping demonstrates that the site lies outside the extent at risk in the event of a reservoir failure.
- 3.56 The flood risk posed by reservoirs is, therefore, considered to be low.

Flood Risk from Sewers

- 3.57 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.

- 3.58 United Utilities is the sewerage undertaker for the local area. A copy of their asset plans has been included as **Appendix 6**. The asset plans indicate the presence of a foul and surface water sewer network that convey flows along the southern and eastern boundaries of the site.
- 3.59 Pipe diameters for the foul network range from 225-300mm, whereas diameters for the surface water sewer network range from 150mm - 1500mm along the western boundary.
- 3.60 Depth to invert levels for the foul water and surface water sewer pipes are no shallower than 2m bgl and 3m bgl, respectively. This is considered to pose a level of mitigation against an exceedance event.
- 3.61 Should an exceedance event occur, flows from foul and surface water pipes along the southern boundary of the site could be conveyed across the site. However, as the site is near to the head of these runs, flow volumes would not be expected to be large.
- 3.62 For pipes along the eastern boundary of the site, the topography is such that flows would be conveyed north-west and away from the site.
- 3.63 In view of the depth to the invert of the existing pipes, the flood risk posed by sewers is considered to be low. However, mitigation towards the residual risk posed by an exceedance event will be further discussed within **Section 4**.
- 3.64 It will also be necessary to consider easements between the United Utilities assets and build development. Further discussion is provided within **Section 4**.

Effect of Development on Wider Catchment

Impedance of Overland Flows

- 3.65 As described within the 'Fluvial Flood Risk' section, the flood risks associated with the north-west and Central UOWs are understood to originate on-site and, as such, future development will not result in their impedance.
- 3.66 The development will need to consider the position of the Eastern UOW within the final layout. This is further discussed within **Section 4**.

Development Land Use/Drainage Considerations

- 3.67 Considering the greenfield condition of the existing site, development is expected to increase the impermeable surface area which may lead to an increase in surface water runoff and volume from the site.
- 3.68 Mitigatory actions to ensure that the development does not exacerbate flood risk to the wider area will be discussed within **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 located within Flood Zone 1 and is made up of 'Less Vulnerable' development in the form of vehicle storage and associated guard/welfare facilities. Therefore, sequential arrangement of the development will be limited to avoiding the UOWs with suitable easements.

Development Levels

- 4.3 As part of the earthwork strategy of the site, it is proposed to raise the site above the surrounding ground levels. A raising of level by at least 3m is provided along the eastern boundary, which is considered to provide a level of mitigation from the Eastern UOW. Alongside the hydraulic control provided by the limiting upstream culvert, the raising of the site is likely to provide a level of mitigation against any flood flow originating from this watercourse.
- 4.4 As the flood risk associated with the North-West UOW and the former channel of the Central UOW is considered to originate entirely within the site, it is understood that the earthworks will lead to a removal of depressions, thus providing mitigation of the flood risk associated with surface water ponding in these features. Any residual surface water flood risk originating on-site is expected to be mitigated through the development's drainage strategy.
- 4.5 Ground levels across external areas should be profiled to encourage pluvial runoff and overland flows away from the built development and towards the nearest drainage point. This will also provide mitigation of flooding from all other sources.

Development Easements

- 4.6 It will be necessary to provide an easement from the Eastern UOW. In line with the requirements set out in the SFRA, development should be set back a minimum of 8m from the watercourse. There are a small number of car parking spaces which nominally encroach into this zone; however, access will not be impeded. An additional 8m access buffer is available on the other side of the watercourse where no development is located.
- 4.7 It will be necessary to provide an easement from the United Utilities Sewer assets along James Kearne Avenue to the south and John Milne Avenue to the east.
- 4.8 The site is approximately 15m away from the position of the 300mm foul water pipe and 1500mm surface water pipe along James Kearne Avenue. At least a 5m easement between the nearest structure and sewers along James Kearne Avenue is provided.

- 4.9 Both these distances are considered to provide adequate easement from the existing United Utilities sewer assets.

Safe Access and Egress

- 4.10 Dry access/egress to the site can be achieved via James Kearne Avenue along the southern boundary of the site.

Groundwater Considerations

- 4.11 Mitigation to the risk posed by groundwater is provided through the raising of levels within the site as part of the proposed earthworks strategy. Should shallow groundwater levels be experienced during excavation activities, a groundwater specialist should be consulted, and appropriate dewatering applied as necessary.

Surface Water Drainage

- 4.12 To mitigate the development's impact on the current runoff regime it is proposed to incorporate surface water attenuation and storage as part of the development proposals.
- 4.13 Further information on the drainage approach is provided within the accompanying Sustainable Drainage Statement (SDS, ref: PJ2-BWB-ZZ-XX-RP-CD-0001_SDS).
- 4.14 In brief, the development will continue to discharge surface water to the United Utilities sewer at an unrestricted rate. Attenuated surface water storage will be provided in the form of a SuDS detention basin with capacity for the 1 in 100-year storm with an allowance for climate change, which serves the wider Kingsway Business Park. Flows will be controlled from this pond at the greenfield (QBAR) rate of the catchment drained, outfalling into the Stanney Brook, ensuring an adequate level of flow control from the site.
- 4.15 The development should be designed with exceedance in mind with road network being used to convey excess overland flows towards the attenuation points. Overflow should be provided from the basin towards the Eastern UOW should the design standard of the drainage be exceeded. It should be ensured that finished floor levels are above maximum possible surface water storage level.

Foul Water Drainage

- 4.16 It is proposed to drain used water from the development separately to surface water.
- 4.17 Further information on the drainage approach is provided within the accompanying SDS.

5. BREEAM ASSESSMENT

- 5.1 The BREEAM UK New Construction scheme is a performance-based assessment method and certification scheme for new buildings. Performance is quantified by individual measures and associated criteria stretching across a range of environmental issues and expressed as a single certified BREEAM rating.
- 5.2 An appropriate consultant is to be appointed to carry out and demonstrate the development's compliance with all criteria. For each criterion, it is possible to achieve a number of credits. Developments which fulfil more requirements of each criterion are eligible to earn an increased number of credits.
- 5.3 The criteria pertinent to flood risk and drainage is 'Pol 03 – Flood and Surface Water Management'. It is possible to earn several credits for fulfilment of requirements relating to Flood Resilience, Surface Water Runoff, Minimising Watercourse pollution and 'Simple Buildings' – Surface Water run-off'.
- 5.4 The site is located within Flood Zone 1 and will be eligible for two credits under the 'Flood Resilience' criterion.
- 5.5 The criterion lists the sources of flooding to be considered as Fluvial (rivers), Tidal, Surface Water, Groundwater, Sewers and Reservoirs. Each of these has been discussed in Section 3 and **Table 3.1**, except tidal flooding which is not applicable at this site due to the distance from any tidally influenced watercourses.
- 5.6 The site is part of a wider development area that is served by downstream attenuation. Runoff rates within this development area are controlled at the greenfield QBAR rate for all events up to the 1 in 100-year event, with a 40% allowance for climate change for the. Moreover, the long-term maintenance of the scheme will be specified within the drainage design.
- 5.7 As such, the development will be eligible for one credit under the 'Surface water run-off' criterion.
- 5.8 No discharge from the development occurs during 5mm of rainfall, with appropriate measures of pollution treatment i.e. bypass/full retention separators are provided. The treatment systems have been designed with relevant industry best practice e.g., SuDS Manual, and a drainage plan will be available for the site with arrangement for maintenance specified.
- 5.9 The development is therefore eligible for one credit under the 'Minimise watercourse pollution' criterion.
- 5.10 The FRA and assessment against the BREEAM criteria have been produced and checked by individuals working within a team specialising in flood risk and drainage.

6. CONCLUSIONS AND RECOMMENDATIONS

- 6.1 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 two warehouse units at Plot J2, Kingsway Business Park, Rochdale.
- 6.2 This FRA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals at the planning stage.
- 6.3 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 6.1**:

Table 6.1: Summary of Flood Risk Assessment

Flood Source	Risk & Proposed Mitigation Measures
Fluvial	In the absence of Flood Zones, mapping of surface water flood risk has been used to indicate the flood risk posed by three UOWs within the site; Eastern UOW, Central UOW and the North-West UOW. An additional ditch is located along the southern boundary which does not have wider connectivity and is expected to be a redundant feature, therefore posing a low risk to development. Surface water flood extents are misaligned with the Eastern UOW which is understood to be due to the re-alignment of the watercourse as part of proposals for wider development, as reinforced by observations during a site visit. These realignment activities are understood to have affected the Central UOW such that it no longer conveys flows, with the only flood risk it poses being potential ponding within a valley form within the site. Similarly, the flood risk associated with the north-western watercourse is understood to originate on-site. The Earthworks strategy for the site is expected to provide a level of mitigation to the flood risk posed by the UOWs through the raising of levels along the eastern boundary of at least 3m. This will involve raising the site such that the on-site topographical depressions associated with the north-west UOW and the former channel of the Central UOW are infilled, thus mitigating the flood risk associated with surface water ponding within these features. Furthermore, a degree of hydraulic control is provided by an upstream 600mm culvert before flows are conveyed to a larger downstream culvert just beyond the north-east corner of the site. This is also considered to provide resilience to flood risk posed by a blockage. To provide a level of mitigation from the Eastern UOW, a minimum set-back of 8m from the Eastern UOW is recommended. There are a small number of car parking spaces which nominally encroach into this zone; however, access will not be impeded. An additional 8m access buffer is available on the other side of the watercourse where no development is located. A degree of hydraulic control is provided by an upstream 600mm culvert, before flows are a larger downstream culvert just beyond the north-east corner of the site. This is also considered to provide resilience to flood risk posed by a blockage.

Groundwater	A Phase 2 ground investigation undertaken by BWB Consulting has recorded groundwater strikes between 0.80-4.80m bgl, which is considered sufficiently shallow to pose a high risk of groundwater emergence. Mitigation to the risk posed by groundwater is provided through the raising of levels within the site as part of the proposed earthworks strategy. Should shallow groundwater levels be experienced during excavation activities, a groundwater specialist should be consulted, and appropriate dewatering applied as necessary.
Other Sources	Flood risk from posed from coastal and pluvial sources, as well as canals, reservoirs and sewers are assessed to be low or minimal. Resilience to any remaining residual risk will be provided by the proposed earthworks strategy.
Impact of the Development	Surface water runoff from the development will be controlled appropriately and discharged to the public surface water sewer at an unrestricted rate. Attenuated surface water storage will be provided in the form of a SuDS detention basin with capacity for the 1 in 100-year storm with an allowance for climate change, which serves the wider Kingsway Business Park. Flows will be controlled from this pond at the greenfield (QBAR) rate of the catchment drained, out-falling into the Stanney Brook. The foul water from the development will be discharged to the public sewer.
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.	

- 6.4 In compliance with the requirements of 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: Indicative Site Layout Plan

DO NOT SCALE, REFER TO FIGURED DIMENSIONS ONLY

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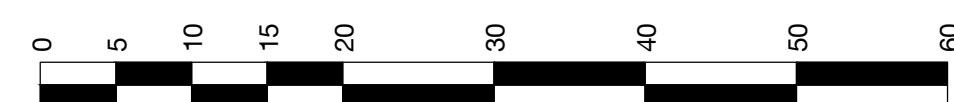
55 St Pauls Street | Leeds | LS1 2TE
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TITLE
SITE PLAN

DLA REF	DRAWN	REVIEWED
2022-052	PSL	BLG

STATUS
PLANNING
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REVISION
P 09



Appendix 2: Parameters Plan

- KEY TO LAND USES

B1(a) Office

B1/ B2/ B8

Car Showrooms
- BUSINESS USES

B1(a) Office

B1/ B2/ B8

Car Showrooms
- ANCILLARY USES

Residential

Leisure

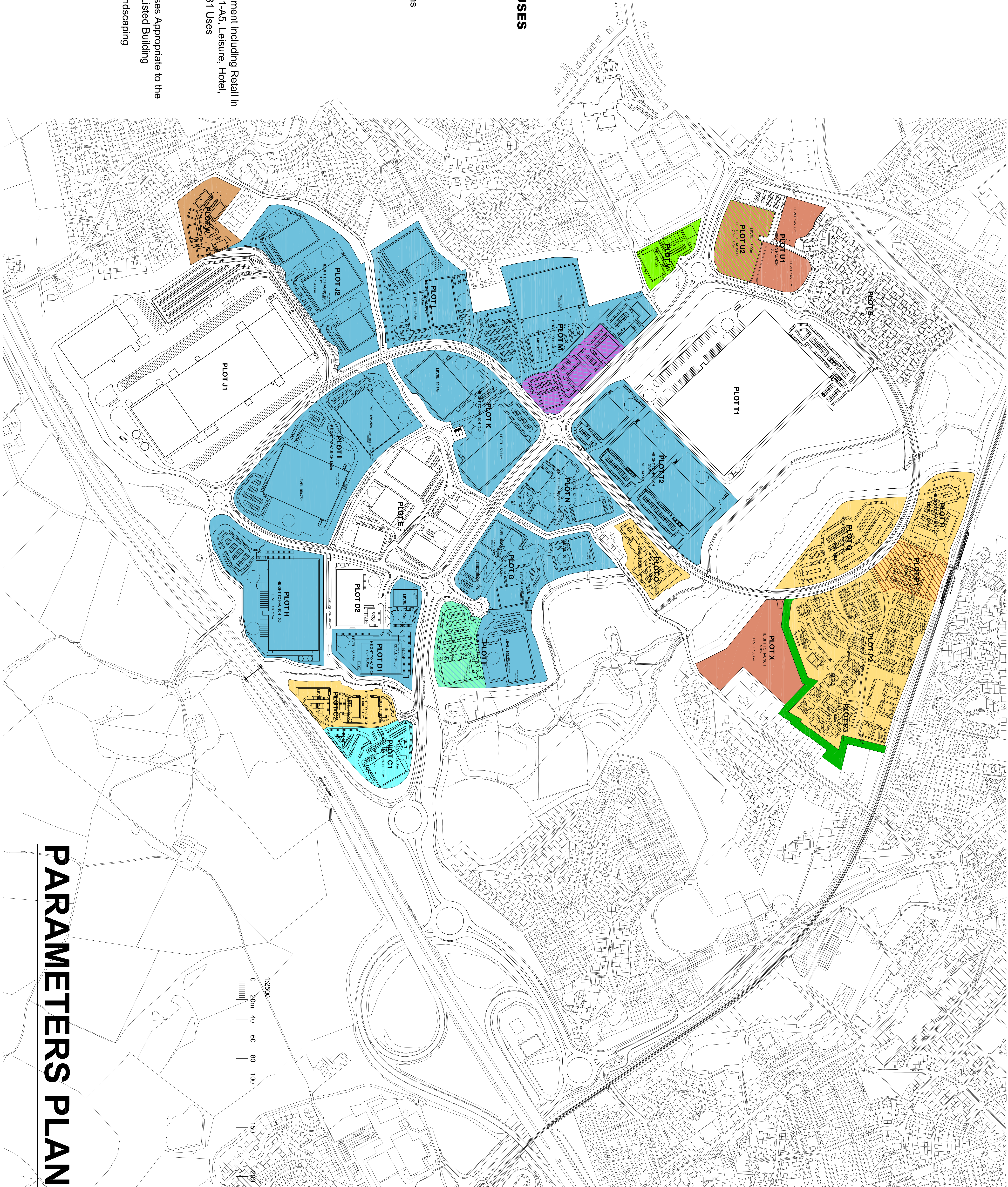
Hotel

Mixed Development including Retail in Use Classes A1-A5, Leisure, Hotel, Residential & B1 Uses

Local Services

Small Scale Uses Appropriate to the Setting of the Listed Building

New Buffer Landscaping



PARAMETERS PLAN

For Planning



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LEEDS LS1 5TE
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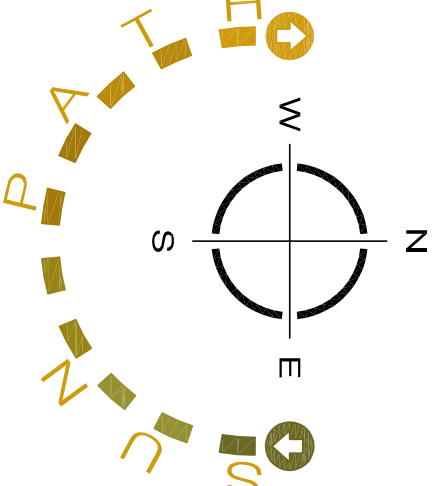
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KINGSWAY BUSINESS PARK
ROCHDALE

TITLE
MASTERPLAN
PARAMETERS PLAN

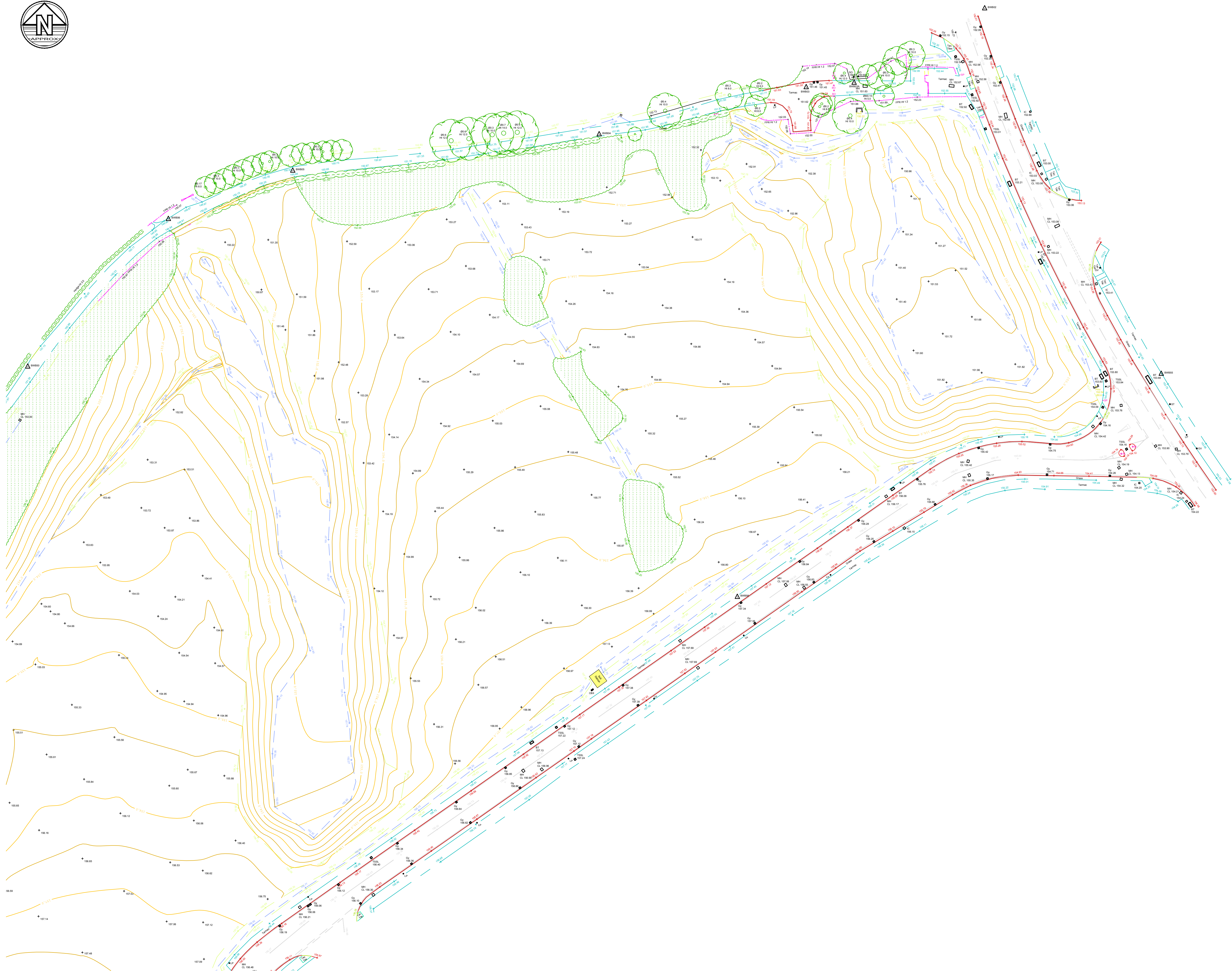
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Appendix 3: Topographical Survey



- 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	Monitoring Borehole
Top of Kerb	Tree / Bush / Sapling
Edge of Surface	Area of Vegetation/ Extent of Tree Canopy
Top of Bank	Hedge
Bottom of Bank	Body of Water
Canopy / Overhang	Body of Water from OS
Line Marking	Spot Level
Centre Line	Assumed Surface
Watercourse	Surface Water Drainage Line
Centre 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
CCTVSecurity 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
GV Gas Valve
GU 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
Mkr 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
WL Water Level
WM Water Meter
WO Wash Out

P1	24.01.18	First Issue	SDS	DS
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

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Client
**Wilson Bowden
Developments Ltd**

Project Title
**Plot J Kingsway Business
Park, Rochdale**

Drawing Title
**Existing Site Plan
Sheet 1 of 2**

Drawn:	S. D. Shreeves	Reviewed:	D. Smith
BWB Ref:	MCS 2374	Date:	24.01.18
Scale:	A1: 1:500		

INFORMATION

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
KBP-BWB-00-01-DR-G-0001	S2	P1



Notes

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- This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
- All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
- Any discrepancies noted on site are to be reported to the engineer immediately.
- 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.
- 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.
- All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
- 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		Monitoring Borehole
	Top of Kerb		Tree / Bush / Sapling
	Edge of Surface		Area of Vegetation/ Extent of Tree Canopy
	Bottom of Bank		Hedge
	Canopy / Overhang		Body of Water
	Line Marking		Body of Water from OS
	Centre Line		Spot Level
	Watercourse		Assumed Surface
	Barrier		Water Drainage Line
	Fence		
	Gate		
	Overhead Powerline		
	Overhead Utilities		

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCL	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker	FPW	Fence Post & Wire	SP	Sign Post
Post		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone
DC	Drainage	FP	Flagpole	Call Box	
Channel		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
DP	Down Pipe	GY	Gully	TP	Telegraph Post
Elec	Electric	HT	Height	TS	Traffic Signal
EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level	WM	Water Meter
FL	Floodlight	(as a reduced level)		WO	Wash Out

P1	24.01.18	First Issue	SDS	DS
Rev	Date	Details of issue / revision	Drw	Rev

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Client
Wilson Bowden Developments Ltd

Project Title
Plot J Kingsway Business Park, Rochdale

Drawing Title
Existing Site Plan Sheet 2 of 2

Drawn:	S. D Shreeves	Reviewed:	D. Smith
BWB Ref:	MCS 2374	Date:	24.01.18
Scale:	A1: 1:500		
Drawing Status	INFORMATION		
Project - Originator - Zone - Level - Type - Role - Number	Status	Rev	
KBP-BWB-00-02-DR-G-0001	S2	P1	

Appendix 4: 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 5: LLFA Correspondence

Ryan Davies

From: Laura Precious <>
Sent: 04 March 2021 15:15
To: Ryan Davies
Subject: RE: LDA2943_Plot J2, Kingsway Business Park
Attachments: Rochdale Council - Drainage Planning Advice 2021.pdf

Good afternoon Ryan

I understand BWB have historically undertaken a couple of FRA's for the Kingsway site / nearby plots; relevant background information you might need for a new FRA should mostly be contained within those documents. Please let me know if you would like these forwarding.

Our records do not show any reports of flooding for the Plot J2 site, however, as this site is undeveloped, flooding could well have occurred historically but gone unreported (as any flooding would not have been seen to be affecting any properties and/or buildings).

I have attached a copy of our latest Drainage Planning Advice to assist with your drainage strategy. It is also worth examining the EA flood maps for both surface water and flood risk which show the site is in part affected by surface water flooding.

I hope this is of assistance however please don't hesitate to let me know if you have any further questions.

Kind regards

Laura

Laura Precious
Planning Officer
Planning & Development



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Please consider the environment before printing this email.

From: Ryan Davies <>
Sent: 25 February 2021 17:29
To: Strategic Planning <>
Subject: LDA2943_Plot J2, Kingsway Business Park

Dear Sir/Madam,

We are conducting a Flood Risk Assessment at the site shown in the attached location plan. We would like to make a request for any flood-related data that is pertinent to the site i.e. modelled flood levels, records of historical flooding etc.

We note that there are two overland flow routes across the site which appear to correspond with drain-like features, as shown by OS Mapping. If there is any flood-related information relating to these, we would be most grateful.

Furthermore, we would like to request the council's input for any drainage requirements that a drainage strategy would need to adhere to.

Thank you for taking the time to answer our queries.

Many thanks,

Ryan

Ryan Davies BSc(Hons), MSc
Graduate Consultant | BWB Consulting Limited

Livery Place, 35 Livery Street, Colmore Business District, Birmingham B3 2PB

T  D  W www.bwbconsulting.com



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Ryan Davies

From: Stephen McCann <>
Sent: 27 June 2022 09:56
To: Ryan Davies
Cc: Francis Comyn; sarah.parkington
Subject: 21/01041/DOC RE: Flood Risk and Drainage_Plot J2, Kingsway Business Park

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Hello Ryan,

I don't have any more information thing to add, in terms of flooding information. I doubt that Sarah would add anything to what she's sent you before, in terms of flooding.

I don't know what any revision might be; I'll await updated information.

However, if you send me any updated Proposed Drainage Plans, I can provide you with my comments, before you (or your Client) submits updated plans to the Planning Authority.

regards

Stephen McCann

Drainage & Flooding Engineer
Highways, Property & Strategic Housing



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Smith Street, Rochdale, OL16 1XU

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From: Ryan Davies <
Sent: 27 June 2022 09:31
To: Stephen McCann <>
Cc: Francis Comyn <>; sarah.parkington
Subject: RE: Flood Risk and Drainage_Plot J2, Kingsway Business Park

Morning Stephen,

Thanks for getting back to me on this. I was on leave Friday and so wasn't able to take your call.

The plan you have attached correctly labels J2. Our client is looking revise the application so we would like a renewed consultation to determine whether any further information pertaining to flood risk and drainage has come to light since the original one back in October 2021.

Many thanks,

Ryan

Ryan Davies BSc(Hons), MSc, GradCIWEM
Environmental Consultant (Water) | BWB Consulting Limited

Livery Place, 35 Livery Street, Colmore Business District, Birmingham B3 2PB

T **D** **W** www.bwbconsulting.com

From: Stephen McCann <____>

Sent: 24 June 2022 10:48

To: Ryan Davies <____>

Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>; _____

Subject: RE: Flood Risk and Drainage_Plot J2, Kingsway Business Park

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Morning Ryan,

You didn't send a plan of the areas but I append one – I assume that this labels Plot J2 correctly?
As Rochdale's Drainage Officer, I submitted a Drainage Consultation on 21/01041/DOC in Oct 2021. This recommended discharging of the drainage Conditions for Plot J2.

Are you asking about J2 or another plot, or is the design for Plot J2 changing and you are revising your application?

I rang but your line was answerphone.

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing



From: Francis Comyn <____>

Sent: 23 June 2022 17:26

To: _____; Stephen McCann <____>

Subject: FW: Flood Risk and Drainage_Plot J2, Kingsway Business Park

Hi

Can you please co-ordinate a response?

Cheers

Fran

Francis Comyn
Service Manager Strategic Planning
Planning & Development



Rochdale Borough Council
Floor 3, Number One Riverside
Smith Street, Rochdale, OL16 1XU

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Please consider the environment before printing this email.

From: Ryan Davies <____>
Sent: 23 June 2022 17:15
To: Strategic Planning <____>
Subject: Flood Risk and Drainage_Plot J2, Kingsway Business Park

:CAUTION: This email originated from outside of the organisation. Do not click links or open attachments unless you recognise the sender and know the content is safe.

Hello,

We are undertaking a Flood Risk Assessment at the above site in Kingsway Business Park, Plot J2.

We would like to request that any information relating to flood risk is sent to us to inform our work. Data such as records of historic flooding or modelled flood data would be especially useful to us.

Thank you for taking the time to review our request and I look forward to hearing from you soon.

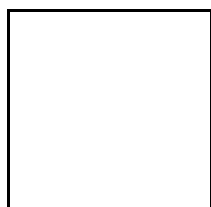
Many thanks,

Ryan

Ryan Davies BSc(Hons), MSc, GradCIWEM
Environmental Consultant (Water) | BWB Consulting Limited

Livery Place, 35 Livery Street, Colmore Business District, Birmingham B3 2PB

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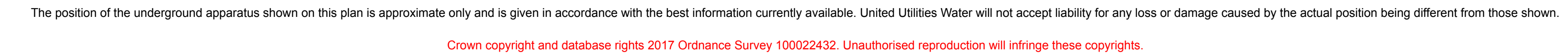
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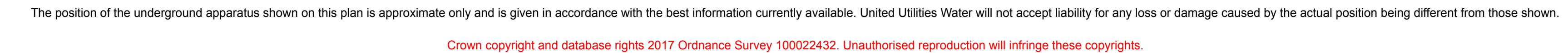
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Appendix 6: United Utilities Sewer Records



SEWER RECORDS  **United Utilities**

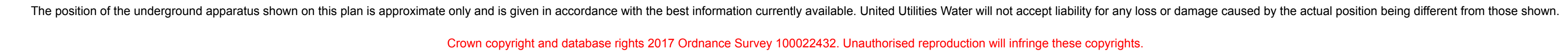


9902 150.33 CU 145.81 Z25

VC 48.2/007

**SEWER
RECORDS**





**SEWER
RECORDS**

 **United
Utilities**

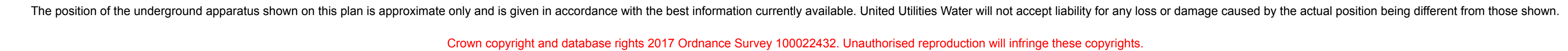
The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Entity	Record	Code	Func	Inv	Cost	Size	x	y	Shape	Mati	Length	Grad
0002	149.46	SAW	149.05	225						CO	47.50789	in 99
0003	149.46	SAW	149.05	225						CO	12.3449	in 100
0011	PAI	149.88	150							CO	40.28738	in 116
0012	PAI	149.88	150							CO	42.81917	in 116
0013	PAI	149.88	150							CO	41.45407	in 143
0014	PAI	149.88	150							CO	42.81917	in 143
0015	PAI	149.88	150							CO	41.45407	in 143
0016	PAI	149.88	150							CO	42.81917	in 143
0017	PAI	149.88	150							CO	41.45407	in 143
0018	PAI	149.88	150							CO	42.81917	in 143
0019	PAI	149.88	150							CO	41.45407	in 143
0020	PAI	149.88	150							CO	42.81917	in 143
0021	PAI	149.88	150							CO	41.45407	in 143
0022	PAI	149.88	150							CO	42.81917	in 143
0023	PAI	149.88	150							CO	41.45407	in 143
0024	PAI	149.88	150							CO	42.81917	in 143
0025	PAI	149.88	150							CO	41.45407	in 143
0026	PAI	149.88	150							CO	42.81917	in 143
0027	PAI	149.88	150							CO	41.45407	in 143
0028	PAI	149.88	150							CO	42.81917	in 143
0029	PAI	149.88	150							CO	41.45407	in 143
0030	PAI	149.88	150							CO	42.81917	in 143
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0038	PAI	149.88	150							CO	42.81917	in 143
0039	PAI	149.88	150							CO	41.45407	in 143
0040	PAI	149.88	150							CO	42.81917	in 143
0041	PAI	149.88	150							CO	41.45407	in 143
0042	PAI	149.88	150							CO	42.81917	in 143
0043	PAI	149.88	150							CO	41.45407	in 143
0044	PAI	149.88	150							CO	42.81917	in 143
0045	PAI	149.88	150							CO	41.45407	in 143
0046	PAI	149.88	150							CO	42.81917	in 143
0047	PAI	149.88	150							CO	41.45407	in 143
0048	PAI	149.88	150							CO	42.81917	in 143
0049	PAI	149.88	150							CO	41.45407	in 143
0050	PAI	149.88	150							CO	42.81917	in 143
0051	PAI	149.88	150							CO	41.45407	in 143
0052	PAI	149.88	150							CO	42.81917	in 143
0053	PAI	149.88	150							CO	41.45407	in 143
0054	PAI	149.88	150							CO	42.81917	in 143
0055	PAI	149.88	150							CO	41.45407	in 143
0056	PAI	149.88	150							CO	42.81917	in 143
0057	PAI	149.88	150							CO	41.45407	in 143
0058	PAI	149.88	150							CO	42.81917	in 143
0059	PAI	149.88	150							CO	41.45407	in 143
0060	PAI	149.88	150							CO	42.81917	in 143
0061	PAI	149.88	150							CO	41.45407	in 143
0062	PAI	149.88	150							CO	42.81917	in 143
0063	PAI	149.88	150							CO	41.45407	in 143
0064	PAI	149.88	150							CO	42.81917	in 143
0065	PAI	149.88	150							CO	41.45407	in 143
0066	PAI	149.88	150							CO	42.81917	in 143
0067	PAI	149.88	150							CO	41.45407	in 143
0068	PAI	149.88	150							CO	42.81917	in 143
0069	PAI	149.88	150							CO	41.45407	in 143
0070	PAI	149.88	150							CO	42.81917	in 143
0071	PAI	149.88	150							CO	41.45407	in 143
0072	PAI	149.88	150							CO	42.81917	in 143
0073	PAI	149.88	150							CO	41.45407	in 143
0074	PAI	149.88	150							CO	42.81917	in 143
0075	PAI	149.88	150							CO	41.45407	in 143
0076	PAI	149.88	150							CO	42.81917	in 143
0077	PAI	149.88	150							CO	41.45407	in 143
0078	PAI	149.88	150							CO	42.81917	in 143
0079	PAI	149.88	150							CO	41.45407	in 143
0080	PAI	149.88	150							CO	42.81917	in 143
0081	PAI	149.88	150							CO	41.45407	in 143
0082	PAI	149.88	150							CO	42.81917	in 143
0083	PAI	149.88	150							CO	41.45407	in 143
0084	PAI	149.88	150							CO	42.81917	in 143
0085	PAI	149.88	150							CO	41.45407	in 143
0086	PAI	149.88	150							CO	42.81917	in 143
0087	PAI	149.88	150							CO	41.45407	in 143
0088	PAI	149.88	150							CO	42.81917	in 143
0089	PAI	149.88	150							CO	41.45407	in 143
0090	PAI	149.88	150							CO	42.81917	in 143
0091	PAI	149.88	150							CO	41.45407	in 143
0092	PAI	149.88	150							CO	42.81917	in 143
0093	PAI	149.88	150							CO	41.45407	in 143
0094	PAI	149.88	150							CO	42.81917	in 143
0095	PAI	149.88	150							CO	41.45407	in 143
0096	PAI	149.88	150							CO	42.81917	in 143
0097	PAI	149.88	150							CO	41.45407	in 143
0098	PAI	149.88	150							CO	42.81917	in 143
0099	PAI	149.88	150							CO	41.45407	in 143
0100	PAI	149.88	150							CO	42.81917	in 143
0101	PAI	149.88	150							CO	41.45407	in 143
0102	PAI	149.88	150							CO	42.81917	in 143
0103	PAI	149.88	150							CO	41.45407	in 143
0104	PAI	149.88	150							CO	42.81917	in 143
0105	PAI	149.88	150							CO	41.45407	in 143
0106	PAI	149.88	150							CO	42.81917	in 143
0107	PAI	149.88	150							CO	41.45407	in 143
0108	PAI	149.88	150							CO	42.81917	in 143
0109	PAI	149.88	150							CO	41.45407	in 143
0110	PAI	149.88	150							CO	42.81917	in 143
0111	PAI	149.88	150							CO	41.45407	in 143
0112	PAI	149.88	150							CO	42.81917	in 143
0113	PAI	149.88	150							CO	41.45407	in 143
0114	PAI	149.88	150							CO	42.81917	in 143
0115	PAI	149.88	150							CO	41.45407	in 143
0116	PAI	149.88	150							CO	42.81917	in 143
0117	PAI	149.88	150							CO	41.45407	in 143
0118	PAI	149.88	150							CO	42.81917	in 143
0119	PAI	149.88	150							CO	41.45407	in 143
0120	PAI	149.88	150							CO	42.81917	in 143
0121	PAI	149.88	150							CO	41.45407	in 143
0122	PAI	149.88	150							CO	42.81917	in 143
0123	PAI	149.88	150							CO	41.45407	in 143
0124	PAI	149.88	150							CO	42.81917	in 143
0125	PAI	149.88	150							CO	41.45407	in 143
0126	PAI	149.88	150							CO	42.81917	in 143
0127	PAI	149.88	150							CO	41.45407	in 143
0128	PAI	149.88	150							CO	42.81917	in 143
0129	PAI	149.88	150							CO	41.45407	in 143
0130	PAI	149.88	150							CO	42.81917	in 143
0131	PAI	149.88	150							CO	41.45407	in 143
0132	PAI	149.88	150							CO	42.81917	in 143
0133	PAI	149.88	150							CO	41.45407	in 143
0134	PAI	149.88	150							CO	42.81917	in 143
0135	PAI	149.88	150							CO	41.45407	in 143
0136	PAI	149.88	150							CO	42.81917	in 143
0137	PAI	149.88	150							CO	41.45407	in 143
0138	PAI	149.88	150							CO	42.81917	in 143
0139	PAI	149.88	150							CO	41.45407	in 143
0140	PAI	149.88	150							CO	42.81917	in 143
0141	PAI	149.88	150							CO	41.45407	in 143
0142	PAI	149.88	150									

Rehno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
00903	148.43	SW	145.92	225			VC	26.4764	1 in 42
00903	148.43	SW	145.92	225			VC	26.4764	1 in 42
1805	147.83	SW	145.75	225			VC	55.25805	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	7.49179	
0421		FO	100				VC	7.49179	
0421		FO	100				VC	7.49179	
0421		FO	100				VC	7.49179	
00901	149.75	CO	0	300			VC	28.84441	
00901	149.75	CO	0	300			VC	28.84441	
2801	149.66	CO	148.19	225			VC	16.12452	1 in 67
0710		CO	100				VC	10.07094	
09006		CO	150				VC	17.7427	
1607		CO	100				VC	2.514988	
0901	146	CO	143.06	300			VC	84.97163	1 in 106
1604		CO	150				VC	13.96629	
0703	146.54	CO	143.37	300			VC	71.02113	1 in 237
2803		CO	145.66	225			VC	65.19202	1 in 56
2720		CO	150				VC	9.220607	
2722		CO	150				VC	12.45645	
0714		CO	100				VC	3.548553	
0714		CO	100				VC	3.548553	
4202		SW	750				CO	26.26324	
4202		SW	750				CO	26.26324	

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  Extant 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
EG	Egg
OV	Oval
FT	Flat Top
RE	Rectangular
SQ	Square
TR	Trapezoidal
AR	Arch
BA	Barrel
HO	HorseShoe
UN	Unspecified
SEWER MATERIAL	
AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass 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	
Number:	SD9111NW
Scale: 1:1250	Date: 08/03/2022
Nodes: 233	
Sheet: 4 of 6	
Printed by:	Property Searches



**SEWER
RECORDS**

 **United
Utilities**
Water for the North West

