

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. 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 n 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 approve parameters.

Table 1.1: Site Summary

Site Name	Plot J2
Location	Kingsway Business Park
NGR (approx.)	SD 9135 1149
Application Site Area (ha)	4.38 (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

- 1.4 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.
- 1.5 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.
- 1.6 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.
- 1.7 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.
- 1.8 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**.

- 1.9 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.

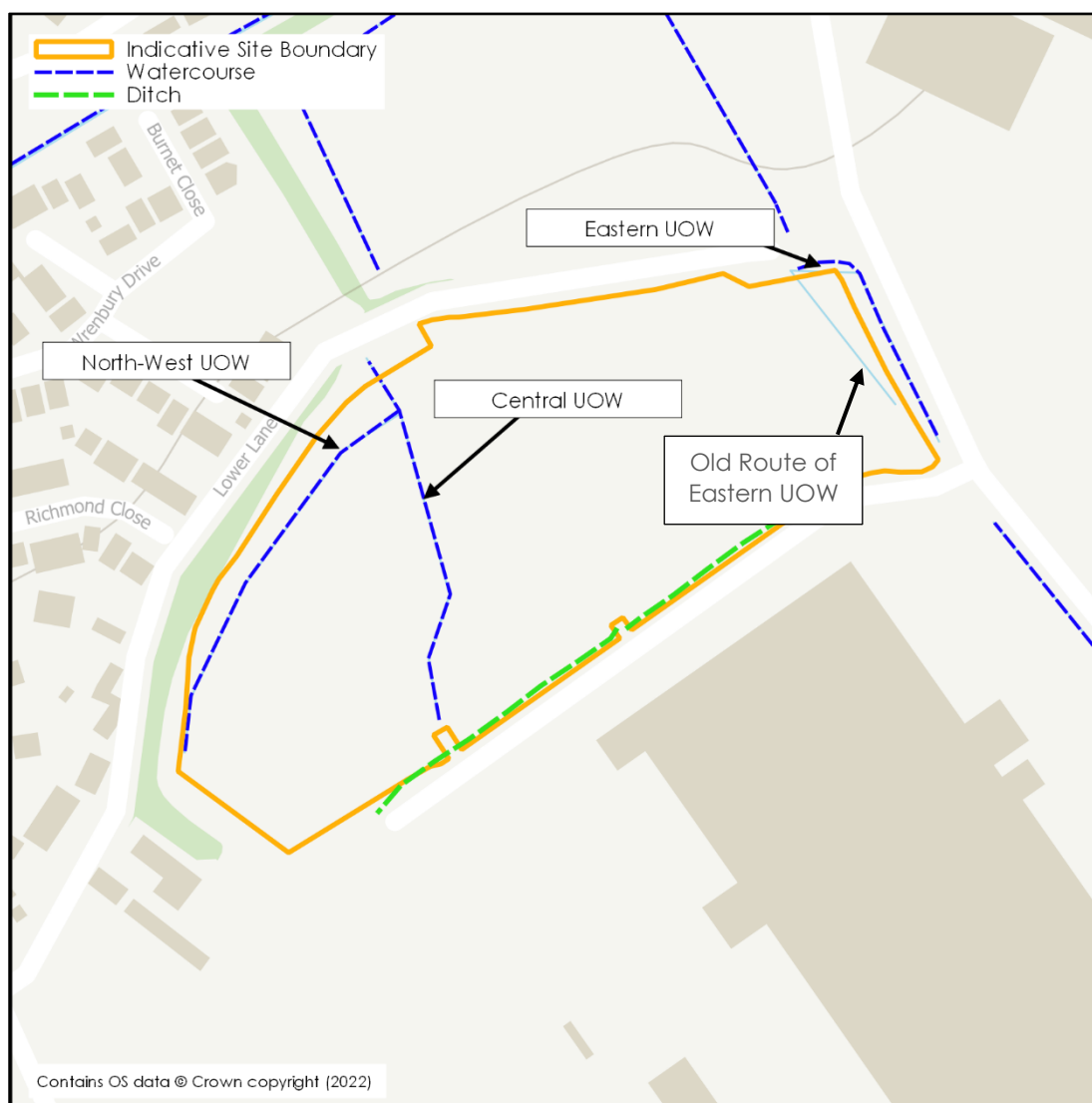


Figure 1.1: Site Location



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

Proposed Development

- 1.10 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.
- 1.11 Proposed access/egress is shown to be achieved via James Kearns Avenue along the southern boundary.

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**.

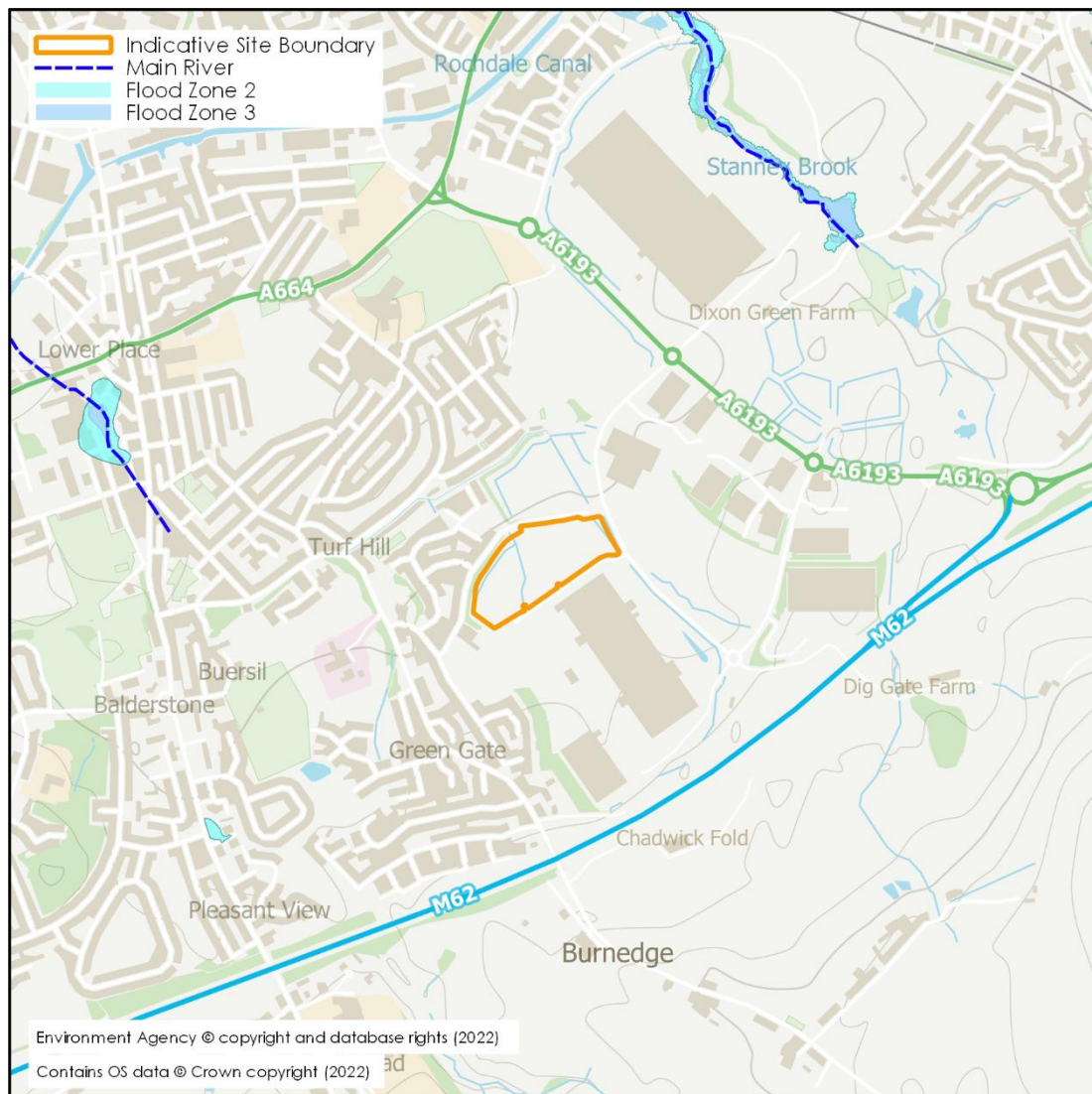


Figure 2.1: Flood Map for Planning

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		No 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.

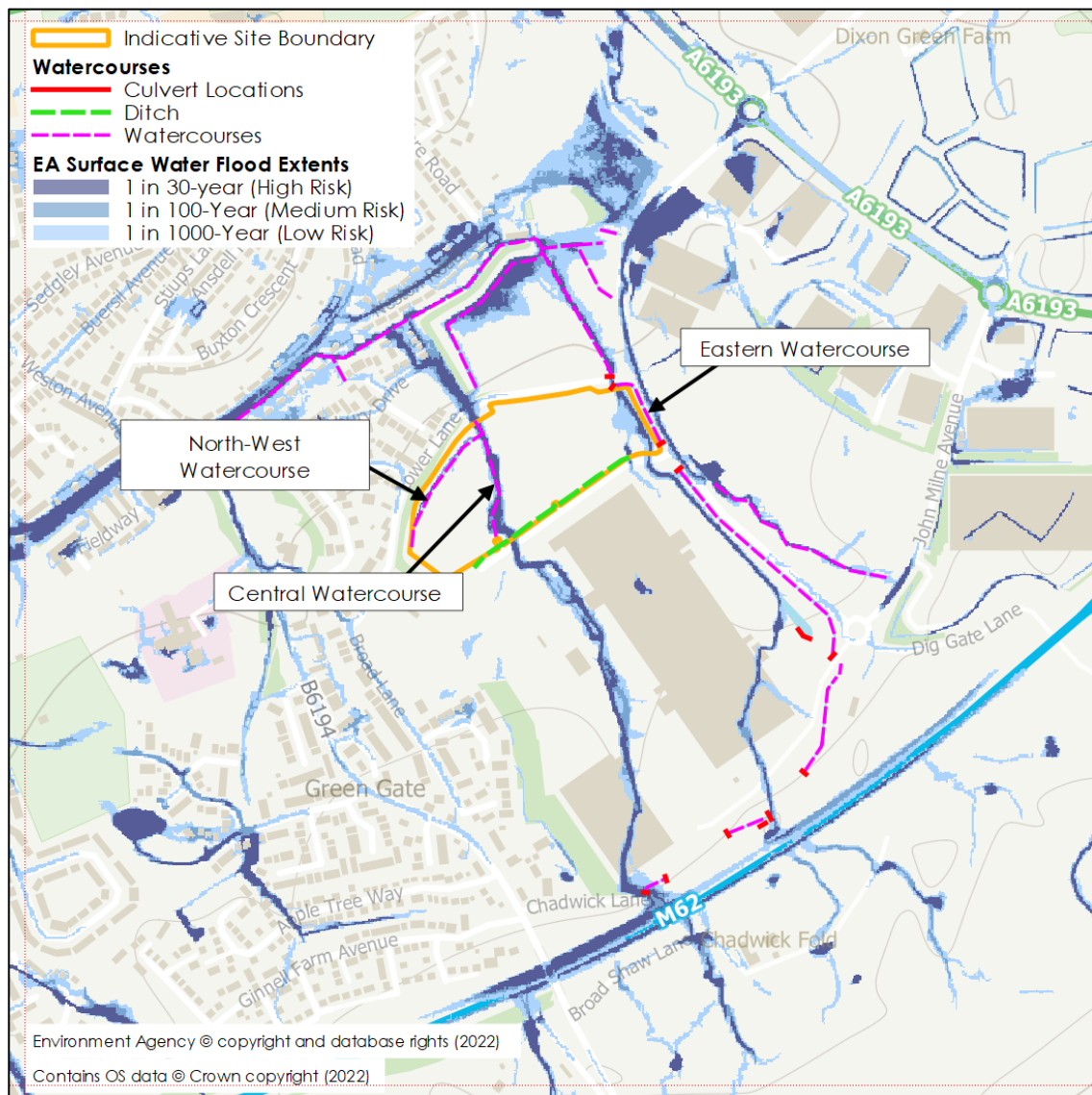


Figure 3.1: EA Mapping of Surface Water Flood Risk

- 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.

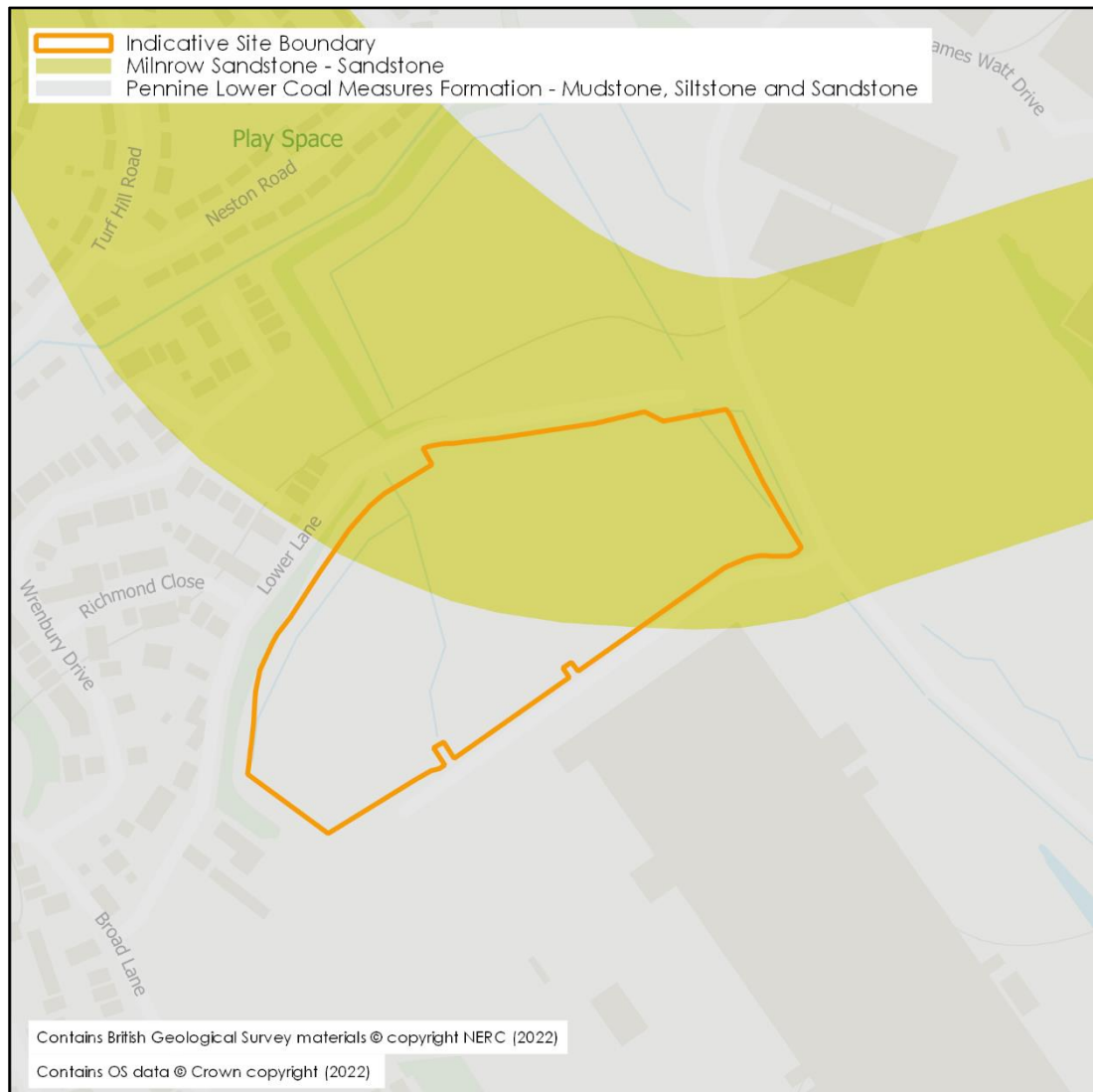


Figure 3.7: BGS Mapping of Bedrock Geology

- 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.

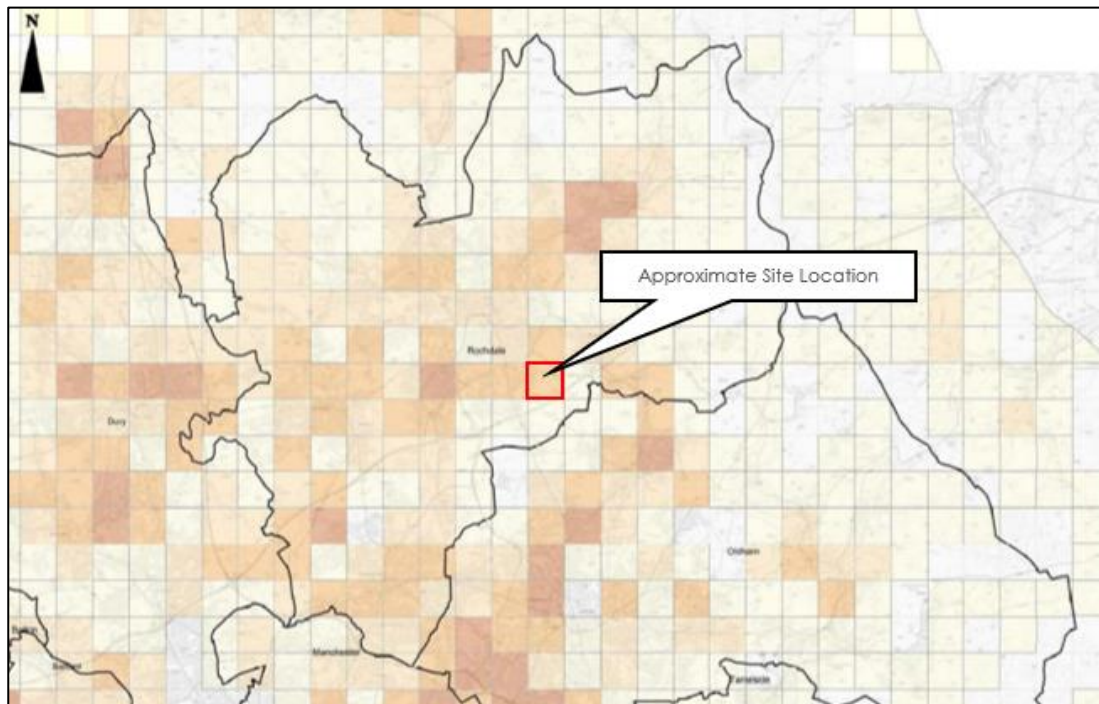


Figure 3.8: LFRMS Mapping of Susceptibility to Groundwater Flooding (Source: Rochdale Borough Strategy for Flood Risk Management)

- 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**.

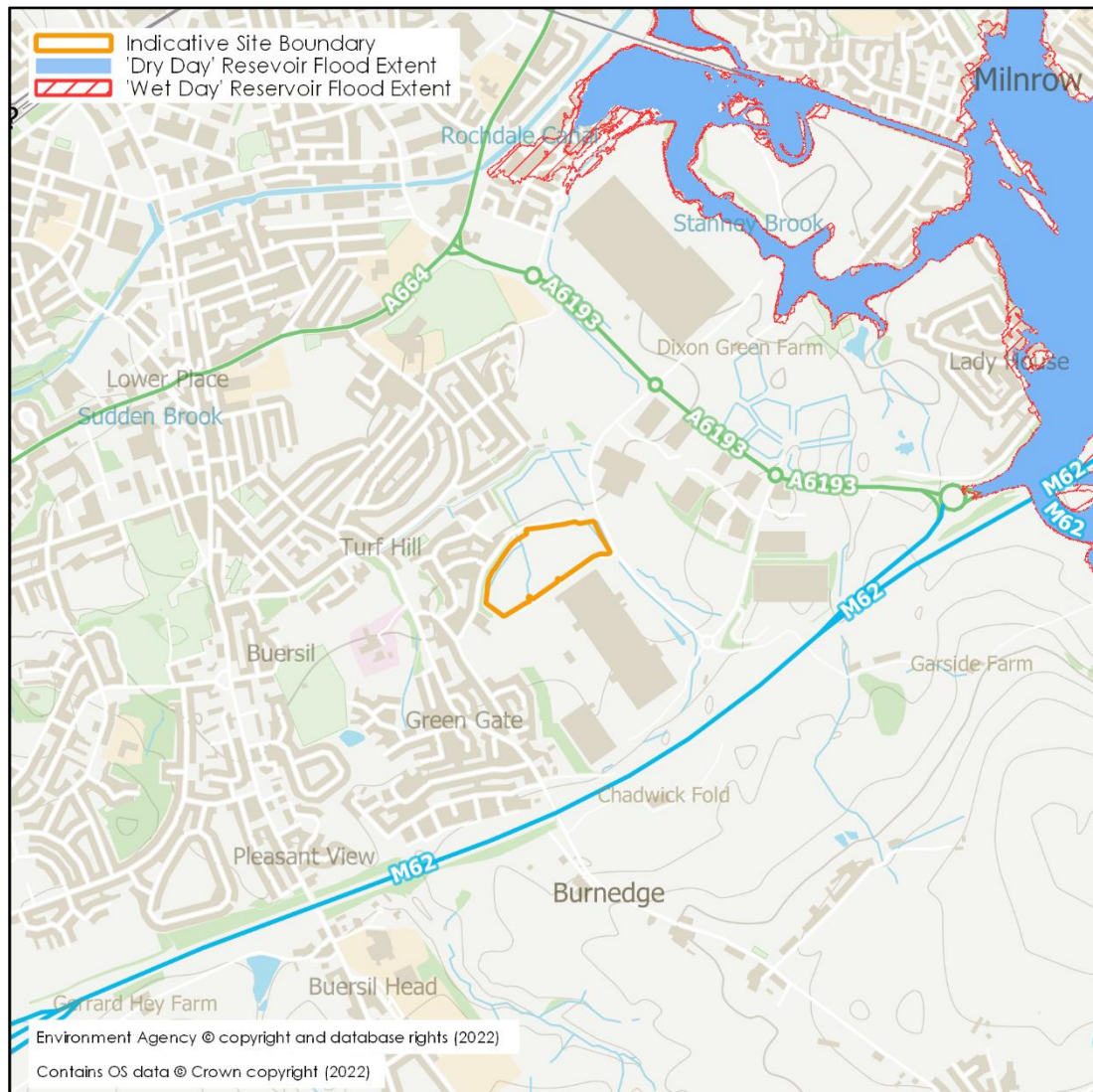


Figure 3.9: EA Mapping of Reservoir Flood Extents

- 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.
- 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

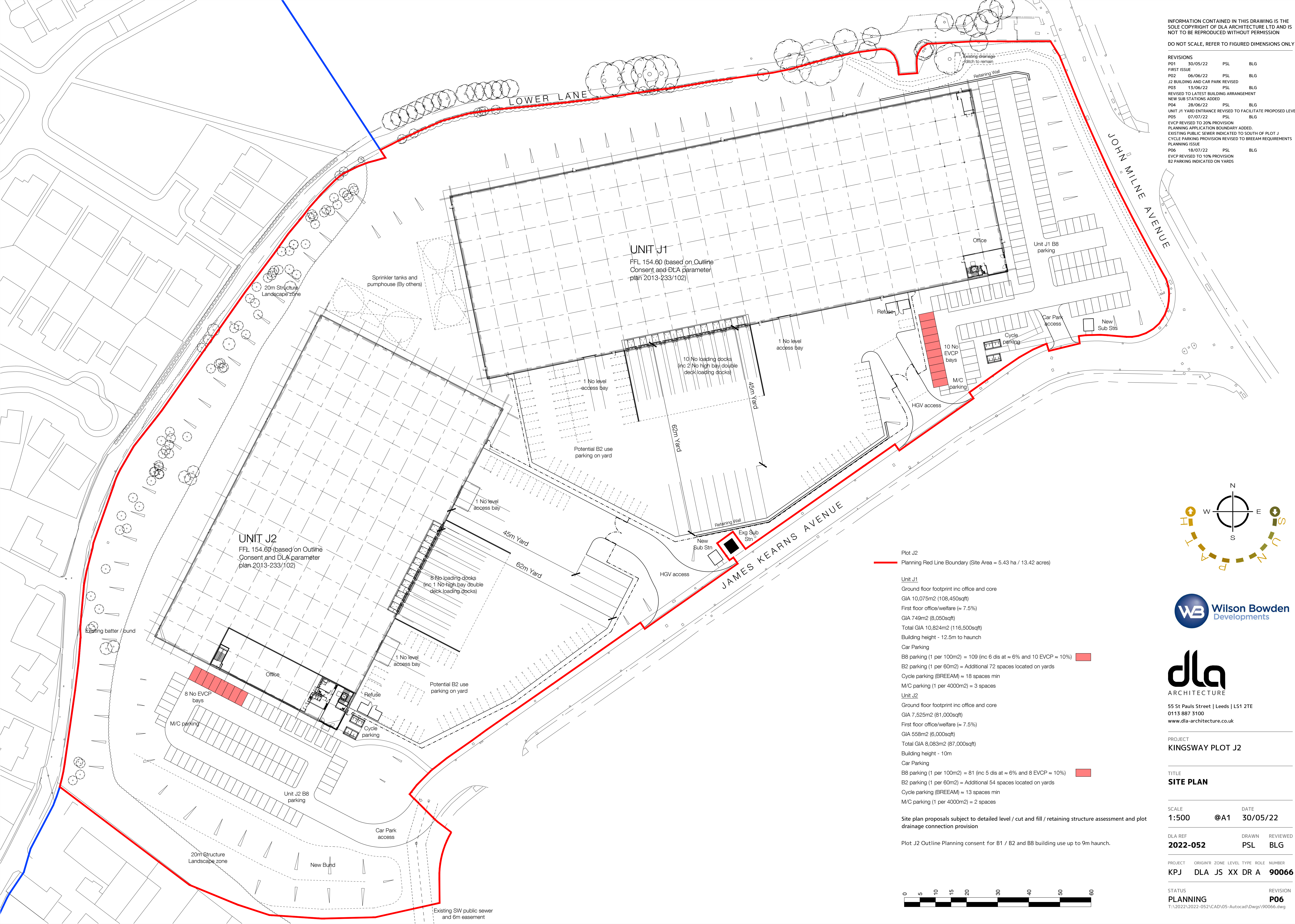
Flood Source	Risk & Proposed Mitigation Measures
Fluvial	In the absence of Flood Zones, mapping of surface water flood risk has been used to indicate the flood risk posed by three UOWs within the site; Eastern UOW, Central UOW and the North-West UOW. An additional ditch is located along the southern 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. 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.	

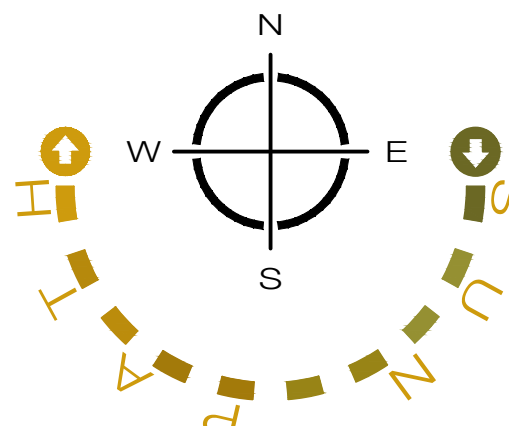
- 6.4 In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area subject to suitable management of surface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

APPENDICES

Appendix 1: Indicative Site Layout Plan



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DO NOT SCALE, REFER TO FIGURED DIMENSIONS ONLY			
REVISIONS			
P01	30/05/22	PSL	BLG
FIRST ISSUE			
P02	06/06/22	PSL	BLG
J2 BUILDING AND CAR PARK REVISED			
P03	13/06/22	PSL	BLG
REVISED TO LATEST BUILDING ARRANGEMENT			
NEW SUB STATIONS ADDED			
P04	28/06/22	PSL	BLG
UNIT J1 YARD ENTRANCE REVISED TO FACILITATE PROPOSED LEVELS			
P05	07/07/22	PSL	BLG
EVCP REVISED TO 20% PROVISION			
PLANNING APPLICATION BOUNDARY ADDED			
EXISTING PUBLIC SEWER INDICATED TO SOUTH OF PLOT J			
CYCLE PARKING PROVISION REVISED TO BREEAM REQUIREMENTS			
PLANNING ISSUE			
P06	18/07/22	PSL	BLG
EVCP REVISED TO 10% PROVISION			
B2 PARKING INDICATED ON YARDS			



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PROJECT
KINGSWAY PLOT J2

TITLE
SITE PLAN

SCALE	DATE
1:500	30/05/22

DLA REF	DRAWN	REVIEWED
2022-052	PSL	BLG

PROJECT	ORIGIN'R	ZONE	LEVEL	TYPE	ROLE	NUMBER
KPJ	DLA	JS	XX	DR	A	90066

STATUS	REVISION
PLANNING	P06

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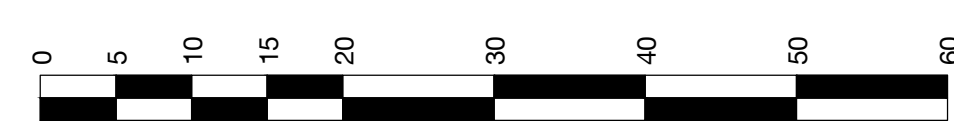
Plot J2
Planning Red Line Boundary (Site Area = 5.43 ha / 13.42 acres)

Unit J1
Ground floor footprint inc office and core
GIA 10,075m² (108,450sqft)
First floor office/welfare (≈ 7.5%)
GIA 749m² (8,050sqft)
Total GIA 10,824m² (116,500sqft)
Building height - 12.5m to haunch
Car Parking
B8 parking (1 per 100m²) = 109 (inc 6 dis at ≈ 6% and 10 EVCP ≈ 10%)
B2 parking (1 per 60m²) = Additional 72 spaces located on yards
Cycle parking (BREEAM) = 18 spaces min
M/C parking (1 per 4000m²) = 3 spaces

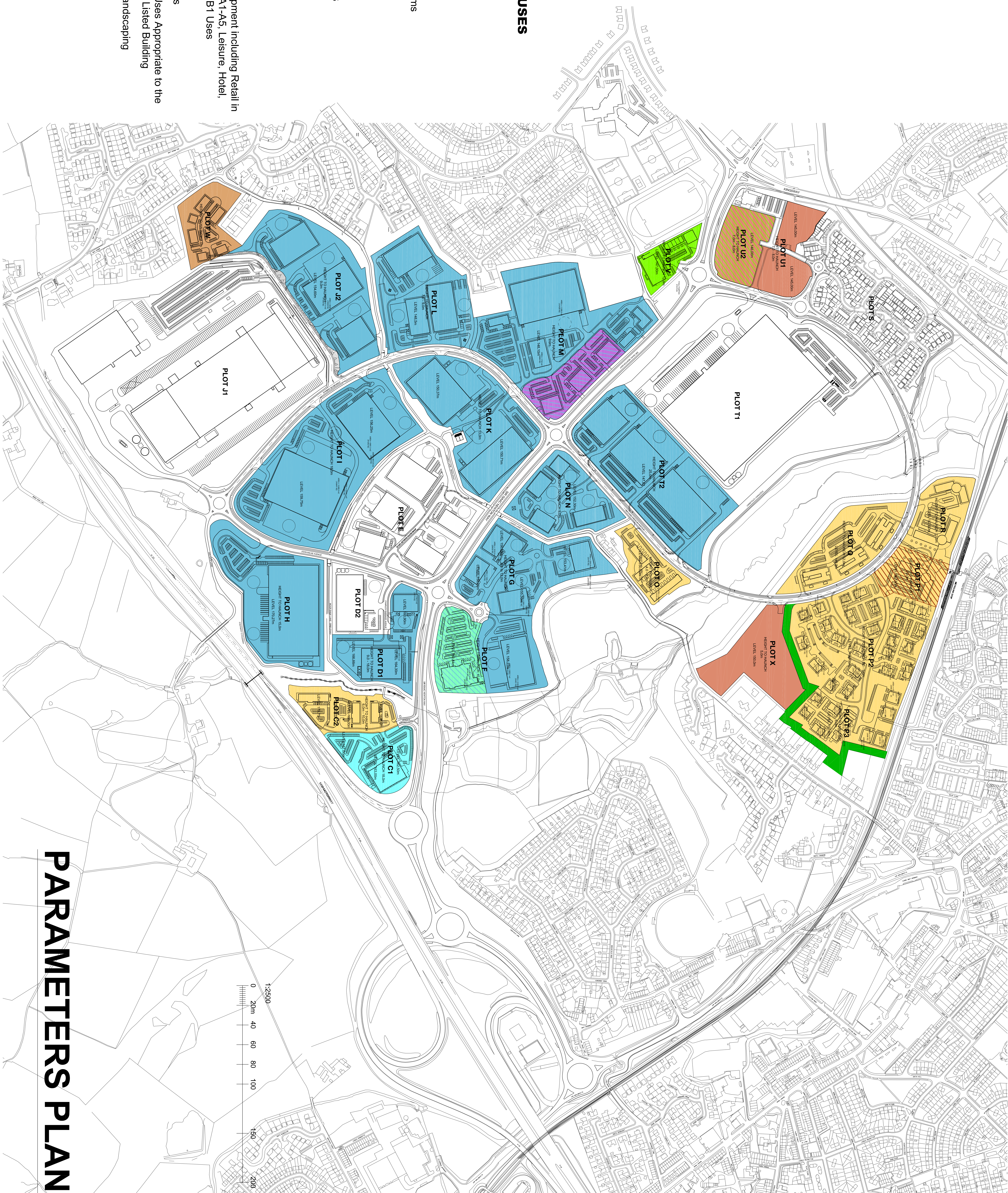
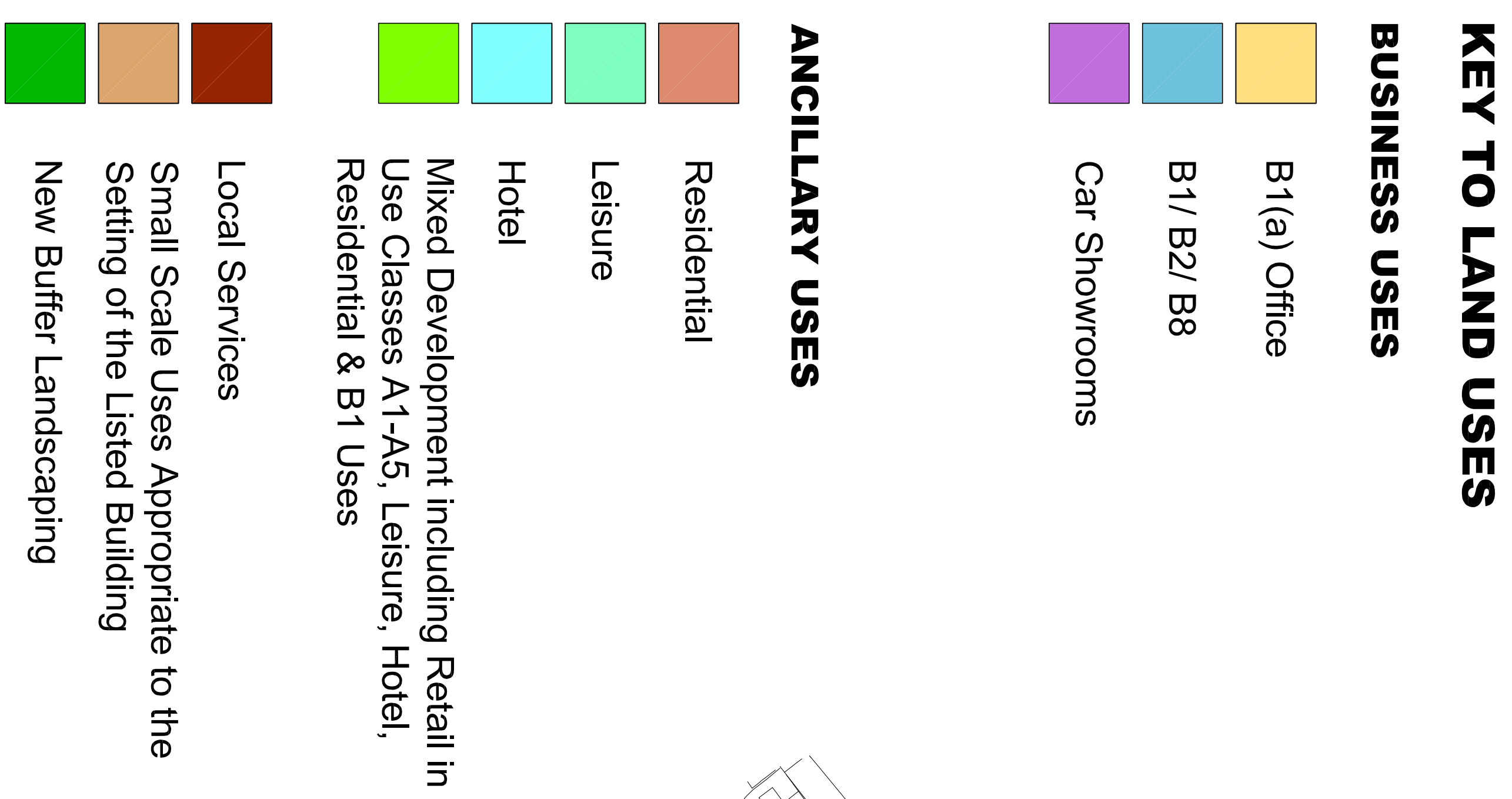
Unit J2
Ground floor footprint inc office and core
GIA 7,525m² (81,000sqft)
First floor office/welfare (≈ 7.5%)
GIA 558m² (6,000sqft)
Total GIA 8,083m² (87,000sqft)
Building height - 10m
Car Parking
B8 parking (1 per 100m²) = 81 (inc 5 dis at ≈ 6% and 8 EVCP ≈ 10%)
B2 parking (1 per 60m²) = Additional 54 spaces located on yards
Cycle parking (BREEAM) = 13 spaces min
M/C parking (1 per 4000m²) = 2 spaces

Site plan proposals subject to detailed level / cut and fill / retaining structure assessment and plot drainage connection provision

Plot J2 Outline Planning consent for B1 / B2 and B8 building use up to 9m haunch.

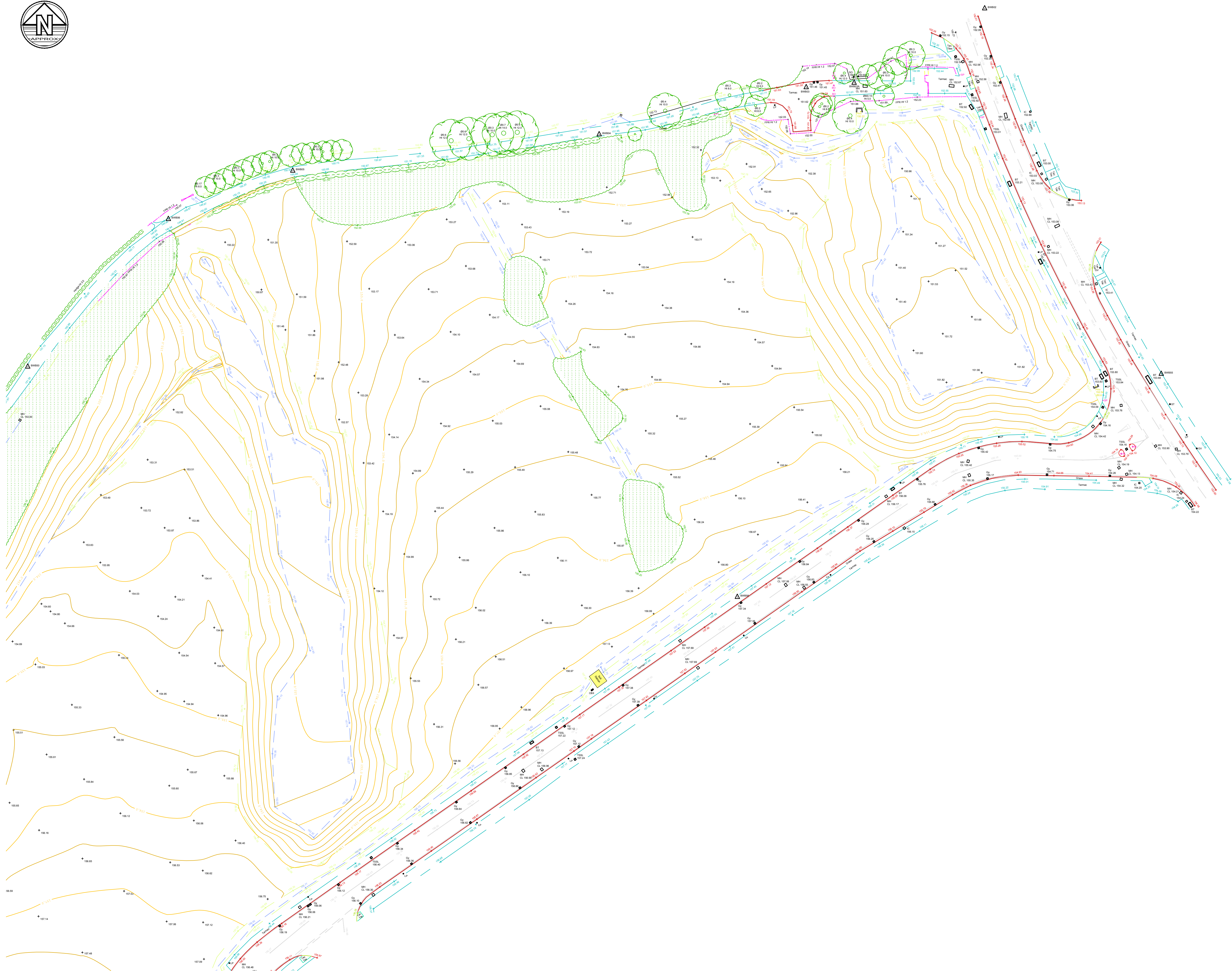


Appendix 2: Parameters Plan



PARAMETERS PLAN

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	Water Drainage Line
Centre Line	
Barrier	
Fence	
Gate	
Overhead Powerline	
Overhead Utilities	

AP Anchor Point	FBW Fence Barbed Wire	LB Litter Bin
BG Back Gully	FCB Fence Closed Board	LP Lamp Post
BO Bollard	FCL Fence Chain Link	MP 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
CCTVSecurity 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	THL Threshold Level
DK Drop Kerb	GV Gas Valve	TL Traffic Light
DP Down Pipe	GU 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 (as a reduced level)	WM Water Meter
FL Floodlight		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		
Drawing Status			
INFORMATION			
Project - Originator - Zone - Level - Type - Role - Number			Status
KBP-BWB-00-01-DR-G-0001			P1



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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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	☐ Nottingham 0115 924 1100
	www.bwbconsulting.com

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 <Laura.Precious@Rochdale.Gov.UK>
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



☎ 01706 924381

✉ laura.precious@rochdale.gov.uk

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

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For news and social media updates go to www.rochdale.gov.uk/news

Please consider the environment before printing this email.

From: Ryan Davies <Ryan.Davies@bwbconsulting.com>
Sent: 25 February 2021 17:29
To: Strategic Planning <Strategic.Planning@Rochdale.Gov.UK>
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 tow 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 0121 233 3322 D 0121 212 8717 W www.bwbconsulting.com



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Company No. 5265863
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Ryan Davies

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 27 June 2022 09:56
To: Ryan Davies
Cc: Francis Comyn; sarah.parkington@floodforum.org.uk
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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BOROUGH COUNCIL

☎ 01706 924606

📠 07552 570262

✉ stephen.mccann@rochdale.gov.uk

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Floor 2, Number One Riverside
Smith Street, Rochdale, OL16 1XU

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From: Ryan Davies <Ryan.Davies@bwbconsulting.com>
Sent: 27 June 2022 09:31
To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>; sarah.parkington@floodforum.org.uk
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 0121 233 3322 **D** 0121 212 8717 **W** www.bwbconsulting.com

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 24 June 2022 10:48
To: Ryan Davies <Ryan.Davies@bwbconsulting.com>
Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>; sarah.parkington@floodforum.org.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



 01706 924606
 07552 570262
 stephen.mccann@rochdale.gov.uk

From: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>
Sent: 23 June 2022 17:26
To: sarah.parkington@floodforum.org.uk; Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
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

☎ 01706 924353

☎ 07976 059367

✉ francis.comyn@rochdale.gov.uk

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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 <Ryan.Davies@bwbconsulting.com>

Sent: 23 June 2022 17:15

To: Strategic Planning <Strategic.Planning@Rochdale.Gov.UK>

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,

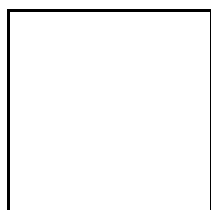
Ryan

Ryan Davies BSc(Hons), MSc, GradCIWEM

Environmental Consultant (Water) | BWB Consulting Limited

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Appendix 6: 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,



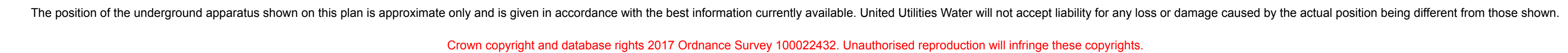
Karen McCormack
Property Searches Manager

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.



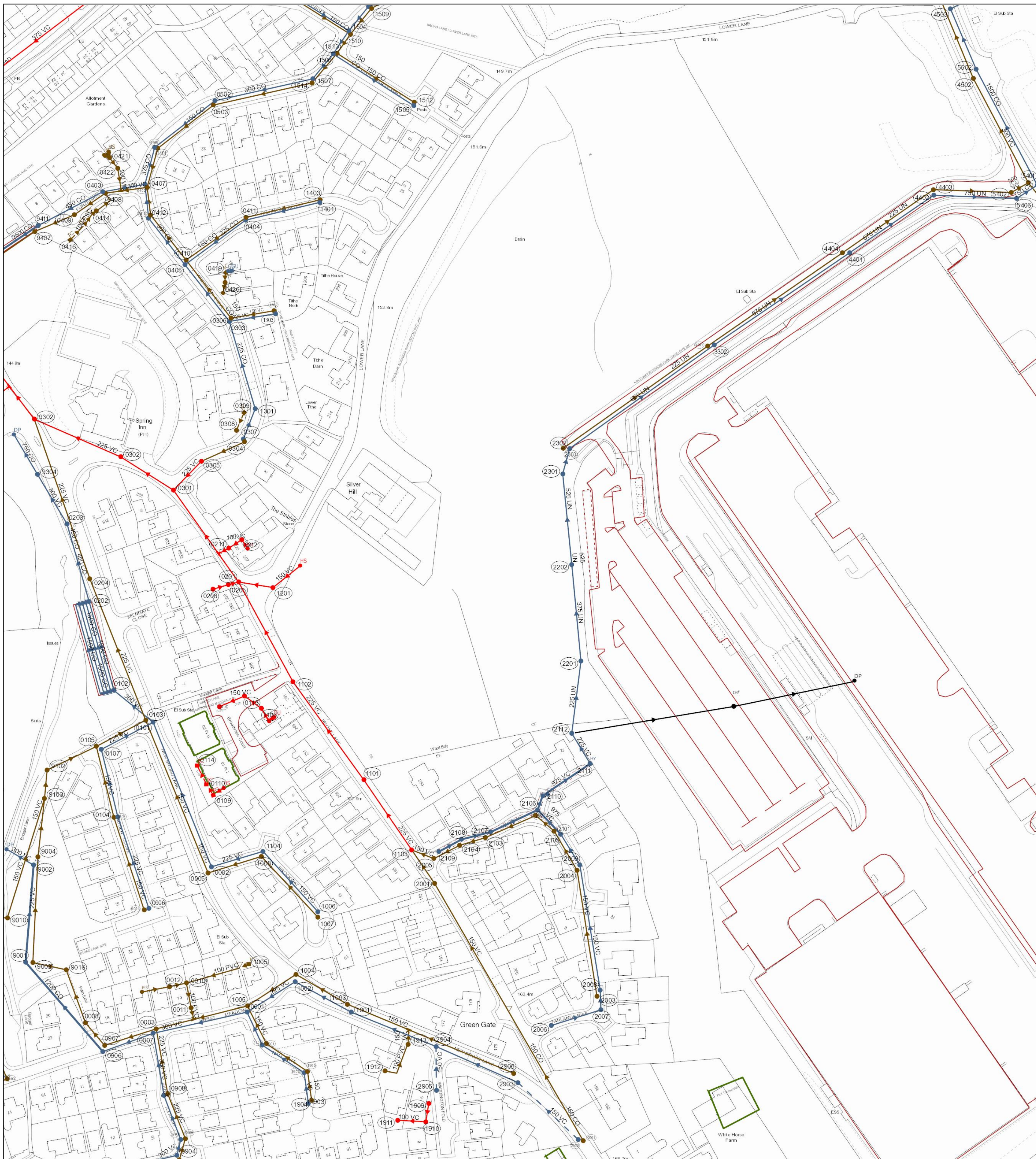
**SEWER
RECORDS**

 **United
Utilities**



Index	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
7000		CO		150			VC	11.02506	
8414	140.15	SW	140.5	1000			CO	8.87761	1 in 129
8414		SW	140.5	1000			CO	8.87761	1 in 129
8905	145.43	CO	142.99	225			VC	10.63766	1 in 82
11001		SW		225			VC	80.9506	
15704	140.29	CO	139.45	150			VC	8.062258	
77005		CO		150			VC	4.983559	
5603	138.79	CO	133.59	460			BR	16.64332	
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
0409		FO	142.53	300			VC	23.71328	1 in 148
5501	140.02	CO	138.5	225			VC	60.87603	1 in 39
5602	151.77	CO	148.66	300			VC	73.24692	1 in 163
7702	149.27	CO	145.47	225			VC	91.97245	1 in 46
6403	143.06	CO	139.18	150			VC	6.403124	
60018	148.89	CO	146.8	375			VC	76.26432	
5508		CO	0	225			VC	24.04163	
5508		CO		225			VC	24.04163	
4504	138.45	SW	136.09	600			BR	42.55409	
5801	148.07	CO	142.21	375			VC	78.49203	
6802	148.71	CO	143.56	225			VC	59.84786	1 in 69
5508	142.25	CO	138.98	225			VC	21.2132	1 in 40
5508	142.25	CO	138.98	225			VC	21.2132	1 in 40
8410	141.83	SW	139.9	1000			CO	24.20744	1 in 303
8410	141.83	SW	139.9	1000			CO	24.20744	1 in 303
8804		CO		100			PVC	4.126227	
801	144.24	CO	0	225			VC	45.69331	
801		SW		150			UN	7.47837	
8408		CO	0	300			VC	35.99508	
8907		CO	0	225			VC	41.81701	
5601	139.69	FO	138.94	150			VC	32.55764	
0703		CO	0	225			VC	19.10497	
5901	140.75	CO	0	300			VC	28.84411	
5901	140.75	CO	0	300			VC	28.84411	
5906	140.37	CO	136.87	450			VC	43.53604	1 in 39
8909		CO		100			PVC	4.434118	
8907		CO		150			VC	20.40897	
8507		CO		150			VC	20.40897	
7706	141.67	CO	139.77	225			VC	85.36377	1 in 848
5804	141.28	CO	139.42	525			VC	25.31798	1 in 21
5801	141.77	CO	140.33	300			VC	65.51338	1 in 67
7707	142	CO	140.17	225			VC	38.63936	1 in 99
5808		CO		100			VC	10.70374	
5808		CO		100			VC	8.98749	
8903		CO		100			VC	14.85812	
6815		CO		100			VC	7.302792	
6701	143.15	CO	141.78	225			VC	76.26311	1 in 55
7501	146.44	CO	143.41	225			VC	87.23929	1 in 29
4814	137.97	CO	133.79	150			VC	8	
6818	0	CO	0	470			BR	17	
4617		CO	0	660			BR	17	
5503	139.71	CO	133.53	150			VC	25.34524	1 in 35
4604		CO	0	525			VC	53.07542	
6556	145.6	CO	142.25	225			VC	53.07542	
6556	145.6	CO	142.25	225			VC	97.28532	1 in 35
6518		CO		100			VC	8.513662	
6518		CO		100			VC	8.513662	
5402	141.67	CO	139.11	225			VC	26.1725	
5402	141.67	CO	139.11	225			VC	26.1725	
5513		CO	0	225			VC	8.776383	
5513		CO	0	225			VC	8.776383	
5601	142.17	CO	138.18	525			CO	72.13876	1 in 57
5601	142.17	CO	138.18	525			CO	72.13876	1 in 57
6517		CO		150			VC	8.14004	
6517		CO		150			VC	8.14004	
6408	142.14	CO	139.6	375			VC	18.11077	1 in 181
6408	142.14	CO	139.6	375			VC	18.11077	1 in 181
6408	142.37	CO	139.77	375			VC	25.18439	1 in 148
6408	142.37	CO	139.77	375			VC	25.18439	1 in 148
8415		CO		225			VC	3.670241	
8415		CO		225			VC	3.670241	
6407	142.31	CO	139.93	375			VC	14.31782	1 in 143
6407	142.31	CO	139.93	375			VC	14.31782	1 in 143
0714		CO		100			VC	3.548553	
0714		CO		100			VC	3.548553	
5507	138.21	CO	137.35	225			VC	60.00833	1 in 107
5507	138.21	CO	137.35	225			VC	60.00833	1 in 107





Refo	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad	Refo	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
0902	159.96	SW	157.37	0	300		VC	16.88111	1 in 333	4502	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0411		FO	146.08	150			CO	40.58736	1 in 116	4502	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0411		FO	146.08	150			CO	40.58736	1 in 116	4502	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
1513		FO	144.32	150			CO	21.407	1 in 143	1007	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
1513		FO	144.32	150			CO	21.407	1 in 143	1007	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
1904		FO	150.1	150			VC	16.033	1 in 203	1101	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0906	158.8	SW	154.1	1200			CO	65.05999	1 in 203	1007	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0906	158.8	SW	154.1	1200			CO	65.05999	1 in 203	1007	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
8304		SW	0	750			CO	25.63263	1 in 21	1006	SW	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
8304		SW	0	750			CO	25.63263	1 in 21	1006	SW	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
1403		FO	148.08	150			CO	41.84739	1 in 21	1006	SW	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
1403		FO	148.08	150			CO	41.84739	1 in 21	1006	SW	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0307		SW	152.75	225			CO	17.85656	1 in 31	1004	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0201		CO	0	160			VC	13.79129	1 in 100	1004	FO	157.79	157.79	157.79	157.79	157.79	VC	16.88111	1 in 333
0009	156.69	FO	152.91	150			VC	35.07051	1 in 125	1545	153.8	SW	150.3	150.3	150.3	VC	16.88111	1 in 333	
1911		FO	144.72	150			CO	72.76296	1 in 102	1405	153.8	SW	150.3	150.3	150.3	VC	16.88111	1 in 333	
2101	160.3	FO	158.36	150			VC	13.28811	1 in 106	1023	SW	150.78	150.78	150.78	VC	16.88111	1 in 333		
0003	160.15	FO	157.51	225			VC	29.93069	1 in 36	1023	SW	150.78	150.78	150.78	VC	16.88111	1 in 333		
1103		FO	157.78	225			VC	46.76296	1 in 22	19103	154.45	FO	152.1	152.1	152.1	VC	16.88111	1 in 333	
2005		SW	150.39	150			VC	24.26135	1 in 11	19103	154.45	FO	152.1	152.1	152.1	VC	16.88111	1 in 333	
0306		FO	150.39	150			UN	45.79684	1 in 9	4402	155.41	SW	151.32	151.32	151.32	VC	16.88111	1 in 333	
2112	159.33	SW	157	225			UN	40.09391	1 in 40.486458	4402	155.41	SW	151.32	151.32	151.32	VC	16.88111	1 in 333	
0413		FO	144.8	150			UN	15.32846	1 in 9	4402	155.41	SW	151.32	151.32	151.32	VC	16.88111	1 in 333	
0413		FO	144.8	150			UN	15.32846	1 in 9	4402	155.41	SW	151.32	151.32	151.32	VC	16.88111	1 in 333	
1504		SW	144.75	300			CO	15.48764	1 in 258	10116	FO	157.79	157.79	157.79	VC	16.88111	1 in 333		
1504		SW	144.75	300			CO	15.48764	1 in 258	10116	FO	157.79	157.79	157.79	VC	16.88111	1 in 333		
1006		SW	0	150			VC	45.0378	1 in 10	1302	FO	157.79	157.79	157.79	VC	16.88111	1 in 333		
0005		SW	144.69	300			VC	89.95042	1 in 103	1514	FO	144.17	150	150	VC	16.88111	1 in 333		
1506		SW	144.69	300			VC	17.76127	1 in 254	1514	FO	144.17	150	150	VC	16.88111	1 in 333		
1506		SW	144.69	300			VC	17.76127	1 in 254	1514	FO	144.17	150	150	VC	16.88111	1 in 333		
5403		FO	150.3	300			VC	47.72846	1 in 10	15406	154.36	SW	150.81	750	750	VC	16.88111	1 in 333	
5403		FO	150.3	300			VC	47.72846	1 in 10	15406	154.36	SW	150.81	750	750	VC	16.88111	1 in 333	
1901		SW	0	225			CO	20.0131	1 in 10	15406	154.36	SW	150.81	750	750	VC	16.88111	1 in 333	
0909		FO	152.61	225			VC	26.60524	1 in 17	15406	154.36	SW	150.81	750	750	VC	16.88111	1 in 333	
4404	157.43	FO	152.61	225			UN	11.11433	1 in 169.928983	15406	154.36	SW	150.81	750	750	VC	16.88111	1 in 333	
1002	161.29	SW	159.63	225			VC	31.34664	1 in 47	10107	SW	150.81	750	750	VC	16.88111	1 in 333		
1003		CO	0	160			VC	32.92714	1 in 107	10107	SW	150.81	750	750	VC	16.88111	1 in 333		
2102	159.74	FO	158.28	150			VC	30.44789	1 in 145	21111	159.32	SW	0	225	VC	16.88111	1 in 333		
1902		SW	0	225			VC	27.6642	1 in 10	10401	SW	143.32	375	375	VC	16.88111	1 in 333		
1104		SW	0	225			VC	29.65007	1 in 10	10401	SW	143.32	375	375	VC	16.88111	1 in 333		
0405		SW	147.01	300			CO	22.53988	1 in 17	10421	FO	150.81	750	750	VC	16.88111	1 in 333		
0104		FO	150.3	150			VC	46.16231	1 in 10	10421	FO	150.81	750	750	VC	16.88111	1 in 333		
0104		FO	150.3	150			VC	46.16231	1 in 10	10421	FO	150.81	750	750	VC	16.88111	1 in 333		
0302	149.55	FO	146.72	225			VC	51.94846	1 in 18	10421	FO	150.81	750	750	VC	16.88111	1 in 333		
0302	149.55	FO	146.72	225			VC	51.94846	1 in 18	10421	FO	150.81	750	750	VC	16.88111	1 in 333		
0101		SW	149.26	150			VC	27.8612	1 in 12	19010	155.78	FO	152.63	150	150	VC	16.88111	1 in 333	
1505		SW	149.26	150			VC	52.75459	1 in 12	19010	155.78	FO	152.63	150	150	VC	16.88111	1 in 333	
1505		SW	149.26	150			VC	52.75459	1 in 12	19010	155.78	FO	152.63	150	150	VC	16.88111	1 in 333	
2303	156.37	UN	153.15	225			UN	97.56244	1 in 12	19010	155.78	FO	152.63	150	150	VC	16.88111	1 in 333	
1401		SW	149.33	225			CO	42.1358	1 in 21	19001	157.08	SW	153.78	1200	1200	VC	16.88111	1 in 333	
1401		SW	149.33	225			CO	42.1358	1 in 21	19001	157.08	SW	153.78	1200	1200	VC	16.88111	1 in 333	
2302	156.15	UN	154.1	600			UN	98.02001	1 in 408.416715	19002	155.74	SW	0	225	VC	16.88111	1 in 333		
1509		FO	144.63	150			UN	6.3746718	1 in 80	19002	155.74	SW	0	225	VC	16.88111	1 in 333		
1509		FO	144.63	150			UN	6.3746718	1 in 80	19002	155.74	SW	0	225	VC	16.88111	1 in 333		
0414		FO	150.3	150			PVC	14.58894	1 in 109	19003	157.54	FO	154.39	150	150	VC	16.88111	1 in 333	
0414		FO	150.3	150			PVC	14.58894	1 in 109	19003	157.54	FO	154.39	150	150	VC	16.88111	1 in 333	
1903		SW	0	150			VC	16.99894	1 in 109	19003	157.54	FO	154.39	150	150	VC	16.88111	1 in 333	
2902		SW	142.67	300			VC	84.70207	1 in 149	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
5401		FO	150.3	300			VC	65.11729	1 in 10	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
5401		FO	150.3	300			VC	65.11729	1 in 10	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
5401		FO	150.3	300			VC	65.11729	1 in 10	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
2103	159.91	FO	156.07	150			VC	14.63467	1 in 183	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
9102	153.3	FO	151.75	225			VC	30.10442	1 in 188	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
9102	153.3	FO	151.75	225			VC	30.10442	1 in 188	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0105		CO	0	225			VC	30.80777	1 in 188	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0105		CO	0	225			VC	30.80777	1 in 188	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0211		CO	0	100			VC	6.453387	1 in 84	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0202		SW	144.05	300			CO	41.14147	1 in 64	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0202		SW	144.05	300			CO	41.14147	1 in 64	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0907	158.88	FO	156.68	225			VC	16.23012	1 in 22	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0907	158.88	FO	156.68	225			VC	16.23012	1 in 22	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
0908		FO	0	225			VC	36.32224	1 in 22	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
2202	157.2	UN	155.11	225			UN	60.39003	1 in 69.0274378	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
2904		SW	0	225			VC	50.4094	1 in 40	19002	146.88	CO	143.85	225	VC	16.88111	1 in 333		
1303		SW	0	225			VC	5											



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	13.96629	
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
2702		CO	150				VC	9.220907	
2722		CO	150				VC	12.46464	
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

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 brown - foul	blue - surface water purple - overflow
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● 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
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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:

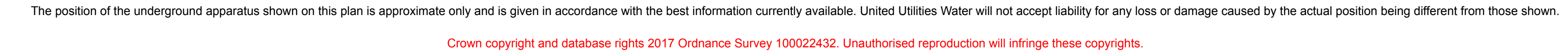
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Nodes: 233

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Water for the North West

