10 WATER RESOURCES AND FLOOD RISK

Introduction

10.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in respect of water resources and flood risk.

10.2 This chapter of the ES has been prepared by Hydrock Consultants Ltd (see Appendix 1.2 Statement of Expertise).

10.3 This chapter should be read in conjunction with the following appendices, which have been used to inform the assessment:

- Appendix 10.1 Flood Risk Assessment (FRA); and
- Appendix 10.2 Drainage Strategy.

Policy Context

National Planning Policy Framework (NPPF)[i]

10.4 In relation to flood risk, the primary aim of the NPPF is to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and wherever possible, to direct development towards areas at least risk of flooding. In terms of flood risk, the NPPF prescribes '*Sequential and Exception Tests'* to protect people and property from flooding, which all Local Planning Authorities are expected to follow, with a view to achieving sustainable development.

10.5 Paragraph 159 of the NPPF states that, 'inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk'…, with paragraph 161 stating 'all plans should apply a sequential, risk-based approach to the location of development – taking into account all sources of flood risk and the current and future impacts of climate change – so as to avoid, where possible, flood risk to people property.'

10.6 Paragraph 167 states that 'when determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment.'

10.7 Footnote 55 to the NPPF states that:

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

Planning Practice Guidance (PPG)

Flood Risk and Coastal Change PPG[ii]

10.8 The PPG on Flood Risk and Coastal Change provides additional technical guidance on flood risk and coastal change to support the NPPF. In terms of the general planning approach to development and flood risk, the PPG sets out the following main steps to be followed:

- Assess flood risk;

- Avoid flood risk; and
- Manage and mitigate flood risk.

10.9 The PPG paragraph 23 states that 'the (Sequential) approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding.'

10.10 Paragraph 2 of the PPG states 'the National Planning Policy Framework sets out strict tests to protect people and property from flooding which all local planning authorities are expected to follow. Where these tests are not met, new development should not be allowed.'

10.11 Paragraph 9 of the PPG notes that 'where SuDS are required in accordance with paragraphs 167 and 169 of the National Planning Policy Framework applicants need to submit a sustainable drainage strategy containing proportionate information on the proposed sustainable drainage systems as part of their planning application.'

10.12 The PPG defines:

- Flood Zones, which are split into Zone 1 (low probability), Zone 2 (medium probability), Zone 3a (high probability) and Zone 3b (the 'functional floodplain') (paragraph 78);
- The flood risk vulnerability of different land uses (Annex 3); and
- The compatibility of different use classes within certain Flood Zones (paragraph 79).

Water Supply, Wastewater and Water Quality PPG[iii]

10.13 The PPG on Water Supply, Wastewater and Water Quality indicates that, subject to limited exemptions, water supply is unlikely to be a consideration for most planning applications as water supply is normally addressed through the Local Plan. With regards to water quality, Paragraph 6 of the guidance states Plan-making may need to consider:

- 'How to help, protect and enhance local surface water and groundwater in ways that allow new development to proceed and avoids costly assessment at the planning application stage. For example, can the plan steer potentially polluting development away from the most sensitive areas, particularly those in the vicinity of drinking water supplies (designated source protection zones or near surface water drinking water abstractions);
- Where an assessment of the potential impacts on water bodies and protected areas under the Water Environment Regulations 2017 may be required, consider the type or location of new development; and
- Whether measures to improve water quality, for example sustainable drainage schemes, can be used to address impacts on water quality in addition to mitigating flood risk.'

Local Planning Policy

Barnsley Metropolitan Borough Council (BMBC) Local Plan[iv]

10.14 The following policies are relevant to the Development:

Policy CC3 Flood Risk

10.15 Policy CC3 states that the extent and impact of flooding will be reduced by:

- 'Not permitting new development where it would be at an unacceptable risk of flooding from any sources of flooding, or would give rise to flooding elsewhere;

- Ensuring that in the Functional Floodplain (Flood Zone 3b), only water compatible development or essential infrastructure (subject to the flood risk exception test) will be allowed. In either case it must be demonstrated that there would not be a harmful effect on the ability of this land to store floodwater;
- Requiring developers with proposals in Flood Zones 2 and 3 to provide evidence of the sequential test and exception test where appropriate;
- Requiring site-specific Flood Risk Assessments for proposals over 1 hectare in Flood Zone 1 and all proposals in Flood Zones 2 and 3;
- Expecting proposals over 1000 m^2 floor space or 0.4 hectares in Flood Zone 1 to demonstrate how the proposal will make a positive contribution to reducing or managing flood risk;
- Expecting all development proposals on brownfield sites to reduce surface water run-off by at least 30% and development on greenfield sites to maintain or reduce existing run-off rates requiring development proposals to use Sustainable Drainage Systems (SuDS) in accordance with policy CC4; and
- Using flood resilient design in areas of high flood risk.'

Policy CC4 Sustainable Drainage Systems (SuDS)

10.16 All major development will be expected to use SuDS to manage surface water drainage, unless it can be demonstrated that all types of SuDS are inappropriate.

10.17 Policy CC4 states that 'BMBC will also promote the use of SuDS on minor development.'

10.18 To enable BMBC to determine the suitability of a proposed SuDS scheme, Policy CC4 states that:

- 'Outline planning applications must be supported by a conceptual drainage plan and SuDS design statement; and
- Detailed planning applications must be supported by a detailed drainage plan and SuDS design statement, which should contain information on how the SuDS will operate, be managed and maintained for the lifetime of the development.'

Policy CC5 Water Resource Management

10.19 To conserve and enhance the Borough's water resources, development proposals will be supported which:

- 'Do not result in the deterioration of water courses and which conserve and enhance:
  i. The natural geomorphology of water courses;
  ii. Water quality; and
  iii. The ecological value of the water environment, including watercourse corridors.
- Make positive progress towards achieving "good" status or potential under the Water Framework Directive in the borough's surface and ground water bodies;
- Manage water demand and improve water efficiency through appropriate water conservation techniques including rainwater harvesting and grey-water recycling; and
- Dispose of surface water appropriately and improve water quality through the incorporation of SuDS, in accordance with Policy CC4.'

Site ES10 Land South of Dearne Valley Parkway

10.20 In relation to flood risk, the Site allocation within the Local Plan states that the Development will be expected to:

- 'Include the creation of a habitat corridor (at least 8m in width) along Carr Dike and a
- sustainable drainage scheme to ensure that rainwater falling on the site is still able to drain into the Dike aiming to improve water quality;
- Avoid locating any built development in Flood zones 2 and 3; and
- Give consideration to Carr Dike and the connecting unnamed ordinary watercourse which run through the site.'

Barnsley Strategic FRA (SFRA)[v]

10.21 The Barnsley Level 1 SFRA Flood maps identify the Site as lying predominantly within Flood Zone 1, with an area of Flood Zones 2 and 3 associated with the Carr Dike. The 1 in 100 year flood map shows flood depths are predominantly less than 0.01m with a small area in the north east of the Site at depths greater than 1.5m (see Appendix 10.1).

Legislative Context

10.22 The assessment will be undertaken in line with the following legislation:

- Environmental Protection Act[vi];
- Land Drainage Act as amended (1994)[vii];
- Water Industry Act[viii];
- Water Resources Act[ix];
- Water Act[x];
- Flood and Water Management Act[xi];
- The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017)[xii];
- Nitrates Directive[xiii];
- Water Supply Regulations[xiv];
- The Water Resources Regulations[xv];
- Anti Pollution Works Regulations[xvi];The Environmental Damage Regulations[xvii]; and
- The Environmental Permitting Regulations[xviii].

Assessment Methodology

Consultation

10.23 The EIA scoping exercise undertaken is summarised in Chapter 2 EIA Methodology of the ES. This chapter has been prepared based on the EIA Scoping Opinion received from BMBC (refer to Appendix 2.2), in accordance with the requirements of the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (as amended) (the 'EIA Regulations')[xix].

Table 10.1: Consultee Responses

Consultee	Responses	
BMBC LLFA	There should be no increase in surface water runoff from the new development Any balancing facility should be designed to accommodate a 1 in 30 year flow from the site below ground and a 1 in 100 year flow retained within the site (including an allowance of 30% for climate change), without causing any flooding to buildings. The authority seeks to promote the use of SUD's techniques to this site and the authority expects the developer of the site to submit detailed investigations such that the use of SUD's has been fully explored. As the site is shown as flood zone 2 a FRA in accordance with NPPF is required to be submitted with any planning application (see Appendix 10.1)	Addressed within Appendix 10.1 (Flood Risk Assessment) and Appendix 10.2 (Drainage Strategy)
Environment Agency	The Environment Agency would not have any objection to this development in principle and does not consider it necessary to scope flood risk into the Environmental Statement (ES). However, we note the applicant's intention to submit a full FRA and this will need to include the following: the Environment Agency does not hold detailed hydraulic modelling for this site. We recommend that detailed, site-specific, assessment of the site is undertaken to ensure the applicants understand the true risk of flooding at the site. Any areas within Flood Zone 2 or 3 may require compensatory flood storage to be provided. Setting the ground floor level above site ground level will provide a measure of protection against any flooding. In Flood Zone 3 finished floor levels should be set no lower than 300mm above the 1% (1 in 100) annual probability plus climate change modelled flood level Your proposal should consider mitigation measures during the construction phase to treat and remove silt and suspended solids from surface water run-off during construction works. This is to prevent surface water contamination and reduce the risk of sediment pollution into surface waters. Sustainable Drainage Systems (SUDS) should always be carefully considered in discussions with the Lead Local Flood Authority. However, any drainage system must not pose a risk to groundwater quality and must not be constructed in ground affected by contamination. Available capacity of foul sewer and surface water sewer should be considered as part of the Development.	Addressed within Appendix 10.1 (Flood Risk Assessment) 10.2 (Drainage Strategy) and Chapter 5 (CEMP) Due to the indicated risk of fluvial flooding from the Environment Agency (EA) Flood Zone Mapping, a Freedom of Information data request was made to the EA to determine what flood risk information was available for the Site. The EA confirmed no detailed modelling is available for the Site.

10.24 The Carr Dike, Thurscoe Dike and Highgate Lane Dike fall within the jurisdiction of the Yorkshire and Humber Internal Drainage Board (IDB).

10.25 Following initial outputs of the hydraulic modelling, the IDB were consulted in October 2022 to discuss methodology, preliminary results, proposed mitigation and flood compensation scheme and any further requirements or concerns the IDB had. The proposed mitigation was discussed and the principle agreed in a meeting with the Yorkshire and Humber IDB (14/10/2022) (see Appendix 10.1).

Scope of the Assessment

10.26 A desk-based assessment has been carried out in order to establish key water receptors and the potential effects that the Development might have on those receptors during the construction and operational phases. The assessment comprises:

- Determination of Site geology and hydrogeology;
- Review of existing sources of data relating to the water regime (including discharge consents, abstraction licences, etc);
- Review of flood risk and drainage related constraints;
- Consideration of the historic uses, drainage regime and the soils and contamination status of the Site and surrounding area in order to determine the existing water quality and regime;
- Consideration of environmental design and management measures to minimise flood risk, such as the use of sustainable drainage systems (SuDS), water efficiency methods and consideration of best practice guidance; and
- Investigation of appropriate mitigation measures to avoid where possible, or minimise, any negative effects on water quality, drainage and flood risk during the construction and operational phases that remain following the implementation of environmental design and management measures.

Study Area

10.27 The Study Area for this chapter principally comprises the Site, but extends to the relevant natural and man-made water resource catchments where necessary, i.e. the downstream 'Dearne' Water Framework Directive catchment within which the Site is located, and, the Yorkshire Water sewer network area which serves the Site.

10.28 Paragraph 006 of the NPPG 'Flood Risk and Coastal Change' states that the lifetime of a non-residential development depends on the characteristics of that development but a period of at least 75 years is likely to form a starting point for assessment, in relation to climate change. As such, the operational phase is assessed from 2025 until at least 2100.

10.29 The flood risk and drainage receptors that have been included in this assessment are:

- Fluvial flood risk (specifically in relation to flood risk within the Site and downstream catchment);
- Surface water drainage (specifically in relation to capacity / flood risk within the Site and downstream catchment);
- Surface water quality (specifically in relation to the Site and downstream catchment); and
- Foul water drainage (specifically in relation to drainage capacity within receiving sewer system / Sewage Treatment Works; and, human health, including construction workers, future Site occupants, and the general population within the Site).

Data Sources

10.30 This chapter draws on the assessment undertaken within the FRA (see Appendix 10.1) and Drainage Strategy (see Appendix 10.2) for the Development. The methodology / data assessed in preparing the FRA and Drainage Strategy are outlined in Appendices 10.1 and 10.2.

10.31 The following key background reports have also been consulted in the preparation of this assessment:

- FRAs: Climate Change Allowances[xx];
- Guidelines for Environmental Impact Assessment[xxi];

- Guidelines for Environmental Impact Assessment[xxii];
- National Standards for Sustainable Drainage Systems[xxiii];
- Non-Statutory Technical Standards for Sustainable Drainage Systems[xxiv];
- Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England, approved version 2.0[xxv];
- The Building Regulations, Approved Document H: Drainage and Waste Disposal[xxvi]; and
- The SuDS Manual[xxvii].

Assessment Approach

10.32 To assess the likely significant effects of the Development, a set of threshold criteria, based on best practice EIA tables used, have been defined to establish the sensitivity of receptors and identify the magnitude of impacts which have the potential to have a beneficial or adverse effect on a sensitive receptor. The level of significance of any predicted effect has been determined using the process set out in Tables 10.2 to 10.3 below.

Sensitivity

10.33 The sensitivity of each identified receptor is qualitatively determined using the criteria in Table 10.2.

Table 10.2: Sensitivity of Receptors

Sensitivity	Criteria
High	Little ability to absorb impact without fundamentally altering baseline condition, and/or is of international / national importance, such as: Within Flood Zone 3 / high risk of flooding identified. No capacity within discharge receiving environment, i.e. drainage system and/or waterbody. Water quality recorded as ‘high’ or 'good' within discharge receiving waterbody, and/or classified of international / national ecological importance.
Moderate	Moderate capacity to absorb impact without significantly altering baseline condition, and/or is of regional importance, such as: Within Flood Zone 2 / medium risk of flooding identified. Limited capacity within discharge receiving environment, i.e. drainage system and/or waterbody. Water quality recorded as 'moderate' within discharge receiving waterbody, and/or classified of regional ecological importance.
Low	Receptor tolerant of impact without detriment to baseline condition, and/or is of local importance, such as: Within Flood Zone 1 / low risk of flooding identified. Unlimited capacity within discharge receiving environment, i.e. drainage system and/or waterbody. Water quality recorded as 'poor' or ‘bad’ within discharge receiving waterbody, and/or classified of local / no ecological importance.

Negligible	Very low importance and rarity, site scale, such as: • Within Flood Zone 1 and no other sources of flood risk identified. • Very Low risk of surface water flooding • Indefinite capacity within discharge receiving environment (drainage system and/or waterbody). • Water quality recorded as 'bad' within discharge receiving waterbody, and/or no areas classified of ecological importance.

Magnitude of Impact

10.34 The criteria in Table 10.3 have been used to identify the magnitude of impacts.

Table 10.3: Magnitude of Impacts

Magnitude	Criteria
Major	Total loss or major / substantial alteration to key elements / features of the baseline conditions such that the post-development character / composition / attributes will be fundamentally changed, such as: Flood risk posed to the Development and/or surrounding areas. Capacity within discharge receiving environment, i.e. drainage system and/or waterbody. Water quality within discharge receiving waterbody.
Moderate	Loss or alteration to one or more key elements / features of the baseline conditions such that post-development character / composition / attributes of the baseline will be materially changed, i.e. loss or alteration to those attributes noted above.
Minor	A minor shift away from baseline conditions. Change arising from the loss / alteration will be discernible / detectable, but not material. The underlying character / composition / attributes of the baseline condition will be similar to the pre-development circumstances / situation, i.e. measurable change to those attributes noted above.
Negligible	Very little change from baseline conditions. Change barely distinguishable, i.e. no measurable change to those attributes noted above.

Significance of Effects Criteria

10.35 The significance of a potential effect is based on the combination of the sensitivity of the receptor and the magnitude of the impact, as set out in Table 10.4.

Table 10.4: Significance of effects matrix

Magnitude	Sensitivity			
	High	Moderate	Low	Negligible
Major	Major	Major	Moderate	Minor
Moderate	Major	Moderate	Minor	Negligible
Minor	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

10.36 An effect may be beneficial, adverse or negligible; on a short, medium (duration of construction) or long term (duration of operation) basis; being permanent or temporary; and, being on a Site, Local, Borough, County, Regional, England, United Kingdom or International scale.

10.37 Those effects identified as 'major' or 'moderate' adverse/beneficial are considered to be 'significant' for the purposes of this assessment.

Limitations and Assumptions

10.38 The flood risk and drainage receptors have been defined using a combination of published data sources, and project-specific assessments. Limitations on published data relate to the age of the data and it's reliability. However, in this instance, the availability of published data with which to inform this assessment is considered robust and therefore this approach is considered acceptable.

Baseline Conditions

Topography

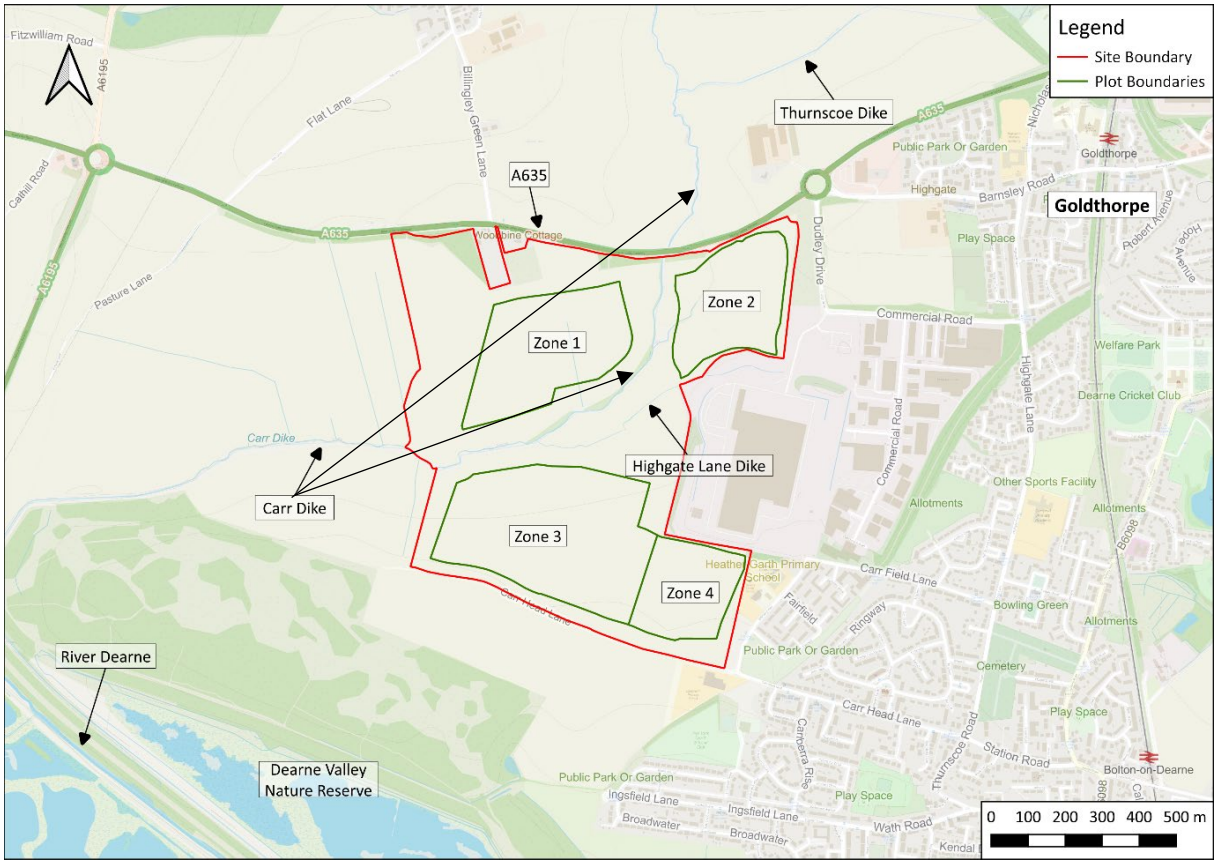
10.39 A Site-specific topographic survey has been undertaken (see Appendix 10.1). The survey indicates levels fall towards the low points within the Carr Dike, from both northern and southern boundaries, running through the centre of the Site. The survey indicates high points of approximately 35.4m AOD and 44m AOD along the northern and southern boundaries respectively.

10.40 A survey of the watercourses within the Site has also been undertaken (see Appendix 10.1). Bed levels of the Carr Dike are identified to have a general fall through the Site from a high point of approximately 21.7m AOD at the top of the Site (northern boundary) to a low of approximately 19.8m AOD at the eastern boundary of the Site.

Surface Water Receptors

10.41 Figure 10.1 below and within Appendix 10.1 shows the location of the surface water features in relation to the Site.

Figure 10.1 Surface Water Features



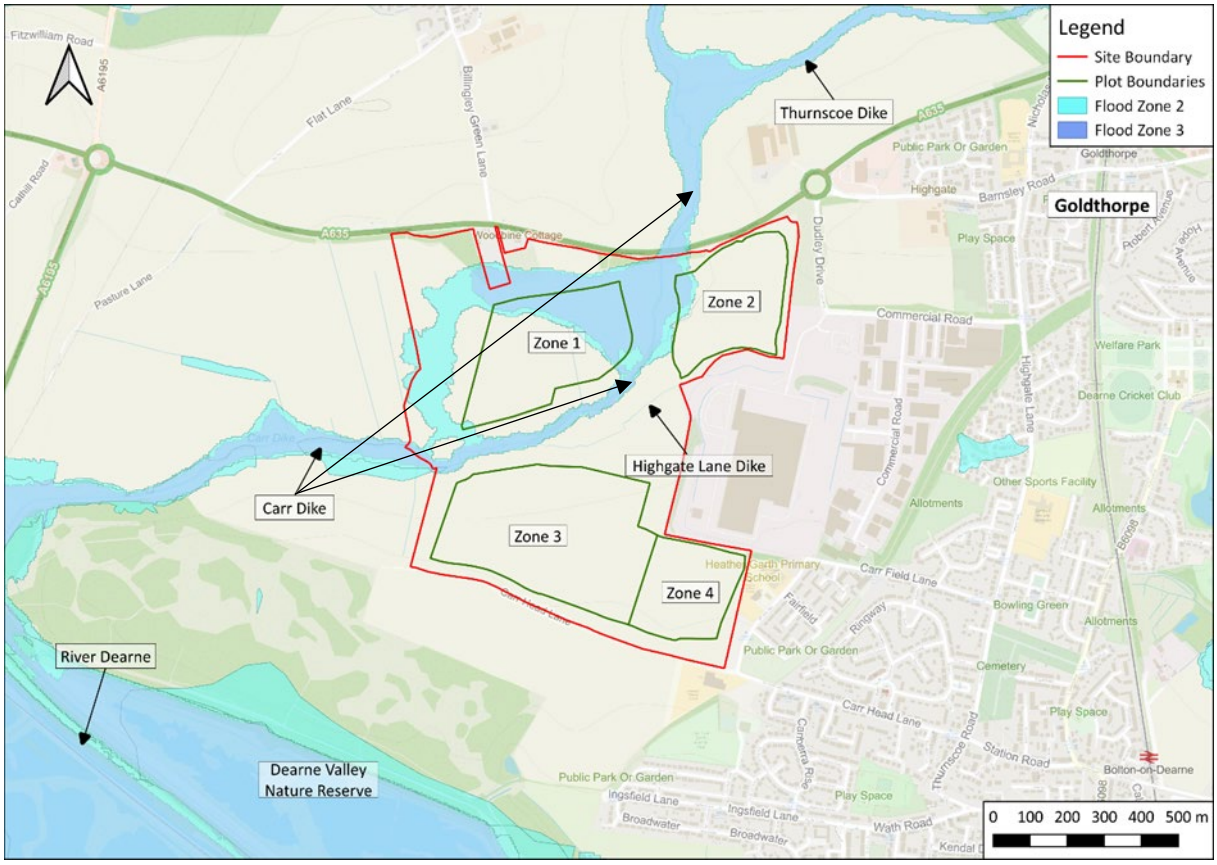
Fluvial Flood Risk

10.42 A Site-specific FRA has been prepared which assesses flood risk to and from the Site in further detail (see Appendix 10.1). The Site is predominantly located within Flood Zone 1 (Low Risk). There is an area of increased risk across the northern half of the Site associated with the Carr Dike. The area of increased risk varies from Flood Zone 2 (Medium Risk) to Flood Zone 3 (High Risk).

10.43 For reference, the Environment Agency Flood Zones are defined as follows:

- Flood Zone 1 (Low Risk) comprises land assessed as having a ≤0.1% AEP of fluvial or tidal flooding in any given year, equivalent to the ≥1,000yr return period flood event.
- Flood Zone 2 (Medium Risk) comprises land assessed as having a 0.1-1% AEP of fluvial flooding or 0.1-0.5% AEP of tidal flooding in any given year, equivalent to the 1,000-100yr and the 1,000-200yr return period flood event, respectively.
- Flood Zone 3 (High Risk) comprises land assessed as having a ≥1% AEP of fluvial flooding or ≥0.5% AEP tidal flooding in any given year, equivalent to the ≤100yr return period flood event.

Figure 10.2: EA Flood Zone Mapping



10.44 The EA have confirmed that detailed hydraulic modelling is not available for the Carr Dike, Thurnscoe Dike or Highgate Lane Dike watercourses.

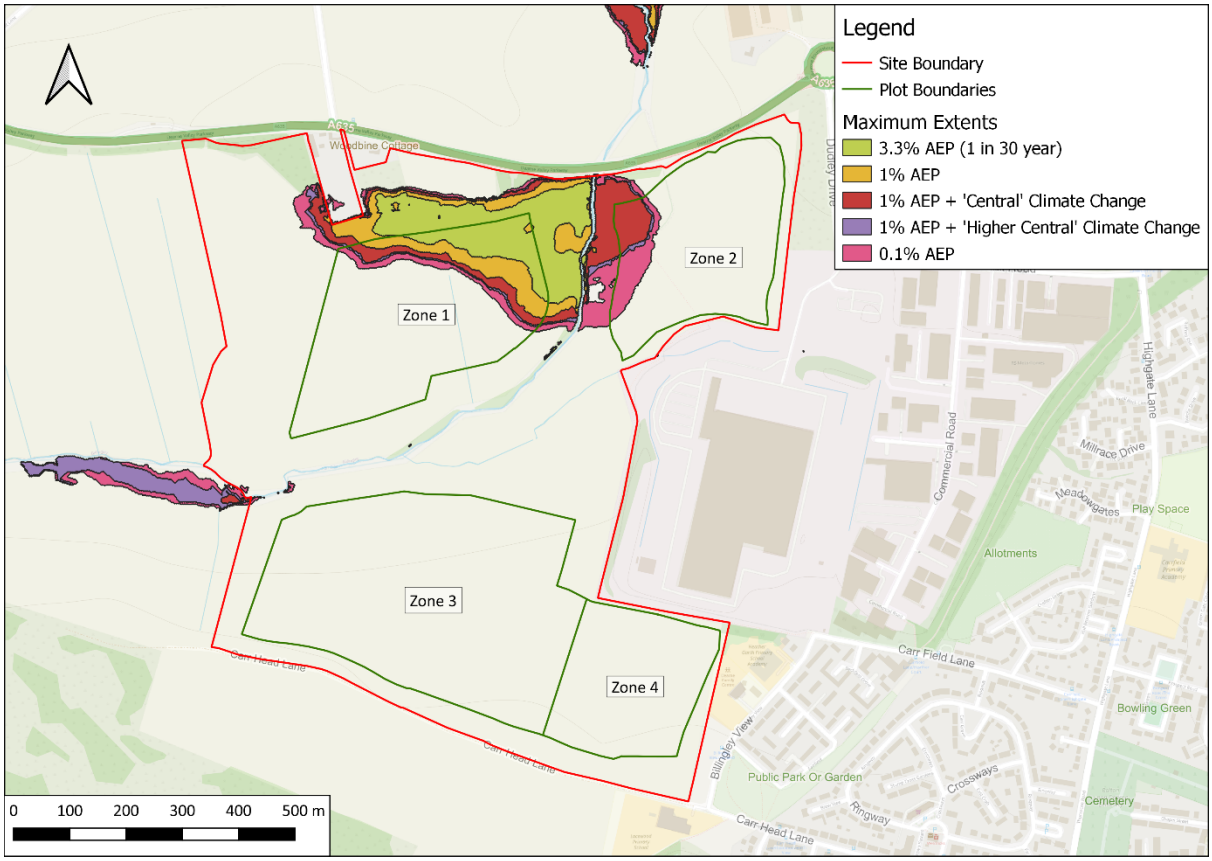
10.45 On the basis that no modelling is available, a detailed hydrological and hydraulic modelling assessment has been undertaken in order to quantitively assess the potential risk of fluvial flooding to the Development. (see Appendix 10.1)

10.46 A number of fluvial flood events have been modelled and these are; 1 in 30-year (Flood Zone 3b), 100-year (Flood Zone 3a), 100-year plus climate change allowances (Future Flood Zone 3a), 1000-year (Flood Zone 2).

10.47 Initial outputs of the modelling confirm the Site to be at risk of flooding in all events modelled including the 100-year plus climate change allowances event, with flooding predicted to overtop the banks of the Carr Dike and spill into the western and eastern portions of the Site (see Appendix 10.1). The modelling does however show a smaller area of predicted flooding than the EA Flood Zone Mapping and does not indicate an overland flow route going through the Site and back into the Carr Dike along the south western boundary.

10.48 Maximum on-Site flood depths in the 1 in 100 year plus 'Central' Climate Change allowance design event are predicted to be up to 1m in places with localised deeper areas attributed with a land drainage channel in the north west of the Site.

Figure 10.3: Modelled Flood Extents



Tidal Flood Risk

10.49 The EA does not distinguish between fluvial and tidal flood risk however, given the Site's elevated position (>19m AOD) and location inland and away from any tidally influenced watercourses, the Site is considered to be at low risk of tidal flooding.

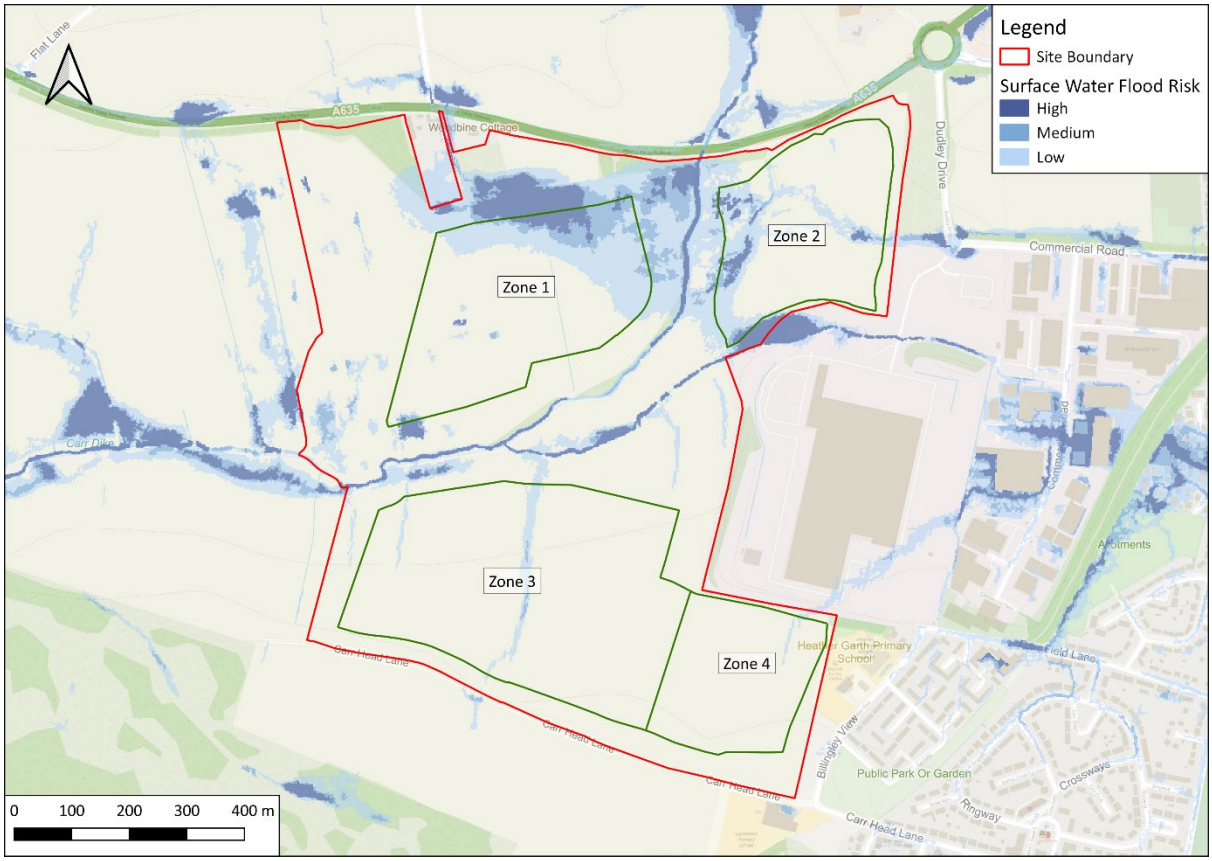
Reservoir Flooding

10.50 The Site does not lie in an area at risk of reservoir flooding.

Surface Water Flood Risk

10.51 Current EA Surface Water Flood Risk Mapping indicates large portions of the Site as being at 'very low' risk of surface water flooding. There are however areas of increased risk within the Site boundary classified as being 'low' to 'high' risk.

Figure 10.4: Surface Water Flood Risk Map



10.52 EA Surface Water mapping shows several surface water flow paths within the Site boundary flowing towards the Carr Dike. The flow paths predominantly travel at velocities exceeding 0.25m/s. The flow paths are largely limited to depths of up to 900mm although depths exceed 900mm within the channel.

10.53 There is also an area of increased risk across the northern half of the Site classified as 'low' to 'high' risk which covers approximately 0.1km^2. EA mapping shows the flood waters to predominantly be limited to velocities of less than 0.25m/s. The flood depths exceed 900mm.

10.54 Detailed hydraulic modelling (as set out in Appendix 10.1) confirms similar extents and depths indicated by the EA Surface Water Mapping and as such the risk is confirmed to be fluvial rather than surface water flooding.

10.55 The remaining predicted flooding within the west of the Site is indicated to be isolated areas of flooding. These small patches of predicted increased risk show no connectivity to the watercourse or each other and as such are more likely to be an indication of localised low-spots in the topography.

10.56 There is a Yorkshire Water surface water main that crosses the Site from Barnsley Road to the south of the Site.

Groundwater

10.57 British Geological Survey (BGS) mapping[xxviii] shows the southern portion of the Site is underlain by bedrock geology consisting of Mexborough Rock, consisting of sandstone. The northern portion of the Site is underlain by bedrock geology of the Pennine Middle Coal Measures Formation, consisting of mudstone, siltstone and sandstone.

10.58 The portion of the Site in close proximity to the Carr Dike is shown to be overlain by superficial deposits of Alluvium, consisting of clay, silt, sand and gravel.

10.59 Soilscapes shows the Site to be overlain by 'slowly permeable, seasonally wet, acid loamy and clayey soils' with 'impeded drainage'. As such, groundwater levels are unlikely to be responsive to rainfall.

10.60 The Site is not located within a groundwater Source Protection Zone. There are no groundwater abstraction licences within or near to the Site, the closest being 10km to the south east.

Potable Water

10.61 The Development is within an area served by Yorkshire Water.

10.62 The EA Water Stressed Areas Final Classification for 2021 classifies the Yorkshire Water company area as 'not seriously water stressed'.

Water Quality

10.63 The Catchment Data Explorer provides information about the water environment used in River Basin Management Plans. The data is organised around a catchment hierarchy, where the larger units contain 1 or many of the smaller units. This runs largest to smallest as follows: River Basin District → Management Catchment → Operational catchment → Water body. The Site is within the Humber and River Basin District, the Don and Rother Management Catchment, the Dearne Operational Catchment, and the Carr Dike from source to Dearne waterbody

10.64 For surface waters, objectives are set for ecological and chemical status. The Carr Dike from source to Dearne Waterbody is classified as having a 'moderate ecological status, and a chemical status of 'fail'.

10.65 The Carr Dike is protected under the Nitrates Directive.

Designated Sites

10.66 The nearest statutory ecological designation to the site is the Dearne Valley Wetlands Site of Special Scientific Interest ('SSSI'), which lies in areas around the Site, located approximately 100m to the south west of the Site, at its closest point.

Foul Water

10.67 Yorkshire Water provides the sewerage service for the area in which the Site is located.

10.68 The Site currently comprises several agricultural fields and as such, there is not considered to be a foul drainage network serving the site, although sewer records confirm (see Appendix 12.2) that there is a Yorkshire Water combined Foul and Surface Water sewer, crossing the north east section of the Site.

Sensitive Receptors

10.69 With consideration to all the aforementioned baseline conditions, the following key receptors have been identified and the sensitivity of each receptor has been determined in accordance with the criteria set out in Table 10.5. Table 10.5 below provides a summary of the receptors identified.

10.70 It should be noted that some of these features lie within influence of a nationally designated SSSI and as such, the significance whilst manageable will be at a national level. This is reflected in the designations within Table 10.7.

Table 10.5: Summary of Receptors identified

Receptor	Sensitivity	Qualifying Comments
Fluvial Flood Risk	Moderate	Predominantly Flood Zone 1, some areas of Flood Zone 2 and Flood Zone 3 associated with Carr Dike
Tidal Flood Risk	Negligible	Not at risk of tidal flooding, therefore not assessed within likely significant effects

Receptor	Sensitivity	Qualifying Comments
Surface Water flooding	Low	Predominantly very low risk with some areas of low risk
Groundwater Flooding	Low	Groundwater levels likely to be unresponsive to rainfall, therefore not assessed within likely significant effects
Surface Water Drainage	Low	Any flooding on Site is fluvially dominated
Foul Water Drainage	Low	No public foul sewers in the vicinity of the Site
Surface Water Quality	High	Dearne Valley wetlands SSSI lies 100m south of the Site

Future Baseline

10.71 Certain baseline conditions within the Site, principally topography, hydrology and hydrogeology, are unlikely to alter in the future in the scenario that the Development was not constructed and operational.

10.72 Conversely, the flood risk posed to the Site, and the potential surface water run-off rate and volume from the Site, could increase in the future as a result of the predicted effect of climate change, regardless of whether the Development was constructed and operational.

10.73 Climate change is integral to the assessment of potential effects and mitigation design in relation to water resources, and therefore the assessment and resulting design of any necessary mitigation measures as part of this chapter takes into account the anticipated increase in river flows and the potentially larger, more intense and more frequent storms that are predicted.

10.74 This chapter adopts the latest EA climate change guidance which requires the adoption of climate change allowances on a catchment basis, and subject to the 'flood risk vulnerability' and the design life of a Development.

10.75 The projected future baseline condition of foul water drainage and surface water quality is difficult to quantify in the scenario that the Development was not constructed and operational, on the basis that such receptors could be altered in the future by external factors currently unknown. Such factors include area-wide interventions/improvement works by relevant bodies (such as Yorkshire Water and the EA); implementation of more or less stringent legislation and guidance; updated technology allowing for improved water treatment; and/or, significant pollution incidents.

Likely Significant Effects

10.76 The potential effects and significance of those effects on the water environment are characterised in the absence of mitigation measures, beyond those embedded into the Development, for the construction and operational phases of the Development. The following embedded mitigation measures have been integrated into the design of the Development and therefore taken into account within the assessment of potential effects.

- The parameter plan (ref to Figure 3.1) shows that the proposed built development avoids, as far as possible, those areas of the Site that are at risk of flooding. Where development has taken place within higher areas of flood risk, to mitigate against lost floodplain storage as a result of the ground raising for the development parcels, two proposed Flood Compensation Areas (FCA's), connected with a series of culverts, have been included to provide the necessary storage required to mitigate against off-Site increases to third party land

- Implementation of the Surface Water Strategy including SuDS and flood risk mitigation measures (Appendix 10.2)

- Implementation of the Foul Water Drainage Strategy (Appendix 10.2)

Construction Phase

Fluvial Flood Risk

10.77 Construction activities (as per Chapter 5), such as the inadvertent placement of temporary structures and/or material stockpiles, and the construction of permanent structures, within those areas of the Site identified to be at risk of fluvial flooding could result in the potential increased risk of fluvial flooding within the Site and wider area.

10.78 The parameters plan ensures that the proposed built development is predominantly outside the higher risk flood zones, (and where this is not possible, compensation storage has been provided, as per the parameters plan) Therefore, the impact of the construction of the Development on flood risk will be of moderate sensitivity and minor magnitude resulting in minor adverse significance.

Surface Water Flood Risk

10.79 Construction activities, such as the inadvertent placement of temporary structures and/or material stockpiles, and the construction of permanent structures, within those areas of the Site identified to be at risk of surface water flooding, may result in the potential increased risk of flooding within the Site, although it has been identified that the surface water flood extents in the EA flood risk maps are deemed to be from fluvial sources with the risk of surface water flooding being low / very low.

10.80 On this basis through early implementation of the Surface Water Strategy (Appendix 10.2) The impact of the construction of the Development on surface water flood risk will be of low sensitivity and negligible magnitude resulting in negligible significance.

Surface Water Drainage

10.81 The following construction activities have the potential to pose network / waterbody capacity and flood risk issues within the Site and Study Area, if unmitigated:

- The movement of plant and enabling groundworks (including those associated with stripping vegetation) could alter the infiltration characteristics of the ground and thereby increase the rate and volume of surface water run-off from the Site;
- The construction of buildings, highways and other hard impermeable surfaces could increase the rate and volume of surface water run-off from the Site.

10.82 The early implementation of the Surface Water Strategy will put in place measures to intercept and manage rainfall run-off on the Site. Surface water runoff from roofs and external areas will be directed to the below ground gravity network, where it will join the wider private drainage network of carrier drains and will be attenuated prior to outfall, where it will discharge at a restricted rate into the Carr Dike and its tributary as set out in Appendix 10.2.

10.83 Given the above, the construction of the Development will be of low sensitivity and minor magnitude resulting in minor adverse significance.

Foul Water Drainage

10.84 Significant volumes of foul water are unlikely to be generated during the construction of the Development, with any construction workers welfare facilities likely to be of a temporary nature with foul water removed from the Site for disposal, initially via tanker from the site compound area(s) before connecting into the public foul sewer to the north east of the site.

10.85 On this basis, construction activities are not anticipated to adversely affect network capacity or water quality within the downstream catchment.

10.86 The construction of the Development will be of negligible sensitivity and minor magnitude leading to a negligible significance.

Surface Water Quality

10.87 The following construction activities have the potential to alter water quality within the Site and Study Area, if unmitigated:

- Surface water run-off from construction plant movement and enabling ground works areas could result in the mobilisation and generation of contaminated run-off, comprising soil, sediment, and/or other construction materials;
- The accidental spillage of fuels or other contaminating substances could cause polluted run-off;
- The discharge of groundwater from any necessary dewatering of excavations could be contaminated with soil, sediment, and/or other construction materials.

10.88 Given the topography of the Site, any contaminated surface water run-off will likely be directed overland as shallow 'sheet flow' towards the Carr Dike which runs east to west through the centre of the site.

10.89 The early implementation of the Surface Water Strategy (Appendix 10.2), will however put in place measures to intercept and manage rainfall run-off from the Site, to ensure that any contaminated flows are not discharged to the downstream catchment and are treated through the use of SuDs structures.

10.90 Given the above, the construction of the Development will be of moderate sensitivity and minor magnitude leading to minor adverse significance on surface water quality.

Operational Phase

Fluvial Flood Risk

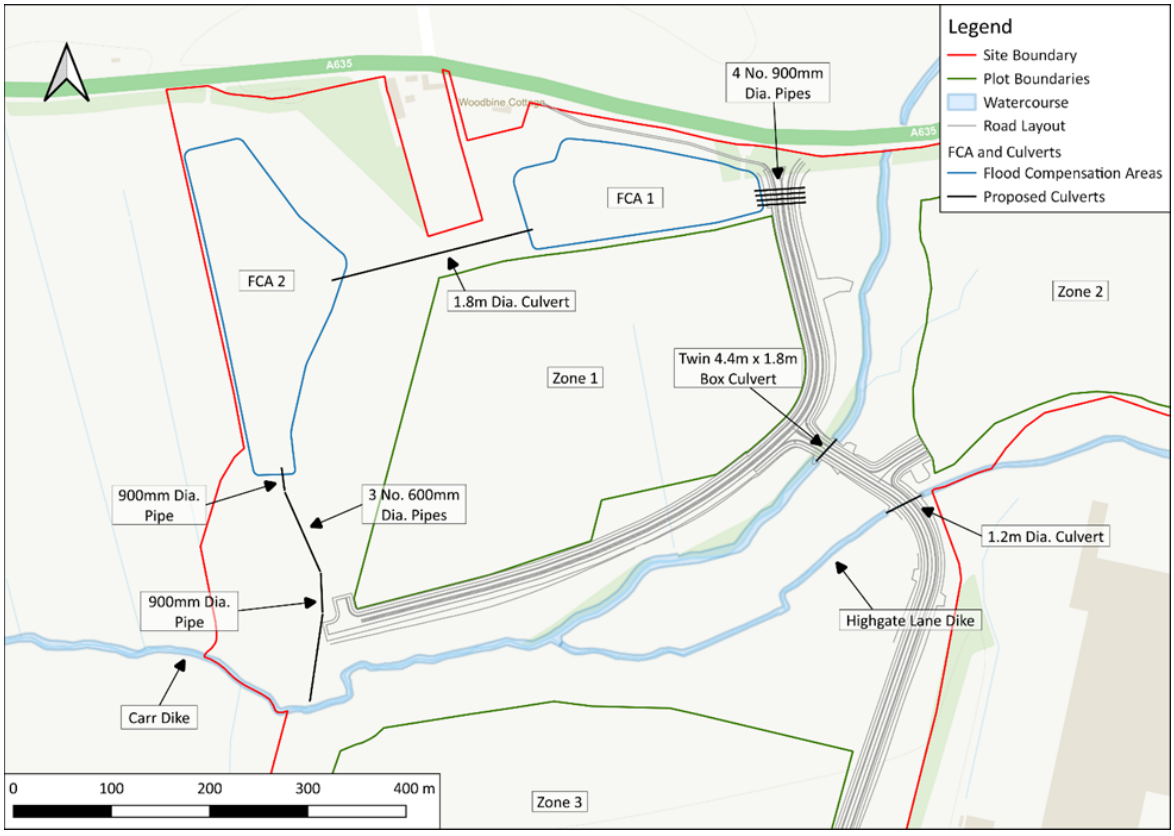
10.91 Based on the parameters plan, the Development would be at risk of fluvial flooding in all modelled events and would be located in Flood Zones 1, 2, 3a and 3b.

10.92 The Development will result in the placement of permanent structures, including buildings, within those areas of the Site identified to be at risk of fluvial flooding. This could result in the potential increased risk of flooding within the Site and downstream Study Area, due to a loss in flood storage area.

10.93 The parameters plan locates where possible the proposed built development outside of areas assessed to be at risk of fluvial flooding; where this is not possible flood compensation storage will be provided as described further within Appendix 10.1.

10.94 To mitigate against lost floodplain storage, two Flood Compensation Areas (FCA's), connected with a series of culverts, have been included to provide the necessary storage required to mitigate against off-site increases to third party land (see Appendix 10.1 and Figure 10.4 below).

Figure 10.5: Flood Compensation Storage Areas



10.95 On this basis, the operation of the Development will result in moderate sensitivity and minor magnitude leading to minor adverse significance on fluvial flood risk.

Surface Water Flood Risk

10.96 Operational activities, such as the placement of structures, within those areas of the Site identified to be at risk of surface water flooding, may result in the potential increased risk of flooding within the Site.

10.97 It has been identified that the surface water flood extents in the EA flood risk maps are deemed to be from fluvial sources with the risk of surface water flooding being low / very low.

10.98 The proposed layout locates the proposed built development outside of areas assessed to be at risk of surface water flooding; combined with early implementation of the surface water drainage strategy will put in place measures to intercept and manage rainfall run-off on the Site.

10.99 On this basis, the operation of the Development will result in a low sensitivity and negligible magnitude resulting in a negligible significance.

Surface Water Drainage

10.100 The operation of the Development will result in currently undeveloped permeable land being developed with the construction of buildings, highways and other hard impermeable surfaces, which could increase the rate and volume of surface water run-off from the Site, if unmitigated.

10.101 The surface water drainage strategy proposes a managed gravity system with a flow control set at a permissible discharge rate of 1.4l/s/ha into the Carr Dike and its tributary.

10.102 SuDS structures, including ponds are proposed to provide water quality enhancement, prior to discharging to the final receiving waterbody (Carr Dike).

10.103 The effective implementation of the Surface Water Drainage Strategy (Appendix 10.2), will intercept, manage and discharge rainfall run-off from the Site to ground, to ensure post-development peak run-off rates are not increased compared to the current and future baseline conditions and hence that additional flows are not discharged to the downstream catchment.

10.104 Given the above, the operation of the Development will result in a moderate sensitivity and minor magnitude leading to minor adverse significance.

Foul Water Drainage

10.105 The operation of the Development will result in the generation of foul water within the Site.

10.106 A diversion of the existing combined public sewer is required.

10.107 All foul flows generated by the Development will outfall at an unrestricted rate to the proposed public foul sewer diversion to the north east of the site

10.108 The operation of the Development will lead to low sensitivity and minor magnitude resulting in minor adverse significance on foul water drainage.

Surface Water Quality

10.109 The following operations have the potential to alter water quality within the Site and Study Area, if unmitigated:

- Surface water run-off from highways and other hard surfaces could result in the generation of contaminated run-off, comprising soil, sediment, salt or other particles; and
- The accidental spillage of fuels or other contaminating substances could cause polluted run-off.

10.110 As part of the effective implementation of the Surface Water Drainage Strategy (Appendix 10.2) the primary pollution control measure for the infrastructure elements will be in the form of the proposed SuDS features for the wider private surface water network. This includes attenuation ponds, which will provide pollution control through filtration and settlement prior to discharging to the final receiving waterbody (Carr Dike).

10.111 Such measures will remove hydrocarbon pollutants and suspended solids (via settlement), and thereby ensure contaminated flows are not discharged to the downstream catchment.

10.112 On this basis, the operation of the Development will result in moderate sensitivity and minor magnitude leading to minor adverse significance.

Mitigation Measures

10.113 The significance of effects considered thus far have been based upon a situation where the Development goes ahead in the absence of suitable mitigation measures beyond those considered to be embedded mitigation. This section outlines additional mitigation measures that will be implemented to avoid, reduce or off-set any significant adverse effects identified in the previous section. Additional mitigation measures include:

- A Construction Environmental Management Plan (CEMP) will be in place during the construction phase to ensure management and operational systems are in position to minimise the potential effects posed to flood risk, surface water drainage, and surface water quality during construction;
- Where development has taken place within higher areas of flood risk, development finished floor levels (FFLs) have been raised with a significant freeboard above the design flood level, in line with the proposed drainage strategy (Appendix 10.2).
- Maintenance of the Carr Dike

- Appropriate Maintenance Plan as set out in the Drainage Strategy report secured by condition.

Residual Effects

Construction Phase

Fluvial Flood Risk

10.114 Additional mitigation through the effective implementation of the CEMP, reduces the effects that could influence the flood risk posed to the Site and Study Area to negligible. The impact of the construction of the Development on flood risk will result in a negligible significance.

Surface Water Flood Risk

10.115 There are no adverse surface water flood risk effects predicted to result from the construction of the Development after the effective implementation of the embedded mitigation measures, and therefore no additional mitigation measures will be required.

Surface Water Drainage

10.116 The effective implementation of the CEMP (Chapter 5) will reduce the significance to Negligible.

Foul Water Drainage

10.117 There are no adverse foul water drainage effects predicted to result from the construction of the Development after the effective implementation of the embedded mitigation measures, and therefore no additional mitigation measures will be required.

Surface Water Quality

10.118 The effective implementation of the CEMP (Chapter 5) will put in place measures to intercept and manage rainfall run-off from the Site, to ensure that any contaminated flows are not discharged to the downstream catchment.

10.119 The additional mitigation measures will lead to negligible significance on the surface water quality.

Operational Phase

Fluvial Flood Risk

10.120 Additional mitigation recommends development finished floor levels (FFLs) are raised with a significant freeboard above the design flood level.

10.121 Combined with, the effective implementation of the CEMP the effects that could influence the flood risk posed to the Site and Study Area are reduced to negligible. Therefore, the impact of the operation of the *Development on flood risk will result in a negligible significance.*

Surface Water Flood Risk

10.122 There are no adverse surface water flood risk effects predicted to result from the operation of the Development after the effective implementation of the embedded mitigation measures, and therefore no additional mitigation measures will be required.

Surface Water Drainage

10.123 The car parking and yard catchment areas will be developed at the detailed design stage. Surface water runoffs from this catchment will be drained via drainage channels, kerb drains and filter drains and then discharge into the new private surface water network. Surface runoff from the roof will also discharge to the new private surface water network, both secured by condition.

10.124 Pollution treatment measures will be provided in the form of Class 1 oil separators for the car park and yard areas, and silt traps on drainage elements which will filter and trap silts and debris and mitigate against the risk of pollution. All separators will be alarmed and remotely monitored at all times to ensure reliability.

10.125 So as to ensure the proposed Surface Water Drainage Strategy (Appendix 10.2) operates as intended and thereby reduce the likelihood of such systems failing, an appropriate maintenance strategy and programme, secured by planning condition, will be put in place for the entirety of the Development's operation phase.

10.126 The additional mitigation measures will lead to a negligible significance on surface water drainage.

Foul Water Drainage

10.127 The diversion of the existing combined sewer is subject to S185 technical acceptance with Yorkshire Water

10.128 An agreement in principle will be sought from Yorkshire Water at detailed design stage, in order to discharge foul flows at an unrestricted rate to the proposed public foul sewer in the north east of the site.

10.129 So as to ensure the proposed Foul Water Drainage Strategy (Appendix 10.2) operates as intended and thereby reduce the likelihood of such systems failing, an appropriate maintenance strategy and programme, secured by planning condition, will be put in place for the entirety of the Development's operation phase

10.130 This additional mitigation will lead to negligible significance on Foul Water Drainage.

Surface Water Quality

10.131 Additional Mitigation will include pollution treatment measures in the form of Class 1 oil separators for the car park and yard areas, and silt traps on drainage elements which will filter and trap silts and debris and mitigate against the risk of pollution. All separators will be alarmed and remotely monitored at all times to ensure reliability.

10.132 The additional mitigation measures will lead to negligible adverse significance on the surface water quality.

Cumulative Effects

10.133 This section summarises the residual cumulative effects of the Development in combination with the cumulative schemes listed in Chapter 2. The cumulative developments are anticipated to have overlapping construction programmes as well as being operational at the same time. To this end, this section summarises the residual cumulative effects during construction followed by the residual cumulative effects during operation of all the developments.

10.134 Due to the close proximity both geographically and temporarily of the developments', effects will be similar and, in some cases, identical between the developments. To provide a clear account of effects, these have been re-described below with specific comment made where necessary to distinguish the elements of these effects.

10.135 If there is any requirement for additional mitigation measures to be implemented to minimise any potentially significant adverse cumulative effects, these will be highlighted and taken into account in the assessment.

Construction Phase

Flood Risk

10.136 Construction activities, such as the inadvertent placement of temporary structures and/or material stockpiles, and the construction of permanent structures, within areas of the development sites identified to be at risk of flooding, have the potential to result in the loss of floodplain storage and/or the impedance of overland flood flow routes, resulting in the potential increased risk of flooding within the Study Area.

10.137 All of the committed developments are located within Flood Zone 1 at low risk of fluvial flooding. Furthermore, all the developments, have embedded mitigation measures in place including a CEMP, and layouts which locate all proposed built development outside of areas at risk of flooding, or have mitigation measures embedded within the design, to reduce the likelihood and mitigate the adverse effects posed by such construction activities.

10.138 On this basis, no potential effects that could influence flood risk within the Study Area have been identified, and therefore the Development in combination with the committed developments will result in negligible significance.

Surface Water Drainage

10.139 The following construction activities have the potential to pose network / waterbody capacity and flood risk issues within the Study Area, if unmitigated:

- The movement of plant and enabling ground works which could result in stripped vegetation and/or could alter the infiltration characteristics of the ground and thereby increase the rate and volume of surface water run-off; and
- The construction of buildings, highways and other hard surfaces which could increase the rate and volume of surface water run-off.

10.140 Additional surface water run-off from the Development in combination with the committed developments could be directed overland and pose a risk of flooding to adjacent land and increase the risk of flooding within the downstream catchment.

10.141 The effective implementation of the development specific CEMPs, will however put in place measures to intercept and manage rainfall run-off from the development sites, to ensure that additional flows are not discharged to surrounding areas and the downstream catchment.

10.142 Given the above, the construction of the Development in combination with the committed developments will lead to a negligible significance on surface water drainage.

Foul Water Drainage

10.143 Significant volumes of foul water are unlikely to be generated during the construction of the Development in combination with the committed developments, with any welfare facilities likely to be of a temporary nature with foul water removed from the development sites for disposal, initially via tanker and then via the new foul drainage systems to be installed as part of all the developments.

10.144 On this basis, construction activities are not anticipated to adversely affect network capacity or water quality within the downstream catchment, including areas of ecological importance; or affect the health of construction workers and the general population within the Study Area.

10.145 The construction of the Development in combination with the committed developments will therefore lead to negligible significance on foul water drainage.

Surface Water Quality

10.146 The following construction activities have the potential to alter water quality within the Study Area, if unmitigated:

10.147 Surface water run-off from construction plant movement and enabling ground works areas could result in the mobilisation and generation of contaminated run-off, comprising soil, sediment, and/or other construction materials; and

10.148 The accidental spillage of fuels or other contaminating substances could cause polluted run-off.

10.149 The effective implementation of the development specific CEMPs will put in place measures to intercept and manage rainfall run-off from the development sites, to ensure that any contaminated flows are not discharged to surrounding areas.

10.150 Given the above, the construction of the Development in combination with the committed developments will lead to a negligible significance on surface water quality.

Operational Phase

Flood Risk

10.151 The Development in combination with the committed developments could result in the placement of permanent structures, including buildings, in areas identified to be at risk of flooding. This could result in the loss of floodplain storage and/or the impedance of overland flood flow routes, resulting in the potential increased risk of flooding within the Study Area.

10.152 However, the committed developments are all located within Flood Zone 1 at low risk of fluvial flooding. Furthermore the proposed layouts, of the Development and the committed developments, locate the proposed built developments outside areas of the sites assessed to be at risk of flooding (from all sources), where possible, to reduce the likelihood and mitigate the adverse effects posed by the developments on flood risk. Where not possible appropriate mitigation has been provided.

10.153 On this basis, no potential effects that could influence flood risk within the Study Area have been identified, and the Development in combination with the committed developments will lead to negligible significance on flood risk.

Surface Water Drainage

10.154 The operation of the Development and the committed developments will generally result in currently predominantly undeveloped permeable land being developed with the construction of buildings, highways and other hard impermeable surfaces, which could increase the rate and volume of surface water run-off from the development sites, if unmitigated. The additional surface water run-off from the developments could be directed overland and pose a risk of flooding to adjacent land.

10.155 The effective implementation of the development specific Surface Water Strategies to be installed as part of the Development and committed developments, will however intercept, manage and discharge rainfall run-off from the development sites to either: ground, surrounding watercourses or surface water sewer network.

10.156 Such measures will ensure post-development peak run-off rates are not discharged to the downstream catchment at such a rate or volume that could increase flood risk within the Study Area.

10.157 Given the above, the operation of the Development in combination with the committed developments will lead to negligible significance on surface water drainage.

Foul Water Drainage

10.158 The operation of the Development and the committed developments will result in the generation of foul water. The specific foul water drainage systems to be installed at the committed developments will manage foul water generated by the committed developments, and discharge flows to the existing Yorkshire foul sewer network where there is capacity for these flows.

10.159 The operation of the Development and the committed developments will lead to negligible significance on foul water drainage.

Surface Water Quality

10.160 The following operations at the Development in combination with the committed developments have the potential to alter water quality within the Study Area, if unmitigated:

- Surface water run-off from highways and other hard surfaces could result in the generation of contaminated run-off, comprising soil, sediment, salt or other particles; and
- The accidental spillage of fuels or other contaminating substances could cause polluted run-off.

10.161 The effective implementation of the development specific surface water drainage systems will include the use of SuDS features prior to water being discharged. Such measures will remove hydrocarbon pollutants and suspended solids (via settlement), and thereby ensure contaminated flows are not discharged to the downstream catchment.

10.162 On this basis, the operation of the Development in combination with the committed developments will lead to negligible significance on surface water quality.

Summary

10.163 The assessment methodology included consultation with Barnsley Metropolitan Borough Council, Environment Agency and the Yorkshire and Humber Internal Drainage Board. A desk-based assessment was undertaken to include determination of site geology and hydrogeology, review of flood risk and drainage related constraints and consideration of environmental design and management measures to minimise flood risk such as the use of SuDS.

10.164 Baseline conditions show a number of surface water features to be present across the site, including the Carr Dike and Highgate Lane Dike. Modelling undertaken confirm the Site to be at risk of flooding in all events modelled including the 100-year plus climate change allowances event, with flooding predicted to overtop the banks of the Carr Dike and spill into the western and eastern portions of the Site. The site is at low risk of all other sources of flooding.

10.165 During construction through the early implementation of the Surface Water Strategy and flood compensation storage areas there will be minor – negligible adverse significance. Additional mitigation in the form of effective implementation of the CEMP reduces the significance to adverse negligible.

10.166 During operation, the embedded mitigation in the form of the Development's layout avoids placing built development in areas of higher flood risk, where possible, with flood compensation storage provided where development has taken place in Flood Zone 3,), implementation the surface water and foul water drainage strategy, including the use of SuDs will lead to a minor adverse significance.

10.167 Additional mitigation in the form of raising Finished Floor Levels, effective implementation of the CEMP, further pollution treatment measures including Class 1 oil separators and an appropriate drainage strategy maintenance programme will reduce the significance to negligible.

10.168 The effects of the Development in combination with the cumulative developments during construction and operation will be very similar when compared to the Development on its own as the committed developments will also have development specific CEMPs, Surface Water Strategies and Foul Water Drainage Strategies to minimise effects on the water environment. Overall, during construction of the Development in combination with the committed developments the use of embedded and additional mitigation will reduce the effects to negligible adverse significance. During operation of the Development in combination with the committed developments there will be negligible adverse significance to flood risk, surface water drainage, foul water drainage and surface water quality within the Site and surrounding area.

10.169 Table 10.7 contains a summary of the likely significant effects of the Development.

Table 10.7: Table of Significance – Water Resources and Flood Risk

Potential Effect	Nature of Effect (Permanent/ Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation / Enhancement Measures (additional)	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	B	L	
Construction											
Fluvial Flood Risk	Temporary	Minor adverse	Effective implementation of the CEMP		x						Negligible
Surface Water Flooding	Temporary	Negligible	None required							x	Negligible
Surface Water Drainage	Temporary	Minor adverse	Effective implementation of the CEMP		x						Negligible
Foul Water Drainage	Temporary	Negligible	None required							x	Negligible
Surface Water Quality	Temporary	Minor adverse	Effective implementation of the CEMP		x						Negligible
Completed Development											
Fluvial Flood Risk	Permanent	Minor adverse	Effective implementation of CEMP, raising finished floor levels		x						Negligible
Surface Water Flooding	Permanent	Negligible	None required							x	Negligible
Surface Water Drainage	Permanent	Minor adverse	Effective implementation of the CEMP and maintenance strategy and use of class 1 oil separators		x						Negligible
Foul Water Drainage	Permanent	Minor adverse	Agreement in principle with Yorkshire Water to discharge to public foul sewer at unrestricted rate							x	Negligible

Surface Water Quality	Permanent	Minor adverse	Effective implementation of the CEMP, additional pollution treatment measures		x						Negligible
Cumulative Effects											
Construction											
Flood Risk	Temporary	Negligible			x						Negligible
Surface Water Drainage	Temporary	Negligible			x						Negligible
Foul Water Drainage	Temporary	Negligible								x	Negligible
Surface Water Quality	Temporary	Negligible			x						Negligible
Completed Development											
Flood Risk	Permanent	Negligible			x						Negligible
Surface Water Drainage	Permanent	Negligible			x						Negligible
Foul Water Drainage	Permanent	Negligible								x	Negligible
Surface Water Quality	Permanent	Negligible			x						Negligible

* Geographical Level of Importance

I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local

REFERENCES

[i] Department for Levelling Up, Housing and Communities (2023) National Planning Policy Framework **https://www.gov.uk/government/publications/national-planning-policy-framework--2**

[ii] Department for Levelling Up, Housing and Communities (2022) National Planning Policy Guidance Flood Risk and Coastal Change **https://www.gov.uk/guidance/flood-risk-and-coastal-change**

[iii] Department for Levelling Up, Housing and Communities (2019) National Planning Policy Guidance: Water Supply, wastewater and Water Quality **https://www.gov.uk/guidance/water-supply-wastewater-and-water-quality**

[iv] Barnsley Metropolitan Borough Council (2019) Barnsley Local Plan **https://www.barnsley.gov.uk/media/17249/local-plan-adopted.pdf**

[v] Barnsley Strategic Flood Risk Assessment Level 1(2010) **https://www.barnsley.gov.uk/media/18125/barnsley-strategic-flood-risk-assessment-level-1-report-sept-2010.pdf**

[vi] Environmental Protection Act (1990) **https://www.legislation.gov.uk/ukpga/1990/43/contents**

[vii] Land Drainage Act (1991) **https://www.legislation.gov.uk/ukpga/1991/59/contents**

[viii] Water Industry Act (1991) **https://www.legislation.gov.uk/ukpga/1991/56/contents**

[ix] Water Resources Act (1991) **https://www.legislation.gov.uk/ukpga/1991/57/contents**

[x] Water Act (2014) **https://www.legislation.gov.uk/ukpga/2014/21/contents/enacted**

[xi] Flood and Water Management Act (2010) **https://www.legislation.gov.uk/ukpga/2010/29/contents**

[xii] The Water Environment (Water Framework Directive) (England and Wales) Regulations (2017) **https://www.legislation.gov.uk/uksi/2017/407/contents/made**

[xiii] Nitrates Directive (1991) **https://www.eea.europa.eu/archived/archived-content-water-topic/water-pollution/prevention-strategies/nitrate-directive**

[xiv] The Water Supply (Water Quality) Regulations 2016 **https://www.legislation.gov.uk/uksi/2016/614/contents**

[xv] The Water Resources (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017 **https://www.legislation.gov.uk/uksi/2017/583/made**

[xvi] Anti Pollution works Regulations (1999) **https://www.legislation.gov.uk/uksi/1999/1006/contents/made**

[xvii] The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 **https://www.legislation.gov.uk/uksi/2015/810/contents/made**

[xviii] The Environmental Permitting (England and Wales) (Amendment) Regulations 2018 **https://www.legislation.gov.uk/uksi/2018/110/contents/made**

[xix] Town and Country Planning (Environmental Impact Assessment) Regulations 2017 SI 2017/571, as amended by SI 2018/695

[xx] Environment Agency (2022) Flood Risk Assessment: Climate Change Allowances **https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances**

[xxi] IEMA (2004) Guidelines for Environmental Impact Assessment

[xxii] IEMA (2006) Guidelines for Environmental Impact Assessment

[xxiii] DEFRA (2011) National standards for sustainable drainage systems **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/82421/suds-consult-annexa-national-standards-111221.pdf**

[xxiv] DEFRA (2015) Non Statutory technical standards for sustainable drainage systems **https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf**

[xxv] Water UK (2019) Design and Construction Guidance for foul and surface water sewers Offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England

https://docslib.org/doc/7238578/design-and-construction-guidance-for-foul-and-surface-water-sewers-offered-for-adoption-under-the-code-for-adoption-agreements-f

[xxvi] Her Majesty's Government (2015) Drainage and Waste Disposal
https://www.labc.co.uk/sites/default/files/content/br_pdf_ad_h_2015_0.pdf

[xxvii] CIRIA (2015) The SuDS Manual
https://www.ciria.org/CIRIA/Memberships/The_SuDS_Manual_C753_Chapters.aspx

[xxviii] British Geological Society Geo Index Onshore
https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.226514078.227288659.1661856126-67398662.1661856126