11. FLOOD RISK AND DRAINAGE

11.1 INTRODUCTION

11.1.1 The proposed development comprises a mixed-use development to provide up to 1,560 new homes and up to 43 hectares of employment land and is described in chapter 3 of the EIA.

11.1.2 This chapter assesses the likely impacts of the proposed development on the environment in respect of flood risk and drainage.

11.1.3 The potential environmental impacts associated with the issues covered in this chapter cross over with other parts of the ES. It is recommended that this chapter is read in conjunction with **Chapter 10 (Ground Conditions)**.

11.1.4 Information has been collected from a variety of sources to provide a baseline review of the drainage and flood risk. Informed by the baseline assessment, receptors of potential environmental effects associated with drainage and flood risk arising from the proposed development have been identified. Mitigation measures have been identified and residual effects evaluated.

11.1.5 The range of effects associated with the construction and operation of the proposed development have been considered.

11.1.6 This chapter presents the assessment of likely significant effects of the Proposed Development upon flood risk and drainage arising from the construction and operation. It summarises the relevant legislation, policy, guidance and standards, the consultation undertaken to support and inform the assessment, the assessment methodology and the baseline conditions both at and in the vicinity of the Barnsley West site. The assessment includes the identification of potential impacts resulting from the proposed development, the requirements for mitigating any residual effects and the significance of these effects.

11.1.7 This chapter should be read in conjunction with the various technical reports which are provided in Appendix 11.1 to 11.3.

11.1.8 The ES chapter in the original ES was prepared by JPG (Leeds) Limited, a multi-disciplinary consultancy with extensive experience of flood risk and drainage design including SuDs. This updated Chapter includes further input from Pegasus Group and additional technical appendices from Queensberry Design Ltd.

11.2 ASSESSMENT APPROACH

11.2.1 The National Policy is set out within the National Planning Policy Framework (NPPF) and is relevant to the Proposed Development. NPPF sets out the Government's planning policy for England and how these should be applied. It provides a framework within which locally prepared plans for housing and other developments can be produced. The main purpose of the planning framework is to 'contribute to the achievement of sustainable development'.

11.2.2 In preparing this chapter, reference has been made to a number of information sources and technical reports including:

- *Appendix 11.1 Flood Risk Assessment, JPG, 2021 (as updated in 2023).*

- *Appendix 11.2 Drainage Impact Assessment – Commercial Development, JPG, 2023.*

- *Appendix 11.3 Drainage Impact Assessment – Residential Development, Queensbury, 2023.*

Methodology

11.2.3 Surface and sub-surface receptors potentially susceptible to environmental impact from flooding and drainage issues associated with the proposed development have been identified. The identification of receptors has been informed by an assessment of baseline conditions.

11.2.4 The EIA has been informed by a site-specific Flood Risk Assessment (FRA) which was undertaken in 2021. The FRA report is presented in Appendix 11.1. The FRA was prepared in accordance with the National Planning Policy Framework (NPPF) and assesses the risk of flooding from a variety of potential sources including fluvial flood risk, the risk of flooding from the failure of water impounding structures such as reservoirs and canals, groundwater emergence and from surface water.

11.2.5 The EIA has also been informed by site-specific Drainage Impact Assessment (DIA) work. The DIA reports are presented in Appendix 11.2 and 11.3. The DIAs include descriptions of the existing drainage system, preliminary drainage calculations, and schematic drainage strategy layouts.

11.2.6 Consultation with stakeholders has been undertaken with the Lead Local Flood Authority (LLFA) Barnsley MBC, the local Water Company Yorkshire Water (YW) and the Environment Agency (EA) regarding flood risk issues and details of the current drainage systems and networks.

11.2.7 A review has been undertaken of local and national planning policies regarding the flood risk, surface water/foul water drainage and sustainable drainage systems.

11.2.8 A review has been undertaken of the topography of the application site and its local and regional settings.

11.2.9 A review has been undertaken of the detailed topographical survey which has been carried out on the site. Further details regarding existing and proposed site levels are set out in the technical appendices which accompany Chapter 10 of the ES.

11.2.10 A review has been undertaken of the EA published flood mapping and record for the application site and its local and regional setting.

11.2.11 Identification of potential sources of flood risk has been undertaken.

11.2.12 Evaluation of the existing drainage networks and systems within the application site as well as outside of this boundary has been undertaken.

11.2.13 A site walkover was undertaken by JPG to gain greater understanding of the site at large and enable critical features on site to be reviewed. There have been no signification physical changes to the site since the walkover was conducted.

11.2.14 The baseline condition used in the assessment have been prepared using currently available information obtained via consultation, site walkover and

review of current guidance and legislation.

Assessment Criteria

11.2.15 This section considers the assessment criteria used for the assessment. The approach undertaken involved analysing the sensitivity of a potential receptor to flood risk and drainage impacts of the development in conjunction with the magnitude of impact to form the significance of the potential effect.

11.2.16 The potential receptors to the flood risk and drainage of the development are varied in nature but can be categorised into two main elements: the water resources of the natural environment and the occupiers/users of the built environment within the site and surrounding area.

11.2.17 The sensitivity of these two elements have been assessed from different perspectives. The water resource receptor sensitivity was based on their ability to tolerate changes resulting from the development. These were based on the criteria or parameter relevant to each particular receptor i.e. surface water flows for flood risk to rivers or groundwater. The occupants and site usage receptors will be assessed based on the vulnerability of the receptor which are defined within the NPPF. **Table 11.1** and **Table 11.2** below set out the sensitivity classification.

Table 11.1: Occupants & Site Use Sensitivity

Receptor sensitivity/ importance	**Definition (NPPG, Table 2 and 3)**
Very High	Essential Infrastructure - Critical transport and utility infrastructure which must remain operational during flood events
High	Highly Vulnerable – Important infrastructure and services required to be operational for response during flood events plus vulnerable zones including basements, caravan sites or muster points
Medium	More Vulnerable – Buildings with permanent or semi-permanent dwellings such as residential development, prisons, care homes and important non-dwelling buildings including hospitals, schools and nurseries.
Low	Less Vulnerable – Non dwelling buildings including commercial, retail, or industrial facilities as well as public service buildings not required to be operational during flood events.
Negligible	Water Compatible – Water industry establishments such as docks, coastguard, ship building facilities as well as low risk spaces such as amenity or recreational spaces.

Table 11.2: Water Resource Sensitivity

Receptor sensitivity/	Definition (NPPG, Table 2 and 3)
Very High	Water resource with no ability to absorb change without significant impact to its continued operation or character. A resource of very high environmental value internationally.
High	Water resource with some ability to absorb change without significant impact to its continued operation or character. A resource of high environmental value or national importance
Medium	Water resource with moderate ability to absorb change without significant impact to its continued operation or character. A resource of some environmental value on a regional level.
Low	Water resource with High ability to absorb change without significant impact to its continued operation or character. A resource of little environmental value to the local area.
Negligible	Water resource unlikely to be affected by change. A resource of low/negligible environmental value.

11.2.18 An assessment of the likely magnitude of impact to the site or water resources is dependent on a number of factors. Flood risk impacts can be judged on frequency of occurrence, extent of flooding, duration of flooding events and severity of flooding which can be assessed on depth and other such factors. Magnitude of impact has been based on professional judgement using a combination of these factors and the potential consequence of the impact. **Table 11.3** below set out the magnitude of impact.

Table 11.3: Magnitude of Impact

Magnitude	Definition
Very High	Impact causes significant or permanent impact on a catchment or resource. Impact causes critical detriment to infrastructure or high health and safety risk to occupants of site or surrounding area

High	Impact causes moderately significant or long-term impact on a catchment or resource. Impact causes adverse detriment to infrastructure or moderate health and safety risk to occupants of site or surrounding area
Medium	Impact causes limited or medium-term impact on a catchment or resource. Impact causes some detriment to infrastructure or low health and safety risk to occupants of site or surrounding area
Low	Impact causes insignificant or short-term impact on a catchment or resource. Impact causes minor detriment to infrastructure with no health and safety risk to occupants of site or surrounding area
Very Low	Impact causes negligible or very short-term impact on a catchment or resource. Impact causes negligible/no detriment to infrastructure with no health and safety risk to occupants of site or surrounding area

11.2.19 Potential impacts have been assessed for significance based on a combination of the likely magnitude of the impact and the sensitivity of the receptor for each impact as defined in **Table 11.4** below.

Table 11.4: Significance of Potential Effects

Receptor sensitivity	Magnitude of Impact					
		Very High	High	Medium	Low	Negligible
	Very High	Major	Major	Moderate	Minor	Minor
	High	Major	Moderate	Minor	Minor	Negligible
	Medium	Moderate	Minor	Minor	Negligible	Negligible
	Low	Minor	Minor	Negligible	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible

11.2.20 Effects considered to have a Moderate or Major adverse impact through this assessment are deemed significant and mitigation measures considered.

Scoping and Consultation Responses

11.2.21 Consultation with the LLFA Barnsley MBC was undertaken to discuss the effects of the development on the existing drainage regime within and around the site and to identify further scope for site investigation required to support the design

of the surface water drainage network as part of the proposed drainage strategy.

11.2.22 The LLFA confirmed that the surface water run off should be restricted to greenfield run off rates. Discharge into the existing watercourses within the site was a potential problem as there has been some off-site flooding issues where the watercourse becomes culverted near to Redbrook Road. Further details of this can be found in the FRA report (appendix 11.1).

11.2.23 An alternative route for the disposal of surface water was suggested by the LLFA however this would have meant the majority of the development plots would require surface water pumping which YW expressed concern over and did not feel this was an appropriate solution for the size of the development when a gravity option already existed for the majority of the site.

11.2.24 Consultation with the Local Water Company Yorkshire Water (YW) was undertaken to discuss the effect of the development on existing public sewer infrastructure within and around the site and to identify suitable points of connection to the public sewer system for both foul and surface water from the proposed drainage to serve the development.

11.2.25 The consultation with YW identified that there was no capacity for surface water into the existing public sewer network adjacent to the site and that the surface water should discharge into the local watercourse/land drainage system as existing regime.

11.2.26 The consultation with YW identified that foul water from the development should discharge into the existing 600dia. public sewer in Barugh Green Road at an unrestricted discharge. However, YW stated that there is limited capacity in the existing sewer network to accommodate the final design flows from the proposed development. As such YW will carry out a capacity study to identify where any upgrading would be required. Cost for this would be borne by YW and any costs associated with upgrading of the existing system would be recovered via the development infrastructure charges.

11.2.27 A further predesign discussion was also held with YW to discuss technical approval via the CODES of adoption system which came into effect in 2020. This will inform the detailed design and Section 104 submissions going forward.

Limitations to the Assessment

11.2.28 The assessment is based on existing information gathered through studies carried out through the course of the scheme development including site walk overs, discussion with the LLFA, EA and Water Company, topographical surveys, and intrusive ground investigation. The assessment is limited to the development site and immediate surrounding area that either impact the site or are impacted by the development.

11.3 BASELINE CONDITIONS

11.3.1 The proposed development is to be constructed on land between Higham and Gawber, with the M1 motorway located to the west and south of the site. The A653 Barugh Green Road is located to the north of the site. For a detailed description of the site see **ES Chapter 3**.

11.3.2 The existing site is defined within the NPPF Planning Practice Guidance Table 2

as "Less Vulnerable" due to the existing use of the land being agricultural.

11.3.3 The proposed development is a mix of commercial and residential and as such falls in both "Less Vulnerable" and "More Vulnerable" categories as detailed in Table 2 of the NPPF Planning Practice Guidance.

11.3.4 As detailed in the Environment Agency "Flood risk and coastal change planning document" table 1, the site falls entirely within Flood Zone 1. This described as land having less than a 1 in 1000 annual probability of river or sea flooding.

11.3.5 Flood risk has been considered from all sources, river and sea (fluvial), from adjoining land (Pluvial), from groundwater, from sewers and drains and from artificial sources. All are considered to be low. For detailed review refer to the FRA which is appended in appendix 11.1.

11.3.6 In considering the lifetime of the development, a design life of 100 years has been adopted for climate change impacts. Based on Tables 1 and 2 of the Environment Agency's "Flooding risk assessments: climate change allowances" and increase in peak rainfall intensities should be taken as 40%. This was agreed with the LLFA as been appropriate for this development.

11.3.7 Based on drainage hierarchy and the ground investigation discharge to ground via infiltration would not be feasible due to the underlaying ground conditions. Further details on the ground conditions can be found in Chapter 10 of the ES and the accompanying ground investigation reports.

11.3.8 There are existing watercourses and land drainage networks within the development site boundary and detailed descriptions can be found in the FRA and DIA reports. The site currently drains into these existing drainage systems.

11.3.9 There are no recorded public sewers within the site boundary other than a surface water public sewer outfall from the Pogmoor area in the southeast. Public sewers located outside of the site are detailed on the YW sewer records which can be found in the FRA report located in Appendix 11.1.

11.3.10 It is anticipated that without the proposed development the identified baseline scenario for the water resources within the site would not change significantly in the short term as a result of natural processes and systems.

11.3.11 Drainage requirements and infrastructure will remain largely unchanged.

11.3.12 Climate change will have an impact through increased rainfall and thus increased surface water flows on the site. This could alter watercourse processes such as erosion, deposition and frequency and intensity of river flooding.

11.3.13 A decrease in rainfall could lead to seasonal and prolonged drying out of watercourses and drains, which may affect aquatic ecology. In addition, a reduction in rainfall may also affect ground water recharge time and decrease groundwater elevations.

11.4 ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

Introduction

11.4.1 The proposed development will adopt a SuDs drainage system where feasible to do so and can be designed to meet current criteria as detail in the Suds manual

along with local authority and Water Company requirements. The systems will be designed to safely discharge runoff from the site for 100 year plus 40% climate change return event at restricted discharge based on greenfield rates mimicking the existing situation. Separate foul and surface water systems will be provided.

11.4.2 On site ground investigation has been carried out and confirm the site is mixed underlaying material consisting of rock, cohesive and fill material and would be unsuitable for infiltration drainage methods on this site. The LLFA have therefore confirmed that the site can drain into the existing watercourse/land drainage network at a restricted rate equivalent to current greenfield run off levels.

11.4.3 As a result of the restricted discharge, surface water attenuation would be required on site and this is to be provide in attenuation basins and the piped network. The basins will generally be located adjacent to the existing watercourses and provided throughout the development.

11.4.4 The attenuation basins will provide storage for storm events up to the design storm event of 1 in 100-year plus climate change. Any flows generated above this event will be directed into the existing water course system at unrestricted rate but in a controlled manor.

11.4.5 Further details of the proposed drainage strategy for the site on which the following assessment is based are set out in Appendix 11.2 and Appendix 11.3.

Construction Phase

11.4.6 This section summarises the likely effects of the proposed development during the construction phase. The assessment of effects is prior to the implementation of the mitigation measures discussed in section 11.5.

11.4.7 During the construction phase there will be a number of activities which could reduce surface water quality with respect to physical contaminants. These include:

- Materials handling, storage, stockpiling, spillage and disposal.
- Earthworks involving manipulation of ground levels and re-engineering of existing made ground as necessary.
- Excavation and foundation construction within the site and site preparation.
- Installation of temporary and permanent infrastructure and roads.
- Construction of proposed dwellings, commercial units etc.
- Construction of drainage runs, and utilities duct runs.
- Formation of public spaces, public realm and associated restoration and landscaping.
- Movement and use of static and mobile plant/construction vehicles.

11.4.8 The construction activities may lead to the disturbance and mobilisation of physical contaminants (i.e., dust, sediments, and muds). In particular, during periods of heavy rainfall, vehicle movements resulting in damage to soil

structure may generate increased sedimentation within surface water runoff. In addition, during periods of dry, windy weather, wind-blown dusts generated by the excavation of soils have the potential to directly reduce the quality of surface water features.

11.4.9 These activities may result in sediments directly or indirectly entering surface water features, impacting on the physical, chemical and biological quality of the surface water receptors in the surrounding area.

11.4.10 Contaminants, spilled contaminants, and suspended sediments have the potential to affect surface and ground water bodies via surface runoff, shallow interflow, and infiltration. Construction activities such as piling and/or ground excavation may create new pollutant pathways from the surface to the underlying strata.

11.4.11 There is a risk of pollution from foul water from site worker accommodation and sanitary facilities.

11.4.12 Off-site flood risk may increase due to increased runoff due to soil compaction on site.

11.4.13 There would therefore be the potential for significant effects to arise if mitigation measures were not implemented. Mitigation which addresses these construction phase effects is therefore set out in section 11.5.

11.4.14 For effects associated with the earthworks refer to ES Chapter 10 (Ground Conditions) and its associated appendices.

Operational Phase

11.4.15 The possible effects of the proposed development during the operational phase are summarised below, with an assessment of each then considered in turn subsequently thereafter:

- The increase in impermeable area and traffic volumes would increase the risk of contamination of surface runoff due to spillage of contaminants and from flushing of pollutants from the impermeable surfaces.

- The impermeable area of the site will increase as a result of the proposed development leading to an increase in peak surface water runoff rates and the total runoff volumes which would increase flows in watercourses and flood risk downstream.

- The large number of residents and users of the proposed development will increase the risk of watercourses becoming blocked due to tipping of rubbish etc, leading to change in flood flow dynamics and an increase in downstream flood risk.

- Foul water from the developed site could pollute the receptor water body should there by a failure in the system.

Tidal and Fluvial Flood Risk

11.4.16 There is no risk from fluvial main river or tidal flooding. There are water courses within the site which are at a lower level then the development platforms and no impact from this source is anticipated during the construction and operation of the proposed development, with no effect therefore arising.

Surface Water Flood Risk

11.4.17 SuDs drainage techniques on site will be designed to mimic and provide betterment to the existing greenfield regime. SuDs can offer beneficial effect to both on and off-site flood risk due to the attenuation of run off on site and reduced discharge rates. They can also provide water quality benefits as part of a treatment train.

11.4.18 The local authority identified some off site issues with flooding downstream of the development site in the Redbrook Road area. Notwithstanding this, a drainage solution which drains into the existing watercourse/land drainage network at a restricted rate is a viable option, subject to confirmation of the final detail, the information for which can be secured via a planning condition. There would therefore be no significant effects in terms of surface water flood risk.

Groundwater Flood Risk

11.4.19 The underlaying ground strata is unsuitable for infiltration. Some springs were noted on the site in the southern areas. Should flows from ground water be encountered during the construction phase, they will be intercepted by a new permanent land drainage system and discharge back into the existing land drainage/watercourse network at suitable locations. The proposals aim to mimic the pre-development condition with the pluvial flows being collected and released back into the land drainage/watercourse system. There would therefore be no significant effects in terms of groundwater water flood risk.

11.4.20 For further information on the existing ground water regime refer to ES chapter 10 (Ground Conditions) and the reports referred to in this chapter.

Artificial Sources Flood Risk

11.4.21 There is no flood risk from artificial sources and no effect from such sources would arise.

Drainage and Sewer Flood Risk

11.4.22 Foul water drainage from the development will generally be via a gravity system. In a pre-planning discussion Yorkshire Water confirmed that the foul should discharge into the existing 600dia. public combined sewer in Barugh Green Road. YW have highlighted known capacity issues with the existing network. This will be addressed by YW who will carry out a capacity study and implement the necessary upgrading work to cater for the development. As such the impact on the existing public sewer network will be minor and no significant impact is anticipated.

11.4.23 Surface water drainage from the development will be collected via a new dedicated on-site surface water infrastructure drainage system. This has been designed to accommodate anticipated flows from the development without any surface flooding in the 1 in 30-year return period and contain the 1 in 100-year return period event with climate change allowance of 40% on site. Discharges will be restricted to calculated greenfield run off with flows attenuated on site in detention basins. Exceedance routing will be provided to the existing water course for storm events above the designed 1 in 100 plus climate change event. The impact on the existing land drainage/watercourse system will be minor and no significant impact is anticipated.

11.4.24 The existing land drainage system will be amended and modified to

accommodate the proposed development. This system will be connected back into the existing land drainage/watercourse system at convenient locations while looking to mimic the current regime. The impact on the existing land drainage/watercourse system will be minor and no significant impact is anticipated.

11.4.25 Detailed strategy drawings for the proposed foul water, surface water and land drainage system can be found in the DIA reports which are located in appendix 11.2 and 11.3.

11.4.26 The foul and surface water infrastructure drainage system will be put forward for adoption via a Section 104 agreement to the local Water Company Yorkshire Water. Any drainage which falls outside of these criteria will be maintained by the landowner or an appointed site management company to ensure continued operation for the life of the development. There will be low risk of failure from the foul and surface water drainage system so the effect will be negligible with no significant impact.

11.5 MITIGATION AND ENHANCEMENT

Tidal and Fluvial Flood Risk

11.5.1 No further mitigation is required in relation to tidal or fluvial flood risk, as the inherent mitigation of keeping the development platforms at a higher level than the existing watercourses has already been built into the scheme design.

Surface Water Flood Risk

11.5.2 As noted previously, SuDs drainage techniques on site will be designed to mimic and provide betterment to the existing greenfield regime and are inherent mitigation built into the scheme design. SuDs can offer beneficial effect to both on and off-site flood risk due to the attenuation of run off on site and reduced discharge rates. They can also provide better water quality as part of a treatment train.

11.5.3 There is minimal risk of flooding within the development site and the drainage system implemented will be designed to minimise the flood risk.

Groundwater Flood Risk

11.5.4 The proposed development will attenuate flow from the impermeable development part of the site by restricting the discharge into the existing watercourse system.

11.5.5 As comprehensive system of land drainage will be installed which will deal with surface run off from the landscaped areas and any shallow ground water encountered during the earthworks. This land drainage system which represents inherent mitigation built into the scheme design will remain in place for the lifetime of the development and will be maintained by the landowner or an appointed representative.

Artificial Sources Flood Risk

11.5.6 There is no flood risk from artificial sources and therefore there is no impact due to this type of flooding during the construction and operation of the proposed development. No further mitigation is therefore required.

Foul and Surface Water Drainage

11.5.7 As discussed above the foul water drainage from the development will connect to the public drainage infrastructure. The existing off site public sewer network will be upgraded by the Water Company YW as a form of mitigation to cater for the development. The proposed foul water infrastructure will be put forward for adoption via a Section 104 agreement with the local water company. Revenue from the water rates will contribute to maintenance and upgrades of the public system to ensure a continued level of service.

11.5.8 The surface water drainage strategy seeks to mimic the pre-development condition by restricting discharges off the site to current greenfield run off rates. This will result in attenuation being required on site and will be provided in detention basins which are an inherent form of mitigation built into the scheme design. SuDs feature will be incorporated where possible to do so. The surface water infrastructure drainage including the basins will be put forward for adoption via a Section 104 agreement with the local water company. Revenue from the water rates will contribute to maintenance and upgrades of the public system to ensure a continued level of service.

11.5.9 A comprehensive land drainage system will be installed as part of the scheme design and will pick up not only the existing land drainage features but cater for the new landscaping areas to control the runoff while looking to maintain the pre-development condition where possible.

Construction Phase

11.5.10 Potential impacts on the water environment through the construction phase would be managed by a range of operational, control and monitoring measures as set out below.

11.5.11 The contractor would prepare a Construction Environmental Management Plan (CEMP) and agreed this with the LPA. The CEMP will set out the methods by which construction will be managed to avoid, minimise, and mitigate any adverse effects on the water environment.

11.5.12 The principal contractor would take regard of the relevant EA Pollution Prevention Guidelines (PPG) in preparation of the CEMP and during the operation of the site.

11.5.13 All construction works will be designed in accordance with the latest relevant EA guidelines.

11.5.14 Method statements will be agreed with the EA to ensure compliance with PPG prior to the commencement of construction work to ensure that surface runoff quality is managed during the construction process. The principal contractor will ensure that all necessary pollution prevention methods are utilized such as the use of a sedimentation basin and temporary silt traps.

11.5.15 Contractors undertaking earthworks will develop risk assessments and method statements covering all aspects of their work that have a potential to cause physical damage to structures (e.g. water supply and sewerage infrastructure), mobilise large quantities of soil / sediment or block open watercourses.

11.5.16 Work will comply with DEFRA guidance on the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites which provides guidance on the soil, management, and movement of soil on site. This is to be within a Soil Management Plan (SMP).

11.5.17 The adoption of best practice construction methods and construction management processes would significantly mitigate many of the identified potential environmental effects of the construction phase of the proposed development.

11.5.18 Foul water from temporary staff welfare facilities would be contained within sealed storage vessels and disposed of off-site to minimise the risk of surface or groundwater contamination where a direct connection cannot be made to the existing public sewer network.

11.5.19 The principal contractor should avoid the storage of plant, machinery, or materials in areas at risk of flooding wherever possible.

11.5.20 Following implementation of these mitigation measures, the construction phase affects which were identified in section 11.4 to have the potential to be significant, would be reduced to such a degree that they would no longer be significant.

11.6 SUMMARY

11.6.1 This chapter considers the likely significant effects on Flood Risk and Drainage effects of the proposed development. The chapter reviews relevant planning policy and provides a review of the baseline conditions at the site and the surrounding area. The chapter then presents the results of the assessment. Mitigation measures are presented and discussed to minimise the impacts of the proposed development during the construction and operation phases to an acceptable level.

11.6.2 The existing site is not at risk from any forms of flooding, which is backed up by there being no record of historic flooding. The site is within Flood Zone 1 and is therefore not at risk of fluvial and tidal flooding. The site is not at risk of surface water flooding due to the topography of the land. Groundwater flooding is also not a risk and can be dealt with via the mitigation methods proposed. There is no risk of flooding from artificial sources.

11.6.3 Foul water will be discharged off site into the existing public sewer network at an unrestricted discharge rate. The offsite existing public sewer network will be upgraded by the local Water Company to accommodate the flows from the site. Cost for this will be recovered via the infrastructure charges levied on the scheme.

11.6.4 The foul infrastructure will generally be a gravity system with a couple of isolated areas needing to be pumped. It is proposed to put forward the infrastructure drainage for adoption by the local Water Company YW where this meets with their design criteria.

11.6.5 Surface water will discharge into the existing on-site land drainage/watercourse system at a restricted discharge rate based on greenfield run off rates as calculated.

11.6.6 As a result of the restricted discharge, surface water attenuation would be required on site and this is to be provide in attenuation basins and the piped

network. The basins will generally be located adjacent to the existing watercourses and located throughout the development.

11.6.7 The attenuation basins will provide for storm events up to the design storm event of 1 in 100-year plus climate change. Any flows generated above this event will be directed into the existing water course system at unrestricted rate but in a controlled manor

11.6.8 The surface water infrastructure will generally be a gravity system with a couple of isolated areas needing to be pumped. SuDs system and feature will be incorporated into the design where possible to do so. It is proposed to put forward the infrastructure drainage for adoption by the local Water Company YW where this meets with their design criteria.

11.6.9 This ES chapter should be read in conjunction with the FRA and DIA reports which can be found in appendix 11.1 - 11.3.

11.6.10 Through this ES chapter and the accompanying FRA and DIA reports it can be seen by implementing the recommendations and design principles the proposed development would have minimal residual impact on flooding and drainage. No significant effects are identified subject to the implantation of the mitigation measures identified.