

Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

Preliminary Environmental Information Report

Chapter 14: Surface water and flood risk

January 2022

This document forms a part of a Preliminary Environmental Information Report (PEIR) for the Hinckley National Rail Freight Interchange project.

A PEIR presents environmental information to assist consultees to form an informed view of the likely significant environmental effects of a proposed development and provide feedback.

This PEIR has been prepared by the project promoter, Tritax Symmetry (Hinckley) Limited. The Proposed Development is described in Chapter 3 of the PEIR and is the subject of a public consultation running from 12 January to 9 March 2022.

Details of how to respond to the public consultation are provided at the end of Chapter 1 of the PEIR and on the project website:

<http://www.hinckleynrfi.co.uk/>

This feedback will be taken into account by Tritax Symmetry (Hinckley) Limited in the preparation of its application for a Development Consent Order for the project.

14 ◆ Surface water and flood risk

INTRODUCTION

- 14.1. This PEIR chapter assesses the potential impacts of the proposed Hinckley National Rail Freight Interchange (HNRFI) development and contiguous road connections (i.e., the A47 Link Road), as well as off-site works, on-site surface water and flood risk matters. It includes an assessment of the potential cumulative impact of the HNRFI in combination with other surrounding significant proposed developments. In particular, consideration is given to effects that might arise during construction and operation in terms of flood risk, surface water drainage, surface water quality, ground water quality, water supply and surface and foul water sewerage capacity.
- 14.2. This PEIR chapter considers the impact of the Proposed Development upon the DCO Site and surrounding area in relation to existing baseline conditions and relevant legislation and national, regional and local planning policy with regard to hydrology, drainage and flood risk.
- 14.3. The chapter provides a description of the methods used in the assessment. This is followed by a description of the relevant baseline conditions of the Proposed Development and an assessment of the likely environmental effects of the Proposed Development during the construction works and once the Proposed Development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any significant adverse effects identified, together with the nature and significance of likely residual effects.
- 14.4. This PEIR chapter is accompanied by the following appendices:
- Appendix 14.1: Flood Risk Assessment (hydraulic modelling is referenced in, and modelling reports and Drainage Strategy are appended to, the FRA and Drainage Strategy).
 - Appendix 14.2: Severn Trent Water Sewer Records and Developer Services Enquiries.

METHODOLOGY AND DATA SOURCES

EIA Scoping Opinion

- 14.5. An application for an EIA Scoping Opinion was submitted in November 2020. A Scoping Opinion from Planning Inspectorate on behalf of the Secretary of State was returned in response in December 2020.
- 14.6. Table 14.1 summarises the Planning Inspectorate's comments received in relation to

Surface Water and Flood Risk, and how these comments have been considered in TSH’s assessment of this topic.

Table 14.1: Advice in the Secretary of State’s EIA Scoping Opinion concerning the assessment of flood risk and drainage (December 2020)

PINS ID Paragraph	Ref	Comments	Response
4.8.2 Table 13.1	Assessment of new roads and alterations to roads.	<p>The Scoping Report (Table 13.1 (ID 1)) states that new roads and alterations to existing roads have been included in this revised Scoping Report, and the approach to assessment will be agreed through consultation with relevant consultees.</p> <p>The ES should make reference to the new access road and alterations to the M69 and include an assessment of how the construction of the access road and the alteration of existing roads will affect the assessment of impacts from surface water and flood risk. The approach to this assessment to be discussed with relevant consultees should take into account the latest applicable guidance.</p>	<p>Assessment of the wider highway works in line with latest applicable guidance is included throughout the PEIR Chapter.</p> <p>Consultation has been undertaken with relevant stakeholders to discuss the approach.</p>
4.8.3 13.37- 13.38	Receptors	<p>The ES should explain how effects on key receptors including existing infrastructure, habitats/sites of ecological value or local residents have been considered, and the Applicant should seek to agree receptors with relevant statutory consultees including the Environment Agency (EA).</p> <p>A preliminary Water Framework Directive (WFD) assessment should be carried out to inform the assessment of impacts from the Proposed Development on WFD waterbodies.</p>	<p>Consultation has been undertaken with relevant stakeholders to discuss the approach. The PEIR Chapter will also identify the key flood risk receptors (Table 14.7).</p> <p>A WFD assessment has been undertaken as part of PEIR Chapter Eleven: Ecology and Biodiversity.</p>
4.8.4	Assessment	The Scoping Report describes the	This assessment has

PINS ID Paragraph	Ref	Comments	Response
13.63	area	Study Area as including ‘areas within and immediately adjacent to the Main HNRFI Site, including the western link road and Eastern Villages by-pass’. The works to the M69 Junction 23 / M1 Junction 21 are not mentioned, nor are the wider highways management works. The ES must assess the impacts of the Proposed Development in its entirety.	assessed the impact of the entire Proposed Development. (Note: works to the M69 Junction 23 / M1 Junction 21 and the Eastern Villages by-pass are no longer included in the proposed development and, therefore, do not need to be included in this assessment.
4.8.5 13.64	Consultation	The Scoping Report states that the ES will be supported and informed through consultations with various stakeholders. The ES should set out how the stakeholder consultation responses have influenced the assessment.	Stakeholder consultation has been undertaken and documented within this PEIR Chapter. Responses from the consultation have been considered when undertaking the assessments.
4.8.6 13.67	Methodology	The Scoping Report states that the assessment would consider the construction and operational stages of the Proposed Development over the lifetime of the proposed scheme, i.e., taking account of the potential influence of climate change on the surface water and flood risk receptors under consideration. The ES should set out the supporting information for the methodological approach and clearly explain how this has been applied to the assessment of effects for the lifetime of the Proposed Development including any decommissioning that is	A list of supporting information has been provided. Where further information and assessment is required to support the ES Chapter, this has been documented. Consideration of climate change has been included throughout the PEIR Chapter.

PINS ID Paragraph	Ref	Comments	Response
		anticipated. The assumptions and assessment made of climate change effects should be fully explained in the ES.	

Definition of study area

- 14.7. The Study Area is defined as the DCO Site. The Study Area is shown in Figure 14.1.
- 14.8. There are potential other significant receptors that exist beyond the Study Area, as well as cumulative effects, which will also be included within the PEIR. These receptors include flood risk and drainage pathways between the DCO Site and potential receptors such as the Thurlaston Brook, River Soar, the sewerage system and groundwater. As such, the assessment also covers a 1km buffer that has been applied to the Main HNRFI Site as this is considered to be the area which will have the greatest potential to affect surface water and flood risk outside of the DCO Site.
- 14.9. The EA assesses surface water and groundwater quality at a river catchment level. Therefore, when considering a potential for impact on downstream water quality, the potential for impacts at a river catchment level, rather than limited to a 1km radius, have been considered in this PEIR chapter.
- 14.10. The negligible impact of the off-site highway improvement works means the majority of the PEIR chapter relates to the Main HNRFI Site.

Consultation

- 14.11. **2018 and 2019 Informal Consultation:** Informal consultations were undertaken in 2018 and 2019 but no concerns were raised with regards to surface water and flooding.
- 14.12. **Environment Agency (EA):** The EA was initially consulted in October 2020 to determine what information it held on flood risk for the Study Area. The EA confirmed it does not hold any detailed hydraulic modelling, although it provided some limited hydrometric information and confirmed there are no licenced abstractions of groundwater or surface water.
- 14.13. The EA was further consulted in February 2021 on the proposed modelling approach. A hydraulic modelling method statement was prepared and provided to the EA which set out the intended approach to modelling. The EA has, subsequently, also reviewed the hydraulic modelling. The EA review comments have been considered when finalising the modelling and consultation is ongoing.
- 14.14. **Leicestershire County Council (LCC):** LCC, as the Lead Local Flood Authority ('LLFA') for this area, was consulted in October 2020 to ascertain what information, relevant to flood risk, the Council holds. LCC's response included information on known flooding incidents in

and close to the Study Area. It also advised on easement requirements for watercourses and ditches. The response confirmed that the LLFA is unable to approve modelling or a modelling methodology.

- 14.15. **LCC (Highways):** LCC Highways was consulted in March 2021 to determine what information it held on hydraulic structures (culverts and bridges) in the vicinity of the DCO Site. LCC's response included information on the one publicly maintained structure in the Study Area, and this culvert information has been used to inform the hydraulic modelling.
- 14.16. **Local Planning Authorities:** Hinckley and Bosworth Borough Council ('HBBC') and Blaby District Council ('BDC') were consulted to determine what information on flood risk and drainage they hold which may support the assessment. With the exception of Strategic Flood Risk Assessments (SRFIs), neither authority held any information pertinent to the Study Area. Further detail of the SRFIs is provided in the *Relevant law, policy and guidance* section of this PEIR chapter.
- 14.17. **Warwickshire County Council:** Warwickshire County Council ('WCC') was consulted in May 2021 in its capacity as a Lead Local Flood Authority ('LLFA') for its area. The consultation sought to agree the approach for assessing and managing flood risk, as well as requesting any historical flooding information in the Study Area. WCC confirmed that it is content with the proposed approach and that it was unaware of any known flooding issues within the DCO Site.
- 14.18. **Severn Trent Water (STW):** STW was contacted in January 2021 to obtain latest sewer records and to understand the capacity of the local sewer network to receive flows from the Proposed Development. The Pre-Development Enquiry (Appendix 14.2) confirmed that STW has previously modelled the Proposed Development and that the results demonstrated insufficient capacity on parts of the network. STW wishes to be kept informed when the HNRFI DCO Application is submitted as this will prioritise and determine how quickly the Main HNRFI Site can be assessed by its Growth Promotions Team to consider options for upgrading the network. The information provided by STW has been used in the preparation of this PEIR chapter and FRA and Drainage Strategy (Appendix 14.1).
- 14.19. STW was also consulted in March 2021 to obtain records of existing water mains and to understand the capacity of the network to meet the demand of the Proposed Development (Appendix 14.2). STW confirmed that the Proposed Development could be supplied from an existing trunk main.
- 14.20. **National Highways (NH, formally Highways England (HE)):** NH was consulted in October 2020 to determine what information it held on structures crossing beneath the stretch of the M69 in the vicinity of the Main HNRFI Site and A47 Link Road. Details on the surface water drainage for the M69 in the Main HNRFI Site area was also requested. A response from HE was received which provided plans indicating where there may be drainage assets present. Culvert information was also provided with the caveat that the information was indicative only; depths and pipe sizes could not be confirmed. The response also included an outline of HE's requirements prior to any intrusive works. Where suitable, the

information provided by HE has been used to inform the hydraulic modelling, FRA and Drainage Strategy for the Main HNRFI Site and A47 Link Road.

14.21. **Network Rail:** Network Rail was consulted in March 2021 to determine what information they held on structures crossing beneath the railway in the vicinity of the Main HNRFI Site. Network Rail responded with information on culverts and drainage systems for the Study Area. Where relevant, this information has been used to support the hydraulic modelling, FRA and Drainage Strategy.

Surveys

14.22. A watercourse survey was undertaken to support the hydraulic modelling. Surveys of watercourse cross sections including open channel and structures were undertaken to EA standards by BWB Consulting during April and May 2021. The survey included the watercourses through the link road route, as well as the primary watercourses leaving the Main HNRFI Site. Survey was not required in relation to other works.

14.23. Where access was not available during the watercourse survey due to landownership constraints or vegetation that prevented access, light detection and ranging (LiDAR) data have been used to supplement the survey. Where LiDAR coverage is limited, photogrammetry data, as the next best available dataset, have been used.

14.24. In addition to the above, the assessment has also used a topographical survey of the Main HNRFI Site. This topographical survey included the watercourses within the Main HNRFI Site and has been used to support the hydraulic modelling. The topographical survey is included as an appendix to the FRA and Drainage Strategy.

Assessment sources

14.25. The PEIR chapter has been informed by the following sources of information:

- *FRA and Drainage Strategy.* The FRA and Drainage Strategy utilised the following information which is also provided as appendices to the FRA and Drainage Strategy report:
 - topographical survey by MK Surveys (2018);
 - watercourse survey by BWB Consulting (2021); and
 - hydraulic flood modelling of the Main HNRFI Site undertaken by BWB Consulting Ltd (2021).
- *STW Sewer Records and Developer Services Enquiries* (Appendix 14.2); and
- *information provided as part of the consultation responses* (outlined in 'Consultation' section above).

Assumptions and limitations

- 14.26. The PEIR chapter and the FRA and Drainage Strategy (Appendix 14.1) are based on available data from the EA, STW and British Geological Survey (BGS). The accuracy of this information has not been verified.
- 14.27. The EA Flood Map for Planning does not include all the watercourses in the vicinity of the Main HNRFI Site. As such, hydraulic modelling has been undertaken to fill this data gap and understand the flood risk from all watercourses in the vicinity of the DCO Site. Accessibility issues have meant not all the watercourses in the Study Area have been surveyed. Additionally, LiDAR data are not available for the entire Study Area; the potential to fly LiDAR locally was investigated but was not feasible due to excessive electromagnetic interference. As a result, photogrammetry data have been used to supplement the watercourse survey for the hydraulic modelling.
- 14.28. The level of understanding in this PEIR chapter will be consolidated through further work to inform the PEIR, including a Highways Agency Water Risk Assessment (HAWRAT) and Sustainable Drainage Statement.
- 14.29. This assessment utilises the Design Manual for Roads and Bridges ('DMRB') guidance (see paragraph 14.53) for matters related to highway design. Where highways are not appraised, other best practice has been utilised.

Establishing baseline conditions

- 14.30. The baseline assessment has been undertaken in accordance with DMRB guidance and IEMA guidance on EIA. Baseline characterisation has been established through the FRA and Drainage Strategy (Appendix 14.1) and has comprised desktop study and hydraulic modelling, including:
- review of surface water hydrology, including water features and surface water drainage in the vicinity of the DCO Site based on EA geo-spatial data, location mapping, Ordnance Survey mapping and further topographic surveys carried out on behalf of the Applicant;
 - identification of existing catchment pressures (e.g. point source and diffuse pollution issues) based on review of the EA's online catchment data explorer;
 - identification of public water supplies within 1 km of the Main HNRFI Site (off-site works will have negligible impact on public water supplies);
 - identification of any flood risks, typically associated with fluvial and surface water sources at this location. This has been informed by consultation with the EA as well as further site-specific hydraulic modelling as described in the FRA and Drainage Strategy and its appendices;
 - consideration of the hydro-morphological conditions of watercourses, where applicable; and

- review of soil, geological and hydrogeological information as described in more detail in PEIR Chapter 15: *Geology, soils and contamination land*.

14.31. The advice entitled *Flood Risk Assessments: Climate Change Allowances* (Environment Agency, 2016, updated 2021) has been used to determine the potential future baseline in terms of fluvial flood risk. This guidance has also been used to inform the surface water drainage designs.

Flood risk assessment

14.32. The hydraulic analysis of the Main HNRFI Site was agreed with the EA and LCC as the main LLFA. Hydraulic modelling reports are provided as appendices to the FRA and Drainage Strategy.

14.33. To assess future flood risks, the hydraulic modelling has made an allowance for climate change of 30% on top of the 100-year river flow.

Identifying likely significant effects

14.34. The assessment of potential effects of the Proposed Development on surface water and flood risk considers the following:

- contamination arising from construction drainage;
- fluvial flood risk, both in terms of impacts to the Proposed Development and changes to flood risk in the surroundings or to downstream receptors as a result of the Proposed Development;
- changes to the surface water runoff regime and associated downstream flood risks;
- the effects of regular discharge of surface water, during operational use, on the water quality of downstream receiving waterbodies; and
- potential impacts on the demand of the local potable water network and on foul drainage infrastructure.

Demolition and construction

14.35. The identification of potential significant effects during the demolition and construction phase is based on a review of the presence of potential receptors, a qualitative assessment of the sensitivity of the receptor and an assessment of the potential pathways for impact and magnitude of likely change.

14.36. The assessment of potential impacts and likely effects has, therefore, comprised the following approach:

- identification and establishment of the sensitivity of water resource receptors on the basis of their use, proximity to the Proposed Development, existing quality or resource value;

- consideration of potential ‘contaminant-pathway-receptor’ linkages;
- evaluation of the magnitude of potential changes in water quality and hydrology as a result of the introduction of the Proposed Development;
- consideration of mitigation measures integral to the Proposed Development;
- classification of the significance of likely effects; and
- identification and communication of additional mitigation measures to eliminate or reduce residual effects, where considered necessary.

Operational development

14.37. The same methodology is applied to the identification of potential significant effects during the operational phase. This is also informed by hydraulic modelling (see Appendix 14.1 for more details and results), undertaken in order to more accurately assess the flood risk and to inform the design of the Proposed Development, and associated mitigation strategies, in order to minimise any increase in flood risk to both off-site receptors and to the Proposed Development itself and its potential occupants.

Determining effect significance

14.38. The significance of potential effects arising from the Proposed Development have been established through a combination of identifying receptor sensitivity and determining the magnitude of potential effects.

14.39. The assessment has considered the construction and operational stages of the Proposed Development over its lifetime, i.e., taking account of the potential influence of climate change on the surface water and flood risk receptors under consideration.

14.40. The sensitivity of the resource was assessed according to the definitions of receptor sensitivity in Table 14.2 using best practice methodologies and considers the quality, rarity and sensitivity of the resource changing.

14.41. Impacts have been described as beneficial or adverse, and the potential magnitude of this impact rated from major to negligible / no change (Table 14.3). The significance was defined using a matrix of the sensitivity and the magnitude of the impact according to Table 14.4. The tables have been based on the published assessment criteria set out in the DMRB guidance.

Table 14.2: Definition of receptor sensitivity

Value / Sensitivity	Criteria	Examples
High	Water environment features with a very high yield, quality	Conditions supporting sites with international conservation designations (Special Areas of

Value / Sensitivity	Criteria	Examples
	<p>or rarity with little potential for substitution.</p> <p>Water resources supporting human health and economic activity at a regional scale.</p> <p>Features with a very high vulnerability to flooding.</p>	<p>Conservation, Special Protection Area, Ramsar Site) where the designation is based specifically on the water features.</p> <p>Groundwater resource in Zone 1 of a Source Protection Zone (SPZ). Principal aquifer providing regionally important resource or supporting a site protected under EC or UK habitat legislation/species protected by EC or UK legislation.</p> <p>Surface water WFD class 'High'.</p> <p>Land use types defined as 'Essential Infrastructure' and 'Highly Vulnerable' in the National Planning Policy Framework (NPPF) flood risk vulnerability classification.</p>
Medium	<p>Water environment features with a high yield, quality or rarity with a limited potential for substitution.</p> <p>Water resources supporting human health and economic activity at a local scale.</p> <p>Features with a high vulnerability to flooding.</p>	<p>Conditions supporting sites with international conservation designations (Site of Special Scientific Interest (SSSI), National Nature Reserve) where the designation is based specifically on the water features. Species protected under EC or UK habitat legislation.</p> <p>Principal aquifer providing a locally important resource, Groundwater resource in Zone 2 of an SPZ.</p> <p>Surface water WFD class 'Good'.</p> <p>Land use types defined as 'More Vulnerable' in the NPPF flood risk vulnerability classification.</p>
Low	<p>Features with a moderate or low yield, quality or rarity with some or good potential for substitution.</p> <p>Water resources supporting human health and economic activity at household/individual business scale.</p> <p>Water resources that do not support human health and are of only limited economic benefit.</p>	<p>Sites with local conservation designations (Local Nature Reserves (LNR), County Wildlife Sites) where the designation is based specifically on the water features.</p> <p>Non-reportable or heavily modified WFD river waterbodies. Groundwater outside SPZ.</p> <p>Surface water WFD class 'Moderate' or 'Poor'.</p> <p>Land use types defined as 'Less Vulnerable' or 'Water-compatible' in the NPPF flood risk vulnerability classification.</p>

Table 14.3: Definition of water environment magnitude of change

Magnitude	Criteria	Examples
Major (Adverse)	Loss of attribute and/or quality and integrity of the attribute.	Increase in peak flood level (>100mm). Loss of a fishery. Deterioration in surface water ecological or chemical WFD element.
Moderate (Adverse)	Results in effect on integrity of attribute, or loss of part of attribute.	Increase in peak flood level (>50mm). Partial loss of a fishery. Measurable decrease in surface water ecological or chemical WFD quality or flow with potential for deterioration in WFD element status.
Minor (Adverse)	Results in some measurable change in attributes, quality or vulnerability.	Increase in peak flood level (>10mm). Measurable decrease in surface water ecological or chemical WFD quality or flow.
Negligible (Neutral / Not Significant)	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity.	Negligible change in peak flood level (< +/-10mm). Discharges to watercourse which lead to no change in the feature's integrity.
Minor (Beneficial)	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring.	Creation of additional flood storage and decrease in peak flood level (>10mm). Measurable increase in surface water ecological or chemical quality.
Moderate (Beneficial)	Results in a moderate improvement of attribute quality.	Creation of additional flood storage and decrease in peak flood level (>50mm). Measurable increase in surface water ecological or chemical quality or flow with potential for WFD element status to be improved.
Major (Beneficial)	Results in a major improvement of attribute quality or creation of new feature.	Creation of additional flood storage and decrease in peak flood level (>100mm). Increase in productivity or size of fishery. Improvement in surface water

Magnitude	Criteria	Examples
		ecological or chemical WFD element.

Table 14.4: Determination of significant effects for the water environment

Magnitude	Receptor Value / Sensitivity		
	High	Medium	Low
Major	Major	Major	Moderate
Moderate	Major	Moderate	Minor
Minor	Moderate	Minor	Negligible
Negligible	Minor	Negligible	Negligible

14.42. For the purpose of undertaking the assessment in accordance with the Infrastructure EIA Regulations 2017, effects determined to be moderate or greater are considered significant in EIA terms.

Duration of effect

14.43. Identified impacts can have differing durations. These have been defined as:

- *Short-term (temporary):* Temporary effects related to a specific construction event of no more than a year’s duration – such as the construction of an individual building or a specific element of infrastructure such as a section of road.
- *Medium-term (temporary and permanent):* This covers the 10-year construction phase, where some elements of the development are operational whilst others are still under construction.
- *Long-term (permanent):* Permanent effects arising from the operation of the HNRFI or from the permanent presence or removal of physical features.

RELEVANT LAW, POLICY AND GUIDANCE

14.44. The following summarises planning and environmental legislation, policies and guidance which are considered relevant to water resources in relation to the Proposed Development, and accordingly have been referenced and consulted in the preparation of this PEIR chapter.

The Water Resources Act (1991)

14.45. The Water Resources Act¹ relates to the control of the water environment. The main

¹ The Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009

aspects of the Act which are relevant to the Proposed Development include provisions concerning land drainage, flood mitigation and controlling discharges to watercourses to prevent water pollution. It also outlines the functions and responsibility of the EA in regulating the water environment.

Flood and Water Management Act (2010)

14.46. The Flood and Water Management Act² takes forward some proposals from the UK government's report *Future Water, Making Space for Water* and the government's Response to Sir Michael Pitt's Review of the summer 2007 floods.

14.47. The Act gives the EA the strategic overview of management of flood risk in England. It gives upper tier local authorities in England responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.

14.48. Local flood authorities, district councils, internal drainage boards and highways authorities have a duty to aim to contribute towards sustainable development.

National Policy Statement for National Networks (2014)

14.49. The Department of Transport National Policy Statement for National Networks³ sets out the need for, and Government policies for, nationally significant infrastructure rail and road projects for England.

14.50. Paragraphs 5.90-5.115 (related to flood risk) and 5.219-5.231 (related to water quality and resources) include the requirements to:

- *'take into account the potential impacts of climate change'*;
- ensure that *'potential releases can be adequately regulated under the pollution control framework'* and *'the effects of existing sources of pollution in and around the project are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable'*;
- undertake an appropriate assessment of flood risk, in accordance with the requirements of the 'National Planning Policy Framework' in order to *'avoid, limit and reduce the risk of flooding to the proposed infrastructure and others'*; and
- assess potential impacts on water quality, water resources, physical characteristics of the water environment, and water bodies or protected areas under the Water Framework Directive.

² Flood and Water Management Act (2010)

³ National Policy Statement for National Networks, Department for Transport (December 2014)

National Planning Policy Framework (2021)

- 14.51. The NPPF⁴ sets out the Government's national policies on different aspects of land use planning, including flood risk. It must be taken into account in the preparation of local plans and is a material consideration in planning decisions.
- 14.52. The NPPF requires development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk to the wider catchment.
- 14.53. The NPPF sets out 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 and property.
- 14.54. The NPPF is accompanied by National Planning Practice Guidance (PPG)⁵. The PPG relevant to surface water and flood risk is *Flood Risk and Coastal Change*, which sets out the vulnerability and suitability of different land uses to flood risk. The PPG also sets out how the Sequential and Exception tests should be applied to the location of development.

CIRIA Document C753: The SuDS Manual

- 14.55. The CIRIA SuDS Manual⁶ provides guidance regarding planning, design, construction and maintenance of Sustainable Drainage Systems (SuDS) to assist with the effective implementation within both new and existing developments.

Design Manual for Roads and Bridges HD 45/09 (Road Drainage and the Water Environment) (2009)

- 14.56. The Highways Agency's Design Manual for Roads and Bridges⁷ gives guidance on the assessment and management of the impacts that road projects may have on the water environment. These include possible impacts on the quality of water bodies and on the existing hydrology of the catchment(s) through which roads pass. The Standard may also be applied to existing roads, where appropriate.

Water Framework Directive (2000)

- 14.57. The Water Framework Directive (WFD)⁸ is an important mechanism for assessing and managing the water environment in the European Union (EU), through a six-yearly cycle of planning and implementing measures to protect and improve the water environment. Since the UK left the EU, the EU Water Framework Directive has been revoked and replaced in England and Wales by the Water Environment (Water Framework Directive)

⁴ National Planning Policy Framework, Ministry of Housing, Communities and Local Government (2021)

⁵ National Planning Practice Guidance: Flood Risk and Coastal Change, Ministry of Housing, Communities and Local Government (2014)

⁶ CIRIA C753 The SuDS Manual, B. Woods Ballard, S. Wilson, H. Udale-Clarke, S. Illman, T. Scott, R. Ashley. R. Kellagher (2015)

⁷ Design Manual for Roads and Bridges HD 45/09 Road Drainage and the Water Environment. The Highways Agency (November 2009)

⁸ Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy

(England and Wales) Regulations 2017⁹.

14.58. The assessment and protection of waterbodies is undertaken by implementing River Basin Management Plans. In general terms, there is an onus on developers to protect and, if possible, enhance waterbodies close to proposed developments. Eleven River Basin Districts have been identified in England and Wales, of which the Study Area falls within the Humber River Basin District. The Regulations include a requirement for surface water bodies to achieve 'good' status with respect to ecology and water chemistry by 2021. Progress is monitored by the EA in its role as the 'competent authority'. The current plan relevant to the Study Area is the Humber River Basin District River Basin Management Plan 2015 - 2021.

LCC Preliminary Flood Risk Assessments (2011)

14.59. The LCC Preliminary Flood Risk Assessment (PFRA)¹⁰ is an assessment, undertaken by LCC, of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by a LLFA. The PFRA seeks to assess past and future flood risk and identify areas at significant flood risk.

WCC Preliminary Flood Risk Assessment (2017)

14.60. The WCC PFRA¹¹ is an assessment, undertaken by WCC, of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by a LLFA. The PFRA seeks to assess past and future flood risk and identify areas at significant flood risk. The PFRA was completed in May 2011 and subsequently reviewed in June 2017¹².

LCC Local Flood Risk Management Strategy (2015)

14.61. The LCC Local Flood Risk Management Strategy (LFRMS)¹³ was prepared by LCC to help understand and manage flood risk at a local level. The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so floods can be better managed. The LFRMS also aims to promote sustainable development and environmental protection.

WCC Local Flood Risk Management Strategy (2016)

14.62. The WCC LFRMS¹⁴ was prepared by WCC to help understand and manage flood risk at a local level. The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so floods can be better managed. The LFRMS also aims to

⁹ UK Statutory Instruments: 2017 No. 4.7: The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

¹⁰ Preliminary Flood Risk Assessment, Leicestershire County Council (2011)

¹¹ Preliminary Flood Risk Assessment, Warwickshire County Council (2011)

¹² Preliminary Flood Risk Assessment Review, Warwickshire County Council (2017)

¹³ Local Flood Risk Management Strategy, Leicestershire County Council (2015)

¹⁴ Local Flood Risk Management Strategy, Warwickshire County Council (2016)

promote sustainable development and environmental protection.

Interim LLFA Guidance Note: Planning and Development in Leicestershire (2018)

14.63. The LCC LLFA Guidance Note¹⁵ serves as interim LLFA surface water and flood risk guidance prior to completion of more comprehensive guidance. It aims to enable the design and evaluation of SuDS to meet agreed standards and ensure SuDS are maintainable now and in the future.

Leicester City and Leicestershire Strategic Water Cycle Study (2017)

14.64. The Leicester City and Leicestershire Strategic Water Cycle Study¹⁶ considered the cumulative impact of the anticipated overall level of growth within Leicestershire to 2050 on the provision of a clean water supply, the safe disposal of wastewater and protection from flooding. It has considered the implications of development in the potential growth areas to assess if large-scale development within these areas would be viable and sustainable in terms of impacts on the 'water cycle'.

Hinckley and Bosworth Borough, Blaby District and Oadby and Wigston Borough Joint Strategic Flood Risk Assessment (2014)

14.65. A SFRA is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

14.66. The Hinckley and Bosworth Borough, Blaby District and Oadby and Wigston Borough Joint SFRA¹⁷ aims to provide an assessment of flood risk from all sources within the three local authority areas. An addendum to the SFRA was published in 2017 which updated the 2014 SFRA based on latest information and guidance.

Leicestershire and Leicester City-wide SFRA (2017)

14.67. The LCC and Leicester City-wide SFRA¹⁸ is a joint SFRA for all local authorities within Leicestershire and Leicester City undertaken to support the Leicestershire Strategic Growth Plan.

HBBC SFRA (2019 and 2020)

14.68. HBBC has published an update to the Joint SFRA and the Leicestershire and Leicester City SFRA. Whereas the two previous documents covered multiple local authority areas, the update covered the Hinckley and Bosworth area only and is presented in two parts: a Level

¹⁵ LLFA Guidance Note: Planning and Development in Leicestershire, Leicestershire County Council (November 2018)

¹⁶ Strategic Water Cycle Study, Leicester City and Leicestershire County Council (2017)

¹⁷ Joint Strategic Flood Risk Assessment, Hinckley and Bosworth Borough, Blaby District, and Oadby and Wigston Borough Councils (2014)

¹⁸ Leicestershire and Leicester City Level 1 Strategic Flood Risk Assessment (Leicestershire Local Planning Authorities and Leicester City Council (2017)

1 SFRA completed in 2019¹⁹ and a Level 2 SFRA completed in 2020²⁰.

Blaby District Local Plan (2013)

14.69. The Blaby Local Plan (Core Strategy) ²¹, prepared by BDC, sets out the vision, objectives, strategy and core policies for the spatial planning of the District up to 2029. The key relevant policies from the Local Plan in relation to water resources and flood risk, comprise of CS21 (Climate Change) and CS22 (Flood Risk Management).

14.70. Amongst other aims, these policies require proposed developments to:

- Minimise the risk of flooding to property, infrastructure and people.
- Minimise vulnerability and provide resilience to climate change and flooding by including adaptations such as appropriate shading and planting, green roofs, SUDS, rain water harvesting and storage, and grey water recycling.
- Be preferentially located in areas at lowest risk of flooding within the District.
- Manage surface water run-off to minimise the net increase in the amount of surface water discharged.

14.71. The Blaby District Local Plan (Delivery) Development Plan Document (DPD)²² was adopted in February 2019. The Delivery DPD includes site allocations and development management policies and sites alongside the adopted Core Strategy.

Hinckley and Bosworth Local Plan 2006-2026 (2009)

14.72. The Hinckley and Bosworth Local Plan 2006-2026 outlines HBBC's policies for development within the Borough. The Local Plan is made up of a series of documents, of which the Core Strategy Development Plan Document (DPD)²³ provides the vision and spatial strategy for the borough. The Core Strategy was adopted in December 2009 and sets out, that whilst flooding is not a major issue for the borough, flood mitigation measures, such as sustainable urban drainage, will need to be incorporated into new developments.

14.73. Another document, Site Allocations and Development Management Policies DPD²⁴, adopted in July 2016, includes Policy DM7 'Preventing Pollution and Flooding' sets out that

¹⁹ Strategic Flood Risk Assessment for Hinckley and Bosworth Borough Council: Final Report, Hinckley and Bosworth Council (July 2019)

²⁰ Hinckley and Bosworth Borough Council Level 2 Strategic Flood Risk Assessment: Final Report, Hinckley and Bosworth Borough Council (May 2020)

²¹ Blaby District Local Plan: Local Plan (Core Strategy) Development Plan Document, Blaby District Council (February 2013)

²² Blaby District Local Plan: Local Plan (Delivery) Development Plan Document, Blaby District Council (February 2019)

²³ Local Plan 2006 – 2026 Adopted Core Strategy, Hinckley and Bosworth Borough Council (December 2009)

²⁴ Local Plan 2006 – 2026 Site Allocations and Development Management Policies DPD, Hinckley and Bosworth Borough Council (July 2016)

adverse impacts from pollution and flooding will be prevented by:

- ensuring development proposals will not adversely impact the water quality, ecological value or drainage function of water bodies in the borough.
- Appropriate containment solutions for oils fuels and chemicals are provided.
- The development does not create or exacerbate flooding by being located away from areas of flood risk unless adequately mitigated against in line with National Policy.

14.74. HBBC are currently developing a new Local Plan which will set out land allocations and planning policies for the period 2020 to 2039

Rugby Local Plan 2011-2031 (2019)

14.75. The Rugby Local Plan 2011-2031²⁵ outlines Rugby Borough Council's strategic policies and detailed development management policies. The key relevant policy from the Local Plan in relation to water resources and flood risk, comprise of SDC5: Flood Risk Management. Amongst other aims, this policy requires proposed developments to apply the sequential approach to the location of development, with development steered to areas with the lowest probability of flooding. SDC5 also sets out how applicants will need to demonstrate compliance with the policy by way of a site-specific FRA.

Harborough Local Plan 2011-2031 (2019)

14.76. The Harborough Local Plan 2011-2031²⁶ sets out the vision, objectives, spatial strategy and planning policies for the Harborough district. The key relevant policies from the Local Plan in relation to water resources and flood risk, comprise of CC3: Managing Flood Risk and CC4 Sustainable Drainage. Amongst other aims, these policies require new development to take place in areas of lowest risk of flooding, including the potential future risk from climate change. They also set out how development should be subject to a site-specific FRA, where required, and that all major development must incorporate sustainable drainage systems.

Humber River Basin Management Plan (2015)

14.77. The latest version of the Humber River Basin Management Plan (RBMP)²⁷, undertaken by Defra and the EA, includes an assessment of river basin characteristics, a review of the impact of human activities, statuses of water bodies and an economic analysis of water use and progress since the first plan was published in 2009.

Severn Trent Water: Water Resources Management Plan (2019)

14.78. The Water Resource Management Plan, prepared by Severn Trent Water²⁸, is a long-term

²⁵ Local Plan 2011 – 2031, Rugby Borough Council (June 2019)

²⁶ Local Plan 2011 – 2031, Harborough District Council (April 2019)

²⁷ Humber River Basin District River Basin Management Plan, Defra and Environment Agency (2015)

²⁸ Water Resource Management Plan, Severn Trent Water (August 2019)

assessment of the likely demand and supply of potable water within the STW supply region. The document also includes an outline of plans in order to balance supply and demand, whilst meeting environmental obligations and climate change uncertainty.

BASELINE CONDITIONS

14.79. The following outlines the existing water resource conditions within the Study Area.

Hydrology

- 14.80. The majority of the Proposed Development is located in the Thurlaston Brook catchment. An unnamed tributary of the Thurlaston Brook, which is referred to here as the 'Thurlaston Brook Tributary', flows eastwards across the route of the proposed A47 Link Road and immediately beyond the railway line to the north of the Main HNRFI Site.
- 14.81. An Unnamed Ordinary Watercourse (UOW) flows north-eastward through the southern portion of the Main HNRFI Site before joining the Thurlaston Brook Tributary just downstream of the railway line. This UOW 'issues' within the Main HNRFI Site itself, rather than being fed by an upstream catchment.
- 14.82. Additionally, several field drainages ditches and small ponds in the Main HNRFI Site discharge into the Thurlaston Brook Tributary.
- 14.83. The Thurlaston Brook catchment has a WFD overall water body quality classification of 'Poor' (2019), with an ecological status of 'Poor' and a 'Fail' chemical status. The catchment has an objective of achieving 'Good' overall status by 2027. Agricultural and rural land management, and pollution from waste water are the main issues preventing waters reaching good status. The Soar from Source to Soar Brook catchment has a WFD overall water body classification of 'Moderate' (2019), with an ecological status of 'Moderate' and a 'Fail' chemical status. The catchment has an objective of achieving 'Good' overall status by 2027. Agricultural and rural land management is the main issues preventing waters reaching good status.
- 14.84. The underlying aquifer (Carmarthen Soar – Secondary Combined) has a WFD classification of 'Good' (2019).

Flood risk

Fluvial

- 14.85. With reference to the EA's *Flood Map for Planning* (Figure 14.2), the majority of the DCO Site lies within Flood Zone 1 (low probability of flooding). Flood Zone 1 is defined in the NPPF as land having a less than 1 in 1,000 annual probability of fluvial or tidal flooding. However, Figure 14.2 shows a small portion of the Main HNRFI Site adjacent to the northern boundary is located in Flood Zone 3 (high probability of flooding) and Flood Zone 2 (medium probability of flooding). Flood Zone 3 is defined in the NPPF as land having a 1

in 100 or greater annual probability of fluvial flooding, or a 1 in 200 or greater annual probability of tidal flooding. Flood Zone 2 is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of fluvial flooding, or between a 1 in 200 and 1 in 1,000 annual probability of tidal flooding. This flood risk is associated with the Thurlaston Brook Tributary.

- 14.86. The *Flood Map for Planning* does not take account of watercourses with a catchment area of less than 3km², which is the case of the smaller watercourses within the Main HNRFI Site and in the vicinity of the A47 Link Road and off-site junction enhancements and highway works. As such, the *Flood Map for Planning* is not considered fully representative of flood risk in these areas.
- 14.87. The *Flood Map for Planning* shows the A47 Link Road will cross through areas of Flood Zone 2 and Flood Zone 3 associated with the Thurlaston Brook Tributary.
- 14.88. The FRA and Drainage Strategy includes an assessment of the fluvial flood risk to those junction enhancements and minor off-site works where physical changes to the roads may be required. This is summarised in Table 14.5 below. Of the proposed improvements, only one, 'B6', has the potential to effect surface water and flood risk. The remaining works are located away from watercourses.

Table 14.5: Junction Enhancements and Off-site works – Fluvial Flood Risk

Off-site works	Flood zone category
Junction of B581 Station Road / New Road and Hinckley Road, Stoney Stanton ('B1'), Junction of B4669 Hinckley Road and Stanton Lane, west of Sapcote ('B2'), B4669 Hinckley Road/ Leicester Road, Sapcote ('B4') Stanton Lane / Hinckley Road, south-west of Stoney Stanton ('B3') Junction of B4114 Coventry Road and B581 Broughton Road at Soar Mill, south-east of Stoney Stanton ('B5'), Junction of B4114 Coventry Road and Croft Road, south-west of Narborough ('B6'), Junction of A47 Normandy Way and A447 Ashby Road, Hinckley ('HB1') Junction of A47 Normandy Way / Leicester Road, the B4668 Leicester Road and The Common, south-east of Barwell ('HB2'), Junction of B4668 and New A47 Link Road, north east of the site access (Access Infrastructure) ('HB3') Cross in Hand roundabout at the junction of the A5 Watling Street, A4303 Coventry Road, B4428 Lutterworth Road and Coal Pit Lane, west of Lutterworth ('H1') Proposed Slip Roads on the A47 link and M69 (north and southbound), M69 signage Junction 1 to Junction 2.	Flood Zone 1
Junction of B4114 Coventry Road and Croft Road, south-west of Narborough ('B6')	Flood Zone 3

(Numbers in brackets refer to the DCO reference as set-out in Table 3.2, Chapter 3)

14.89. Modelling of the Thurlaston Brook Tributary and other key watercourses and ditches inside the Main HNRFI Site has been undertaken to understand any flooding issues associated with these waterbodies. The baseline modelling includes the current day scenario as well as risk associated with climate change. The model and its results are included in the FRA and Drainage Strategy. The FRA and Drainage Strategy concludes that the majority of the land inside the Main HNRFI Site is located outside of the floodplain and is at low risk of flooding. However, there are a few localised areas upstream of the railway line where water can pond, as well as an overland flow route near Burbage Common.

14.90. This PEIR chapter has utilised the hydraulic modelling and is accompanied by an FRA and Drainage Strategy which assesses the floodplain and flood risk from all sources in more

detail. The FRA and Drainage Strategy has been submitted in support of the PEIR.

Surface water

- 14.91. Figure 14.3 of this PEIR Chapter shows the EA's Flood Risk from Surface Water Map for the DCO Site. This shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground.
- 14.92. The mapping identifies the Main HNRFI Site to be predominantly at very low risk of flooding from pluvial sources, with some areas of higher risk associated with the watercourses on the Main HNRFI Site. The pluvial flood risk to the A47 Link Road corridor and the various junction enhancements range from very low to high.
- 14.93. The FRA and Drainage Strategy includes an assessment of the surface water flood risk to those junction enhancements and minor off-site works where physical changes to the roads may be required. This is summarised in Table 14.6 below. Of the proposed improvements, only one (Junction of A47 Normandy Way / Leicester Road, the B4668 Leicester Road and The Common, south-east of Barwell) has the potential to affect surface water and flood risk. The remaining works are either located away from surface water bodies and / or involve minor works such as introduction of traffic lights.

Table 14.6: Junction Enhancements and Minor Off-site works – Surface Water Flood Risk

Off-site works	Surface Water Risk Category
Normandy Way and Ashby Road A47, Junction of B581 Station Road / New Road and Hinckley Road, Stoney Stanton, Junction of B4114 Coventry Road and B581 Broughton Road at Soar Mill, south-east of Stoney Stanton, Junction of A47 Normandy Way / Leicester Road, the B4668 Leicester Road and The Common, south-east of Barwell, Cross in Hand roundabout at the junction of the A5 Watling Street, A4303 Coventry Road, B4428 Lutterworth Road and Coal Pit Lane, west of Lutterworth, Junction of B4114 Coventry Road and Croft Road, south-west of Narborough, Junction of B4668 and New A47 Link Road, north east of the site access (Access Infrastructure), Proposed Slip Roads on the A47 link and M69 (north and southbound), M69 signage Junction 1 to Junction 2.	Low
Junction of B4669 Hinckley Road and Stanton Lane, west of Sapcote	Medium
Junction of A47 Normandy Way / Leicester Road, the B4668 Leicester Road and The Common, south-east of Barwell, B4669 Hinckley Road/ Leicester Road, Sapcote,	High

Canals and reservoirs

- 14.94. The nearest canal to the Main HNRFI Site is the Ashby Canal, located over 5km to the west. This distance and the intervening topography is such that the HNRFI is not considered to be at risk from flooding from the canal.
- 14.95. The off-site works are located away from any canals and are not considered to be at risk from canal flooding.
- 14.96. Based on EA reservoir inundation mapping, the DCO Site is located entirely outside the area predicted to be at risk in the event of a reservoir failure.

Groundwater

- 14.97. The FRA and Drainage Strategy concludes that the Main HNRFI Site is underlain predominantly by glacial deposits of the Thrussington Member and Bosworth Clay Member. Localised deposits of Alluvium and the Wolston Sand & Gravel are mapped at

the Main HNRFI Site. The bedrock at the Main HNRFI Site is indicated to comprise Mercia Mudstone.

- 14.98. The EA classifies the Alluvium and the Wolston Sand and Gravel as Secondary A Aquifers, the Bosworth Clay Member as unproductive strata, the Thrussington Member as an undifferentiated Secondary Aquifer, and the Mercia Mudstone and Edwalton Member Mudstone are categorised as a Secondary B Aquifer.
- 14.99. The FRA and Drainage Strategy describes that preliminary exploratory site investigations reported that groundwater was encountered in the Main HNRFI Site in four exploratory positions during fieldwork between 3.10m below ground level (bgl) and 3.90m bgl.
- 14.100. The FRA and Drainage Strategy also concludes that the off-site works are at low risk of groundwater flooding.
- 14.101. The conclusion from the FRA and Drainage Strategy is the DCO Site is at low risk of groundwater flooding due to the depth of groundwater and the low permeability of the underlying strata.

Drainage

- 14.102. The Main HNRFI Site does not appear to be served by any existing drainage infrastructure. Rainfall is believed to infiltrate into the ground where geological and hydrogeological conditions allow, and then to runoff at surface level once the infiltration capacity of the ground has been exceeded. Any run-off currently generated will likely be directed to local surface water bodies, and ultimately into the Thurlaston Brook or the River Soar.
- 14.103. The off-site works are to existing highways and are, therefore, served by existing drainage.

Foul water

- 14.104. The Main HNRFI Site is located within STW's sewerage area, although it is not believed to currently be served by a public foul water drainage system. Foul water from existing properties within the Main HNRFI Site is understood to currently be disposed to on-site management / disposal systems.
- 14.105. The nearest public foul water sewer connection point to the Main HNRFI Site is a 150mm diameter sewer to the north-east of the nearest part of the Main HNRFI Site. This connects downstream to the Elmesthorpe – Bostock Close Sewage Pumping Station (SPS) and Elmesthorpe – Bostock Close Combined Sewer Overflow (CSO). The SPS pumps foul water to the Wastewater Treatment Works (WwTW) at Stoney Stanton, approximately 3.0km to the east of the Main HNRFI Site. The WwTW discharges treated water to the River Soar, within whose immediate downstream catchment no designated sites of ecological importance were identified, nor any Drinking Water Protected Areas (Surface Water) or Drinking Water Safeguard Zones (Surface Water).

- 14.106. Consultation with STW highlighted that it had undertaken modelling of the Proposed Development in the past, the results of which demonstrated insufficient capacity at the SPS from additional foul flows. As such, an upgrade to the network will be required.
- 14.107. The proposed A47 Link Road, junction enhancements and minor off-site works do not affect any foul water drainage assets.

Potable water supply

- 14.108. The EA classifies the STW region as having a 'moderate' degree of water stress.
- 14.109. Potable water is supplied to the area by STW. STW has confirmed that there is a 300 mm trunk main to the northeast of the Main HNRFI Site, running along the B4668. STW confirmed that it can supply the development from this existing trunk main.
- 14.110. The proposed A47 Link Road, junction enhancements and minor off-site works do not affect any water supply assets.

Designations

- 14.111. Burbage Wood and Ashton Firs, located immediately adjacent to the south-west of the Main HNRFI Site, are designated as a SSSI and LNR, on the basis of biological interest. However, the topography of the area is such that land in the Main HNRFI Site slopes, and watercourses flow, away from the SSSI; therefore, surface water and drainage is not expected to have any significant effect on the SSSI.
- 14.112. There are no other SSSIs within 1km of the DCO Site.
- 14.113. No designated sites of ecological importance were identified in the DCO Site, nor any Drinking Water Protected Areas (Surface Water) or Drinking Water Safeguard Zones (Surface Water).
- 14.114. None of the DCO Site is located in a Groundwater Source Protection Zone. There are no active abstraction licences listed within 1km of the Main HNRFI Site and there are no discharge consents listed as issuing to groundwater at the Main HNRFI Site or in the surrounding area.

Future baseline

- 14.115. Climate change will lead to increased rainfall intensity and flows within watercourses which may subsequently increase flood risk both within the DCO Site and further downstream. The potential impact of climate change has been considered as part of the FRA and Drainage Strategy.
- 14.116. By the time the Proposed Development is complete (projected to be in 2036) it is assumed that the committed development listed in Chapter 20: *Cumulative and transboundary effects* of this PEIR will be in place. However, it is not anticipated that the Proposed Development would have any significant impact upon flood risk, surface water quality and quantity, and foul water. As per the NPPF, PPG and Non-Statutory Technical

Standards for Sustainable Drainage requires all new developments are upheld to the same standards, so as to not increase risk to third parties and, where possible, make provision for betterment.

Summary of receptors and sensitivity

14.117. The potential receptors and their sensitivity in terms of groundwater, surface water, flood risk and drainage are described below in Table 14.7. Those receptors identified remain valid for both the existing and future situation.

Table 14.7: Potential sensitivity of receptors

Receptor	Type of Impact	Sensitivity (Value)	Reason for Sensitivity
Thurlaston Brook Tributary	Water Quality	Low	Overall Poor WFD Status
	Flood Risk	High	Flood Zone 1, 2 and 3
UOW	Water Quality	Low	Overall Poor WFD Status
	Flood Risk	High	Flood Zone 1, 2 and 3
Soar Brook	Water Quality	Low	Overall Moderate WFD Status
	Flood Risk	High	Flood Zone 1, 2 and 3
Minor Watercourses	Water Quality	Low	Overall Poor WFD Status
	Flood Risk	High	Flood Zone 1, 2 and 3
Groundwater	Water Quality	Low	Minor Aquifer
	Underlying Aquifer	Medium	Good WFD Status
Construction Workers	Flood Risk	High	Human Life
STW Public Sewer Network	Flood Risk / Resource availability	Medium	Existing residential, commercial or retail property.
STW Potable Water Network	Resource availability	Low	Development can be supplied by existing Trunk Main.

POTENTIAL SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSALS

14.118. This section provides an assessment of the potential significant environmental impacts of the Proposed Development on the basis that no mitigation measures are in place. As such the impacts might appear extreme. In the medium term the construction stage may

overlap with the operational stage; as such the effects from both stages outlined below may occur. The assessment covers the worst-case effects of both construction and operational stages. As such, any medium term overlap of construction and operational stage is encompassed within these worst case scenarios and is not expected to result in effects more significant than those outlined below. Mitigation measures to address these potential impacts are outlined in the sections below.

Construction stage

14.119. The effects associated with the construction phase of the Proposed Development are considered to be direct, temporary and short to medium term duration. The effects, prior to mitigation are outlined below.

Flood risk

14.120. The majority of the DCO Site is located within Flood Zone 1. However, there are some small areas of the Main HNRFI Site and off site highway work 'B6' within Flood Zone 2 and 3. Therefore, the effect of flood risk (*major magnitude*) in these areas on construction workers (*high sensitivity receptor*) is considered to be major adverse, prior to mitigation.

14.121. The following construction activities within the DCO Site could potentially increase flood risk within the Study Area and downstream catchments, prior to mitigation:

- Construction works could compromise the 'normal' functioning of existing watercourses, through altering channel geometry, and hence altering flow characteristics and / or routes.
- The mounding of materials and placement of other structures within areas identified as being at risk of flooding could result in a loss of floodplain storage and / or the alteration of overland flow characteristics and / or routes.

14.122. Small portions of the Main HNRFI Site, and off site highway work 'B6', as well as downstream catchments are designated as Flood Zone 2 and 3 (*high sensitivity receptor*). As such the significance of the effect of an increase in flood risk (*major magnitude*) to the site or downstream catchments is considered major adverse, prior to mitigation.

Surface water quantity

14.123. The use of heavy machinery on the DCO Site during the construction phase is likely to result in short term disruption to the rate of infiltration. The movement of construction traffic could also disturb the upper portions of the ground, leading to compaction, altering the degree of surface water infiltration and runoff. A short-term increase in runoff rates (*minor impact magnitude*) may increase the volume and rate of runoff into minor watercourses (*high sensitivity receptor*). The impact is considered to be moderate adverse. The significance of the effect of a short-term reduction in infiltration (*minor impact magnitude*) to the bedrock aquifer (*low sensitivity resource*) is considered to be negligible.

14.124. The effect of the off-site works 'Junction of A47 Normandy Way / Leicester Road, the B4668 Leicester Road and The Common, south-east of Barwell' is considered negligible considering the short term, minor nature of the proposed works.

Surface water quality

14.125. Construction activities can lead to the pollution of controlled waters. Activities that might generate impacts include the demolition of existing structures, earth stripping, stockpiling, excavation, construction plant movements and hauls, refuelling, equipment maintenance, storage of materials and chemicals and the generation, storage and disposal of waste materials. Impacts are generally from sediment (soil particles) suspended in runoff, particularly from rainfall during storm events, which can affect water quality, or from pollution by construction materials or fuels.

14.126. Suspended solids are one of the most common causes of water pollution from construction sites. They emanate from excavations, exposed ground or stock piles, plant and wheel washing, build-up of dust and mud on roads, or pumping of contaminated surface waters and groundwater accumulated on the Main HNRFI Site. Extreme rainfall events could exacerbate runoff rates and the mobilisation of suspended solids has the potential to affect ecological habitats, block watercourses and alter flow regimes. Additionally, suspended solids from construction work, particularly from intrusive earthworks for foundations and sewers, could create pathways to local groundwater.

14.127. Diversion of the UOW is proposed as part of the Proposed Development. During construction and prior to vegetation colonisation the diversion of the UOW channel through the Main HNRFI Site risks exposing loose sediments to the water environment that could become mobilised under high flow conditions and transported into the downstream fluvial environment.

14.128. Prior to mitigation, the significance of the effect of runoff containing suspended solids (*moderate impact magnitude*) on the Thurlaston Brook Tributary, UOW and minor watercourses UOW (*low sensitivity receptors*) is considered to be minor adverse. It will also have a minor adverse effect on groundwater (*low sensitivity receptor*) within the DCO Site.

14.129. The formation of hydrocarbons has the potential to impact on watercourses and aquatic ecosystems. The significance of the effect of hydrocarbons (*moderate impact magnitude*) on the local watercourses (*low sensitivity receptor*), prior to mitigation, are considered minor adverse.

14.130. The uncontrolled release of substances such as solvents, cleaning agents, paints and other chemicals, liquids or solids could lead to further pollution. These could become a hazard if used in the construction process or stored on the DCO Site. These substances can be of high toxicity (*moderate impact magnitude*), thereby having a minor adverse effect on the Thurlaston Brook Tributary, UOW and minor watercourses, and groundwater (*low sensitivity receptors*) prior to mitigation.

14.131. Concrete production taking place on the DCO Site or introduced by ready-mix lorries

could cause small particulates to settle in the surrounding area. Wastewater from the batching plant or washing down of lorries/mixing areas could cause particulates to runoff into watercourses. Without mitigation, the potential impact of this source of pollutant (*moderate impact magnitude*) on the Thurlaston Brook Tributary, UOW and minor watercourses (*low sensitivity receptors*) is considered a short term minor adverse effect.

- 14.132. The above impacts on surface water quality as a result of decreased runoff quality and the introduction of machinery, vehicles and substances may also lead to decreased quality of groundwater receptors. Without mitigation, the potential impact of these pollutants (*moderate impact magnitude*) on the underlying aquifer (*medium sensitivity receptor*) is considered moderate adverse.

Foul water

- 14.133. There will be increased pressure on the local foul water network due to the temporary presence of construction workers and associated welfare facilities. The demand placed upon the existing public sewer network (*medium sensitivity receptor*) for the construction period is considered to be low (*minor impact magnitude*). The significance of the effect is considered minor adverse due to the medium sensitivity of the receptor and minor magnitude of the effect, prior to mitigation.

Potable water supply

- 14.134. There will be an increased demand on the local water supply because of construction activities and the presence of construction workers. The demand placed upon the water supply network (*low sensitivity receptor*) for the construction periods is considered to be negligible. The significance of the effect is considered negligible due to the low sensitivity of the receptor and negligible magnitude of the effect.

Operational stage

- 14.135. The effects associated with the operation phase of the Proposed Development are considered to be direct, permanent and medium to long term in length. The effects prior to mitigation are described below.

Flood risk

- 14.136. The Proposed Development includes the reprofiling of the Main HNRFI Site to form two plateaux. To facilitate the reprofiling, the UOW in the Main HNRFI Site will be realigned to flow along the south-eastern boundary within a new channel. The channel will be designed to convey the necessary flood flows.
- 14.137. The A47 Link Road crosses a number of small watercourses. The road will be elevated upon an embankment above the floodplain so that it can remain operational during times of flood. Culverts will be provided beneath the road to preserve hydraulic connectivity and convey flood flows into the downstream channels.
- 14.138. Therefore, the Proposed Development designs have taken account of the need to

balance flood risk by allowing flood water to move through the Main HNRFI Site in such a way that conveyance is not significantly impeded. Hydraulic modelling has been completed to determine the extent and depth of flooding at the Main HNRFI Site and in its surrounds during a 100 year plus climate change (30% increase in flow) event. Therefore, the effect of flood risk on occupants and users of the Main HNRFI Site is considered to be negligible, as a result of a negligible magnitude effect on a high sensitivity receptor.

Surface water quantity

- 14.139. The Main HNRFI Site and the A47 Link Road will introduce a significant area of impermeable surfaces onto a currently greenfield area. This has the potential to increase surface water runoff through reduced infiltration which will increase discharge into receiving watercourses such as the Thurlaston Brook Tributary and UOW (*high sensitivity receptors*). This could cause an increase in flood risk (*moderate impact magnitude*). The impact on the Thurlaston Brook Tributary and UOW is considered to be major adverse, without mitigation.

Surface water quality

- 14.140. Once in use, pollutants associated with run-off from the Main HNRFI Site and the A47 Link Road have the potential to impact detrimentally upon the quality of water (*moderate impact magnitude*) both in the sewer network (*medium sensitivity receptor*) and the Thurlaston Brook Tributary and UOW (*low sensitivity receptors*) from direct runoff. Contamination in the operational phase is most likely to be caused by vehicle usage. The effect on the sewer network is considered to be moderate adverse, and on the Thurlaston Brook Tributary and UOW is considered to be minor adverse, respectively, without mitigation.

Foul water

- 14.141. There will be increased foul water flows (*minor impact magnitude*) to the local foul water network (*medium sensitivity receptor*) because of the Proposed Development. STW has confirmed network upgrades will be required because of insufficient capacity at the Elmesthorpe – Bostock Close SPS. The significance of the effect is considered minor adverse due to the medium sensitivity of the receptor and minor magnitude of the effect, prior to mitigation.

Potable water supply

- 14.142. The increase in water demand as a result of the Proposed Development could lead to an impact on the capacity of the local public water supply. The significance of the effect is considered negligible due to the low sensitivity of the receptor and negligible magnitude of the effect.

Major accidents and disasters

- 14.143. The main disaster, related to surface water and flood risk, that might affect the Main

HNRFI Site is a significant flooding event. The hydraulic modelling includes an allowance for climate change, including a high impact climate change scenario, which for the Main HNRFI Site is a 60% increase to the 1 in 100-year fluvial event. The results from the modelling have been used to support the Proposed Development and help inform mitigation measures. Therefore, the vulnerability of the Main HNRFI Site to a major disaster or accident, following mitigation, is considered negligible.

- 14.144. The drainage strategy for the Proposed Development will be designed to consider climate change. Additionally, reduced rates of discharge from the Main HNRFI Site as a result of the drainage strategy may provide downstream benefits in the form of reduced flood risk. As such, the effect of the development on major accidents or disasters is considered negligible, following mitigation.
- 14.145. Major accidents and disasters are covered in PEIR Chapter 19.

PROPOSED MITIGATION

Construction stage

- 14.146. The likelihood of any residual impacts following the implementation of the mitigation measures outlined below is likely to result in negligible effects.

Flood risk

- 14.147. The DCO Site is predominantly at low to high risk of flooding from fluvial and pluvial sources. It is recommended that construction workers, site managers and site visitors monitor local weather warnings for heavy rainfall. Latest best practice guidance on working near watercourses should be followed by construction workers, such as the Health and Safety Executive's Personal buoyancy equipment on inland and inshore waters (1995).
- 14.148. In addition, site compound welfare facilities and materials will be stored outside of the floodplain.

Surface water quantity and quality

- 14.149. An outline Construction Environmental Management Plan (CEMP) will be prepared and submitted as part of the ES and DCO documentation to outline methods and monitoring requirements to prevent effects on Surface Water and Flood Risk, as a result of the construction phase.
- 14.150. Large areas of exposed topsoil or similar materials, including stockpiles, would be covered or contained where possible when not in use.
- 14.151. The diverted UOW will be constructed offline and will include measures to prevent erosion and the mobilisation of sediments. Appropriate monitoring will also be followed to identify and mitigate any pollution incident.

- 14.152. Wheel washing facilities and regular sweeping would be undertaken to prevent dust build-up and silt on roads. Wheel washing facilities should be in a designated bunded impermeable area and surplus water from washing would be disposed of via the foul water system or treated adequately prior to disposal.
- 14.153. Concrete would be mixed off-site where possible. Where this is not possible, waste water from concrete production and lorry washing would be limited to a designated bunded impermeable area to prevent contaminated water entering watercourses. Wastewater would be directed to the foul water network or adequately treated prior to disposal.
- 14.154. To avoid infiltration of polluted water from vehicles or accidental spillage, vehicles would be inspected regularly and maintained to reduce the risk of leakages. Vehicle wash-down areas would be at least 10m from any surface waters and located in a designated bunded impermeable area. Any runoff would be treated through oil interceptors prior to discharge.
- 14.155. On-site refuelling would be undertaken in a designated bunded impermeable area to prevent infiltration of contaminated waters.
- 14.156. As is the case for potential surface water pollution, a spillage or pollution incident could affect groundwater quality. Procedures to be set out in the CEMP would be specifically developed in order to reduce the likelihood of such uncontrolled discharge, spillage or pollution incident. If such an occurrence were to occur due to unforeseen circumstances, actions would be undertaken to limit the spread of any spillage and to clear the spillage prior to discharge to ground. Such actions would be detailed in an emergency response plan which would be prepared in accordance with the CEMP.
- 14.157. Storage facilities for oil and fuels would be in suitable above ground tanks. Any tanks storing more than 200 litres of oil will have secondary bunding. Any above ground storage tanks will be located on a designated area of hardstanding.
- 14.158. Where existing infrastructure is proposed to be used during the construction phase it would be fully assessed and where necessary serviced prior to use. It is assumed that the infrastructure is appropriate for the intended use.
- 14.159. Drip trays would be used under vehicles where appropriate to ensure that oil is collected and contained to prevent infiltration of contaminated waters.
- 14.160. Designated pathways would be provided for large vehicles to limit the areas impacted by soil compaction. This will reduce the effect of soil compaction on infiltration and subsequently increased pooling of surface water.

Foul water

- 14.161. STW would be consulted prior to the start of construction works to understand suitable connection points for foul water during the temporary construction phase.

Potable water supply

14.162. STW would be consulted prior to the commencement of construction works to understand the impacts of the increased demand for water supply as a result of the construction phase.

Operational stage

14.163. The likelihood or any residual impacts following the implementation of the mitigation measures outlined below is likely to be negligible or minor beneficial in significance.

Flood risk

14.164. Using the baseline model of the Thurlaston Brook Tributary, UOW and minor watercourses, appropriate mitigation will be provided to ensure that no land outside the Main HNRFI Site would be at an increased risk of fluvial and surface water flooding. Any residual impacts with the implementation of mitigation measures will be minor beneficial in significance due to the general decrease in flows in higher return period events improving the situation off-site.

14.165. An FRA and Drainage Strategy, including a technical note to describe the hydraulic modelling has been prepared and appended to the PEIR (see appendices 14.1 and 14.2).

Surface water quantity

14.166. An appropriate drainage strategy including SuDS will be identified to reduce surface water runoff rates and direct any pluvial flow paths towards a positive drainage system. Existing surface water runoff routes are likely to be altered once the Proposed Development is operational and, as such, to prevent an adverse impact on the wider catchment an appropriate drainage strategy is necessary. The detailed foul and surface water drainage strategy for the Main HNRFI Site is appended to the FRA and Drainage Strategy.

14.167. Overall, the Proposed Development will provide a betterment in regard to water quantity control, particularly for the higher return period events (e.g., storm events of heavy rainfall). By restricting the volume generated by the natural catchment of flows leading to the Thurlaston Brook Tributary, UOW and other minor watercourses, the Proposed Development will help to reduce the likelihood and severity of flooding downstream of the Main HNRFI Site and A47 Link Road.

14.168. The off-site works might necessitate a small increase in impermeable area and thus a theoretical impact on existing drainage infrastructure. Given the relatively small-scale of many of these, and their location within or adjacent to the existing highway, these works are not likely to have any major impacts on flood risk. Indeed, the new works could offer opportunities to improve or reinforce the existing highways drainage infrastructure.

14.169. A new surface water drainage network has been designed for the Proposed Development and will be further developed and submitted as part of the DCO application. It is acknowledged that a development should aim to achieve greenfield run-off rates wherever feasible and should ensure that surface water run-off is managed as close to

its source as possible in line with local policy to:

- store rainwater for later use;
- use infiltration techniques, such as porous surfaces in non-clay area;
- attenuate rainwater in ponds or open water features for gradual release;
- attenuate rainwater by storing in tanks or sealed water features for gradual release;
- discharge rainwater direct to a watercourse;
- discharge rainwater to a surface water sewer/drain; and then
- discharge rainwater to the combined sewer.

14.170. The proposed surface water drainage network seeks to discharge via outfalls to the Thurlaston Brook Tributary under appropriate consent from the EA. This discharge would be at an equivalent greenfield rate and the EA has advised that this is likely to be acceptable. The reduction in the rate of surface water discharge from the Main HNRFI Site as a result of the Proposed Development (from an unrestricted and unmanaged rate to an equivalent greenfield rate) would be achieved through use of a range of SuDS techniques. Therefore, the proposed drainage network would act to reduce downstream flood risk through on-site attenuation.

14.171. The impact of the Proposed Development upon surface water quantity following mitigation is considered to be minor beneficial.

Surface water quality

14.172. The Proposed Development's facilities management team would also be responsible for cleaning and maintenance of proposed oil interceptors which would mitigate against the potential impact of contaminated surface runoff entering the drainage system. A maintenance schedule for the proposed SuDS measures would also be prepared such that the effectiveness of the proposed stages of water quality treatment remains for the lifetime of the Proposed Development.

14.173. A WFD Compliance Assessment has been produced to support the ES, which assesses the impacts and water quality and quantity in relation to the designated waterbodies potentially affected by the Proposed Development. It identifies mitigation measures that will be incorporated to improve the wider water environment and prevent deterioration in water body status. Initial assessment of the scheme under the WFD concludes that, subject to implementation of mitigation and design principles, the Main HNRFI Site is unlikely to result in a deterioration in the current ecological status of the Thurlaston Brook and Soar Brook catchments or the Soar Secondary Combined ground water body, nor is it likely to compromise progress towards achieving good status.

14.174. The change of use of the Main HNRFI Site will be of benefit due to reduced farming

activities which are currently considered a key explanation for the Thurlaston Brook and Soar Brook catchments not reaching Good WFD status.

- 14.175. The impact of the Proposed Development upon potential contamination of water resources is deemed to be minor beneficial.

Foul water

- 14.176. Following network upgrades to the Elmesthorpe – Bostock Close SPS the impact of the Proposed Development upon the existing sewerage network is considered negligible.

Potable water

- 14.177. The increase in water demand as a result of the Proposed Development is unlikely to but could lead to an impact on the capacity of the local public water supply. It is anticipated that any increase in water demand will be reduced as far as possible by the incorporation of appropriate water-saving devices, wherever practicable. The buildings will be designed to maximise water efficiency through low water use sanitary appliances and optimising hot water use in appropriate locations.

RESIDUAL ENVIRONMENTAL EFFECTS

Construction

- 14.178. A CEMP will be prepared and submitted with the ES and DCO documentation which will set out detailed methodologies and monitoring requirements to prevent adverse effects on flood risk and drainage. As a result, there would be negligible residual impacts from the development during the construction phase, which are not considered to be significant.
- 14.179. Assuming welfare facilities are appropriately installed and managed at the DCO Site, there will be a negligible residual impact from the construction phase.
- 14.180. The surface water drainage strategy will also mitigate the impacts of the development on groundwater and local watercourses, by directing runoff to appropriately constructed drainage features.
- 14.181. Subject to appropriate network improvement works, the impact on the foul water network is considered negligible.

Operation

- 14.182. The profiling of ground levels will direct runoff away from the built development.
- 14.183. Appropriate management of surface water runoff from the Main HNRFI Site and A47 Link Road will ensure that flood risk is not increased elsewhere.
- 14.184. These measures will ensure that the Main HNRFI Site and A47 Link Road has a negligible

effect on flood risk, which is not considered to be significant.

- 14.185. Any potential impacts likely to arise as part of the operational phase would be negligible in nature once mitigation has been incorporated into the development. There are likely to be minor beneficial effects in the form of a reduced risk of flooding in more extreme events because of reduced rates of discharge from the Main HNRFI Site into local watercourses and as a result of the drainage strategy, as well as the change of use from agricultural which is currently a key issue preventing the Thurlaston and Soar Brook catchments reaching Good WFD status.

CUMULATIVE AND IN-COMBINATION EFFECTS

- 14.186. There are no current existing or permitted schemes that are relevant to, or would represent a cumulative impact with, the Proposed Development regarding surface water and flood risk. Additionally, any other committed developments nearby would be subject to similar requirements of national planning policy and best practice to limit surface water runoff, and to manage water efficiently and in a sustainable way, including with regards to climate change.
- 14.187. Therefore, no cumulative effects are predicted with the relevant committed developments identified for consideration by this PEIR Chapter.
- 14.188. Outside of the committed developments, any emerging proposals would adhere to the same principles with regards to reducing flood risk and limiting surface water runoff, therefore it can be considered likely that there would be no cumulative adverse impact the/these development/s being constructed.
- 14.189. Therefore, the cumulative impact should the existing, permitted or emerging schemes be approved and delivered would be negligible or minor beneficial.

CLIMATE CHANGE

- 14.190. The baseline environment is expected to be at risk of changing due to the impacts of climate change.
- 14.191. Climate change is likely to increase flood levels associated with the Thurlaston Brook, UOW, Soar Brook and other minor watercourses and subsequently, increase risk of flooding both within the DCO Site and downstream. The hydraulic modelling includes an assessment of climate change and mitigation measures proposed based upon the results. With the implementation of mitigation measures, the effect of climate change on the fluvial flood risk to the Proposed Development is considered negligible.
- 14.192. The Main HNRFI Site and A47 Link Road might be at an increased risk of surface water pooling because of increased rainfall. The increase in impermeable surfaces within the Main HNRFI Site will also increase runoff towards the local watercourses. However, the drainage strategy for the Main HNRFI Site will be designed to account for climate change.

Additionally, reduced rates of discharge because of the drainage strategy may provide downstream benefits in the form of reduced flood risk. As such, the effect of climate change on surface water flood risk is considered to be negligible or minor beneficial.

SUMMARY AND CONCLUSIONS

- 14.193. This PEIR chapter has provided an interim assessment of the effects of the construction and operation of the Proposed Development on surface water and flood risk.
- 14.194. An assessment of the significance of the effects was undertaken based on the DMRB, adapted for this assessment, and considering the sensitivity of each resource and the magnitude of the effect. Effects of moderate significance or above were considered to be significant.
- 14.195. There will inevitably be an increase in the volume of surface water runoff post-development prior to mitigation. The surface water drainage strategy will ensure surface water will be managed appropriately to ensure that the rate of surface water arising from the Main HNRFI Site and A47 Link Road is not increased and water quality is not compromised. The drainage strategy will take account of climate change. The minor nature of the off-site works mean they will have negligible impact on flood risk and water quality.
- 14.196. Pollution control methods will supplement the use of SuDS on-site to provide pre-treatment to surface water from higher risk pollution areas such as highways and car parking areas.
- 14.197. With appropriate mitigation in place, no significant adverse effects will remain as a result of the Proposed Development.