7. WATER RESOURCES AND DRAINAGE

7.1 INTRODUCTION

7.1.1 This chapter contains details of the assessment of potential receptors and likely effects, including potential water quality and hydrological issues associated with the proposed development of a Strategic Rail Freight Interchange (SRFI) together with associated landscaping, access and other infrastructure works on land adjacent to and in the vicinity of J15 of the M1. This development consists of an intermodal rail freight terminal, rail served warehousing, new road infrastructure and works to the existing road infrastructure. A full description of development is provided in Chapter 2 of this ES. The assessment undertaken also includes consideration of the drainage and flood risk issues associated with the proposed Bypass around the village of Roade and highway mitigation works elsewhere on the highway network.

7.1.2 The purpose of the assessment is primarily to identify surface water and hydrological features and characteristics in the vicinity of the Proposed Development in order to assess the potential significant environmental impacts on, or as a result of, the development, propose relevant mitigation measures and identify the significance of any residual effects. The chapter considers the effects related to flooding, drainage and the water cycle of the proposed development.

7.1.3 The Main Site and Roade Bypass are mainly greenfield in nature, consisting of arable farmland, subject to a natural regime of pluvial runoff, infiltration and drainage. The nearest watercourses are tributaries of the Wootton Brook which is located in the southern part of the Main Site, flowing from south to north, passing under the A508 and an unnamed watercourse which crosses the proposed bypass corridor. The Highways Mitigation measures all include existing land in the highway, plus small areas of additional verge or other land adjacent to the highway, but typically consist of land which already benefits from positive drainage features to collect run-off.

7.1.4 This chapter considers the effects of the Proposed Development in comparison to the existing conditions and means of replicating the natural hydrology and providing appropriate mitigation for surface water and subsequent fluvial flows to the local brooks and watercourses in the wider catchment. An assessment has been made of existing flooding problems on or close to the Main Site, with the aim of ensuring no additional risk of flooding is created, and where possible to provide measures to reduce flooding off-site.

7.2 RELEVANT POLICY, LEGISLATION & GUIDANCE

National Policy Statement for National Networks (NPSNN)

7.2.1 The NPSNN provides planning policy guidance for the promoters of nationally significant infrastructure projects, including SRFIs. The NPSNN includes guidance about the generic and other impacts which should specifically be considered in assessing and designing projects, and also sets the context for the Examination of proposals by the Planning Inspectorate (PINS).

7.2.2 Paragraph 5.90 of the NPSNN identifies the requirement for a Flood Risk Assessment to accompany the application. This should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed taking climate change into account.

7.2.3 The NPSNN specifically refers to the National Planning Policy Framework for further guidance on flood risk (at paragraph 5.95 of the NPS).

7.2.4 Drainage of developments is also a consideration within the NPSNN (paragraph 5.100) which places the onus on the applicant to demonstrate compliance with the Flood and Water Management Act 2010 and to make provision for Sustainable Drainage Systems (SuDS).

Key Legislation & Guidance

National Planning Policy Framework

7.2.5 Prepared by the Department for Communities and Local Government, the National Planning Policy Framework (NPPF) outlines the Government's planning policies for England (2012).

7.2.6 Within the context of climate change, flooding and coastal change the Government's objective is that planning should fully support the transition to a low carbon economy in a changing climate, taking full account of flood risk and coastal change.

7.2.7 NPPF Section 10 (Paragraphs 91-108) outlines how planning policy should meet the challenges of climate change, flooding and coastal change. It retains the ethos of steering new development to be located in areas at lowest risk of flooding.

Groundwater Directive

7.2.8 Groundwater Directive 80/68/EEC (enacted into English law through the Groundwater (England and Wales) Regulations (2009)) aims to protect groundwater against pollution by 'List 1 and 2' Dangerous Substances.

C532 CIRIA Guidance on Control of Water Pollution from Construction Sites: A Guide to Good Practice (2001)

7.2.9 This document and training aid provides help on environmental good practice for the control of water pollution arising from construction activities. It focuses on the potential sources of water pollution from within construction sites and the effective methods of preventing its occurrence.

C753 SuDS Manual (November 2015)

7.2.10 The SuDS Manual provides best practice guidance on the planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments. The proposed surface water drainage strategy seeks to utilise the recommendations of the SuDS Manual within the design of the surface water drainage strategy.

Flood and Water Management Act 2010

7.2.11 The Flood and Water Management Act 2010 is largely aimed at delivering the recommendations of the Pitt Review following the 2007 floods. The Flood and Water Management Act makes the following recommendation amongst others: Sustainable Drainage Systems (SuDS) must be the first choice for drainage for all new developments, and the Lead Local Flood Authority (LLFA), which is either the Unitary Authority or the County Council, have a duty to adopt the SuDS (subject to approval).

Water Framework Directive

7.2.12 Water Framework Directive 2000/60/EC (enacted into English law through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003): The overall requirement of the Water Framework Directive (WFD) is that all river basins must achieve 'Good Ecological Status' by 2021 or by 2027 if there are grounds for derogation (essentially if it can be proven that it is not possible to achieve it by 2021). The WFD, for the first time, combines water quantity and quality issues together and, as an umbrella Directive, effectively incorporates and/or supersedes all water related legislation that drives the existing consenting framework.

Anglian River Basin Management Plan

7.2.13 The Environment Agency Anglian River Basin Management Plan (RBMP) describes the river basin district, and the pressures that the water environment faces. It shows what this means for the current state of the water environment, and what actions will be taken to address the pressures under the requirements of the WFD. It sets out what improvements are possible by 2021 and beyond and how the actions will make a difference to the local environment – the catchments, the estuaries and coasts, and the groundwater.

7.3 ASSESSMENT METHODOLOGY & SIGNIFICANCE CRITERIA

Assessment Methodology

7.3.1 This assessment identifies the potential impacts of the Proposed Development on the water environment and specifically the impacts on water resources, hydrology and drainage. It also determines the significance of the identified impacts for both the construction and operation phases.

7.3.2 A key focus of this assessment is on the risk of flooding to the Proposed Development and the potential impacts of the development on flood risk in the wider catchment.

7.3.3 This assessment has been informed by the following key sources of information:

- Northampton Strategic Flood Risk Assessment (2009)
- Parameters Plan prepared by pHp Architects (Document 2.10)
- Highway Plans prepared by BWB (Document 2.4)
- Data from the Environment Agency's website
- Anglian Water Sewer Records
- British Geological Survey Drift & Geology Maps
- Ground Investigations undertaken by RSK
- Topographical Survey by Greenhatch
- Local Press Flood Reports / Anecdotal Evidence

7.3.4 Consultation has also been undertaken with Anglian Water regarding the capacity for foul drainage.

Assessment Criteria

7.3.5 Impacts in relation to the water environment are assessed against the following methodology. The definitions identified below have been adapted from the Design Manual for Roads and Bridges Volume 11, Section 2, Part 5 (HA 205/08). Firstly, potential receptors and impacts will be identified and the receptors will be classed according to their sensitivity to environmental change (**Table 7.3.1**).

Table 7.3.1 - Receptor Sensitivity

Sensitivity	Descriptions
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Very Low	Very low importance and rarity, local scale.

Effect Magnitude

7.3.6 Impacts are described as beneficial or adverse, and the potential magnitude of this impact rated from High to Very Low (**Table 7.3.2**). The overall significance of the impact is appraised from Major to Negligible (**Table 7.3.3**) in terms of whether they are a key consideration for further assessment or mitigation.

Table 7.3.2 - Magnitude of Impact

Magnitude of impact	Descriptors
High	**Adverse** – Loss of resource and/or quality, severe damage to key characteristics, features or elements. **Beneficial** – Large scale or major improvement of resource quality, extensive restoration or enhancement, major improvement of attribute quality.
Medium	**Adverse** – Loss of resource but not adversely affecting the integrity. Partial loss of/damage to key characteristics, features of elements. **Beneficial** – Benefit to, or addition of, key characteristics, features of elements, improvement to attribute quality.
Low	**Adverse** – Some measureable change in attributes, quality or vulnerability, minor loss of, or alteration to key characteristics, features or elements. **Beneficial** – Minor benefit to, or addition of key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring.
Very Low	**Adverse** – Very minor loss or detrimental alteration to one or more characteristics, features or elements. **Beneficial** – Very minor benefit to, or positive addition of, one or more characteristics, features or elements.

Table 7.3.3 - Effect Significance

Sensitivity	Descriptions
Major	The beneficial or adverse effects are considered to be very important considerations and are likely to be material in the design-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence the design if they lead to an increase in the overall adverse effects on a particular resource or receptor.
Minor	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in the enhancing of subsequent design of the project.
Negligible	No effects of those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error,

7.3.7 The significance can be defined using a matrix of sensitivity and the magnitude of impacts as shown (**Table 7.3.4**).

Table 7.3.4 - Significance Matrix

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

7.3.8 Potential receptors that may be impacted by the proposed development are identified below as (Table 7.3.5).

Table 7.3.5 – Development Specific Receptor Sensitivity

Sensitivity	Development Receptors
High	-
Medium	Pluvial Flow Routes Public sewer network (local & wider foul & surface water network) Courteenhall Brook & Wootton Brook
Low	Bedrock Aquifer Water supply
Very Low	-

7.4 BASELINE CONDITIONS

Overview of Site and Surrounding Area

7.4.1 The Main Site and Roade Bypass Corridor generally comprise arable and grazing land which is greenfield in nature and essentially subject to a natural regime of pluvial runoff into localised watercourses with limited infiltration via land drainage features.

7.4.2 The remainder of the proposals (highway mitigation works) amount to localised amendments to the existing highway infrastructure and are typically comprised of bituminous paved carriageways/ footways with positive drainage features to collect run off.

Fluvial Flood Risk

7.4.3 With reference to the Environment Agency Flood Map for Planning, the Proposed Development (with the exception of a small area at the Pury Road/A508 junction noted in paragraph 7.4.8) lies within Flood Zone 1 (Low Probability). Flood Zone 1 is defined in the NPPF as land having a less than 1 in 1,000 annual probability of river or sea flooding. Therefore, fluvial flood risk is considered to be low.

7.4.4 Areas of Flood Zone 2 (Medium Probability) and 3 (High Probability) are present in relation to a tributary of Wootton Brook which lies east of the Main Site and flows through the Grange Park area before joining the main Wootton Brook channel south of Northampton town centre.

7.4.5 Modelling of the Courteenhall Brook within the Main Site has been undertaken to further understand any flooding issues associated with this watercourse. The baseline modelling produced shows that, in a 100 year plus 65% climate change storm, the lower parts of the Main Site, adjacent to the existing M1/A508 roundabout are at risk of flooding, in part due to an undersized culvert from the site under the A508. These areas are not shown on the EA flood mapping as being at risk as the Courteenhall Brook is not considered large enough to represent a significant flood risk, and is therefore classified as an 'Ordinary Watercourse'. The hydraulic modelling exercise was undertaken to ensure a diligent and thorough approach to the assessment could be undertaken.

7.4.6 The Bypass Corridor is shown to cross a small un-named ordinary watercourse, which will require culverting to maintain its route after the construction of the highway. BWB have undertaken modelling of this watercourse to inform the scheme which shows that all flows stay within the confines of the embankment up to the 1 in 1000 year return period and the route can therefore be considered to be at low risk of flooding (i.e entirely within Flood Zone 1).

7.4.7 The only area affected by highway mitigation which encroach into Flood Zones 2 and 3 is the proposed Pury Road/A508 Northampton Road junction however the highway is already raised above the floodplain which passes underneath it, and the proposed amendments will have no impact or encroachment into the floodplain.

Surface Water

7.4.8 The Main Site generally slopes from west to east, at its peak along the western boundary elevations are approximately 102m AOD, falling to its lowest elevation of approximately 80m AOD within the shallow valley associated with the Courteenhall Brook along the south eastern boundary which flows to the north east.

7.4.9 Risk of flooding from surface water has been mapped by the Environment Agency. This shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. This shows several routes which cross the site boundary, generally indicating drainage ditches and ordinary watercourses which are evident on the topographical survey.

7.4.10 Along the north eastern boundary of the Main Site a route is shown to travel from the centre of the site towards Collingtree, and from the topographical survey this follows the route of a drainage ditch which leads to a 300mm culvert under the M1. Another route represents the path of the Courteenhall Brook to the south of the site.

7.4.11 Surface water risk associated with the Bypass Corridor is almost entirely confined to the route of the watercourse noted in the Fluvial Flood Risk Section and this source is considered to represent a low risk as the hydraulic modelling previously noted represents a more detailed assessment of flows in the channel.

7.4.12 Of the highway mitigation works, there is limited surface water risk with the exception of the Knock Lane/Stoke Road junction which is known to suffer from surface water flooding in extreme rainfall events due to the localised topography of the highways.

7.4.13 There are no licensed surface water abstractions within 1km of the proposed development, however within the river catchment, Collingtree Park Golf Course Ltd does hold a license for surface water abstraction for the purpose of irrigation.

Groundwater

7.4.14 The Proposed Development is not located within a Groundwater Source Protection Zone and no groundwater abstraction licences have been identified within 1km of the Proposed Development.

7.4.15 The British Geological Survey's mapping series indicates that the Main Site is underlain by a Whitby Mudstone Formation bedrock, with large drift deposits of Oadby Member (Diamicton till / Glacial till) which is primarily sandy gravelly clay, and a small area to the north east shown to be sand and gravel. These were found to be consistent with the investigations carried out in the Ground Investigation report referred to below (Chapter 6 of this ES contains full details).

7.4.16 Groundwater testing was undertaken by RSK on behalf of Roxhill Developments Ltd and is discussed within the Ground Investigation Reports (ref. 312598-02 (00)) for the Main Site produced in November 2017. It found that typically groundwater was encountered at several metres below the existing ground level, or that water was not encountered at all in some of the trial pits.

Water Supply

7.4.17 The existing potable water supply network for the local area is managed by Anglian Water. They have indicated that there are two water mains within the Main Site, located near to the eastern boundary of the site.

7.4.18 The remaining highway mitigation proposals do not impact on any water supply assets.

Foul Water

7.4.19 There are currently no known adopted foul sewers which cross the Main Site, however Anglian Water sewer records show significant networks in the neighbouring villages of Milton Malsor, Collingtree and Roade.

7.4.20 Consultation with Anglian Water highlighted that the development flows are likely to require upgrading of the existing sewerage network to convey flows to the nearest treatment works, although the treatment works themselves have sufficient capacity to treat flows.

7.4.21 The remaining highway mitigation proposals do not impact on any foul water drainage assets.

7.5 ASSESSMENT OF LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS

7.5.1 This section of the chapter provides an assessment of the potentially significant environmental impacts of the proposals on the basis that there are no mitigation measures in place and therefore the impacts may appear severe. Mitigation measures to address these potential impacts are outlined in the sections below. The assessment is used to identify the nature and scope of measures that should be present to mitigate any adverse impacts.

7.5.2 The main impacts on the water environment typically relate to the potential to alter the amount of water flowing off the site, disruption of flow routes within the site and the pollution of surface and groundwater through the mobilisation of sediments and potential pollutants. An increased risk of flooding elsewhere in the catchment could potentially also be created as a result of the development without mitigation measures in place.

Construction Phase

Potential Impact upon Existing Surface Water/ Groundwater Drainage Regime

7.5.3 Construction activity will involve the stripping of topsoil on parts of the Proposed Development and could lead to additional surface compaction. This would reduce the rate of infiltration currently experienced on those parts of the Proposed Development and increase the rate and volume of surface water runoff.

7.5.4 The effect of construction works is likely to result in short term disruption to the rate of infiltration. The movement of construction traffic may also disturb the upper portions of the ground surface within the construction site thus compacting it which will again alter the degree of surface water infiltration and runoff.

7.5.5 A short term reduction in infiltration (*low impact magnitude*) to the bedrock aquifer (*low sensitivity receptor*) would therefore have a **negligible** effect significance. A short term increase in runoff rates (*low impact magnitude*) to the pluvial flow routes (*low sensitivity receptor*) would also have a **negligible** effect significance.

Potential Spillage of Pollutants / Contamination of Water Resources

7.5.6 Common instances of water pollution during the construction period can occur from suspended solids, oils and hydrocarbons, concrete and cement products, metals, sewage and other pollutants and hazardous materials generated during the construction process. Situations in which such substances could enter the water environment include routine operations such as tyre-washing, as well as accidents and vandalism.

7.5.7 According to the CIRIA guidance on Control of Water Pollution, the most common instance of water pollution from construction sites is from suspended solids. Possible sources of suspended solids from the construction of the proposed development include:

- Earthworks / excavations
- Exposed ground or stock piles
- Plant and wheel washing
- Build-up of dust and mud on site haul roads
- Pumping of contaminated surface waters or groundwater accumulated on the development
- Disturbance of river bed or banks

7.5.8 Suspended solids from construction work, particularly from intrusive earthworks for foundations and sewers, could create pathways to local groundwater and could also adversely affect extensive reaches of surface watercourses during rainfall events.

7.5.9 It is considered that, without mitigation, the potential impact of suspended solids (*medium impact magnitude*) on both the receiving watercourse systems (*medium sensitivity receptor*) and the groundwater present within the Main Site and Bypass (*low sensitivity receptor*) represents a potentially short term **moderate adverse** and **minor adverse** effect respectively.

7.5.10 The formation of hydrocarbons has the ability to enter watercourses and lead to the build-up of a film on the surface water. This has the potential to reduce the oxygen content in the water and could pose a significant effect to any potential aquatic ecosystems. The potential impacts of such sources of pollutants (*medium impact magnitude*) on the local watercourses (*medium sensitivity receptor*) are considered to be short term **moderate adverse** effects without mitigation.

7.5.11 If any concrete production is to take place on the construction site or is brought onto the Proposed Development site by ready mix lorries, a large volume of waste water could be generated either from washing out the batching plant or through the washing down of lorries before their departure from the site. Without mitigation, the potential impact of this source of pollutant (*medium impact magnitude*) on the water environment (*medium sensitivity* receptor) is considered a short term **moderate adverse** effect.

7.5.12 The activities noted above have the potential to cause detrimental impacts; however, it should be noted that these impacts would only occur should mitigation or construction safety initiatives not be in place. As described in the Section 7.6, mitigation and best practice principles will be followed throughout the entirety of the construction stage process.

7.5.13 A Water Framework Directive Compliance Assessment has been produced which assesses the impacts on water quantity and quality in relation to the designated waterbodies potentially affected by the development. It identifies mitigation measures that will be incorporated to improve the wider water environment and prevent deterioration in water body status. The WFDCA is included as Appendix 7.2 of this Environmental Statement.

Sewerage Infrastructure

7.5.14 Due to the size of the Proposed Development there is likely to be a large presence of construction staff during the construction phases. Staff on-site will require welfare facilities which may have the potential to impact on the existing public sewer network (*medium sensitivity receptor*) in terms of additional foul flows entering the network. The demand placed upon the receiving network for the construction period is considered to be low (*low impact magnitude*).

7.5.15 The likely significance of environmental effects can be considered to have a **minor adverse** effect significance.

Operational Phase

7.5.16 During the operational phase of the Proposed Development the primary impact will be an increase in surface water runoff due to the large increase in impermeable areas across the Proposed Development.

Potential Impact upon Existing Surface Water / Groundwater Drainage Regime

7.5.17 There are two potential effects associated with the increase in impermeable surfacing and these are; a reduction in the area of ground able to contribute towards groundwater recharge, and increased runoff volumes and rates.

7.5.18 The Main Site and Roade Bypass 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 in turn increase the size of catchment areas discharging to the adjacent watercourses (*medium sensitivity receptor*). This could cause an increase in flood risk (*medium impact magnitude*), particularly in respect to the village of Collingtree. The impact is considered to be **moderate adverse** without mitigation.

Potential Spillage of Pollutants / Contamination of Water Resources

7.5.19 Once the development is in use pollutants associated with road areas and service / delivery yards have the potential to impact detrimentally upon the quality of water (*medium impact magnitude*) both in the sewer network (*medium sensitivity receptor*) and the local watercourses from direct runoff (*medium sensitivity receptor*). Contamination at this phase of the development is most likely to be caused by vehicular usage. The effect is considered to have a **moderate adverse** significance without mitigation.

7.6 MITIGATION

Construction Phase

Impact upon Existing Surface Water / Groundwater Drainage

7.6.1 In order to reduce the potential for large machinery to compact soils and increase the volume and rate of runoff, the movements of these vehicles will be restricted around the Main Site and Bypass site by creating a designated pathway for them to follow, thus reducing the area which can be affected. A Construction Environment Management Plan (CEMP, Appendix 2.1 of this ES) has been prepared to secure such details as routing and storage of plant and other vehicles on the construction site. The CEMP is an overarching document from which detailed phase specific CEMPs will be produced.

7.6.2 To prevent localised flooding during the construction phase a temporary surface water management system will be put in place to mitigate the potential detrimental effects. Bespoke proposals for each phase will be proposed in a phase specific CEMP (P-CEMP).

7.6.3 The overall effect following the implementation of the mitigation measures noted is therefore **negligible** in significance.

Potential Spillage of Pollutants / Contamination of Water Resources

7.6.4 All construction activity will be carried out in accordance with the CEMP which will govern the mitigation set out in the following paragraphs. It includes incident response procedures to prevent accidental spillage of fuels during construction.

7.6.5 These measures are proportionate to the scale of the works proposed for the Main Site and Bypass. For the remaining Highway Mitigation works, the scale of mitigation should be in broad accordance with the following, but proportionate to the nature of work taking place, its duration and likelihood that it would present a risk of contamination.

7.6.6 One of the main sources of suspended solids is from the erosion of exposed soil (including the erosion of stockpiled material). Any large areas of exposed soil will be kept covered or contained to prevent suspended solids from entering the water environment and affecting nearby receptors.

7.6.7 During the infrastructure construction phase, the haul roads should be kept clear of mud deposits and pedestrian routes will be setup and maintained. Public roads should be kept clear of mud.

7.6.8 Water from any dewatering operations which may take place will pass through a stilling basin to allow suspended solids to settle out before disposal.

7.6.9 To prevent the leakage of oils and fuel from plant machinery, machines will be checked on a regular basis. Vehicle wash-down areas will be bunded and runoff passed through separators to intercept any pollutants.

7.6.10 Any wastewater from the washing down of ready-mix lorries or from the production of concrete on site will be carried out in a designated area where wastewater is unable to enter the groundwater and surface water environment without being treated first to prevent contamination at its source.

7.6.11 Disposal of other hazardous materials such as paints and detergents will be carried out in bunded/ contained designated store areas and in compliance with relevant legislation.

7.6.12 Pollution of surface water runoff will be restricted by the prevention of contamination at its source through suitable delivery, storage and usage procedures.

7.6.13 Construction techniques identified above will be mitigated through various methods to ensure water quality is not affected. Sediment interceptors will be placed near to pluvial flow paths to ensure any eroded sediment does not impact upon the water quality and temporary drainage solutions will be present during the construction phase which will be replaced once the construction phase is nearing completion.

7.6.14 In all instances, a P-CEMP will assess the specific risks to that phase of construction which will be the definitive document.

7.6.15 The Water Framework Directive Compliance Assessment assesses risks to the designated waterbodies and proposes suitable mitigation measures that will be incorporated into the wider water environment and prevent deterioration in water body status. The WFDCA is included as Appendix 7.2 of this Environmental Statement.

7.6.16 The likelihood of any residual impacts following the implementation of the mitigation measures highlighted above is likely to **negligible** in significance.

Operational Phase

Impact upon Existing Surface Water / Groundwater Drainage Regime

7.6.17 An appropriate drainage strategy including Sustainable Drainage Systems (SuDS) has been 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 at each location. The detailed foul and surface water drainage strategy for the site is summarised in a Sustainable Drainage Statement (SDS) which forms Appendix 7.3 of this Environmental Statement.

7.6.18 The broad principles of the SDS have been developed based on previous consultation advice and best practice. Surface water runoff will be restricted to the existing greenfield annual average flow (QBAR) rate with an attenuation volume provided for up to the 1 in 200 year event plus 20% climate change allowance for areas in the Upper Nene catchment and 100 year plus 20% climate change elsewhere. Where possible, it has been ensured that the proposed surface water drainage catchments mimic the natural catchments across the site. The Lead Local Flood Authority have reviewed calculations and drawings and entered into a Statement of Common Ground.

7.6.19 The Main Site drainage strategy being proposed will see the creation of a network of new dry detention basins or permanently wet ponds which are designed to attenuate surface water flows to an equivalent greenfield runoff rate. Based on the description of development and Parameters Plan (and as included on the Indicative Masterplan), there is a requirement to provide in the region of 97,000m^3 of attenuation across the site. The proposed strategy would see this volume delivered by six basins/ponds.

7.6.20 The basins are located to mimic natural catchments and utilise existing outfall locations. Due to the topography of the site the majority of the basins are to be located around the southern edge adjacent to the Courteenhall Brook, with a northern basin serving an area draining to Collingtree. The position and approximate size of these basins are shown on the Illustrative Masterplan (Document 2.11).

7.6.21 Surface water will be fed to these basins from across the site via a network of new pipes and ditches. Although soakaways act as a preferred destination for surface water runoff to promote groundwater recharge, ground investigations have indicated that the potential for infiltration is extremely limited.

7.6.22 Where practicable, flow is conveyed from proposed plots to attenuation features on the surface via swales and ditches which will provide additional treatment to runoff, and also provide the potential for new habitat, forming part of the green infrastructure provided on site as part of the wider landscaping scheme.

7.6.23 The Roade Bypass alignment is naturally split into five catchments due to the likely vertical alignment, and presence of the rail crossing towards the eastern end. Runoff is proposed to be collected via gullies or in dished channels at the carriageway edge before being conveyed to detention basins which provide attenuation before discharging to existing watercourses along its length.

7.6.24 Attenuation basins are proposed to be located at the topographic low points of each sub catchment and provide an approximate total of 3,400m^3 of attenuation to cater for storm events up to the 1 in 100 year event plus an allowance for climate change of 20%. The northern two basins connect into a culverted watercourse that flows through Roade via Bailey Brooks Lane and the southern three directly into the unnamed watercourse.

7.6.25 The remaining highway mitigation works proposals may necessitate a small increase in impermeable area and thus a theoretical impact on existing drainage infrastructure. Given the relatively small-scale of many of the required highway mitigation works, 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.

7.6.26 A bespoke strategy for each area has been proposed which seeks to demonstrate that additional runoff volume can be incorporated within the existing drainage networks.

7.6.27 Overall the development will provide a betterment in regards 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 Wootton Brook and the culvert under the M1, the development will help to reduce the likelihood and severity of flooding downstream of the Main Site. This is also true for the bypass route which ultimately drains to the River Tove.

7.6.28 The proposals to mitigate flood risk to the Main Site involve raising land around the new site access roundabout and adjacent to the A508 to impound water within the boundary, and form floodplain compensation areas adjacent to the existing channel of the Courteenhall Brook (on the southern side). This will have the effect of removing areas proposed for development from the floodplain, and also reduce pass forward flows downstream of the M1 in extreme flood events. The details of this strategy are presented within the Technical Note that accompanies the FRA.

7.6.29 Using the baseline hydraulic model of the watercourses, appropriate mitigation will be provided which ensures that no land outside the ownership of the applicant will be at an increased risk of fluvial flooding. Any residual impacts with the implementation of the mitigation measures highlighted, is likely to be **moderate, beneficial** in significance due to the general decrease in flows in higher return period events improving the situation off site.

7.6.30 A Flood Risk Assessment incorporating the Technical Notes describing the hydraulic modelling has been produced by BWB Consulting and forms Appendix 7.1 of the Environmental Statement. The completed FRA reflects a scheme of mitigation incorporating runoff from the surface water drainage strategy, agreement to which has been sought from the Lead Local Flood Authority and is confirmed within the Statement of Common Ground.

Potential Spillage of Pollutants / Contamination of Water Resources

7.6.31 Runoff from highway and car parking areas will require treatment before discharge to the local watercourses. Where appropriate, pollution control methods such as oil separators and sediment interceptors will be used on site.

7.6.32 The Water Framework Directive Compliance Assessment assesses risks to the designated waterbodies and propose suitable mitigation measures that will be incorporated into the wider water environment and prevent deterioration in water body status. The WFDCA is included as Appendix 7.2 of this Environmental Statement.

7.6.33 The impact of the development upon potential contamination of water resources is deemed to be **negligible**.

Foul Sewerage Infrastructure

7.6.34 Anglian Water have proposed a solution to pump foul water from the site northwards along the A45 to an existing foul sewer network. As part of this solution a length of sewer will need to be increased in size to mitigate the risk of flooding the new development flows would create.

7.6.35 The impact of the development upon the existing foul sewerage network is therefore deemed to be **negligible**.

7.7 RESIDUAL EFFECTS

7.7.1 This assessment demonstrates how impacts may persist post-mitigation and how these may be beneficial / adverse when compared to the existing situation.

7.7.2 Generally, as the construction period of a development is short when compared to the overall life of a development any residual impact including pollution of a watercourse through an increase in suspended solids, oil, fuel, cement etc. and subsequent change quality would be considered short term.

7.7.3 The conclusion is that any potential impacts likely to arise as part of the construction or operational phase would be negligible in nature once mitigation has been incorporated into the development. There are likely to be off-site (downstream) benefits in the form of a reduced risk of flooding in more extreme events as a result of reduced rates of discharge from the site into local watercourses and as a result of the drainage strategy which will store and hold water in basins before controlled release from the site.

7.8 CUMULATIVE EFFECTS

7.8.1 There are no currently existing or permitted schemes which are relevant to or would represent a cumulative impact with the Proposed Development regarding water resources and flood-risk. Other committed developments nearby (such as the Northampton South, and South of Brackmills Sustainable Urban Extensions) will be subject to similar requirements of national planning policy and best practice to limit surface water runoff, and to managing water effectively and in a sustainable way within the site, including with regards to climate change.

7.8.2 Therefore, no cumulative effects exist with the relevant committed developments identified for consideration by this ES.

7.8.3 Outside of the Core Strategy and other relevant commitments, emerging proposals exist for a SRFI (Rail Central) on land to the west of the Proposed Development. It is also necessary to assess the potential cumulative impact of both on the assumption that both could, theoretically at least, be approved (albeit as proposed the two schemes appear not to be compatible).

7.8.4 From a flood risk and drainage perspective, the two sites can be considered distinct from each other as they are almost entirely located in separate topographical, and therefore hydraulic, catchments due mainly to the location of the Northampton Loop railway line which separates them. At present, some areas of the SRFI (Northampton Gateway) site drain westwards towards the Rail Central site. However, the proposed drainage strategy does not discharge any surface water westwards and as such any potential impact posed by developing both sites is removed. Similarly, having reviewed the emerging draft details available, no runoff from Rail Central is proposed to flow towards the Northampton Gateway site.

7.8.5 As that proposed adjacent development would adhere to the same principles as outlined in the NPSNN with regard to reducing flood risk and limiting surface water runoff it can be considered likely that there would be no cumulative adverse impact of both developments being constructed.

7.8.6 Therefore, the cumulative impact were both schemes approved and delivered remains **minor, beneficial**.

7.9 CONCLUSIONS

7.9.1 There would inevitably be an increase in the volume of surface water runoff post-development prior to mitigation. The surface water drainage strategy will ensure that surface water will be managed appropriately to ensure that the rate of surface water emanating from Proposed Development site is not increased and the water quality not compromised.

7.9.2 The drainage strategy for the Main Site will use SuDS to provide betterment at higher return periods by restricting runoff from the site to the greenfield QBAR for all events up to and including the 1 in 200 year + 20% climate change event for the Main Site which is intended to have a beneficial impact upon flood risk, particularly on the Wootton Brook and therefore upon Collingtree village.

7.9.3 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.

7.9.4 The Bypass will also use SuDS measures to attenuate and store surface water run-off, and to prevent any adverse impacts off-site or nearby.

7.9.5 With appropriate mitigation in place, as highlighted within this document and supporting Flood Risk Assessment, Sustainable Drainage Statement and Water Framework Directive Compliance Assessment, no significant adverse effects will remain as a result of the proposed development.