CHAPTER 9:

WATER RESOURCES, DRAINAGE AND FLOOD RISK

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9.0 WATER RESOURCES, DRAINAGE AND FLOOD RISK

9.1 Scope of Assessment

9.1.1 This chapter of this Updated ES assesses the likely significant effects of the Proposed Development in terms of Water Resources, Drainage and Flood Risk and is supported by **ES Volume 4, Appendix E.**

9.1.2 The chapter describes: the assessment methodology; the baseline conditions currently existing at the Site and in the surrounding area; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; the likely residual effects after these measures have been employed; and the cumulative effects associated with the Proposed Development in combination with other developments within 3.50 km of the Site.

9.1.3 'Intra-project effects' which are the combined effects of individual topic impacts on a particular sensitive receptor are considered in **Volume 2, Chapter 11: Effect Interactions.**

9.2 Key Legislation, Policy and Guidance Considerations

9.2.1 The Water Resources, Drainage and Flood Risk assessment has been undertaken within the context of relevant planning policies, guidance documents and legislative instruments. These are summarised below.

Legislation and Regulation

The Flood Risk Regulations 2009

9.2.2 The Flood Risk Regulations 2009[1] transpose the European Commission (EC) Floods Directive (Directive 2007/60/EC) into domestic law. The regulations require that Preliminary Flood Risk Assessments (PFRAs) are prepared by the Environment Agency (EA) and Unitary/County Authorities (Lead Local Flood Authorities (LLFAs)) that identifies areas at significant potential risk of flooding. For these "significant risk" areas, hazard maps must be produced, and flood risk management plans developed to reduce flood risk.

Flood and Water Management Act 2010 & Sustainable Drainage Systems: Written Statement – HCWS161

9.2.3 The Flood and Water Management Act (FWMA) 2010[2] takes forward some of the proposals set out in three previous strategy documents published by the UK Government: Future Water[3], Making Space for Water[4] and the UK Government's response to the Sir Michael Pitt Review of the summer 2007 floods[5]. In doing so, it gives the EA a strategic

[1] DEFRA 2009, Flood Risk Regulations 2009. No.3042

[2] DEFRA 2010, Flood and Water Management Act 2010. Chapter 29.

[3] DEFRA 2008, Future water: The Government's water strategy for England (Vol. 7319).

[4] DEFRA 2005, Making Space for Water: Taking Forward a New Government Strategy for Flood and Coastal Erosion Risk Management.

[5] Pitt M 2008, Learning lessons from the 2007 floods. The Pitt Review.

overview of flood risk and gives local authorities responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.

9.2.4 The FWMA 2010 (Schedule 3) proposed the establishment of Sustainable drainage systems (SuDS) Approval Bodies (the SAB) at county or unitary local authority levels. The role of the SAB was envisaged as implementing the recommendations of the Pitt Review (2008) in promoting the use of SuDS within future development.

9.2.5 Following a period of consultation, the proposed role of the SAB has been amended, with the promotion of SuDS being incorporated into the planning process. This has been achieved by designating LLFAs as statutory consultees with regards to 'local' sources of flood risk and surface water management. The Ministerial Written Statement HCWS161[6] details this change in policy, which came into effect in April 2015.

9.2.6 The FWMA 2010 also amends Section 106 of the Water Industry Act 1991[7] (WIA) in respect of the right of connection to a public sewer. As the role of the SAB has been removed following HCWS161, this process is now subsumed into the planning process under the purview of the LLFA.

Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

9.2.7 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017[8] ('WFD Regulations 2017') consolidate, revoke and replace the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003[9], which transpose the European Union (EU) Water Framework Directive (WFD) into national law. The WFD is a wide-ranging piece of European legislation that establishes a new legal framework for the protection, improvement and sustainable use of surface waters, coastal waters and groundwater across Europe in order to:

- Promote sustainable water use;
- Contribute to the mitigation of floods and droughts;
- Prevent deterioration and enhance status of aquatic ecosystems, including groundwater; and
- Reduce pollution.

9.2.8 Water management has historically been co-ordinated according to administrative or political boundaries. The WFD promotes a new approach based upon management by river basin - the natural geographical and hydrological unit. River basin management plans, published by the EA and the Department for Environment, Food and Rural Affairs (Defra), include clear objectives in respect of water quality and pollution control and a detailed account of how objectives are to be met within a prescribed timeframe.

[6] Department for Communities and Local Government 2014, Written Ministerial Statement (18 December 2014) (HCWS161).

[7] Water Industry Act 1991, Section 106.

[8] Water Environment 2017, (Water Framework Directive) (England and Wales) Regulations 2017.

[9] Water Environment 2003, (Water Framework Directive) (England and Wales) Regulations 2003.

The Environmental Permitting (England and Wales) Regulations 2016

9.2.9 The Environmental Permitting Regulations 2016[10] consolidate and replace the 2010 Regulations and the 15 associated amendments. The permitting regime covers a range of activities that release emissions to land, air or water or that involve waste. The regime covers facilities previously regulated under the Pollution Prevention and Control Regulations 2000[11] and Waste Management Licensing and exemptions schemes, some parts of the Water Resources Act 1991[12] (WRA) and the Groundwater Regulations 2009[13].

9.2.10 Schedule 21 relates to water discharge activities and Schedule 25 relates to flood risk activities. Schedule 22 to the Regulations relates to Groundwater activities and the regulations place a duty on regulating authorities to implement the Water Framework Directive and the Groundwater Daughter Drainage Directive and exercise their relevant function to ensure all necessary measures are taken to:

> *"(a) prevent the input of any hazardous substance to groundwater; and*
>
> *(b) limit the input of non-hazardous pollutants to groundwater so as to ensure that such inputs do not cause pollution of groundwater*" (Paragraph 6, Schedule 22).

The Water Resources Act 1991

9.2.11 The Water Resources Act 1991 sets out the responsibilities of the EA in relation to water pollution, resource management, flood defence, fisheries, and in some areas, navigation. The WRA 1991 regulates discharges to controlled waters, namely rivers, estuaries, coastal waters, lakes and groundwater. Discharge to controlled waters is only permitted with the consent of the EA. Similarly, a licence is required to abstract from controlled waters.

Land Drainage Act

9.2.12 The Land Drainage Act 1991[14] consolidates various enactments relating to Internal Drainage Boards and the functions of these Boards and local authorities, including LLFA in relation to land drainage. Amongst other matters, the Act sets out provisions and powers in respect of the control of flow of watercourses and watercourse restoration/improvement works.

The Building Regulations 2010

9.2.13 The guidance document H3 'Drainage and waste disposal' (2015 edition)[15] issued by the Government in respect of the requirements of the Building Regulations 2010[16] stipulates

[10] DEFRA 2016, The Environmental Permitting (England and Wales) Regulations 2016

[11] DEFRA 2000, Pollution Prevention and Control (England and Wales) Regulations, 2000, SI 2000 No. 1973

[12] Water Resources Act 1991, Elizabeth II. Chapter 57. Her Majesty's Stationery Office, London, UK.

[13] DEFRA 2009, Groundwater Regulations 2009.

[14] Land Drainage Act 1994, Elizabeth II. Chapter 25. Her Majesty's Stationery Office, London, UK.

[15] Ministry of Housing, Communities & Local Government 2015, H3 'Drainage and waste disposal' (2015 edition)

[16] Department for Communities and Local Government 2010, Building Regulations 2010

that rainwater from roofs and paved areas is required to be carried away from the surface to discharge to one of the following, listed in order of priority:

- an adequate soakaway or some other adequate infiltration system, or where that is not reasonably practicable;
- a watercourse; or where that is not practicable; and
- a sewer.

Planning Policy

National Planning Policy Framework (NPPF, 2019)

9.2.14 Promoting appropriate development in areas at low risk of flooding is key to the thread of the National Planning Policy Framework (NPPF)[17]. Paragraph 155 highlights the importance of directing development away from areas at highest risk of flooding (whether existing or future).

Fareham Core Strategy (2011)

9.2.15 The Fareham Core Strategy[18] was adopted in August 2011. The strategy includes a number of policies relating to flood risk, drainage and water supply, and seeks too incorporate SuDS based drainage into new developments where appropriate.

9.2.16 In addition to the above, it is noted that Hampshire County Council (HCC) in its role as LLFA, are a statutory consultee for all major applications, and advises on the suitability of Sustainable Drainage proposals.

The Partnership for South Hampshire (PfSH)

9.2.17 The PfSH Strategic Flood Risk Assessment (SFRA) 2016 update[19] has delivered revised reporting, mapping and guidance notes to replace the document “Partnership for Urban South Hampshire Strategic Flood Risk Assessment Final Report, December 2007[20]. The update was undertaken on behalf of PfSH by the Eastern Solent Coastal Partnership and delivered in June 2016.

9.2.18 After the publication of the previous PfSH SFRA there were a number of changes to planning guidance and the enactment of new Legislation that includes the FWMA. National planning policy is now defined in the NPPF and the supporting Planning Practice Guidance (PPG).

9.2.19 This Level 1 Strategic Flood Risk Assessment is a strategic document which assesses and maps all forms of flood risk from tidal, river, groundwater, surface water and sewer sources, considering future climate change predictions. The package of work provides appropriate supporting evidence for The PfSH Spatial Strategy review in addition to Local Plans being developed by the local partner authorities.

[17] Ministry of Housing, Communities and Local Government 2019, National Planning Policy Framework (NPPF, 2019)

[18] Fareham Borough Council 2011, Fareham Core Strategy

[19] Eastern Solent Coastal Partnership 2016, PfSH Strategic Flood Risk Assessment 2016 update

[20] Atkins Ltd 2007, Partnership for Urban South Hampshire Strategic Flood Risk Assessment Final Report, December 2007

Technical Standards and Guidance

Code for Adoption

9.2.20 On 1 April 2020, the Water Services Regulation Authority (Ofwat) introduced a new standard practice across the water industry in England which covers the adoption of newly constructed sewers, pumping stations and wastewater treatment works. The new process is outlined in Water UK's new Sewer Sector Guidance (SSG)[21] which has now replaced the 'Sewers for Adoption' guidance[22].

9.2.21 The 'Code for Adoption[23] is the standard in England and Wales for the design and construction of sewers to adoptable standards. It is a guide to assist developers in preparing their submission to a Sewerage Undertaker prior to entering an Adoption Agreement under Section 104 of the Water Industry Act 1991.

Non-statutory Technical Standards for Sustainable Drainage Systems

9.2.22 This document[24] contains non-statutory technical standards for the design, maintenance and operation of sustainable drainage systems serving housing, non-residential or mixed-use developments and was published by Defra in March 2015.

Rainfall Runoff Management for Developments (Report SC030219/R, October 2013)

9.2.23 This document[25] advises regulators, developers and local authorities on the requirements for storm water drainage design for new developments and sets out recommended methods for the sizing of storage measures for the control and treatment of storm water runoff.

The SuDS Manual

9.2.24 The SuDS Manual (C753)[26] expands upon the framework set out by the Government's Non-Statutory Technical Standards for SuDS and sets out the latest industry practice and guidance regarding the planning, design, construction, management and maintenance of SuDS.

Flood Risk Assessments: climate change allowances

9.2.25 This guidance[27] was published by the EA in February 2016 and should be used as the basis for preparing FRAs. The guidance sets out the climate change allowances for peak river flow, peak rainfall intensity, sea level rise, off-shore wind speeds and extreme wave height. Allowances in respect of peak river flow vary according to River Basin District,

[21] Water UK 2019, Sewer Sector Guidance (SSG)

[22] Water UK 2018, Sewers for Adoption version 8

[23] Ofwat 2017, Code for Adoption Agreements

[24] DEFRA 2015, Non-statutory Technical Standards for Sustainable Drainage Systems

[25] Kellagher, R., 2013. Rainfall runoff management for developments. Bristol, UK: Environment Agency.

[26] Ballard, B.W., Wilson, S., Udale-Clarke, H., Illman, S., Scott, T., Ashley, R. and Kellagher, R., 2015. The SUDS manual. CIRIA: London, UK.

[27] Environment Agency, 2016, Flood Risk Assessments: climate change allowances

flood zone and proposed land-use (and therefore the lifetime of the development). The Site lies within the South East River Basin District.

PINS Advice Note 18 – Water Framework Directive

9.2.26 The purpose of this Advice Note[28] is to alert Applicants to the requirements of the WFD and WFD Regulations 2017. This Advice Note explains the information that the Inspectorate considers an Applicant must provide with their application in order to clearly demonstrate that the WFD and the WFD Regulations 2017 have been appropriately considered.

9.3 Assessment Methodology and Significance Criteria

9.3.1 In the absence of 'industry standard' significance criteria for the consideration of hydrology, flood risk and water resources impact, a qualitative approach, based upon available knowledge, experience and professional judgement, is employed.

9.3.2 The EIA assessment methodology identifies the significance of an effect by firstly considering the sensitivity of the receptor (i.e. its importance and ability to tolerate and recover from change) and, secondly, by considering the likely magnitude of the impact (i.e. its spatial extent and duration). By combining sensitivity and magnitude, the significance of the effect is established. Where significant negative effects are identified, mitigation measures are proposed to reduce the significance.

Deterioration of the Water Environment

9.3.3 The Proposed Development comprises new housing development and has inevitable waste water implications. It is Natural England's view that these implications, and all other matters capable of having a significant effect on designated sites in the Solent, must be addressed in the ways required by Regulation 63 of the Conservation of Habitats and Species Regulations 2017.

9.3.4 A nitrogen budget has been submitted with the application which confirms that the application is neutral, and no mitigation is required. Provided the council, as the competent authority, is assured and satisfied that the site areas are correct and that the existing land uses are appropriately precautionary, then Natural England raise no further concerns with regard to the nutrient budget.

9.3.5 The calculation is based on all wastewater from the development being treated at Peel Common WwTWs. If this situation changes, a reassessment of the nutrient calculation will be required and a revised Habitats Regulations Assessment will be necessary. Natural England recommends a condition that secures the water use of 110 litres per person per day.

9.3.6 **Table 9.1** outlines the criteria used to determine receptor sensitivity, which as discussed in paragraph 9.3.1 is based on available knowledge and professional judgement.

[28] The Planning Inspectorate 2017, Advice Note 18 – The Water Framework Directive

Table 9.1 Sensitivity / Value of Receptor

Sensitivity/Value of Receptor	Description	Example
High	Attribute with a high quality and rarity, local scale and limited potential for substitution. Attribute with a medium quality and rarity, regional or national scale and limited potential for substitution. Attribute highly sensitive to change.	Examples include: Receiving watercourse classified as High or Good Ecological status / potential under WFD Site protected under EU or UK wildlife legislation (Special Area of Conservation (SAC), Special Protection Area (SPA), Site of Special Scientific Interest (SSSI)). Species protected under EU or UK wildlife legislation. Site located within a Groundwater Source Protection Zone (SPZ) inner or outer protection zone (Zone 1), NPPF Flood Risk Vulnerability Classification “Essential Infrastructure” or “Highly Vulnerable”. EA current groundwater quantitative and chemical qualities defined as Good Human receptors (construction workers and future residents).
Medium	Attribute with a medium quality and rarity, local scale and limited potential for substitution. Attribute reasonably tolerant of change.	Examples include: Floodplain providing a moderate volume of storage. Receiving watercourse classified as Good or Moderate Ecological status / potential under WFD. NPPF Flood Risk Vulnerability Classification “More Vulnerable”.
Low	Attribute with a low quality and rarity, local scale and limited potential for substitution. Attribute tolerant of modest change.	Examples include: EA current river ecological quality defined as Poor / Bad and chemical quality defined as Fail. Floodplain with limited existing development. Receiving watercourse classified as Poor Ecological status/potential under WFD. NPPF Flood Risk Vulnerability Classification “Less Vulnerable”.
Negligible	Attribute of very limited quality and tolerant of substantial change.	Examples include: Floodplain essentially rural in nature, characterised by agricultural land use. NPPF Flood Risk Vulnerability Classification “Water Compatible”.

9.3.7 The magnitude of change arising as a result of the Proposed Development has been assessed using the criteria set out in **Table 9.2**.

Table 9.2 Magnitude of Impact

Magnitude of Impact	Description	Example
High	Results in a loss of attribute and / or quality and integrity of the attribute. Following development, the baseline situation is fundamentally changed.	Examples include: Change in ecological and / or chemical qualities of the surface water. Loss of flood storage / increased flood risk. Large change in: • water quality of receiving watercourse; • NPPF Flood Risk Vulnerability Classification; • surface water flood risk; • fluvial flood risk; • water supply volume; and • foul drainage volume.
Medium	Results in impact on integrity of attribute, or loss of part of attribute. Following development, the baseline situation is noticeably changed.	Examples include: Contribution of a significant proportion of the effluent in the receiving river, but insufficient to change its qualities. Moderate change in: • water quality of receiving watercourse; • NPPF Flood Risk Vulnerability Classification; • surface water flood risk; • fluvial flood risk; • water supply volume; and • foul drainage volume.
Low	Results in some measurable change in attribute's quality or vulnerability. Following development, the baseline situation is largely unchanged with barely discernible differences.	Examples include: Measurable changes in attribute, but of limited extent/duration. Small change in: • water quality of receiving watercourse; • NPPF Flood Risk Vulnerability Classification; • surface water flood risk; • fluvial flood risk; • water supply volume; and

Magnitude of Impact	Description	Example
		• foul drainage volume.
Negligible	The impacts are unlikely to be detectable or outside the norms of natural variation.	Examples include: Unmeasurable changes in attribute. Negligible change in: • water quality of receiving watercourse; • NPPF Flood Risk Vulnerability Classification; • surface water flood risk; • fluvial flood risk; • water supply volume; and • foul drainage volume.

9.3.8 The significance of an effect is derived based upon the sensitivity of the receptor and the magnitude of the impact using the matrix presented at **Table 9.3**. The significance of an effect can be beneficial, neutral or adverse.

Table 9.3 Significance of Effect Criteria

		Sensitivity or Value			
		High	***Medium***	***Low***	***Negligible***
Magnitude	***High***	Major adverse / beneficial	Major-moderate adverse / beneficial	Moderate-minor adverse / beneficial	Minor/ negligible
	Medium	Major-moderate adverse / beneficial	Moderate-minor adverse / beneficial	Minor adverse / beneficial	Minor/ negligible
	Low	Moderate-minor adverse / beneficial	Minor adverse / beneficial	Minor / negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

9.3.9 For the purpose of undertaking the assessment in accordance with The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations 2017), effects determined to be moderate or greater are considered significant in EIA terms.

9.3.10 Examples of how the significance of effect (**Table 9.3**) are applied to Water Resources, Drainage and Flood Risk are set out below in **Table 9.4**.

Table 9.4 Examples of Application of Significance to Water Resources, Drainage and Flood Risk

Significance Level	Significance Level Criteria	Typical Examples
Substantial Beneficial	Substantial improvements at catchment scale associated with sites and features of national or regional importance.	Fundamental changes to the regional hydrological regime. Fundamental reduction in volume and / or peak discharge of surface water run-off from the Site. Fundamental improvement in surface water quality. Fundamental changes to flow conveyance and floodplain storage.
Major Beneficial	Major improvements at catchment scale.	Fundamental changes to the regional hydrological regime. Fundamental reduction in volume and / or peak discharge of surface water run-off from the Site. Fundamental improvement in surface water quality. Fundamental changes to flow conveyance and floodplain storage.
Moderate Beneficial	Improvements at local scale.	Moderate changes to the local hydrological regime. Moderate reduction in volume and / or peak discharge of surface water run-off from the Site. Moderate improvement in surface water quality. Moderate changes to flow conveyance and floodplain storage.
Minor Beneficial	Limited Improvements at local scale.	Some noticeable changes to the local hydrological regime. Some noticeable reduction in volume and / or peak discharge of surface water run-off from the Site. Some noticeable improvement in surface water quality. Some noticeable changes to flow conveyance and floodplain storage.
Negligible	No appreciable impact.	No noticeable changes to the local hydrological regime. No noticeable change in volume and / or peak discharge of surface water run-off from the Site. No noticeable changes in surface water quality. No noticeable changes to flow conveyance and floodplain storage.
Minor Adverse	Limited detrimental effects at local scale.	Some noticeable changes to the local hydrological regime. Some noticeable increase in volume and / or peak discharge of surface water run-off from the Site.

Significance Level	Significance Level Criteria	Typical Examples
		Some noticeable deterioration in surface water quality. Some noticeable changes to flow conveyance and floodplain storage.
Moderate Adverse	Detrimental effects at local scale.	Moderate changes to the local hydrological regime. Moderate increase in volume and / or peak discharge of surface water run-off from the Site. Moderate deterioration in surface water quality. Moderate changes to flow conveyance and floodplain storage
Major Adverse	Important detrimental effects at catchment scale which may become key factors in the decision-making process.	Fundamental changes to the regional hydrological regime. Pollution of potable sources of water abstraction. Fundamental increase in volume and / or peak discharge of surface water run-off from the Site. Fundamental deterioration in surface water quality. Fundamental changes to flow conveyance and floodplain storage.
Substantial Adverse	Substantial detrimental effects at catchment scale associated with sites and features of national or regional importance.	Fundamental changes to the regional hydrological regime. Pollution of potable sources of water abstraction. Fundamental increase in volume and / or peak discharge of surface water run-off from the Site. Fundamental deterioration in surface water quality. Fundamental changes to flow conveyance and floodplain storage.

9.3.11 The assessment has been undertaken based on the indicative masterplan and maximum number of dwellings, as presented in **Chapter 5: The Proposed Development and Construction Overview.** This is considered to be both the reasonable worst case and most likely scenario for the Proposed Development. Any deviation from this at subsequent application stages would be subject to further assessment.

Determination of Baseline

9.3.12 The land-use balance across the Site is unlikely to change in the absence of the Proposed Development and, on this basis, the hydrological regime is unlikely to change.

9.3.13 **Chapter 3: EIA Methodology** provides a full list of schemes which have been identified as being likely to be completed prior to the construction of the Proposed Development. Where relevant, these schemes therefore form part of the 'future baseline' scenario and have been taken account of in the assessment of likely significant impacts from the Proposed Development (construction and operation) presented in **Section 9.6**.

9.3.14 The hydrological regime may change as a result of the predicted impacts of climate change, irrespective of any development. River flows, tide levels and rainfall intensities are predicted to increase as a result of climate change. Should such changes materialise, rates of surface water run-off, flood flows within watercourses and flood levels associated with tidal flooding would increase. The assessment has been completed to take account of the future changes in hydrological regime through incorporating appropriate allowances for climate change.

Topography

9.3.15 A Topographical Survey, provided by Encompass Surveys (December 2016) indicates that levels fall from 10.3 m AOD in the northeast corner of the Site to 3.9 m AOD in the southwest corner. This indicates that the site falls gradually towards the Portsmouth Harbour located to the southwest of the Site.

Surface Water Drainage

9.3.16 There are no surface water sewer assets located within, adjacent to or surrounding the Site. As such, it is considered that the area drains via natural processes, overland flow and infiltration to the ground.

Foul Water Drainage

9.3.17 There are several existing foul water sewers crossing the Site. These sewers generally fall towards the southwest corner of the Site.

9.3.18 Correspondence with Southern Water confirms that these foul water sewers are Southern Water assets.

Receptor Waterbodies

9.3.19 There are no main rivers, ordinary watercourses or smaller field drains within, adjacent to or in close proximity of the Site.

9.3.20 Portsmouth Harbour is situated 400 m south of the Site and is considered a RAMSAR site, a Site of Special Scientific Interest (SSSI) and a Special Protection Area (SPA).

9.3.21 The lack of drainage features within or surrounding the Site indicates that surface water runoff drains via natural processes, overland flow and infiltration to the ground eventually discharging into the Portsmouth Harbour.

Other Water Features

9.3.22 There are no other surface water drainage features within close proximity of the Site.

Surface Water Quality

9.3.23 There are no surface water features adjacent to Site.

Portsmouth Harbour Water Quality

9.3.24 The Cycle 2 classifications (the second cycle of river basin planning under the Water Framework Directive, running from the publication of the river basin plans in 2015 until 2021) classifies the Portsmouth Harbour water body as currently being at ‘Moderate’

ecological potential and a 'fail' for chemical status. As such, the current overall water body potential is 'Moderate', with an objective of maintaining moderate overall potential by 2027.

9.3.25 Portsmouth Harbour is a large estuary used for industry and designated for its bird interest. As with the neighbouring Chichester and Langstone Harbours, the harbour is composed of intertidal mudflats and sandflats along with seagrass beds, saltmarsh, shallow coastal waters, coastal lagoons and coastal grazing marsh. Evidence provided by the EA and Natural England indicate that there is a eutrophication problem in the harbours and that measures are required now to reduce nitrate input.

Surface Water Abstractions

9.3.26 There are no surface water abstractions for potable water within a 2 km radius of the Site. The impact of the Proposed Development on water supply is therefore not considered further in this assessment.

Flood Risk

9.3.27 The importance of receptors in the context of flood risk relates to the NPPF vulnerability classification for land uses potentially affected by any changes in flood risk as a result of the Proposed Development. Potential receptors could therefore be occupiers or users of the Proposed Development itself, as well as users or occupiers of land outside of the Site boundary that could be affected by changes to flood risk resulting from the Proposed Development. The receptor importance is therefore defined independently of the sources of flood risk.

9.3.28 The NPPF considers the vulnerability of different forms of development to flooding and classifies proposed uses accordingly. The Proposed Development is considered as 'More Vulnerable' in terms of the NPPF vulnerability classification and as such it is assigned as a receptor of high importance. The vulnerability and hence importance of receptors elsewhere has been defined where flood risk impacts have the potential to occur.

Limitations and Assumptions

9.3.29 Flood risk data, including flood levels derived through hydraulic modelling analysis, although usually calibrated using observed/recorded data, contains a degree of uncertainty associated with the flood levels. However, the modelling has been undertaken using industry-standard methods and the Environment Agency (EA) considers the data to be sufficiently robust to inform the FRA and EIA process.

Consultation

9.3.30 A summary of consultation undertaken to date relevant to this Chapter is given in **Table 9.1**.

Table 9.1 – Consultation Summary Table

Consultee	Date/Method of Consultation	Summary of Consultee Comments	Summary of Response/Hoe Comments have been addressed
Hampshire Country Council	06/12/2018 Statutory	Insufficient soakaway testing undertaken.	Client advised to instruct additional soakaway testing

Consultee	Date/Method of Consultation	Summary of Consultee Comments	Summary of Response/Hoe Comments have been addressed
(HCC) (LLFA)	Consultee Comments	Additional tests to be completed in accordance with BRE365 method and must demonstrate that a strategy with infiltration is possible	across the Site. Results provided to LLFA.
HCC (LLFA)	31/07/2020 Statutory Consultee Comments	Drainage Strategy needs to be updated taking soil infiltration information into account.	Drainage strategy updated attenuation storage estimates provided to LLFA.
HCC (LLFA)	03/09/2020 Statutory Consultee Comments	Further information required to determine effectiveness of infiltration as a suitable means of surface water disposal.	Updated Surface Water Drainage Strategy Technical Note, Drawings and Calculations provided to LLFA which addresses, with substantial evidence, each individual point raised in latest Consultee Comments.

9.4 Baseline Assessment and Identification of Key Receptors

9.4.1 The Site is currently used as arable farmland and comprises permeable land which generally infiltrates surface water runoff into the ground or is routed via overland flow towards the Portsmouth Harbour, located approximately 200 m to the southwest.

9.4.2 Portsmouth Harbour is considered to be a RAMSAR site, a Site of Special Scientific Interest (SSSI) and a Special Protection Area (SPA).

9.4.3 Portsmouth Harbour is a large estuary used for industry and designated for its bird interest. As with the neighbouring Chichester and Langstone Harbours, the harbour is composed of intertidal mudflats and sandflats along with seagrass beds, saltmarsh, shallow coastal waters, coastal lagoons and coastal grazing marsh. Evidence provided by the EA and Natural England indicate that there is a eutrophication problem in the harbours and that measures are required now to reduce nitrate input.

9.4.4 There are no Main Rivers or Ordinary Watercourses within, adjacent or within close proximity to the Site.

9.4.5 Topographic survey information, provided by Encompass Surveys (December 2016) (provided within the FRA (presented in **ES Volume 4, Appendix E**) indicates that levels fall from 10.3 m above ordnance datum (AOD) in the northeast corner of the Site to 3.9 m AOD in the southwest corner of the Site.

9.4.6 Sewer records obtained from Southern Water (SW) indicate that there are several foul water sewers crossing the Site. There are no surface water sewers within close proximity of the Site.

9.4.7 The Site is not located within any part of a groundwater Source Protection Zone (SPZ).

9.4.8 The northern portion of the Site lies within a Major aquifer high, while the southern portion lies within a Major aquifer intermediate.

9.4.9 The SI states that groundwater was not encountered within any of the boreholes. The investigation was conducted when groundwater levels should be rising to their annual maximum elevation.

Flood Map for Planning

9.4.10 The EA publishes online floodplain maps[29]. These maps show the possible extent of fluvial flooding for a 1 in 100-year flood (1% probability of occurrence) and the possible extent of tidal flooding associated with a 1 in 200-year event (0.5% probability of occurrence), ignoring the presence of flood defences. Also shown is the possible extent of flooding arising from a 1 in 1,000-year event (0.1% probability).

9.4.11 The map indicates that the Site lies entirely within Flood Zone 1, which is defined as:

"***Flood Zone 1*** *Low Probability – Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding*."

9.4.12 The PUSH Strategic Flood Risk Assessment 2 2115 Climate Change flood extent mapping identifies the Site as being located in Flood Zone 1.

Surface Water Flood Risk

9.4.13 The EA online 'Flood Risk from Surface Water Map'[30] shows areas that may be susceptible to surface water flooding following an extreme rainfall event.

9.4.14 The map highlights a Low Risk corridor within the Site along the western boundary. This area coincides with the Public Open Space element of the Proposed Development. The developable area of the Site is located within an area identified as having a very low risk of surface water flooding.

Reservoir Flood Risk

9.4.15 The map 'Flood Risk from Reservoirs' shows that the Site is not located in an area at risk of reservoir flooding.

Groundwater

9.4.16 The published geology indicates the sequence to comprise Superficial Deposits comprising River Terrace Deposits (undifferentiated) consisting of sand, silt and clay over bedrock consisting of chalk from the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk Formation.

9.4.17 A Site Investigation (SI), undertaken by Soils Limited (January 2017), confirmed geology on-Site of River Terrace Deposits over Chalk. The SI report is presented in **ES Volume 4, Appendix A**.

9.4.18 Initial infiltration testing was undertaken within five trial pits across the Site. Two of the tests reported negligible infiltration, while the other three trial pits recorded rates ranging between 2.14 x 10-6 m/s and 7.02 x 10-6 m/s which indicates that infiltration is a suitable means of disposing surface water runoff from the proposed development.

[29] https://flood-map-for-planning.service.gov.uk/

[30] https://flood-warning-information.service.gov.uk/long-term-flood-risk

9.4.19 Updated infiltration testing, undertaken at the request of HCC acting as LLFA, in accordance with published guidance was performed between 20 May 2019 and 1 June 2019 in order to provide guidance on the suitability of the ground for the adoption of shallow surface water drainage systems within the River Terrace Deposits and Lewes Nodular Formation, Seaford Chalk Formation, Newhaven Chalk Formation and Culver Chalk Formation. Rates of between 1.445 x 10-4 m/s and 5.155 x 10-7 m/s were calculated from tests within the deep trial pits (>2.5 m deep) and rates of between 9.853 x 10-5 m/s and 1.1916 x 10-6 m/s were calculated based on data from the shallow test pits.

9.4.20 The updated report concluded that *"given the observed infiltration over the test period, it is considered that some areas of the site would be suitable for the adoption of surface water soakaway systems"*.

9.4.21 Groundwater was not encountered on-Site during either the initial (2017) or updated (2019) infiltration testing.

Water Framework Directive

12.1.1 The Site falls within the area administered by the South East River Basin District Management Plan (RBDMP) and the relevant management catchment is the East Hampshire Management Catchment.

12.1.2 The principal water bodies within the vicinity of the Site are as follows:

- Portsmouth Harbour.

12.1.3 The principal receptors that may be affected by the Site are as follows:

- Portsmouth Harbour.

9.5 Identification and Description of Changes Likely to Generate Effect

Construction Phase

9.5.1 There are a number of potential impacts that can occur during the construction and Site preparation phases of the Proposed Development:

- Contamination of soils as a result of leakage or accidental spillage of oils, fuels or other chemicals on-Site;
- Site run-off containing contaminants or pollutants from road surfaces as a result of construction traffic;
- Elevated sediments in Site run-off as a result of disturbance/clearance of land for Site preparation; and
- Soil remediation works (if required) which could result in remobilisation of existing pollutants.

Operational Phase

9.5.2 The potential impacts resulting from the operational phase of the Proposed Development are:

- Possible increase in flood risk;
- Potential contamination of surface water or groundwater by oils, fuels or other chemicals;
- Modification of the natural drainage on- Site;
- An increase in wastewater generation, subsequent need for treatment and discharge; and
- An increase in demand for public water supply.

9.6 Assessment of Likely Significant Effect

9.6.1 The design philosophy that underpins the Site includes measures to prevent, reduce and offset significant adverse effects upon water resource, drainage and flood risk. Being 'built-in' to the Proposed Development from the outset, the assessment of the significance of effects includes consideration of these embedded mitigation measures.

Construction Phase

9.6.2 A number of factors will influence the significance of any impacts to water quality including the type of pollutant, location and the controls designed into the drainage systems for the Site.

Embedded Mitigation Measures

9.6.3 Embedded mitigation measures will include, but not be limited to, the following:

- Best practice working methods to prevent both water pollution and adverse impacts upon the surface water drainage regime;
- Appropriate storage of oil and chemical tanks in accordance with Control of Substances Hazardous to Health (COSHH) Regulations 2002 and Control of Pollution (Oil Storage) Regulations 2001;
- Any surface water potentially contaminated by hydrocarbons would be passed through oil/grit interceptors prior to discharge;
- Precautions would be in place to prevent silt laden run-off, arisings or chemicals entering watercourses; and
- Where required, cables would be laid at a sufficient depth beneath watercourses to avoid causing damage to the integrity of embankments during installation.

9.6.4 A Construction Environment Management Plan (CEMP) will be provided. Mitigation measures in respect of impacts on water resource, drainage and flood risk during the construction phase would be secured through implementation of the measures set out in this document. Such measures will include, but not be limited to, the following:

- The provision of temporary measures to intercept and control surface water run-off from worked areas;

- Installation of construction site drainage to intercept and control run-off from worked areas;
- Siting stockpiles away from watercourses; and
- Refuelling on areas of hardstanding only away from watercourses and surface water drains.

Anticipated Effects

9.6.5 Construction works, including earthworks operations, have the potential to impact upon the surface water drainage regime which, in turn, may impact upon sensitive locations in the vicinity of the site and the main temporary construction compound.

9.6.6 Construction activities at the Site and the main temporary construction compound would include the clearance of vegetation, topsoil stripping and stockpiling, establishment of compound areas, excavation and Site levelling/reprofiling (to create the Proposed Development platforms), preparation of Site roads and construction of foundations. Compaction of the ground caused by construction plant and an increase in the extent of impermeable surfaces associated with access roads and compound areas has the potential to impact upon the surface water drainage regime and increase surface water run-off from the Site and the main temporary construction compound and potentially into nearby receptors, such as the Portsmouth Harbour SPA. However, such effects would be localised and temporary and controlled in accordance with the embedded mitigation measures set out in paragraphs 9.6.3 to 9.6.4. The surface water drainage regime is considered to be of **Medium** sensitivity. The magnitude of impact is anticipated to be **Negligible** with regards to the Site and the main temporary construction compound and, therefore, the impact is anticipated to be of **Negligible** significance. The potential effects of construction activities on the surface water drainage regime are, therefore, **Not Significant**.

9.6.7 Construction activities also have the potential to give rise to the contamination of surface water and groundwater resulting from spilled hydrocarbons/petrochemicals from construction plant and the mobilisation of silts and contaminants during soil stripping and earthworks operations, potentially leading to increased silt loading in nearby receptors (such as Portsmouth Harbour SPA). However, such effects would be localised and temporary and controlled in accordance with the embedded mitigation measures set out in paragraphs 9.6.3 to 9.6.4. The magnitude of impact is anticipated to be **Negligible** with regards to the Site and the main temporary construction compound and, therefore, the impact is anticipated to be of **Negligible** significance. The potential effects of construction activities on water quality and WFD are therefore **Not Significant**.

9.6.8 At the end of its operational life, the decommissioning of the Site is considered to have similar effects upon the environment as those during the construction stage and, therefore, similar measures to reduce effects are likely to be proposed. The potential effects of the decommissioning phase in respect of water resource, drainage and flood risk are therefore anticipated to be **Not Significant**.

Operational Phase

Embedded Mitigation Measures

9.6.9 Embedded mitigation measures will include, but not be limited to, the following:

- A detailed drainage strategy has been prepared for the Proposed Development in accordance with CIRIA C753 and guidance set out by the LLFA, such that the surface water run-off regime replicates that existing prior to development;
- Implementation of SuDS (i.e. interceptors and silt traps);
- The increase in wastewater will be discharged to the local foul sewer network. Negotiations with the local water provider will ensure that the impact of the Proposed Development will not have an adverse effect on the local sewer system; and
- Water use of 110 litres per person per day will be secured by condition.

Anticipated Effects

9.6.10 The Proposed Development would give rise to an increase in the impermeable area within the catchment of the Portsmouth Harbour which, in the absence of mitigation, has the potential to increase surface water run-off to the harbour and associated drains/tributaries. This has the potential to increase flood risk to existing development/infrastructure/third party assets/land in the vicinity and downstream of the Site. However, such effects would be controlled by the embedded mitigation measures outlined above, specifically, a SuDS strategy (**presented in Volume 4, Appendix E**) that mimics the greenfield site, thereby replicating the existing/prior to development surface water run-off regime. Details of the surface water management strategy are set out in the FRA (**presented in Volume 4, Appendix E**) and supplementary Surface Water Drainage Technical Note (presented in **Volume 4, Appendix E**). The surface water drainage regime is considered to be of **Medium** sensitivity. The magnitude of impact is anticipated to be **Negligible** with regards to the Site, on account of embedded mitigation measures, and therefore the impact is anticipated to be of **Negligible** significance. The potential effects of operation on the surface water drainage regime are, therefore, **Not Significant**.

9.6.11 A nitrogen budget has been submitted with the application which confirms that the application is neutral and no mitigation is required. Provided the council, as the competent authority, is assured and satisfied with the Site areas are correct and that the existing land uses are appropriately precautionary, then Natural England raise no further concerns with regard to the nutrient budget.

Potential Additional Mitigation Measures

Construction Phase

9.6.12 With the implementation of embedded mitigation measures as set out above, the effects associated with construction of the Site are **Negligible** and therefore **Not Significant**. On this basis, there is no requirement for additional mitigation measures over and above those already identified.

Operational Phase

9.6.13 With the implementation of embedded mitigation measures as set out above, the effects associated with operation of the Site are **Negligible** and therefore **Not Significant**. On this basis, there is no requirement for additional mitigation measures over and above those identified above.

9.7 Residual Effects

9.7.1 With the embedded mitigation presented above, there are no significant residual effects anticipated as a result of the Proposed Development.

9.7.2 It is acknowledged that even with the implementation of impact avoidance measures, there a very limited potential for some residual risk to the water environment associated with the construction, operation and decommissioning of the Proposed Development, for example, through design exceedance or blockage of the drainage system. However, further mitigation is not considered necessary.

9.8 Cumulative Effects

9.8.1 Cumulative effects are the combined effects of several development schemes (in conjunction with the Proposed Development) which may, on an individual basis be insignificant but, cumulatively, have a significant effect.

9.8.2 The ES has considered 'Cumulative 'Effects' for schemes located within a 3.5 km radius from the boundary of the Site.

9.8.3 The surface water proposals for the Proposed Development are designed in accordance with the NPPF which states that surface water run-off should be controlled and attenuation provided within the Site to prevent flooding from the Site. Therefore, the Proposed Development will have no cumulative effect on the surrounding area.

9.8.4 The foul drainage strategy proposes the Proposed Development connects to the public foul drainage network. The cumulative effect from the Proposed Development will be an increase in flow within the foul sewer network which could potentially result in surcharging the local foul network.

9.9 Summary and Conclusions

9.9.1 The baseline conditions at the Site have been described and the principal receptors that may be affected by the Proposed Development identified.

9.9.2 Construction activities at the Site and main temporary construction compound have the potential to impact upon the surface water drainage regime and both groundwater and surface water quality. However, the effects are likely to be localised, temporary and controlled by embedded mitigation measures, such that the residual effects would be **Negligible** and therefore **Not Significant**.

9.9.3 Similarly, the potential effects arising during the operational phase of the Site would be controlled by embedded mitigation measures, such that the residual effects are likely to be **Negligible** and therefore **Not Significant**.

9.9.4 Significant adverse cumulative effects are not anticipated on account of construction phase and operational phase mitigation measures being employed at the Site and 'Other Developments' being constructed / operational simultaneously with the Site.

9.9.5 **Table 9.5** summarises the topic effects resulting from the Proposed Development.

Table 9.5 Summary of Residual Effects

Receptor/ Affected Group	Value or Sensitivity (Significance) of Receptor	Activity or Impact	Embedded Design Mitigation	Magnitude/ Spatial Extent/ Duration/ Likelihood of Occurrence	Significance of effect	Additional Mitigation	Residual Magnitude of Impact	Significance of Residual effect
Construction								
Surface Water	Medium	Increase in surface water run-off	Best Practice Working Measures CEMP	Low Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
Ground water / surface water	Medium	Contamination from spilled hydrocarbons/petrochemicals	Best Practice Working Measures CEMP	Low Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
Operation								
Surface Water	Medium	Increase in surface water run-off	Detailed Drainage Strategy, SUDs, limited water use and wastewater discharge	Low Direct Local Permanent Likely	Negligible	None	Negligible	Negligible
Cumulative Effects - Construction								
N/A								
Cumulative Effects - Operation								
Wastewater local network	Low	Increase in wastewater in local network	Reduced water consumption in line with Core Strategy requirements	Low Direct Local Permanent Likely	Negligible	None	Negligible	Negligible