

11.0 WATER ENVIRONMENT

11.1 INTRODUCTION

- 11.1.1 This chapter has been produced to consider the impact of the proposed development on the existing flood risk and surface water (hydrology) and how any predicated adverse impacts may be mitigated.
- 11.1.2 The Site is located to the northeast of Portsmouth, is bounded to the east by A3(M) highway, to the west by educational establishments and College Road, to the south by greenfield land and to the north by woodland. There is an existing ordinary watercourse which runs along the southern boundary of the site, which flows under the A3(M) motorway and continues eastwards into a designated EA Main River, which eventually leads into the Langstone Channel.
- 11.1.3 The detailed proposals are described in Chapter 3 of the Environment Statement (ES)

11.2 METHODOLOGY AND SCOPE

Policy Background

- 11.2.1 The impact assessment has been based on information provided within the site-specific flood risk assessment (FRA). This FRA has been developed in accordance with the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG). The risk of flooding from various sources including fluvial, groundwater, surface water and sewer infrastructure failure have been assessed. In addition to the production of the site-specific FRA, a surface and foul water drainage strategy has been developed taking into account an assessment of the existing surface and foul water drainage regimes.
- 11.2.2 The assessment has been undertaken, taking into account the context of the Revised National Planning Policy Framework (NPPF) (2021). The key elements relevant to the assessment are detailed below:
- 11.2.3 Paragraph 159: *“Inappropriate development in areas at risk from flooding should be avoided by directing development away from areas at highest risk (whether existing or future). Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere.”*
- 11.2.4 Paragraph 167: *“When determining any planning applications LPAs should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood risk assessment. Development should only be allowed in areas at risk of flooding where, in the light of this assessment (and the sequential and exception tests as applicable) it can be demonstrated that:*
- a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location.*
 - b) the development is appropriately flood resistant and resilient;*

- c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;*
- d) any residual risk can be safely managed; and*
- e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.”*

- 11.2.5 Paragraph 174, Part e): *“Planning policies and decisions should contribute to and enhance the local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”*

Key Legislation

- 11.2.6 There is a range of Legislative as well as National, Regional and Local Policies which are relevant to the assessment of the potential impacts. Furthermore, there are several guidance documents relating to mitigating the potential impacts. We have listed below the relevant documents.
- Water Framework Directive (2000);
 - National Planning Policy Framework (2021);
 - Water Resource Act (1991);
 - Water Act (2003);
 - Building Regulations (2010);
 - CIRIA C753 – The SuDS Manual (2015);
 - DCG – Adoption Sewer Guidance;
 - BS EN 752:2008 –Drains and Sewer Systems Outside Buildings (2008);
 - PUSH Hampshire- SFRA

Scoping Assessment Stage

- 11.2.7 Tetra Tech, on behalf of Dandara, consulted with Havant Borough Council (HBC) requesting an EIA screening and scoping opinion and confirming that the previous Scoping Opinion, dated April 2018 is still applicable to this site.
- 11.2.8 HBC have requested that the EIA consider the impacts of the high levels of nitrogen and phosphorus in the water as well as the impacts of the development is considered. This is considered in further detail in the Ecology Chapter 9 of the EIA.
- 11.2.9 Hampshire County Council (HCC) as Lead Local Flood Authority (LLFA) were consulted in June 2022 and have confirmed that the site is wholly within Flood Zone 1. The LLFA have requested that the assessment and potential impacts on building on existing overland flow routes is considered and provide proposed mitigation measures. The LLFA have noted that the site maybe located over soils with low permeability and noted that the discharge is proposed to the existing watercourse and have

requested that additional information on the watercourse location, flow direction route, evidence of gravity connection to another watercourse and evidence which demonstrates adequate capacity and condition for the proposed discharge rate.

Assessment Methodology

11.2.10 The methodology of assessment follows that as defined in Chapter 2

Receptor Sensitivity

11.2.11 Surface and sub-surface hydrology receptors have been identified by the baseline assessment. The importance of each receptor has been designated based on judgement and reference to the guidance criteria presented in Table 11.1.

Table 11.1 Receptor Importance

Importance	Criteria	Measures
Very High	Receptor has a high quality and rarity on a national or regional scale	Surface Water: Designated Salmon/Cyprinid fishery High WFD Ecological Status Good WFD Chemical Status Protected under EU or UK habitat legislation
		Flood Risk Flood Zone 3a or 3b
		Groundwater: Principle Aquifer providing regionally important resource Source Protection Zone 1 WFD status = Good
High	Receptor has a high quality on a local scale	Surface Water: Major Cyprinid fishery Good WFD Ecological Status Good WFD Chemical Status Species protected under EU or UK habitat legislation
		Flood Risk Flood Zone 2
		Groundwater: Principle Aquifer providing locally important resource Source Protection Zone 2 Good WFD status
Medium	Receptor has a medium quality on a local scale	Surface Water: Moderate WFD Ecological Status Good WFD Chemical Status
		Flood Risk Flood Zone 2
		Groundwater:

		Secondary Aquifer with limited connection to surface water Source Protection Zone 3 Good/Poor WFD status
Low	Receptor has a low quality and rarity on a local scale	Surface Water: Poor/Bad WFD Ecological Status Poor WFD Chemical Status
		Flood Risk Flood Zone 1
		Groundwater: Unproductive Strata Poor WFD status

Effect Magnitude

11.2.12 A seven-point scale has been used to assess the potential effects and magnitude on each receptor. This scale has been derived based on the methodology described in Chapter 2 of the EIA. Furthermore Table 11.2 highlights the potential impacts on each receptor in accordance with this scale as informed by the baseline assessment.

11.2.13 The characteristics of each identified impact at the construction and operational stages are considered in terms of: direction; magnitude, extent, duration, reversibility; timing & frequency and cumulative effects

Table 11.2: Criteria for Estimating the Magnitude of an Effect on a Receptor

Importance	Criteria	Measures
Substantial Magnitude	Loss of receptor or loss of quality of receptor	Surface Water: Reduction in WFD Class High risk of pollution from a spillage Loss or extensive change to a fishery Loss or extensive change to a designated Nature Conservation site
		Flood Risk Increase in flood risk due to blockage of new bridges or hydraulic structures Increase 100 year flood levels by min. 100mm
		Groundwater: Reduction in WFD Class Loss or extensive change to an aquifer High risk of contamination of groundwater from polluted run-off Loss or extensive change to groundwater supported wetlands Reduction in aquifer recharge
Moderate Magnitude	Effect on integrity of receptor or loss of part of receptor	Surface Water: Reduction in WFD Class Medium Risk of pollution from a spillage Partial loss of productivity of a fishery

		Flood Risk 100 year flood levels increased by 50-100mm
		Groundwater: Reduction in WFD Class Partial loss or change to aquifer Medium risk of contamination of groundwater Partial loss of integrity of groundwater support wetlands
Slight Magnitude	Measurable change in receptor quality or vulnerability	Surface Water: Minor Risk of pollution from a spillage
		Flood Risk 100 year flood levels increased by less than 50mm
		Groundwater: Low risk of contamination of groundwater from runoff Minor effects on groundwater support wetlands
Negligible Magnitude	Effect on receptor but insufficient magnitude to affect the use of integrity	Surface Water: Negligible or no pollution from a spillage
		Flood Risk Negligible change in flood levels (less than 25mm)
		Groundwater: No measurable impact on aquifer Negligible risk of pollution from spillages
		Groundwater: Improvement in WFD Class Removal of existing polluting discharge to aquifer

Effect Significance

11.2.14 The significance of effects is provided in Table 11.3 below. All effects intermediate and above are considered significant.

Table 11.3 Significance of Effects Matrix

		Magnitude of Impact			
		Substantial magnitude	Moderate magnitude	Slight magnitude	Negligible magnitude
Sensitivity of Receptor	Very High	Major	Major	Intermediate	Neutral
	High	Major	Intermediate	Minor	Neutral
	Medium	Major	Intermediate	Minor	Neutral

	Low	Intermediate	Minor	Neutral	Neutral
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Limitations of the Assessment

11.2.15 The assessment is limited to the ground investigations carried out in 2016, and the effects of the potential for varying groundwater levels during the winter periods is currently being undertaken through onsite groundwater monitoring. The outcomes of these investigations are not expected to impact the EIA as mitigation measures associated with potential for high groundwater levels can be introduced as part of the detailed design.

11.3 BASELINE ENVIRONMENT

Existing baseline

Ground Conditions and Hydrogeology

- 11.3.1 Based on the British Hydrogeological Survey Maps the site is largely located over the London Clay Formation, comprising of Clay, Silt and Sand, whilst the southern portion of the site is located over the Lambeth Group comprising of Clay, Silt and Sand. There is a localized seam of the Bognor Sand Member formation which comprises of sand which crosses the central part of the site. There is a Superficial Head Deposits over this bedrock geology within the southern part of the site. An initial site investigation carried out by RSK in October 2016 has indicated groundwater levels ranging from 1.20 to 2.5mbgl. Infiltration testing carried out indicated very low permeability rates
- 11.3.2 The EA groundwater vulnerability maps indicates that the site lies within the InnerZone – subsurface activity only (Zone 1c) groundwater protection zone with the south eastern part of the site within Zone 1 Groundwater source protection zone. The superficial deposit is designated as a Secondary (undifferentiated), whilst the majority of the site is not located over and designate bedrock aquifer, a small portion along the southern boundary is noted to lie within the Secondary A bedrock aquifer which is described as “permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers”

Flood Risk

- 11.3.3 A site specific flood risk assessment as found in Appendix 11.1 has been undertaken to assess the flood risk at the site from all identified sources to the site as well as the demonstrating that the development would be safe for its lifetime and ensure that the proposals will not increase the risk of flooding elsewhere.
- 11.3.4 According to the EA flood map (DEFRA.gov.uk), the site is located wholly within Flood Zone 1, considered to have a low risk of flooding rivers (less than 0.1% probability in any given year) or the sea (less than 0.5% in any given year).
- 11.3.5 The risk of groundwater flooding to the proposed development has been deemed as low, based on the results of the intrusive investigations as well as assessment of bedrock geology. In addition,

- based on the topography of the site, any potential risk groundwater flooding would occur in the lower lying areas of the site, limited to the existing woodlands in the southern portion.
- 11.3.6 The risk of surface water flooding to the site is low. There are localised overland flow routes shown on the DEFRA flood risk maps, which indicate the potential for overland flow routes which follow the existing topography of the land in the southern and south western part of the site This assessment has been made on the information provided within the EA maps for surface water flooding (DEFRA.gov.uk) in conjunction with a review of the topography of the site.
- 11.3.7 There is an existing Southern Water foul sewer which runs across the northern part of the site. There are no historic recorded instances of flooding of this sewer.
- 11.3.8 The site is not in an area at risk of flooding from reservoirs.

Existing Site Drainage

- 11.3.9 The existing surface water run-off from the site, discharges overland to the existing watercourse which runs along the southern boundary of the site through the center of the site at which point the flows continue in an easterly direction to an existing outfall beneath the A3(M). A baseline hydrology assessment demonstrating the existing flow routes is presented within the FRA.

Development Receptors

- 11.3.10 Table 11-4 below identifies the receptors and their importance/scale as assessed using the guidance criteria present in Table 11.3

Table 11.4- Development Receptors

Receptor and Nature of Impact	Receptor Importance
Langstone Channel (water quality and hydrology)	Very High
Aquifer (water quality)	Very High
Site workers (flood risk)	Low
Development Residents and visitors (flood risk) – Operational phase	Low

Future baseline

- 11.3.11 In terms of the future impacts to the site, should the development not go ahead, there is no change to the baseline conditions.

11.4 MITIGATION WITHIN THE SUBMITTED DESIGN

Design

- 11.4.1 The design of the new developments will seek to locate the roads and houses in areas of higher elevations on the site, well above the levels of the existing watercourse and potential surface water

flow paths. This ensures the flood risk to the development residents remains as low to negligible by taking a site sequential based approach in positioning key elements of the development.

- 11.4.2 The proposed levels of the new development will seek to ensure that any exceedance flow paths of surface water from storm events is directed away from the new houses and to areas of low risk within the site.
- 11.4.3 The design of the development proposals implements attenuation basins with bio-retention wetland areas within the inlet and outlet forebays. These attenuation basins will have the benefit of providing temporary storage of surface water run-off from the areas of the site being re-developed and slowly release these flows back into the downstream existing watercourse at the Mean Annual Average Greenfield run-off rates. This will provide the benefit of reducing the peak run-off from the site during severe storm events and thus reduce the risk of flooding downstream.
- 11.4.4 As the development will incorporate a number of SuDS system within the site, treatment of surface water is provided at the source within these development parcels within the proposed basins and associated bio-retention areas. This ensures that discharge leaving the site has no adverse effect to the downstream watercourses nor to the underlying Secondary Aquifer.

Construction

- 11.4.5 The construction works will be undertaken in accordance with a Construction Environmental Management Plan (CEMP) or similar. The CEMP is an appropriate document within which appropriate procedures and methods can be specified to protect the water environment. This will include a series of specific method statements identifying methods of working and controls to address the surface water environment impacts. The CEMP will be implemented during the construction phase. This will include guidance on ‘Pollution prevention for businesses’ on gov.uk (DEFRA and the Environment Agency, 2016, updated 2019) as a minimum.
- 11.4.6 The CEMP will include a plan and specific method statements for how water efficiency will be achieved. This could include measures such as:
- Auto isolation of cleaning devices (hoses): The contractor will ensure flow from cleaning devices auto-isolates once it is no longer in use. This ensures there is no possibility of an unused cleaning device being left operational when it is not in use. The contractor will look to identify the high-pressure washer system which provides the required level of cleaning, with the lowest water pressure (to maximise the water savings on offer.
 - Dust suppression activity: The contractor will only use water for dust suppression when on site temporary/permanent road conditions require it in order to limit water use over the duration of the project.
 - Road sweeping: The contractor will only use a road sweeper system with built in water recycling.
 - Washing of ready-mix concrete wagons: If a batching plant is set up on site, and washing of wagons will be undertaken on site then this must occur in a designated hard standing area with waste water collection sump, and the waste water will then be re-used as an ingredient in the concrete mixing process, up to the maximum amount which can be used.

- Commissioning and testing of services: The contractor will follow the advice in the relevant Building Services Research and Information Association (BSRIA) guidance. The water used for flushing building services should be isolated as soon as possible after the flush water turns clear.

- 11.4.7 Construction will occur in appropriate phases. The site works will be controlled by the approved and agreed Construction Drainage Design Plan prepared by the contractor.
- 11.4.8 The temporary construction drainage system and neighbouring water courses will be visually inspected on a pre-agreed basis during construction to detect any problems with function and any changes in colour or turbidity, or for olfactory evidence which may indicate a temporary reduction in water quality. If on a visual inspection the drainage appears to be polluted or excessively turbid, the EA will be contacted regarding the appropriate action and the source of the pollution should be identified if possible and the spillage/containment procedure specified in the CEMP followed.
- 11.4.9 The site facilities will include messing and toilet facilities for the site workers contained within the construction compound. The design of the temporary foul drainage collection system is expected to utilise temporary connections to the nearest foul drainage system.
- 11.4.10 Discharge consents will be required for temporary discharges to ground or surface water from the construction site under the Water Resources Act 1991. It is assumed that any required water related consents will be in place before works commence and it is the responsibility of the developer and contractor to ensure that this is the case. The surface water and foul water drainage measures proposed will be further developed in consultation with the EA. This is not embedded mitigation but is stated here for clarity.

11.5 LIKELY SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE SCHEME

Construction Phase Effects

- 11.5.1 During the construction phase there are several activities which could lead to a reduction of surface water quality. The activities include the following:
- Excavations and construction for foundations, drainage runs, services, and new road construction;
 - General earthworks involving the excavation, movement and compaction of soil to form the proposed site levels;
 - Stockpiling, storage, handling of materials as well as potential spillages and disposal;
 - Movement of construction plant and vehicles.
- 11.5.2 These construction activities could lead to the disturbance and mobilisation of contaminants (dust and sediments), particularly during heavy rainfall and vehicle movements. In addition to this, during long dry periods, dust generated by the excavation of soils could reduce the quality of surface water during windy periods.
- 11.5.3 The risk of increasing off site flooding could be prevalent during this phase due to the compaction of soil on the site.

- 11.5.4 However, adhering to the CEMP largely mitigates these risks. The impact is considered negligible; therefore, the significance of effect is considered neutral.

Operational Phase Effects

- 11.5.5 The possible impacts of the development during the operational phase are summarized below:
- Increased impermeable area and traffic volumes could increase the risk of contamination within the surface water run-off
 - The increased impermeable area of the development will increase the peak rate of surface water run-off and volume thus increase the risk of flooding downstream;
 - The increase occupancy on the site will increase the foul water discharge from the site which could pollute the receiving water body.
- 11.5.6 The provision of a sustainable drainage strategy, involving the implementation of SuDS and flood mitigation measures will reduce the impact magnitude of the effects on site identified above to Negligible. The provision of a sustainable drainage strategy, involving the implementation of SuDS to intercept contaminated runoff and provide a degree of pollution treatment will reduce the impact magnitude of the effect identified above to Negligible. The effect significance of the operation of the Proposed Development on downstream surface water quality is assessed as Neutral.

11.6 ADDITIONAL MITIGATION, COMPENSATION AND ENHANCEMENT MEASURES

Construction Phase

- 11.6.1 The mitigation measures proposed during the construction phase are subject to controls being implemented during this phase of the project following general good practices during the construction works.

Operational Phase

- 11.6.2 A site-specific flood risk assessment has been produced in conjunction with a surface water drainage strategy (Appendix 11.1) to mitigate the increase of surface water run-off from this site.
- 11.6.3 As the existing site area is considered Greenfield, the proposed development will increase the surface water runoff from this site. A detailed drainage strategy has been developed which is incorporated within the overall development's surface water Sustainable Drainage Systems (SuDS) scheme.
- 11.6.4 This SuDS scheme makes use of a series of detention basins with a combination of bio-retention areas within these basins to provide both attenuation storage and treatment of the surface water prior to discharge to the downstream watercourse.
- 11.6.5 The scheme has been designed to accommodate peak storm events up to and including the 1 in 100 year return period with an additional allowance for climate change.
- 11.6.6 The proposed surface water scheme will improve water quality by the introduction of at least two levels of treatment in the SuDS treatment train in accordance with the recommendations of the SuDS Manual (CIRIA C753).

- 11.6.7 As the scheme seeks to discharge the surface water run-off into the ground, there is expected to be a betterment, in terms of flood risk downstream by reducing run-off from the site for all storm events up to the 1 in 100 year event plus climate change compared to the predevelopment condition.

11.7 ASSESSMENT SUMMARY AND LIKELY SIGNIFICANT RESIDUAL ENVIRONMENTAL EFFECTS

- 11.7.1 There are no significant residual effects that will remain, both during the construction and operational phases of the proposal, after the implementation of the additional mitigation measures.
- 11.7.2 The residual effects tables set out in the template should also be completed as this provides a consistent and useful quick reference point for the reader to consider the different topics.

Table 11.1 Assessment Summary and Residual Environmental Effects

Summary description of the identified impact	Sensitivity of Receptor	Impact Magnitude	Significance and Nature of Effect	Additional Mitigation	Residual Impact Magnitude	Residual Significance and Nature of Effect	Confidence Level
Construction							
Pollution and flood risk to the Langstone Channel	Very High	Substantial	Major	Construction Environmental Management Plan; Implementation of proposed surface water proposals following the drainage strategy	Negligible	Neutral	Medium
Pollution and flood risk to Secondary Aquifer	Very High	Moderate	Moderate	Construction Environmental Management Plan; Implementation of proposed surface water proposals following the drainage strategy	Negligible	Neutral	Medium
Flood risk to Site Workers	Low	Slight	Neutral	Construction Environmental Management Plan;	Negligible	Neutral	High
Flood risk to residents	Low	Slight	Neutral	Construction Environmental Management Plan; Implementation of proposed surface water proposals following the drainage strategy	Negligible	Neutral	High
Operation							
Pollution and flood risk to the Langstone Channel	Very high	Substantial	Major	Implementation of proposed surface water proposals following the drainage strategy	Negligible	Neutral	High
Pollution and flood risk to Secondary Aquifer	Very High	Moderate	Major	Implementation of proposed surface water proposals following the drainage strategy	Negligible	Neutral	High
Flood risk to residents	Low	Slight	Neutral	Implementation of proposed surface water proposals following the drainage strategy	Negligible	Neutral	High

11.8 REFERENCES

- 11.8.1 Flood Risk Mapping <https://www.gov.uk/check-long-term-flood-risk> - 08th June 2023
- 11.8.2 Geological Mapping information: <https://www.bgs.ac.uk/information-hub/borehole-records> - 8th June 2023
- 11.8.3 Groundwater Vulnerability Mapping and Groundwater Source Protection Zones Maps- <https://magic.defra.gov.uk/> - 8th June 2023
- 11.8.4 CIRIA C753 (2015) The SuDS Manual
- 11.8.5 RCP Consultants (2023) – Flood Risk Assessment Report