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19 Water environment

19.1 Introduction

19.1.1 This document has been updated at Deadline 1 to reflect updated water quality modelling data. References to other Application documents have not been updated from the original submission. Please refer to the latest version of the Guide to the Application (Document reference 1.3, Volume 1) for the list of current versions of documents.

19.1.2 This chapter provides the assessment of the likely significant effects on the water environment from the construction, operation and decommissioning of the Hampshire Water Transfer and Water Recycling Project (hereafter referred to as the 'Proposed Development'), which is being progressed by Southern Water Services Limited ('the Applicant').

19.1.3 This chapter details the legislation, policy and guidance that is relevant to the water environment, summarises the engagement and consultation undertaken for the Proposed Development to date, sets out the scope and methodology of assessment, and describes the baseline environment. Following this, the likely significant effects of the Proposed Development on the water environment are assessed taking account of embedded primary and tertiary mitigation within the design. The need for any secondary mitigation is then considered along with any proposals for monitoring and/or enhancement. The chapter concludes with a summary of residual effects.

19.1.4 The water environment topics considered within this chapter for the Proposed Development are:

1. The hydrology, geomorphology, quantity and quality of surface waters (including freshwater, coastal and transitional waters)
2. The hydrogeology, quantity and quality of groundwater
3. Surface and groundwater resources
4. Surface and groundwater-dependent designated sites
5. Flood risk to and from the Proposed Development

19.1.5 This chapter should be read in conjunction with Environmental Statement (ES) Chapter 3 Description of the Proposed Development, Volume I, (Document Reference 6.1, Volume 6) which describes the development parameters against which the effects considered in this chapter have been assessed.

19.1.6 In addition, this chapter should be read alongside relevant parts of other chapters in Volume I, namely:

1. ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I, (Document Reference 6.1, Volume 6) – covering likely significant effects on designated sites, habitats and protected and notable species, which could be affected by changes to hydrology, hydrogeology, geomorphology and water quality. Invasive non-native species (INNS) are also considered in relation to the Proposed Development in terms of their potential effect on freshwater biodiversity. Likely significant effects on hydrologically connected habitats and

associated species are assessed in ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I, (Document Reference 6.1, Volume 6) and are informed by the potential impacts on the water environment assessed in this chapter.

2. ES Chapter 9 Marine biodiversity, Volume I, (Document Reference 6.1, Volume 6) – covering likely significant effects on marine ecology (habitats and species) and fisheries (recreationally and commercially targeted species). This includes designated sites, marine mammals, fish, marine habitats, benthic marine species and recreationally and commercially targeted fish and shellfish species. These receptors could be affected by changes to coastal or transitional water quality. Water quality modelling outputs used in this chapter have informed the assessment of likely significant effects on marine biodiversity in ES Chapter 9 Marine biodiversity, Volume I, [Document Reference 6.1, Volume 6).
3. ES Chapter 10 Carbon and climate change, Volume I, (Document Reference 6.1, Volume 6) – covering likely significant effects on carbon and climate. Climate change could affect hydrology, hydrogeology, flood risk and water resources. Climate changes that affect flood risk are considered in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
4. ES Chapter 11 Land quality and ground conditions, Volume I, (Document Reference 6.1, Volume 6) – covering likely significant effects on land quality and ground conditions, which could affect water quality. ES Chapter 11 Land quality and ground conditions, Volume I, Document Reference 6.1, Volume 6) draws on baseline data presented in this chapter, specifically relating to hydrology, hydrogeology and groundwater abstractions.
5. ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, Volume 6) – in an emergency scenario, such as in the event of damage to the Pipeline, sections of the Pipeline may need to be drained using the washout valves to facilitate repair. These events are considered operationally exceptional and are not expected during the life of the Proposed Development; they are therefore considered in Chapter 14 rather than this chapter.
6. ES Chapter 20 Cumulative and in-combination effects, Volume I (Document reference 6.1, DCO Volume 6) - provides an assessment of the cumulative effects, i.e. effects from the interrelationship between the Proposed Development and other developments, and an assessment of the in-combination effects, i.e. effects from the interaction between the individual effects of the Proposed Development

19.1.7 This chapter is supported and informed by the following appendices, all contained in ES, Volume II:

1. ES Appendix 19.1 Flood Risk Assessment, Volume II, (Document Reference 6.2, Volume 6)
2. ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II, (Document Reference 6.2, Volume 6)
3. ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II, (Document Reference 6.2, Volume 6)
4. ES Appendix 19.4 Watercourse crossing schedule, Volume II, (Document Reference 6.2, Volume 6)

5. ES Appendix 19.5 Eastney Long Sea Outfall (L:Solent dispersion modelling, Volume II, (Document Reference 6.2, Volume 6)
6. ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II, (Document Reference 6.2, Volume 6)
7. ES Appendix 19.7 Nutrient Assessment, Volume II, (Document Reference 6.2, Volume 6)
8. ES Appendix 19.8 CORMIX Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II, (Document Reference 6.2, Volume 6)
9. ES Appendix 19.9 Outline Water Monitoring Plan, Volume II (Document Reference 6.2, Volume 6)
10. ES Appendix 19.10 Degradation Modelling, Volume II (Document Reference 6.2, Volume 6)
11. ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II (Document Reference 6.2, Volume 6).
12. ES Appendix 19.12 Water Recycling Plant site Sustainable Drainage System dispersion modelling, Volume II (Document Reference 6.2, Volume 6).

19.2 Legislation, policy and guidance

19.2.1 This section identifies the legislation, policy and guidance and other documentation that has informed the assessment of likely significant effects on the water environment.

Legislation

19.2.2 Table 19-1 lists the legislation relevant to the assessment of the likely significant effects on the water environment.

Table 19-1 List of relevant legislation

Legislation	Relevance to assessment
Water Resources Act 1991 [1]	The Water Resources Act 1991 establishes regulatory controls for water abstraction, water impoundment and protection of water resources, including provision for drought orders and drought permits. The Act is relevant because the Proposed Development involves the abstraction of water for which licences could be required under the Act. The provisions regarding pollution control and environmental duties set out in the Act are relevant to the assessment of effects that could impact the chemistry and biology of water bodies. This requires an assessment to understand the potential effects of the Proposed Development on water resources and to mitigate any likely significant effects.
Land Drainage Act 1991 [2]	The Land Drainage Act 1991 identifies the parties responsible for the management and maintenance of land drainage including maintaining flows in watercourses. It provides relevant authorities with the powers to ensure landowners carry out works to maintain flows within watercourses and obtain the relevant consent(s) as required. This is relevant because the Proposed Development could affect flows in Main Rivers and Ordinary Watercourses. The likely significant effects associated with this are considered in section 19.8 and they are also

Legislation	Relevance to assessment
	considered in the ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6) and ES Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6).
Urban Waste Water Treatment (England and Wales) Regulations 1994 [3]	The Regulations aim to protect the environment from the adverse effects of urban wastewater discharges and some industrial discharges. They also require the designation of sensitive areas that require additional water quality protection. The Proposed Development involves the use and release of treated wastewater and sensitive areas that require additional protection are identified in the baseline (section 19.7) and considered in the assessment of effects (section 19.8).
Marine and Coastal Access Act 2009	The Marine and Coastal Access Act 2009 makes provision: • In relation to marine functions and activities • About migratory and freshwater fish • In connection with the establishment of an English coastal walking route and of rights of access to land near the English coast • In relation to works which are detrimental to navigation Part 3 of the Act makes provision for marine policy statements and Marine Plans to be prepared. Part 4 makes provision for marine licensing. Part 5 sets out the stipulations for the designation of marine conservation zones. The Marine and Coastal Access Act 2009 is relevant because the Proposed Development would require construction at the Water Recycling Plant (WRP) site of an outfall below mean high water springs, which would require a marine licence.
Flood and Water Management Act 2010 [4]	The Flood and Water Management Act 2010 (FWMA) aims to improve the management of flood risk and water resources by creating clear roles and responsibilities. It gives local planning authorities the role of Lead Local Flood Authority (LLFA) under which they take on the responsibility of managing flood risk on a local scale from surface water, groundwater and Ordinary Watercourses. The Environment Agency has a strategic overview of all flood risk. The FWMA provides opportunities for a comprehensive, risk-based approach on land use planning and flood risk management by local planning authorities and other key partners. The FWMA 2010 is relevant because the Proposed Development could impact upon and be affected by flood risk.
Environmental Permitting (England and Wales) Regulations 2016	The Environmental Permitting (England and Wales) Regulations 2016 provide a consolidated system of environmental permitting in England and Wales. Reg 12(1) provides that a person must not, except under and to the extent authorised by an environmental permit cause or knowingly permit a water discharge activity or groundwater activity or flood risk activity.

Legislation	Relevance to assessment
	Flood risk activities include work on Main Rivers. The Proposed Development would cross Main Rivers and would therefore require flood risk activity permits. Under the Regulations groundwater activities are defined to include the discharge of a pollutant that results in or could lead to the direct or indirect input of that pollutant to groundwater. A 'water discharge activity' includes the discharge or entry to inland freshwaters, coastal waters or relevant territorial waters of any (i) poisonous, noxious or polluting matter, (ii) waste matter, or (iii) trade effluent or sewage effluent. The Proposed Development would require released to the water environment that would be permitted under the Environmental Permitting (England and Wales) Regulations 2016.
The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [5]	The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 transpose into English and Welsh law the Water Framework Directive (WFD) 2000/60/EC and contain provisions to protect rivers, lakes, estuaries, coastal waters and groundwater. The Regulations provide for protection of all types of water bodies and include environmental objectives, compliance parameters to be assessed and provide for the protection of areas with specific requirements such as shellfish waters for example. The Proposed Development could impact the quality elements of water bodies. An assessment must be undertaken to establish whether the Proposed Development is likely to result in a failure to achieve Water Environment Regulations (WER) objectives in relation to a water body. These requirements underpin the impact assessment for the water environment and are specifically assessed in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6). The WER are supported by the Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015 (typically referred to as 'the WFD Directions 2015'), which establish specific environmental quality standards for surface and groundwaters. The WFD Directions 2015 are used to underpin the assessment of water quality impacts presented in section 19.8 of this chapter and in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
Conservation of Habitats and Species Regulations 2017 [6]	The Conservation of Habitats and Species Regulations 2017 provide for the designation and protection of important habitats and species as part of the National Site Network (NSN), which include protected sites known as Special Protection Areas (SPA) and Special Areas of Conservation (SAC). Water dependent NSN sites also benefit from protection under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The Proposed Development could impact habitats and species in the fluvial and inshore marine areas. This requires assessment to understand the potential effects of the Proposed Development on habitats and species of conservation importance and to mitigate any likely significant effects.

Legislation	Relevance to assessment
Environmental Targets (Water) (England) Regulations 2023 [7]	The Environmental Targets (Water) (England) Regulations 2023 set binding targets in relation to the water environment. The first target in respect of water is that the load of total nitrogen, total phosphorus and sediment entering the water environment through agricultural diffuse pollution by 31st December 2038 should be at least 40% lower than the baseline. The baseline was established between 1 January 2018 and 31 December 2018. The second target in respect of water is that the load of total phosphorus discharged into freshwaters from relevant discharges is, by 31 December 2038, at least 80% lower than the baseline. The baseline was established between 1 January 2020 and 31 December 2020. The Proposed Development could impact the water environment as recycled water could affect total phosphorus levels in Havant Thicket Reservoir and downstream water bodies that would receive compensatory flows from Havant Thicket Reservoir. This requires assessment to understand any potential effects of the Proposed Development on designated sites and their protected features and to mitigate any likely significant effect.
Salmon and Freshwater Fisheries Act 1975 [8]	This Act consolidates the Salmon and Freshwater Fisheries Act 1923 and certain other enactments relating to salmon and freshwater fisheries [8]. The Act covers a wide range of issues relating fisheries; with relevance to the Proposed Development, it is an offence to hinder fish passage or introduce liquid or solid matter that is poisonous or injurious to fish, spawn, spawning areas [8]. Temporary dams at trenched crossings could affect fish passage and changes in water quality in watercourses that would receive compensatory flows from Havant Thicket Reservoir could affect fish behaviour. This requires assessment to understand any potential effects of the Proposed Development on fish and to mitigate any likely significant effect.

National policy

19.2.3 The primary policy for considering the application for the Development Consent Order (DCO) for the Proposed Development is the National Policy Statement for water resources infrastructure (NPSWRI) [9]. This sets out policies to guide how DCO applications for water resources infrastructure should be decided and how the effects of such infrastructure are considered.

19.2.4 Table 19-2 lists the paragraphs from the NPSWRI, relevant marine policy documents and other national policy that are relevant to the water environment assessment. It also sets out where these policy requirements are addressed within the chapter.

Table 19-2 List of relevant national policy and plans

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
National Policy Statement for water resources infrastructure [2025] [9]		

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
2.1.1; 2.1.3 to 2.2.16	These paragraphs summarise pressures on water resources including population growth and the need for sufficient water in watercourses, to enhance biodiversity and protect the environment. There is an immediate need to build resilience in the water sector to address pressures on water supplies. Clean and plentiful water is a goal set out in the government's 25 Year Plan to Improve the Environment (the 25 Year Environment Plan) and in its first revision, the Environmental Improvement Plan (2023) for improving the natural environment (the Environmental Improvement Plan). The government's vision is a water industry that works for everyone providing reliable, robust services now and in the future, without compromising the needs of the environment.	Potential impacts on the water environment are assessed in section 19.8. Enhancements to the water environment future baseline of the Hermitage Stream are described in section 19.7. Refer to ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6) which assesses the impact of the Proposed Development on water bodies and associated protected areas.
4.7.1 to 4.7.16; 4.7.19	These paragraphs establish a requirement that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, whether existing or future (i.e. arising from climate change). Where development cannot be avoided, it should be made safe without increasing flood risk elsewhere. Supporting guidance explains that essential infrastructure (which can include nationally significant infrastructure projects covered by the National Policy Statement) is permissible in areas of high flood risk, subject to the sequential and exception tests. Infrastructure must be flood-resilient and avoid increasing risk elsewhere. Mitigation should be secured through DCO requirements, and may include the use of Sustainable Drainage Systems (SuDS) and vegetation to help to slow runoff, hold back peak flows, and make landscapes more able to absorb the impact of severe weather events. Surface water discharge should match greenfield runoff rates, accounting for climate change, unless equivalent off-site arrangements are secured.	The impact of the Proposed Development on surface and groundwater flows and flood risk is assessed in section 19.8. Also refer to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Mitigation measures are detailed in section 19.4.

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
	The sequential approach should be applied within the site layout by prioritising the placement of the most vulnerable uses in areas with the lowest flood risk. Open spaces should be designed for multiple purposes, such as providing amenity value, wildlife habitats, and flood storage. Additionally, the layout should improve flow routes, enhance flood storage capacity, and incorporate SuDS. This approach encourages multi-functional land use, combining flood resilience with environmental and social benefits. A Flood Risk Assessment (FRA) is mandatory for all sites in Flood Zones 2 and 3 (medium/high probability of river or sea flooding). An FRA is also required for sites in Flood Zone 1 (low probability) if the development has an area ≥ 1 hectare, strategic flood risk assessments indicate future risk, or the Project may be affected by other sources (surface water, groundwater, canals, reservoirs) or critical drainage problems. The FRA should identify and assess all sources of flooding (river, sea, surface water, groundwater, reservoirs) and demonstrate how risks to and from the development will be managed. Climate change should also be considered for the design lifetime of the development, including likely climate scenarios from the latest UK Climate Projections. The FRA should also consider safe access and egress routes during flood events, and opportunities for enhancing local flood management, e.g. using reservoirs for temporary flood storage. Early discussions with the Environment Agency (and where relevant, lead local flood authorities, Internal Drainage Boards, sewerage undertakers and other relevant bodies) are recommended to scope the FRA and resolve concerns before submission as part of a DCO application.	
4.15.1 to 4.15.12	Paragraphs 4.15.1 to 4.15.12 set out a series of requirements for the assessment of environmental impacts on impacts of new development on the local water environment. This includes groundwater, inland surface water, transitional waters and coastal waters, including designated bathing waters.	The impact of the Proposed Development on surface and groundwater is assessed in section 19.8. Impacts on surface and groundwater bodies and

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
	The ES should provide a description of: • *"the existing quality of waters affected by the proposed project* • *existing water resources affected by the proposed project and the impacts of the proposed project on water resources* • *existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project, and any impact of physical modifications to these characteristics* • *reference any impacts of the proposed project on water bodies or protected areas under the Water Framework Directive Regulations including groundwater resources, bathing or coastal waters* • *the likely range of impacts on existing water quality, resources, physical characteristics of the water environment and waterbodies or protected areas due to climate change* • *any cumulative effects"* • Potential for spreading non-native species • Any mitigation measures that are required (e.g. pollution control measures)	protected areas such as bathing waters are also assessed in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6). Cumulative effects are assessed in ES Chapter 20 Cumulative and in-combination effects, Volume I (Document Reference 6.1, Volume 6).
South Inshore and South Offshore Marine Plan [2018] [10]		
Table 1, Objective 11	The Proposed Development is located within the South Inshore Marine Plan area; this is covered under the South Inshore and South Offshore Marine Plan, which was adopted in 2018. Note that the Proposed Development does not cross into the South Offshore Marine Plan area. Relevant polices in Objective 11 include S-WQ-1 which requires that proposals that may have significant adverse impacts upon water environment, including upon habitats and species that can be of benefit to water quality must demonstrate that they will, in order of preference: a) avoid, b) minimise, c) mitigate significant adverse impacts. S-WQ-2 is also relevant and requires that activities that can deliver an improvement to water environment or enhance habitats and species which can be of benefit to water quality should be supported.	Impacts on marine waters are assessed in section 19.8 and in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
National Planning Policy Framework (NPPF) [2025] [11]		

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
164	Paragraph 164 sets out that new development should be planned for in ways that avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures.	Refer to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6) for climate change allowances.
170 -182	Section 14, paragraphs 170 - 182 set out detailed considerations for flood risk in terms of planning for climate change, avoiding new development in areas of inappropriate flood risk by applying a sequential, risk-based approach followed by an exception test where applicable, and ensuring that new developments are sufficiently resilient to flooding. The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the Proposed Development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying this test. If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. The need for the exception test will depend on the potential vulnerability of the site and of the development proposed, in line with the Flood Risk Vulnerability Classification. The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. To pass the exception test it should be demonstrated that: a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk	Refer to ES Appendix 19.1, Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
	elsewhere, and, where possible, will reduce flood risk overall. Both elements of the exception test should be satisfied for development to be allocated or permitted. Further details related to flood risk are provided in the supporting Planning Practice Guidance for Flood Risk and Coastal Change [12]. It provides additional guidance on flood risk vulnerability classifications and managing residual risks in support of the NPPF. It uses the concept of Flood Zones, areas at increased risk of flooding from other sources, vulnerability classifications and their compatibility to assess the suitability of a specific site for a certain type of development. It provides clarification on the application of the Sequential Test for all sources of flood risk, not only fluvial and coastal/tidal flooding, and where there is a need to apply the Exception Test.	
187 (e)	Section 15, paragraph 187 (e) states that new and existing development should not pose an unacceptable risk of water pollution, and that it should help to improve local environmental conditions, including water quality and actions set out in the River Basin Management Plans (RBMP).	The impact of the Proposed Development on surface and groundwater quality is presented in section 19.8. The consideration of the Proposed Development on actions set out in the RBMP is undertaken in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
Environmental Improvement Plan [2025] [13]		
Targets and commitments (note this document does not have paragraph numbers).	Goal 3: Water of the Environmental Improvement Plan (EIP) sets a range of targets which aim to improve the water environment and safeguard water resources, including: • Reduce nitrogen, phosphorus and sediment pollution from agriculture to the water environment by at least 40% by 2038, compared to a 2018 baseline, with an interim target of 12% by December 2030 compared to a 2018 baseline. • Reduce total nitrogen, phosphorus and sediment pollution from agriculture to the water environment by at least 18% in	The Proposed Development could affect water quality (phosphorus and sediment levels) in watercourses and associated water bodies assessed under the Water Environment Regulations. Water dependent designated sites could also be affected.

Relevant paragraph reference	Summary of policy requirement	Where addressed in chapter
	catchments containing protected sites in unfavourable condition due to nutrient pollution by December 2030. • Reduce phosphorus loadings from treated wastewater by 80% by 2038 against a 2020 baseline, with an interim target of 55% by December 2030 against a 2020 baseline. • Reduce the use of public water supply in England per head of population by 20% by 2038 from a 2019 to 2020 baseline, with interim targets of 9% by 31 March 2027 and 14% by 31 March 2032. • Restore 75% of our water bodies to good ecological status. • Reduce leakage by 20% from a 2017 to 2018 baseline by 31 March 2027 and 30% from a 2017 to 2018 baseline by March 2032. • Require water companies to have eliminated all adverse ecological impact from sewage discharges at all sensitive sites by 2035, and at all other overflows by 2050. • Target a level of resilience to drought so that emergency measures are needed only once in 500-years.	Refer to ES Appendix 19.7 Nutrient Assessment, Volume II, (Document Reference 6.2, Volume 6) for an assessment of the impact of the Proposed Development on nutrient supply. Refer to ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6) for the assessment of surface and groundwater bodies and associated designated sites.
South East River Basin Management Plan [2022] [14]		
Whole document	The South East RBMP was updated in 2022. It provides a baseline classification of the water environment in the South East River Basin District and highlights statutory objectives for protected areas[1]. It lays out the actions needed to improve the water environment and achieve the objectives of the WER.	Classification information is used in section 19.7 to inform the baseline for the water environment receptors. The objectives of the South East RBMP are addressed in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).

[1] Regulation 10 of the WER requires the EA to establish a register of protected areas which include areas identified for the abstraction of water intended for human consumption (DrWPA), areas designated for the protection of economically significant aquatic species (shellfish waters), bodies of water designated as recreational waters (bathing waters), nutrient-sensitive areas (Nitrate Vulnerable Zones (NVZ) and Urban Waste Water Treatment Directive (UWWTD)) and water-dependant areas designated for the protection of habitats or species (SAC and SPA).

Local policy

19.2.5 The local policies listed in Table 19-3 are considered relevant to the water environment assessment of the Proposed Development. While the Secretary of State (SoS) is required to determine a DCO application in accordance with the NPSWRI, it may be that the SoS considers aspects of local policy to be matters that are important and relevant to the determination. In accordance with the NPSWRI, in the event that there is any conflict between local policy and the NPSWRI, the NPSWRI would prevail for the purposes of decision making given the national significance of the infrastructure.

19.2.6 -Adopted and emerging development planning policy that is considered to be relevant, to the extent that they do not duplicate or conflict with NPS policy, is included in Table 19-3.

Table 19-3 List of relevant local policy

Local planning authority	Relevant local policy	Relevance to assessment
East Hampshire District Council (EHDC)	East Hampshire District Local Plan: Joint Core Strategy (adopted June 2014) [15] • Core Policy (CP) CP25: Flood Risk • CP26: Water quality/water resources	Policy CP25 informs the approach taken (methodology) in the ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). The Flood Risk Assessment (FRA) assesses flooding from all sources, including groundwater. As the Proposed Development crosses areas of flood risk, the policy has informed the assessment of flood risk in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6) (i.e. application of the sequential and exception tests). The FRA also addresses the question of ensuring that there is no net increase in surface water runoff. Policy CP26 requires the protection of water resources, especially during development. It is relevant to the water environment assessment as the Proposed Development could have effects on Havant Thicket Reservoir and the surrounding environment. The assessment methodology within section 19.5 identifies the relevant receptors and section 19.8 assesses the potential risks to those receptors.
Eastleigh Borough Council (EBC)	Eastleigh Borough Local Plan 2016-2036 (adopted 25th April 2022) [16]	Policies DM5 and DM6 have informed the approach regarding the management of flood risk and surface

Local planning authority	Relevant local policy	Relevance to assessment
	• Policy Development Management DM5: Managing flood risk • Policy DM6: Sustainable surface water management and watercourse management • Policy DM8: Pollution • Policy DM10: Water and wastewater	water drainage particularly during the operational phase of the Proposed Development (refer to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Policy DM8 sets out requirements for pollution management and has informed the approach to mitigation of pollution, refer to section 19.4. Policy DM10 requires no deterioration to the status of water bodies which might impact adversely on WFD requirements. This has been assessed in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
Fareham Borough Council (FBC)	Fareham Local Plan 2037 (adopted 5 April 2023) [17] Policy CC2: Managing Flood Risk and Sustainable Drainage Systems • Policy NE4: Water Quality Effects on the Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar Sites of the Solent Policy D4: Water Quality and Resources	Policy CC2 has informed the approach regarding the management of flood risk and surface water drainage of the Proposed Development (refer to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Policy NE4 aims to ensure that development proposals are not detrimental to the management and protection of river, coastal and groundwater (including Source Protection Zones). Opportunities to enhance these resources in line with the water body objectives will be supported. ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6) provides a detailed assessment of potential impacts of the Proposed Development on surface and groundwater bodies. The council has the objective of restoring water bodies around Fareham to 'good' WER status. Thus, through the D4 policy, the council ensures new developments protect and enhance water quality and

Local planning authority	Relevant local policy	Relevance to assessment
		existing resources where such opportunities arise.
Hampshire County Council (HCC)	Local Flood and Water Management Strategy (adopted October 2020) • Section 4. Sustainable and Resilient Development Policy	This policy identifies the actions to be implemented by the council in order to guide local planning authorities for approving development which will not increase flood risk. Refer to Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Havant Borough Council (HBC)	Havant Borough Council Local Plan (Allocations) – Adopted Version (2014) Policy AL7: Hermitage Stream	Policy AL7 states that planning permission will be granted for development proposals that positively contribute to the improvement of the Hermitage Stream. Planning applications for development proposals within proximity of the Hermitage Stream that prevent improvements to the Hermitage Stream being delivered, may be refused. As described in section 19.7, the future baseline of Hermitage Stream, against which our Proposed Development is be assessed, will be affected by Portsmouth Water's package of river channel improvement measures, which includes a range of geomorphological and habitat improvements in Hermitage Stream, and its tributaries Riders Lane Stream and Park Lane Stream. The combined length of these improvements would be approximately 5.48km.
	Havant Borough Council Draft building a better future plan 2025 [18] (the Council was working on a new Local Plan to replace the Core Strategy and Allocations plan. Due to issues raised by the planning the plan was withdrawn in 2021). • Policy 23: Water Quality Effects on International Sites • Policy 26: Flood Risk • Policy 27: Drainage • Policy 45: Aquifer Source Protection Zones	Draft Policy 23 deals with water quality nutrient impacts on designated sites. This has been taken into account in ES Appendix 19.7 Nutrient Assessment, Volume II, (Document Reference 6.2, Volume 6). Results of the nutrient assessment have also been used to inform potential impacts on water quality and designated sites in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II, (Document Reference 6.2, Volume 6).

Local planning authority	Relevant local policy	Relevance to assessment
		Draft Policy 26 (flood risk) has informed the approach regarding the flood risk (refer to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Draft Policy 27 deals with surface water drainage and SuDS, including in future risk associated with climate change. This has been taken into account in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Draft Policy 45 is designed to assist in the protection of groundwater and controlled waters. This has been taken into account in ES Appendix 19.2 Hydrogeological Impact Assessment (HIA), Volume II (Document Reference 6.2, Volume 6).
Portsmouth City Council (PCC)	Portsmouth Local Plan 2038 (Draft) (2021) [19] • Policy G3: Water Quality (Nutrient Neutrality) • Policy G5: Flood risk and drainage	Policy G3 requires the need for planning applications to be nutrient neutral for their lifetime. This requirement is addressed in ES Appendix 19.7 Nutrient Assessment, Volume II (Document Reference 6.2, Volume 6). Policy G5 requires that new development proposals should address risk from all types of flooding and that proposals should follow the relevant flood risk management steps as set out in the NPPF and National Planning Practice Guidance. This is addressed in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
	Milton Neighbourhood Plan, Adopted Version 2021 – 2036 • Place and Design Policies PLD1: Sustainable Design	Policy PLD1 requires that developments must be well designed and sustainable to meet set requirements. Specifically, requirement 4 states that development must have no adverse impact on surrounding land or properties from surface water run-off. Wherever possible, hard surfaces must be permeable and SuDS should be used. This is addressed in ES Appendix 19.1 Flood Risk

Local planning authority	Relevant local policy	Relevance to assessment
		Assessment, Volume II (Document Reference 6.2, Volume 6).
South Downs National Park Authority (SDNPA)	South Downs Local Plan (adopted July 2019) [20] • Policy SD17: Protection of the Water Environment • Policy SD49: Flood Risk Management Policy • Policy SD50: Sustainable Drainage Systems	Though the Proposed Development is not within the SDNPA, activities are proposed in close proximity and may therefore impact on surface and groundwater within the SDNPA. Policy SD17 is relevant to the water environment as it states that development will not be permitted unless it conserves and enhances water quality, the ability of groundwater, surface water features and water course corridors to function by natural processes and the biodiversity of such receptors. Development proposals must incorporate measures to eliminate risk of pollution to ground water, surface water and watercourse corridor features which would harm their ecological status. The assessment within this chapter identifies groundwater and surface water features located within and surrounding the Proposed Development (refer to section 19.7) and assesses the potential risks to those receptors (refer to section 19.8). Policy SD49 states that development will be permitted where it seeks to reduce the impact and extent of all types of flooding and requires that the necessary flood protection, mitigation and adaptation measures should be included. This is considered in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Policy SD50 identifies SuDS as being important considerations in development planning. These policies have informed the approach regarding the management of flood risk and surface water drainage of the Proposed Development (refer to ES Appendix 19.1 Flood Risk

Local planning authority	Relevant local policy	Relevance to assessment
		Assessment, Volume II (Document Reference 6.2, Volume 6).
	South Downs Local Plan Review: • First Public Consultation (Regulation 18) January 2025 • Policy SD17: Protection of the water Environment • Policy SD49: Flood risk management • Policy SD50: sustainable drainage systems	The Local Plan Review has the same policy numbers and scope for the water environment as described above for the adopted Local Plan.
Winchester City Council (WCC)	Your Place Your Plan Winchester District Local Plan 2020 – 2040 [21]: • Policy D7: Development standards • Policy NE6: Flooding, flood risk and the water environment • Policy NE17: Rivers, watercourses and their settings	Policy D7 states that development will only be permitted where it achieves an acceptable standard of environmental quality and avoids unacceptable impacts on health or quality of life. Where there is potential for adverse impacts to occur on the following matters a proportionate assessment should be conducted (relevant to the water environment): iv. Groundwater and surface water pollution; vi. Construction phase pollution impacts for large or prolonged developments. Potential risks to surface and groundwater and pollution from construction are considered in ES Chapter 19 Water Environment Volume I (Document Reference 6.1, Volume 6); ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6) and ES Appendix 19.3 Hydrogeological Impact Assessment (HIA), Volume II (Document Reference 6.2, Volume 6). Policy NE6 has informed the approach to the management of flood risk and surface water drainage of the Proposed Development (refer to ES Appendix 19.1 Flood Risk

Local planning authority	Relevant local policy	Relevance to assessment
		Assessment, Volume II (Document Reference 6.2, Volume 6). Policy NE6 also covers the requirement for sequential and exceptional tests, site lifetime risks from climate change, management of flood risk from new developments, and the use of SuDS – all of which are considered in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6). Policy NE17 states that development proposals that affect rivers, watercourses or their settings will be permitted where they conserve and enhance the following (relevant to the water environment): • Water quality and quantity, and help achieve requirements of the Water Framework Directive and Habitats Regulations or their replacement, in the case of the River Itchen SAC and Upper Hamble (Solent Maritime SAC, and Solent & Southampton Water SPA/Ramsar); SAC compensatory habitats on the River Meon, River Dever, River Dun, Bourne Rivulet, and River Test; and habitats relied upon as identified in the Solent Wader and Brent Goose Strategy (SWBGS). • Ability of groundwater, surface water features and watercourse corridors to function as natural flood management areas throughout seasonal variations. • Include measures to eliminate risk of pollution to groundwater, surface water and watercourse corridor features which would harm their ecological and/or chemical status; • Creation of adequate natural buffer zones between riverbanks/watercourse banks and any built development. Potential risks to surface and groundwater and pollution from

Local planning authority	Relevant local policy	Relevance to assessment
		construction are considered in ES Chapter 19 Water Environment Volume I (Document Reference 6.1, Volume 6) and ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6) and ES Appendix 19.3 Hydrogeological Impact Assessment (HIA), Volume II (Document Reference 6.2, Volume 6). Water dependent protected areas are also assessed in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6)
Denmead Neighbourhood Plan 2011 - 2031 (adopted September 2012)	Policy 1A spatial plan for the parish Policy 2 Housing site allocations	Policy 1A and Policy 2 of the Denmead Neighbourhood Plan, which aim to ensure new developments do not increase flood risk, have also informed the approach in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).

Guidance and standards

19.2.7 In addition, the water environment assessment has been undertaken in accordance with relevant guidance and has been compiled in accordance with professional standards. The guidance and standards which relate to this assessment are detailed in Table 19-4.

19.2.8 Note that some of the guidance cited below was written prior the UK leaving the European Union, and as such refers to 'WFD' rather than 'WER'.

19.2.9 The guidance all remains applicable to the WER by virtue of the Floods and Water (Amendment etc.) (EU Exit) Regulations 2017.

Table 19-4 List of relevant guidance and standards

Guidance	Description	Relevance to assessment
Non-local planning authority guidance		
Environmental Impact Assessment (EIA) guidance		
Department for Transport (2023) Transport Analysis Guidance Unit A3: Environmental Impact Appraisal (Section 10) [22]	The methodology set out in this chapter provides an appraisal framework for analysing the key information of relevance to the water environment.	The guidance has been consulted whilst developing the definitions for receptor sensitivity and magnitude of impact, as set out in section 19.5. This guidance is relevant because it has been

Guidance	Description	Relevance to assessment
		developed for linear schemes, and the Proposed Development includes linear elements.
National Highways (2020) Design Manual for Roads and Bridges (DMRB) – Sustainability and Environmental Appraisal, LA 113 Road drainage and the water environment. Revision 1. HE-DMRB-SE LA 113 [23]	This document describes the requirements for assessment and management of the impacts that road projects can have on the water environment.	The guidance has been consulted whilst developing the definitions for receptor sensitivity and magnitude of impact, as set out in section 19.5. This document, alongside others identified in the methodology, set out a well-established framework for EIA that is accepted by regulators and is widely applied with respect to infrastructure projects. This guidance is relevant because it has been developed for linear schemes, and most of the Proposed Development is a linear scheme.
Planning Inspectorate (2024) Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive [24]	This advice note explains the roles of applicants, the appropriate agencies and the SoS in meeting the requirements of The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, as applicable to Nationally Significant Infrastructure Projects under the Planning Act 2008.	The approach detailed in this guidance has been followed to produce the WER compliance assessment – refer to ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
WER Compliance Assessment guidance		
Environment Agency (2023) Clearing the Waters for All [25]	This guidance details how to assess the impact of activities in estuarine (transitional) and coastal waters for the WFD.	The approach detailed in this guidance has been followed to produce the WER compliance assessment – refer to ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
Environment Agency (2016) Environmental Quality Standards Directive (EQSD)	This lists all priority substances and certain other polluting	This guidance has informed the work undertaken in ES Appendix 19.2 Water

Guidance	Description	Relevance to assessment
list for WFD assessments [26]	chemicals in the regulations and EQSD to be considered.	Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
UK Technical Advisory Group (TAG) (2004) Water Framework Directive UK Risk assessment of Groundwater Dependent Terrestrial Ecosystems (GWDTE) [27]	The paper sets out UKTAG's guidance outlining an approach for identifying GWDTE; and identifying those that are at risk of significant damage.	The guidance has been used in ascertaining non-designated sites that may be groundwater dependent as set out in section 19.5.
Flood risk guidance		
Environment Agency and Department for Environment, Food and Rural Affairs (Defra) (2024) Preparing a Flood Risk Assessment: Standing Advice [28]	Guidance that details information to make sure flood FRAs contain the correct information follow the standing advice.	This guidance is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Environment Agency (2022) Flood Risk Assessments: Climate Change Allowances [29]	Details when and how climate change allowances in FRAs should be used.	This guidance is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Pollution prevention guidance		
Environment Agency (2025) Surface water pollution risk assessment for your environmental permit [30]	This guidance details how to carry out a risk assessment for a bespoke water discharge permit that includes discharging hazardous chemicals and elements to surface water.	The approach detailed in this guidance has been followed to provide the list of chemicals that have been modelled and included within the ES (refer to section 19.8 and ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
Construction Industry Research and Information Association (CIRIA) (2001) Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors [31] [31]	Provides guidance regarding planning and managing construction projects to control water pollution.	The requirements in this guidance have fed into the development of mitigation as detailed in section 19.4.
CIRIA (2006) Control of Water Pollution from Linear Construction Projects – Technical Guidance (C648) [32]	This guidance looks at the issues of controlling and managing water pollution specifically for linear construction projects, such as roads, railways, pipelines, cables and water courses.	The requirements in this guidance have fed into the development of mitigation as detailed in section 19.4.

Guidance	Description	Relevance to assessment
CIRIA (2023) Publication Environmental good practice on site guide (fifth edition) (C811) [33])	This guidance sets standards for managing and controlling environmental impacts of construction projects.	The requirements in this guidance have fed into the development of mitigation (Outline Construction Environmental Management (CEMP) (Document Reference 7.1, DCO Volume 7) as detailed in section 19.4. These include measures to reduce contamination risk.
Department for Environment, Food and Rural Affairs (Defra) and Environment Agency (2024) Pollution prevention for businesses [34]	This guidance details how businesses and organisations can avoid causing pollution from the use and storage of potentially polluting substances and materials during construction and other activities.	The requirements in this guidance have fed into the development of mitigation as detailed in section 19.4.
Groundwater guidance		
Environment Agency (2007) Hydrogeological impact appraisal for groundwater abstractions. Science Report [35]	This provides practical guidance on how to assess the hydrogeological impact of groundwater abstractions.	This guidance has informed the assessment of hydrogeological impacts and informed the work undertaken in ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
Environment Agency (2007) Hydrogeological impact appraisal for dewatering abstractions. Science Report – SC040020/SR1 [36]	This provides practical guidance on how to assess the hydrogeological impact of groundwater abstractions in connection with dewatering operations at quarries, mines and engineering works.	This guidance has informed the assessment of hydrogeological impacts and informed the work undertaken in ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
CIRIA (2016) Groundwater control: design and practice (second edition) (C750) [37]	This guidance covers dewatering methods used to control groundwater as part of the temporary works for construction projects to reduce the risk that it will become unstable or flood.	The requirements in this guidance have fed into the development of mitigation as detailed in section 19.4 and ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
Environment Agency (2024) Protect groundwater and	This guidance assists in determining whether works would have an impact on	The requirements in this guidance have fed into the development of mitigation as detailed in section 19.4 and

Guidance	Description	Relevance to assessment
prevent groundwater pollution [38]	groundwater (quality and quantity).	ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
Environment Agency (2017) Groundwater protection technical guidance [39]	This guidance assists in determining whether works would have an impact on groundwater quality.	The requirements in this guidance have fed into the development of mitigation as detailed in section 19.4 and ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
Local planning authority Guidance		
Flood risk guidance		
East Hampshire District Council (2022) Level 1 Strategic Flood Risk Assessment [40]	This document reflects changes in planning policy and improvements to available flood mapping and modelling datasets since its original publication in 2008, and subsequent update in 2018.	This assessment is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Eastern Solent Coastal Partnership (2016) Partnership for Urban South Hampshire Strategic Flood Risk Assessment 2016 [41]	This document informs the development of the South East Plan and partner authority Local Plans.	This assessment is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Hampshire County Council (HCC) (2011) Preliminary Flood Risk Assessment (PFRA) and PFRA Review in 2017	The PFRA presents high-level information on significant local flood risk from past and potential floods.	This assessment is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Hampshire County Council (2020) Local Flood and Water Management Strategy	This strategy sets out the LLFA strategy for flood and water management.	This strategy is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Hampshire County Council (2023) Catchment Management Plans	Catchment Management Plans have been produced for Hampshire's 18 river catchments to identify Priority Areas (where flood risk is a particular concern) policies and actions needed to address the flooding	This management plan is relevant to ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
Hampshire County Council (2018) SuDS information for	This document sets out requirements for the	The requirements in this guidance have fed into the

Guidance	Description	Relevance to assessment
developers on SuDS principles and application	incorporation of SuDS in new developments.	development of mitigation, as detailed in section 19.4.
Groundwater guidance		
Hampshire County Council (2013) Hampshire Groundwater Management Plan (GWMP)	The GWMP sets out priorities for the management of groundwater flooding.	This management plan has informed the work undertaken in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6) and Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
Nutrient neutrality guidance		
East Hampshire District Council (undated) Position statement on nutrient neutral development [42] and East Hampshire District Council guidance on Nutrient Neutrality [43]	These documents set out the respective city, district and borough council positions on Natural England's guidance related to nutrient neutrality. This guidance is relevant to rivers and coastal waters that could be affected by the Proposed Development.	The position statements are relevant to ES Appendix 19.7 Nutrient Assessment, Volume II (Document Reference 6.2, Volume 6).
Havant Borough Council (2022) Position Statement and Mitigation Plan for Nutrient Neutral Development [44]		
Fareham Borough Council Position Statement (2024) on the effects of new residential development upon the Solent [45]		
Winchester City Council Position Statement (2020) on the effects of new residential development upon the Solent [45]		

19.3 Consultation, scoping and engagement

Consultation

19.3.1 Feedback received from stakeholders for each consultation relevant to air quality and odour is summarised within the Consultation Report (Document reference 5.1. DCO Volume 5) including how the Proposed Development has had regard to the feedback. These cover the consultation responses received for the following consultations:

1. Summer 2022 Consultation

2. Summer 2024 Consultation
3. Spring 2025 Consultation
4. Autumn 2025 Consultation
5. Spring 2026 Consultation

Environmental Impact Assessment scoping

Environmental Impact Assessment Scoping Opinion

19.3.2 An EIA Scoping Opinion was adopted by the Planning Inspectorate (the Inspectorate) on behalf of the SoS on 31 August 2023. A full list of the EIA Scoping Opinion comments made by the Inspectorate and their respective responses are provided in ES Appendix 5.3 Response to EIA Scoping Opinion (Document Reference 6.2, Volume 6).

19.3.3 Comments received in relation to the water environment are set out in Table 19-5 describing how and where these are addressed in the ES:

Table 19-5 Environmental Impact Assessment Scoping Opinion - Planning Inspectorate comments

Scoping Opinion ID	Summary of Scoping Opinion comment	How the ES addresses the Scoping Opinion comment	Where addressed in the ES
3.13.1	**Direct disturbance of surface and groundwaters during operation** The EIA Scoping Report proposes to scope this matter out on the basis that activities associated with the operation of the Proposed Development would not result in direct disturbance of surface water or groundwater bodies and that any routine intrusive maintenance work would be small scale and localised. The EIA Scoping Report does not consider potential events such as a burst or breakage to the pipeline and leakage during operation on surface water bodies. The ES should provide an assessment of these matters where there is potential for likely significant effects to occur or demonstrate the absence of a likely significant effect with agreement from relevant consultation bodies. The Inspectorate agrees that given the spatial extent and limited	This chapter considers impacts that are considered to be reasonably foreseeable as a consequence of the construction, routine operation and decommissioning of the Proposed Development. The potential impacts of the routine maintenance activities described in section 3.6 of ES Chapter 3 Description of the Proposed Development, Volume I, (Document Reference 6.1, Volume 6) are assessed in section 19.8. The potential impacts of emergency scenarios such as a pipe burst or breakage are instead considered in ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, Volume 6).	Risk identification and assessment for operation of the Proposed Development is detailed in Table 14.8 in ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, Volume 6).

Scoping Opinion ID	Summary of Scoping Opinion comment	How the ES addresses the Scoping Opinion comment	Where addressed in the ES
	duration of likely future maintenance activities, significant effects are unlikely to occur to groundwaters and is content to scope this matter out of further assessment.		
3.13.2	**Increased sediment supply during operation** The EIA Scoping Report proposes to scope this matter out on the basis that routine or unplanned maintenance work which could result in increased sediment supply would be infrequent and limited to discrete areas of the Proposed Development. In addition, it is stated that good practice mitigation measures for preventing and limiting soil erosion and turbid runoff would be in place. The Inspectorate agrees to scope this matter out of the ES based on information in the EIA Scoping Report. The ES should include a description of the good practice mitigation measures proposed and confirm how these would be secured in the DCO.	As summarised in section 19.4, maintenance activities during the operational phase that require excavation are subject to good practice measures secured in the Operational Environmental Management Plan (OEMP) (Document Reference 7.7, Volume 7).	Paragraphs 19.4.1 to 19.4.3
3.13.3	**Changes to groundwater flow during operation** The EIA Scoping Report proposes to scope this matter out on the basis that changes to groundwater flows would be assessed as part of the construction phase assessments and that, once constructed, the underground infrastructure will not have any further likely significant effects on groundwater flows to those assessed during the construction phase. The Inspectorate is content to scope this matter out of further assessment on the	Section 19.8 assesses the long-term impacts of the Proposed Development on subsurface flow patterns and volumes, as a result of construction.	Paragraphs 19.8.43 to 19.8.55; Table 19-57.

Scoping Opinion ID	Summary of Scoping Opinion comment	How the ES addresses the Scoping Opinion comment	Where addressed in the ES
	basis set out in the EIA Scoping Report provided that the construction phase assessment considers the long-term impacts of the infrastructure installed on subsurface flow patterns and volumes including through areas of sensitive geological faulting and spring flow.		
3.13.4	**Havant Thicket Reservoir and receiving watercourses water quality during construction** The EIA Scoping Report proposes to scope this matter out on the basis that no water would be present in the reservoir during construction resulting in no pathway for impact. Given the lack of impact pathway during construction, the Inspectorate agrees to scope this matter out of further assessment.	No construction would occur within the surface water catchments that drain into Havant Thicket Reservoir (i.e. the headwaters of Riders Lane Stream), and as such there is no mechanism for construction activities to affect the reservoir. Construction impacts on watercourses downstream of Havant Thicket Reservoir (Riders Lane Stream, Hermitage Stream and Langstone Harbour) have been scoped in and assessed in section 19.8.	Section 19.8
3.13.5	**Coastal water quality during construction** The Applicant proposes to scope this matter out on the basis that there are no activities directly within transitional or coastal water bodies during construction. The Inspectorate agrees to scope this matter out on the basis set out in the EIA Scoping Report. This matter should be revisited if the scope of construction activity changes.	Since the publication of the EIA Scoping Report, a requirement for construction of a surface water outfall below MHWS to the Hermitage Stream has been identified as being required therefore this activity has been scoped in and assessed in section 19.8.	Section 19.8
3.13.6	**Drainage strategy** The EIA Scoping Report states that a drainage strategy will be developed for the Proposed Development. The	Construction-stage drainage management measures are described and secured in the Outline	Paragraph 19.4.2 (construction); paragraph 19.4.3.

Scoping Opinion ID	Summary of Scoping Opinion comment	How the ES addresses the Scoping Opinion comment	Where addressed in the ES
	Applicant should provide a draft/outline version of the drainage strategy and demonstrate how this will be secured through the DCO or other legal mechanism. Potential construction phase impacts should also be addressed in the drainage strategy.	CEMP (Document Reference 7.1, Volume 7). Outline operational drainage strategies for above-ground infrastructure are FRA shown in Annex A of ES Appendix 19.1 Flood Risk Assessment, Volume II, (Document Reference 6.2, Volume 6).	
3.13.7	**Flood Zones** The EIA Scoping Report identifies Flood Zones across the study area however does not include sub-categories, such as an area of high probability (Flood Zone 3a) or functional floodplain (Flood Zone 3b). The ES should provide an accurate and consistent description of the baseline flood risk for each element of the Proposed Development and the description should clearly distinguish between Flood Zones, including Flood Zones 3a and 3b where relevant.	ES Appendix 19.1 Flood Risk Assessment, Volume II, (Document Reference 6.2, Volume 6) provides a description of baseline flood risk in the study area, a summary of which is provided in section 19.7. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	Table 19-53
3.13.8	**Sensitivity of receptors** The EIA Scoping Report states that the assessment methodology for groundwater will adopt the methodology set out in the Design Manual for Roads and Bridges (DMRB) standard LA 113 Road drainage and water environment. Table 18-7 of the EIA Scoping Report provides definitions of sensitivity for the purposes of water receptors and flood risk. Table 18-7 does not include a 'Very High' category of receptor sensitivity commonly used when applying an approach informed by the DMRB. Deviation from this	As set out in section 19.3, the Applicant has engaged with the Environment Agency, Natural England and the Lead Local Flood Authorities through the Biodiversity and Water Environment EIA Working Group. The approach to defining receptor value and sensitivity has been discussed, and a technical note providing more detail has been issued to stakeholders for comment. Comments were received and addressed in the ES. The assessment methodology described in	Table 19-10 and paragraphs 19.5.27 to 19.5.29.

Scoping Opinion ID	Summary of Scoping Opinion comment	How the ES addresses the Scoping Opinion comment	Where addressed in the ES
	approach has potential to undervalue or underestimate the significance of effect. Where the assessment deviates from established guidance, the Applicant should ensure that this is clearly stated and suitably justified in the ES. The Applicant should seek agreement with the relevant consultation bodies regarding the methodology used in the assessment and evidence this in the ES.	section 19.5 reflects the Working Group discussions.	
3.13.9	**Three-dimensional modelling** The EIA Scoping Report states that due to the complexities of the hydrogeological regime, it is considered that the Proposed Development cannot be sufficiently defined in a full scale three-dimensional model to accurately represent the processes occurring and how they may be affected by the Proposed Development. It is proposed to use analytical and two-dimensional conceptual models to inform the assessment. The Inspectorate considers that efforts should be made to agree the modelling approach with relevant consultation bodies. Modelling should be sufficient to inform a robust assessment of likely significant effects in the ES.	The Applicant has consulted with the EA and agreed the assessment approach.	ES Appendix 19.10 Degradation Modelling, Volume II (Document Reference 6.2, Volume 6) and ES Appendix 19.8 CORMIX Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II, (Document Reference 6.2, Volume 6)
3.13.10	**Nutrient levels** The EIA Scoping Report identifies a number of nature conservation sites which have been classified as failing condition due to elevated nutrient levels and for which nutrient neutrality is required to be demonstrated to enable	The Applicant notes the potential issues regarding nutrient supply to protected areas within the Itchen catchment and in the Solent, the requirement to demonstrate nutrient neutrality, and Natural England's comments on	ES Appendix 19.7 Nutrient Assessment, Volume II (Document Reference 6.2, Volume 6).

Scoping Opinion ID	Summary of Scoping Opinion comment	How the ES addresses the Scoping Opinion comment	Where addressed in the ES
	development. The ES should take account of any solutions for nutrient neutrality of Diffuse Water Pollution Plans currently being developed or mitigated. The Applicant's attention is drawn to Natural England's comments (Appendix 2 of this EIA Scoping Opinion).	the EIA Scoping Report. A detailed assessment of the potential impact of the Proposed Development on nutrient loads in the Solent and Itchen catchments is presented in Appendix 19.7 Nutrient Assessment, Volume II (Document Reference 6.2, Volume 6).	
3.13.11	**Existing flood defences** The Applicant's attention is drawn to Havant Borough Council and East Hampshire District Council's comments about existing sea defences reaching the end of their serviceable life. The assessment of flood risk for the WRP should include consideration of any potential future change in risk from sea level rise including the implications arising from a change to existing defences.	ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6) provides an assessment of flood risks to the Proposed Development including the WRP site. The FRA includes consideration of any potential future change in flood risk from climate change, including the implications arising from a change to existing defences. A summary of this is provided in section 19.8.	Section 19.8 ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).

Engagement

19.3.4 This section provides details of the ongoing technical engagement that has been undertaken with stakeholders in relation to the water environment.

EIA Working Groups

19.3.5 Five EIA Working Groups have been established as forums for ongoing engagement with statutory bodies regarding the Proposed Development. These Working Groups when combined cover all of the assessment topics considered by the EIA. A full description of each of the EIA Working Groups, the key stakeholders, and an overview of the topics presented can be found in ES Chapter 5 EIA approach and methodology, Volume I, (Document Reference 6.1, Volume 6). This section presents a summary of the topics covered in the EIA Working Groups which are of relevance for the water environment assessment.

19.3.6 The Biodiversity and Water Environment and Resilience EIA Working Groups, which includes biodiversity, water and flood risk have been the main forum for engagement for the water environment topic. There have been 12 meetings for the Biodiversity and Water Environment EIA Working Group and 12 meetings for the Resilience EIA Working Group between Summer 2022 and Spring 2026. Technical officers from EHDC, EBC, EA, FBC, Forestry Commission (FC), HCC, HBC, Joint

Nature Conservation Committee (JNCC), Marine Management Organisation (MMO), NE, PCC, SDNPA, Southern Inshore Fisheries and Conservation Authority (IFCA), Sussex IFCA and WCC attended the EIA Working Group meetings.

19.3.7 The following overarching themes were covered across the EIA Working Group meetings:

1. Introduction and background to the Proposed Development.
2. Overview of the baseline environment, including surveys.
3. An overview of the EIA Scoping Report and seeking feedback on the EIA Scoping Opinion.
4. An overview of the PEI Report, including setting out the baseline and approach to mitigation, as well as providing an overview of the PEI Report findings.
5. Updates on the approach to development of the design of the Proposed Development.
6. Briefings on the materials to be consulted on, including design and environmental assessment related matters, ahead of the summer 2022, summer 2024 and Spring 2025 Consultations.
7. Approach to mitigation, Commitments Register (ES Appendix 5.5 Commitments Register, Volume II (Document reference 6.2, DCO Volume 6)) and associated management plans to be provided with the DCO application.
8. Consultation feedback and updates on scheme development, and design principles following the Summer 2024 Consultation and PEI Report.
9. Updates on EIA progress and development of mitigation, including management plans and the Commitments Register.
10. An overview of the ES, including setting out the baseline and any updates from the PEI Report, as well as providing an overview of the findings of the EIA.

19.3.8 Comments received as part of the EIA Working Groups and matters resolved in relation to the water environment included:

1. In February 2023, the EA stated that the River Meon should be considered as a SAC, even though it is not formally designated. This was agreed and has been reflected in this assessment (see Table 19-54, section 19.7 and section 19.8). Potential construction impacts to the River Meon were discussed in February 2024, including sediment supply and impacts on fish.
2. In June 2023, the EA and NE queried the interaction between Havant Thicket Reservoir and Hermitage Stream. In January 2024, the approach to be taken to assess water quality impacts in Havant Thicket Reservoir and downstream water bodies was discussed with stakeholders (as a precursor to more detailed technical discussions in a separate technical meeting; refer to paragraph 19.3.9). Potential impacts on the reservoir and downstream water bodies, including the Hermitage Stream, are discussed in more detail in section 19.8.
3. In January 2024, NE raised the potential impact of any entrained sediment on sensitive ecological features from washouts, either directly into water bodies or through run off. Potential impacts on the water environment resulting from washouts during the construction and operational phases are discussed in more detail in section 19.8.

4. In January 2024, NE raised concerns about potential contaminants leaching from the historical landfill on the WRP site impacting water-dependent designated sites. Potential impacts on water quality in Langstone Harbour and connected water bodies during the construction and operational phases are discussed in more detail in section 19.8.
5. During the September 2024 meeting, an overview of the Summer 2024 Consultation and associated feedback was provided. This included concerns raised by the general public regarding purified recycled water mixing with spring water within Havant Thicket Reservoir and the suitability of purified recycled water as drinking water. Potential impacts on water quality in Havant Thicket Reservoir and connected water bodies are discussed in section 19.8.
6. Engagement with Portsmouth Water, the Applicant's Otterbourne Site team and the EA was ongoing to discuss potential impacts to Source Protection Zones (SPZs) and the appropriate mitigation measures. Groundwater monitoring was also ongoing from boreholes. It was confirmed that the data would be used to assess the impact of dewatering (see section 19.8 and ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II, (Document Reference 6.2, Volume 6).
7. At the December 2024 meeting a summary of the progress on the Spring 2025 Consultation was provided. This covered:
    a. Reporting the updates since the Summer 2024 Consultation on potential impacts on water quality arising from the Proposed Development
    b. Information in relation to the assessment of potential impacts on Havant Thicket Reservoir, connected downstream water bodies, and the Solent
    c. Potential design changes that may be included in the Spring 2025 Consultation

Technical Working Group

19.3.9 The EA, NE and the MMO were engaged on a regular basis through the Technical Working Group, with 23 meetings held between November 2023 and Spring 2026. These meetings allowed for the regular communication of progress on key elements such as:

1. The approach to the assessment, the range of impacts to be considered in this chapter and the scope of supporting technical assessments. The assessment approach is described in section 19.5, and Proposed Development impacts are considered in section 19.8.
2. The proposed approach to modelling the potential water quality effects of the Proposed Development, including compensatory flows from Havant Thicket Reservoir, releases from Eastney Long Sea Outfall (LSO) and releases from the WRP SuDS. Potential water quality effects are considered in section 19.8, and further details are provided in ES Appendix 19.5 Eastney Long Sea Outfall Solent dispersion modelling, Volume II (Document Reference 6.2, Volume 6), ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II (Document Reference 6.2, Volume 6), and ES Appendix 19.8 CORMIX Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II (Document Reference 6.2, Volume 6).

3. The future water body type and status classification of Havant Thicket Reservoir under the WER. The outcomes of these discussions are presented in ES Appendix 19.2 Water Environment Regulations compliance assessment, Volume II (Document Reference 6.2, Volume 6).
4. The proposed approach to assessing likely significant effects on the Solent and Itchen nutrient sensitive catchments. The results of this assessment are presented in ES Appendix 19.7 Nutrient Assessment, Volume II (Document Reference 6.2, Volume 6).

Technical engagement: Environment Agency, Natural England and Portsmouth Water

19.3.10 Technical engagement on the Proposed Development and matters related to the assessment of impacts on the water environment has been undertaken with the EA, NE and Portsmouth Water (where relevant). These meetings allow the regular communication of progress on key elements such as:

1. The approach to undertaking numerical modelling of the potential water quality effects of the Proposed Development on Havant Thicket Reservoir and downstream water bodies such as Riders Lane Stream, Hermitage Stream and Langstone Harbour. These meetings were used to discuss and agree the modelling methodology, agree assessment scenarios, and obtain third party data to inform the modelling.
2. The approach to the hydrogeological impact assessment (HIA), including the approach to quantitative assessment and mitigation of impacts during works in proximity to public water supplies.

Wildlife and Water Interest Group

19.3.11 Engagement with non-statutory stakeholders that have an interest in the water environment has taken place through the Wildlife and Water Interest Group (WWIG) between Summer 2022 and Spring 2026. A full description of the WWIG, the non-statutory stakeholders, and an overview of the topics presented can be found in ES Chapter 5 EIA approach and methodology, Volume I, (Document Reference 6.1, Volume 6). This section presents a summary of the main themes and matters covered in the WWIG which are of relevance to the water environment assessment.

19.3.12 The following overarching themes were covered across the WWIG meetings:

1. Introduction and background to the Proposed Development, including the assessment timescales, key issues and risks
2. Overview of the baseline environment and surveys undertaken. This has informed the baseline in section 19.7 and ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6).
3. An overview of the development of the PEI Report, including Proposed Development design and responses to the EIA Scoping Report
4. An overview of the Summer 2024 and Spring 2025 Consultation responses
5. Approach to mitigation and associated management plans provided with the DCO application

6. An overview of the ES, including setting out the baseline and any updates from the PEI Report, as well as providing an overview of the findings of the EIA

19.3.13 Key comments received as part of the WWIG meetings and matters resolved in relation to the water environment included:

1. The need to highlight the significant positive impacts on sensitive chalk river habitats that the Proposed Development would deliver, as a result of a reduction in abstractions from the chalk aquifer and the River Itchen. This is discussed in ES Chapter 1 Introduction, Volume I (Document Reference 6.1, Volume 6).
2. The Applicant informed the WWIG that water quality modelling was being undertaken, the results of which were not included in the PEI Report at Summer 2024. Modelling results are presented in ES Appendix 19.5 Eastney Long Sea Outfall Solent dispersion modelling, Volume II (Document Reference 6.2, Volume 6), ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II (Document Reference 6.2, Volume 6), and ES Appendix 19.8 CORMIX Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II (Document Reference 6.2, Volume 6).
3. A Nutrient Assessment to be undertaken to identify any potential changes in nitrogen loading to the Solent nutrient sensitive catchment and phosphorus to the River Itchen nutrient sensitive catchment. The results of this assessment are presented in ES Appendix 19.7 Nutrient Assessment, Volume II (Document Reference 6.2, Volume 6).

19.4 Primary and tertiary mitigation

Primary measures

19.4.1 As described in ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6) a range of measures have been embedded into the Proposed Development design to avoid or reduce environmental effects. These primary mitigation measures specific to the water environment, which form part of the design that has been assessed, are:

1. The location of Above Ground Plant (AGP) and the route of the Pipeline, as detailed in ES Chapter 4 Consideration of alternatives, Volume I (Document Reference 6.1, Volume 6) have been selected to avoid or reduce environmental effects where practicable. With regards to the water environment, this includes crossings of major rivers (such as the River Itchen and River Meon) that are located outside the chalk aquifer.
2. All Main Rivers would be crossed using trenchless crossing techniques. Additional information is provided in Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6).
3. All tunnels and trenchless crossings of watercourses and other barriers would use a methodology that excludes groundwater.
4. The Pipeline would be installed at a minimum of 2.5m below the bed of watercourses crossed using trenchless techniques. This includes all Main Rivers and many Ordinary Watercourses; additional information is provided in

Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6).

5. The Pipeline would be installed at a minimum of 1.5m below the bed of watercourses crossed using open trenching. This includes some Ordinary Watercourses; additional information is provided in Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6).
6. Tunnel shafts associated with the Pipeline would be avoided where reasonably practicable in the chalk aquifer (particularly in SPZ).
7. Leak detection would be present on the pipeline transfer, either via flow and pressure monitoring or active acoustic monitoring. This has been designed to automatically shut the pipeline system down in the event a leak starts. Therefore, no long-term leakages are likely to occur.
8. Phosphorus would be removed using reverse osmosis membranes within the WRP site, as described in section 3.6 in ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6).
9. Washout valves would be used during the commissioning process and are anticipated to be tested approximately every six months during normal operation. All release of water from washouts would be collected directly in a tanker for disposal at an appropriately licenced facility, with no release of water from washouts released to the environment.

Tertiary measures

19.4.2 Good construction practices are set out in the Outline CEMP which is secured by a requirement in the DCO (Document Reference 7.1, Volume 7) and will manage the effects of construction. Detailed CEMP(s) will be produced and submitted for approval in accordance with the corresponding requirement in Schedule 2 to the draft DCO. The measures of particular relevance to the water environment are:

1. A Construction Drainage Plan will be prepared by the Contractor, once appointed, to manage the quality and quantity of construction stage drainage. Measures required to be included in the Construction Drainage Plan are set out in the main body of the Outline CEMP (under WE5 and WE6). (Document Reference 7.1, Volume 7).
2. A range of measures will be incorporated to manage potential contamination risks during construction.
3. Measures to manage effects where trenched crossings are to be carried out on an Ordinary Watercourse. Temporary dams would be used to create a dry area of channel in which to excavate a trench and install the pipeline, and river flows would be maintained through the use of pumps, pipes or flumes. These measures, required to be included in the Construction Drainage Plan, are set out in the main body of the Outline CEMP (under WE5 and WE6) (Document Reference 7.1, Volume 7).
4. Measures to manage effects where temporary culverts are required for crossings (e.g. where haul road access across watercourses is required).
5. A Drilling Fluid Management Plan (DFMP) will be developed by the Contractor to document how risks of any fluid breakouts would be reduced, and in the event of an outbreak from drilling or tunnelling works during construction how

any breakout would be managed and mitigated, to reduce environmental impacts.

6. A Voids Treatment Protocol is to be developed by the Contractor to document how voids encountered during construction within the chalk would be mitigated to avoid impacts on groundwater bodies.
7. Where the pipeline has the potential to be installed below groundwater level in permeable strata, clay stanks would be used at regular intervals to prevent the pipeline acting as a preferential pathway.
8. Establish and implement appropriate measures for the management of wastewater generated from construction activities, including dewatering operations, prior to release into foul sewers, groundwater, or surface water. All releases must comply with applicable regulatory requirements, and the necessary consents and permits shall be secured.
9. The Contractor will undertake a detailed Foundation Works Risk Assessment (FWRA). The detailed FWRAs will provide an assessment for each of the proposed foundation types for the WRP site, above ground plant, trenchless crossings, tunnels and shafts respectively. The detailed FWRAs will be undertaken in consultation with the EA, relevant local planning authority and other relevant bodies (if applicable).
10. The OEMP (Document Reference 7.7, Volume 7).includes details of washout management measures for isolation valves, air valves and washout valves.

19.4.3 In addition, a range of management plans, strategies and technical assessments have been developed to manage potential impacts that could occur during the operation of the Proposed Development. These include:

1. Permanent operational drainage strategies to control runoff and off-site flood risk from permanent above-ground infrastructure have been developed as part of the Flood Risk Assessment process. These include measures to control the supply of water, sediment and contaminants from the AGP and WRP and are presented within the SuDS Strategy in ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).
2. Maintenance activities during the operational phase that require excavation are subject to the same management measures as described in the Outline CEMP.

19.4.4 A detailed Water Monitoring Plan is to be developed by the Contractor to ascertain the pre-construction baseline and verify predicted impacts to the local surface water and groundwater regime from temporary and permanent construction effects during and post-construction. ES Appendix 19.9 Outline Water Monitoring Plan, Volume II, (Document Reference 6.2, Volume 6) will form the basis of the detailed Water Monitoring Plan and includes trigger levels and action plans (to enable mitigation to be implemented based on the monitored conditions).

19.4.5 Decommissioning would be subject to the appropriate permits, consents and regulatory requirements at the relevant time. Decommissioning activities are expected to follow good industry practice in place at the time and are anticipated to be similar in nature to measures contained in the Outline CEMP (Document Reference 7.1, Volume 7).

19.5 Assessment methodology

Scope of assessment

19.5.1 Likely significant effects requiring assessment may be temporary or permanent, direct, indirect, secondary, cumulative, in-combination, beneficial or adverse and may occur during construction, operation or decommissioning. Potential likely significant effects on water environment receptors within the scope of the assessment are summarised in Table 19-6. The scope of the assessment has responded to feedback received as detailed in section 19.3.

19.5.2 Effects from decommissioning of the Proposed Development are considered to be no greater than those identified during the construction phase and are therefore assessed as construction effects. Please refer to ES Chapter 3 Description of the Proposed Development, Volume I, (Document Reference 6.1, Volume 6) section 3.7 for additional information on decommissioning.

19.5.3 Cumulative effects are those that result from the interrelationship between the Proposed Development with other developments (inter-project). These are reported within ES Chapter 20 Cumulative and in-combination effects, Volume I (Document Reference 6.1, Volume 6).

19.5.4 In-combination effects are those that result from the interaction of individual effects combined together on a single receptor or resource at a single point in time. For example, effects on designated sites, habitats, protected and notable species, and effects from INNS which could be affected by changes to hydrology and hydrogeology are inherently assessed within ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6). However, where a receptor is affected by multiple topics and there is the potential for significant in-combination effects to occur, these aggregated effects are reported within ES Chapter 20 Cumulative and in-combination effects, Volume I (Document Reference 6.1, Volume 6).

19.5.5 Table 19-6 represents the summary of scope for the assessment of likely significant effects on the water environment. All scoped out elements as agreed in the EIA Scoping Opinion are confirmed in ES Appendix 5.3 Response to EIA Scoping Opinion, Volume II (Document Reference 6.2, Volume 6).

Table 19-6 Summary of scoping assessment

Receptor	Construction	Operation	Decommissioning
All surface and groundwater receptors: direct disturbance	Scoped in	Scoped out	Scoped in
All surface and groundwater receptors: supply of contaminants	Scoped in	Scoped in	Scoped in
All surface water receptors: changes to flows	Scoped in	Scoped in	Scoped in
All groundwater receptors: changes to flows	Scoped in	Scoped out	Scoped in
Havant Thicket Reservoir and downstream water bodies: water quality	Scoped in	Scoped in	Scoped in

Study area

19.5.6 This section describes the spatial scope (the area which may be impacted) for the assessment as it applies to the water environment. The spatial scope for the water environment is defined by the hydrological catchments for freshwater and groundwater bodies that intersect with the Order Limits. For marine water bodies, the study area also encompasses the area over which effects could occur as a result of changes to the existing release at the Eastney LSO resulting from the Proposed Development.

19.5.7 The study areas for the receptor groups are described in Table 19-7.

Table 19-7 Summary of the study area for the water environment

Receptor group	Description of study area	Figure reference
Surface fresh waters	As part of the SERBMP [14], the EA has defined river water body catchments based on surface hydrological catchments with an area of greater than 5km^2. For the purposes of this chapter, the study area for the freshwater environment (including flood risk) has been defined based on the hydrological catchments that intersect with the Order Limits. These hydrological catchments have been used because they are an established representation of distinct units (or receptors) within the surface drainage network. Surface catchments have been included within the study area if they are crossed by the Order Limits or if they are hydrologically connected (i.e. downstream) to a catchment in which activities associated with the Proposed Development would take place.	ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6).
Groundwater	Includes groundwater bodies that underlie the Order Limits or are hydrologically connected to these bodies. EA groundwater bodies are based on large-scale hydrogeological units and have been used to delineate the boundaries of the study area and define groundwater receptors. The extent of the groundwater study area has been based on the 'source-pathway-receptor' linkage principle, which incorporates a risk-based approach based on the assessment of impact pathways. The groundwater study area focusses on groundwater features within a 1km radius of the Order Limits.	ES Figure 19.2 Groundwater features, Volume III (Document Reference 6.3, Volume 6).
Surface waters – transitional and coastal	Covers the onshore catchments (referred to as coastal catchments by the EA) which are part of transitional and coastal water bodies within which the Order Limits are located, but also the water bodies within which changes could potentially occur as a result of alterations to the existing release at the Eastney LSO. This has been determined on the output of three-dimensional (3D) dispersion modelling.	ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6).

Assessment scenarios

19.5.8 ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume 6) provides an overview of the Proposed Development's approach to the temporal scope (the timescales over which impacts may occur) of the EIA. This section describes the temporal scope for the assessment as it applied to the water environment.

19.5.9 The assessment of likely significant effects compares a scenario without the Proposed Development against one with the Proposed Development in place as it develops over time (i.e. during the construction, operation and decommissioning phases).

19.5.10 Likely significant effects associated with the construction and decommissioning of the Proposed Development could commence at any point in the construction and decommissioning phases. Likely significant effects associated with the operational phase could occur when the Proposed Development is fully operational, at any time during the Proposed Development's operational lifetime (assumed to be a minimum of 100 years).

19.5.11 This assessment therefore considers effects that could occur at any point in time during each of the phases of the Proposed Development and encompasses the full duration of each development phase rather than a specific sub-period within each phase.

19.5.12 The timescales for ecological effects vary from the timescales presented in ES Chapter 5 EIA approach and methodology, Volume I (Document reference 6.1, DCO Volume 6). The duration of individual effects on water environment receptors has been aligned with river basin management planning periods, as follows:

1. Short-term – up to six years
2. Medium-term - 7 to 15 years
3. Long-term - greater than 15 years

Baseline methodology

Desk study

19.5.13 Baseline data collection has been undertaken to obtain information across the study area. This section provides the approach to collecting baseline data.

19.5.14 Much of the data describing the status of the water environment is available via the Catchment Data Explorer [46], the EA's online database. Within this database, the data is organised around a catchment hierarchy in response to the requirements of the WER, where the larger units contain one or many of the smaller units. This runs largest to smallest as follows: River Basin District → Management catchment → Operational catchment → Water body.

19.5.15 The WER also incorporates objectives and requirements for waters used for shellfish harvesting and the quality of raw waters abstracted for drinking water supply. Areas designated for the protection of habitats or species, or for their sensitivity to nutrients, and bathing waters have separate regulations that set out the objectives and requirements for these sites. These were once protected by EU Directives such as the Nitrates Directive, Urban Waste Water Treatment Directive

(UWWTD) and Habitats Directive and therefore are still noted on the EA database as resulting from these Directives.

19.5.16 Waters and water-dependent areas which are subject to the requirements of this separate legislation and the WER are known as Protected Areas. These include:

1. Areas identified for the abstraction of water intended for human consumption (Drinking Water Protected Areas)
2. Areas designated for the protection of economically significant aquatic species (Shellfish Water Protected Areas)
3. Bodies of water designated as recreational waters, including bathing waters (Bathing Water Protected Areas)
4. Nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones (NVZ) and sensitive areas for urban waste-water treatment (UWWTD Protected Areas)
5. Areas designated for the protection of habitats or species. These are water-dependent SAC and SPA and Ramsar sites (Habitats Protected Areas).

19.5.17 The South East RBMP has been developed to comply with the WER by the EA (Environment Agency, 2022) [14]. The RBMP defines river water body catchments based on surface hydrological catchments with an area of greater than 5km^2. The study area for water resources and hydrology has been defined based on these surface hydrological catchments. Where these receptors are identified as being at risk from the Proposed Development, they are separated out of the defined water body catchment as a distinct receptor in their own right.

19.5.18 Designated sites reliant on the water environment which are not covered by WER, such as Sites of Special Scientific Interest (SSSIs) and Marine Conservation Zones (MCZs) are also detailed in the relevant water body sections below.

19.5.19 Details of surface and groundwater abstractions and consented discharges within the study area (as defined by the river water body catchments) were accessed from the EA and local planning authorities. This allows evaluation of potential impacts of the Proposed Development on existing abstractions and water quality.

19.5.20 The following data sources have been accessed to inform the baseline with respect to the water environment (refer to Table 19-8).

Table 19-8 Data sources used to inform the water environment assessment

Source of data	Baseline data
EA Catchment Data Explorer [46]	Water body status objectives and classification data accessed November 2024)
EA Water Quality Data Archive [47]	Water quality data collected by the EA. Available online via the water quality data archive (accessed May 2025)
EA (data available on request)	Consented discharges within Hampshire (accessed May 2025)
EA (unpublished data available on request)	Detailed flood risk information (Products 4, 5, 6, 7 and 8) (accessed September 2024)
Defra map application – Multi Agency Government	Source Protection Zones (accessed May 2025)
	Aquifer designation mapping (accessed May 2025)
	Groundwater vulnerability mapping (accessed May 2025)

Source of data	Baseline data
Information for the Countryside (MAGIC) [48]	Priority habitat inventory (accessed May 2025)
	Statutory and non-statutory designated sites (accessed May 2025)
British Geological Survey [49]	Geological mapping (accessed January 2025)
	Hydrogeology maps (accessed January 2025)
EA [50]	Flood risk mapping (rivers and sea, surface water, reservoirs) (accessed May 2025)
EA [51]	Groundwater Dependent Terrestrial Ecosystems (GWDTE) (England only) (accessed May 2025)
LLFA (various dates; unpublished data available on request from the LLFA)	Historical flood incident information relating to highways, surface water and drainage flooding (accessed May 2025)

Site surveys

19.5.21 The following surveys have been undertaken to inform the baseline characterisation of the water environment:

1. Following best-practice guidance [52] [53] [54] for geomorphological characterisation, a visual inspection was undertaken on each watercourse where crossings are proposed to identify channel form (including planform, width and depth variation, bank form and condition, substrate types and the type and presence of bed forms such as pools, riffles and bars), flow conditions (including dominant flow types and the degree of variability within each reach), floodplain characteristics (including connectivity to the river channel, and the structure of the riparian zone), in-channel/riparian vegetation, and evidence of channel modification (including enlargement and re-sectioning, artificial bank protection, embankments and in-channel structures). The outputs of this survey are described in section 19.7.
2. A water features survey of identified groundwater related features including licenced and unlicenced abstractions, springs and groundwater dependent watercourses and terrestrial ecosystems has been undertaken. The outputs of this survey are discussed in ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6) and have been used to inform the baseline characterisation presented in section 19.7.
3. Targeted water quality surveys in Riders Lane Stream and Hermitage Stream. The outputs of these surveys are described in section 19.7.
4. Targeted ground investigations for the Proposed Development have been completed to verify ground conditions alongside the collection of data on groundwater levels and quality. Groundwater level monitoring in purpose-constructed monitoring wells in locations of the proposed shafts, tunnel sections and sensitive river crossings, with selected wells installed with automatic water level data loggers has also been completed (groundwater level monitoring ongoing in some locations). The locations of monitoring wells are shown in ES Figure 19.3 Complete ground investigation, Volume III (Document Reference 6.3, Volume 6). The outputs of this survey are described in detail in the HIA (refer to ES Appendix 19.3 Hydrogeological Impact Assessment,

Volume II (Document Reference 6.2, Volume 6) and data have been used to inform the baseline presented in section 19.7.

5. Targeted geophysical surveys have been undertaken to inform the subsurface, including in the area of the proposed tunnel across the Bedhampton Springs source protection zone. These surveys have informed the hydrogeological conceptualisation in the karst zone that feeds the local Bedhampton and Havant springs. The outputs of this survey are described in detail in the HIA (refer to ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6) and data have been used to inform the baseline characterisation presented in section 19.7.
6. A site-specific survey to determine marine water quality around the Eastney LSO has been undertaken. This survey collected data at six points in line with tidal currents. Three samples were collected at the surface, mid depth and near bottom and were analysed for parameters on the EA's Coastal waters EQSD list for WER compliance assessments [26]. Details are provided in section 19.7.

Assessment methodology

19.5.22 The approach to assessment is set out in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume 6). This has informed the approach used in this water environment assessment.

19.5.23 The methodology for assessing likely significant effects is based on the principle that the environmental effects of the Proposed Development, in relation to surface water and groundwater receptors, are determined by identifying the potential receptors, assigning receptor value, assessing the magnitude of change the Proposed Development would have on the resource significance (where significance is defined as the attributes that give the resource its value). This process then combines these two elements to identify the likely significance of the effect.

19.5.24 The assessment of effects on the water environment considers each of the Proposed Development components and then assesses the Proposed Development as a whole.

19.5.25 Detailed methodologies for supporting assessments are set out in the appendices listed in section 19.1 (paragraph 19.1.7).

Types of receptors

19.5.26 Within the water environment topic, there are four types of receptors that are assessed. Selection of these receptors is based on the WER requirements, the NPSWRI, NPPF and Planning Practice Guidance for flood risk. Receptors are listed in Table 19-9 alongside the characteristics of each receptor type that are considered.

Table 19-9 Summary of receptor type and description

Receptor type	Description
Surface water features	The hydrology, geomorphology and water quality of surface waters (e.g. rivers, canals, lakes and reservoirs, estuarine and coastal waters) and water-dependent habitats, including designated sites (e.g. SAC, SPA, SSSI, MCZ).

Receptor type	Description
Groundwater features	The flows, quantity and quality of groundwater bodies and groundwater-dependent receptors, including designated sites (e.g. SAC, SPA, SSSI).
Surface and groundwater resources	Water resources, including abstractions from surface and groundwaters (e.g. Principal, Secondary A and Secondary Undifferentiated aquifers) and associated designated sites (e.g. SPZ, DrWPA) and existing water supply infrastructure (including Havant Thicket reservoir, treatment plants, pumping stations and distribution networks) and surface and foul drainage infrastructure. To avoid repetition, water resources are considered alongside the associated surface and groundwater features in the assessment presented later in this chapter.
Flood risk	Flood risk to the Proposed Development and to sensitive receptors from all sources, including fluvial, coastal, surface water, groundwater, sewer and reservoir flooding, and changes in flood risk to sensitive receptors as a result of the Proposed Development.

Sensitivity of receptors

19.5.27 For the purposes of this assessment, the sensitivity of a water environment receptor is considered to be dependent on:

1. The capacity of the receptor to tolerate changes to hydrology, geomorphology, water quality and/or flood risk
2. The potential for substitution of the receptor, in terms of water resources which support human health, economic activity and/or water-dependant ecosystems

19.5.28 Using these principles, the sensitivity of surface, groundwater and flood risk receptors is categorised in this chapter using the four-point scale set out in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume 6). The definitions of each category have been developed using professional judgement and have been informed by the definitions provided in appropriate guidance, principally:

1. Table 14 of TAG Unit A3 Environmental Appraisal (Department for Transport, 2023) [22]
2. Table 3.70 of Design Manual for Roads and Bridges LA113 Road drainage and the water environment (Highways England, 2020) [23]

19.5.29 These guidance documents set out a well-established framework for EIA that is accepted by regulators and is widely applied with respect to infrastructure projects (often linear in nature, although the guidance is also applicable to their non-linear elements). As the Proposed Development is an infrastructure project comprising both linear and non-linear elements, the principles of assessment and the type and scale of construction impacts are similar to those for which the guidance was originally developed. Professional judgement has then been used to refine and update the definitions to provide additional detail and ensure compatibility with other chapters within the ES. These updates are focussed on the following:

1. Changes to sensitivity category nomenclature: The guidance documents both set out definitions for receptor sensitivity based on four categories ranging from ‘very high’ to ‘low’. However, to align with the approach described in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume

6) the methodology used in this chapter instead defines the categories from 'high' to 'negligible'. It is important to note, however, that the number of categories remains the same and that receptor sensitivity is not therefore undervalued.

2. Addition of further detail: The guidance documents each provide a limited amount of detail with regards to the different types of receptor that fall within each category. The definitions set out in Table 19-10 have been expanded to include more explicit reference to each type of water receptor.

Table 19-10 Definition of terms relating to receptor sensitivity

Sensitivity	Summary	Surface and groundwater features and resources
High	Receptor has no or very limited capacity to tolerate changes to hydrology, geomorphology, water quality or flood risk and has little potential for substitution. Includes water resources which support human health and/or economic activity at a regional scale, and receptors with a high vulnerability to flooding.	Controlled waters with an unmodified, naturally diverse hydrological regime, a naturally diverse geomorphology with no barriers to the operation of natural processes, and good water quality. Supports habitats or aquatic species (e.g. fish, invertebrates, macrophytes) that are highly sensitive to changes in surface hydrology, geomorphology, water quality or groundwater flow and level. Supports Principal aquifer with public water supply abstractions by provision of recharge. Principal aquifer providing a regionally important resource and/or supporting GWDTE, a site protected under UK legislation Ecology and Nature Conservation. Proposed Development is within Inner or Outer SPZ (i.e. SPZ 1 or SPZ 2)[2]. National (SSSI, MCZ, National Nature Reserve (NNR) or equivalent) or international level (SPA, SAC or Ramsar). This includes WER protected areas (e.g. DrWPAs).
Medium	Receptor has limited capacity to tolerate changes to hydrology, geomorphology, water quality or flood risk. Water resources which support human health and/or economic activity at a local scale. Receptors with a moderate vulnerability to flooding.	Controlled waters with hydrology that sustains natural variations, geomorphology that sustains natural processes, and water quality that is not contaminated to the extent that habitat quality is constrained. Supports or contributes to habitats or species that are sensitive to changes in surface hydrology, geomorphology, water quality and/or groundwater flow and level. Supports Secondary A or Secondary B aquifer with water supply abstractions. Proposed Development is within a Catchment SPZ (i.e. SPZ 3[3]).

[2] Source Protection Zones (SPZs) are defined around large and public potable groundwater abstraction sites. Their purpose is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction. The zones are defined by groundwater travel time, with SPZ 1 having a travel time of 50-days or less from any point within the zone at or below the water table and has a minimum 50m radius, whereas SPZ 2 is defined by a 400-day travel time or less from any point within the zone. [56]

[3] SPZ 3 is defined as the area around a groundwater source within which all groundwater recharge is presumed to be released at the abstraction source.

Sensitivity	Summary	Surface and groundwater features and resources
Low	Receptor has moderate capacity to tolerate changes to hydrology, geomorphology, water quality or flood risk. Water resources that support human health and/or economic activity at a neighbourhood (multiple property) scale. Receptors with a low vulnerability to flooding.	Controlled waters with hydrology that supports limited natural variations, geomorphology that supports limited natural processes, and water quality that may constrain some ecological communities. Supports or contributes to habitats that are not sensitive to changes in surface hydrology, geomorphology or water quality. Supports Secondary A or Secondary B aquifer without abstractions. Not designated but may contain habitats or populations/assemblages of species that appreciably enrich the local habitat resource.
Negligible	Receptor is generally tolerant of changes to hydrology, geomorphology, water quality or flood risk. Water resource that supports human health and/or economic activity at a single property scale. Receptors with a very low vulnerability to flooding.	Controlled waters with hydrology that does not support natural variations, geomorphology that does not support natural processes, and water quality that constrains ecological communities. Aquatic or water-dependent habitats and/or species are tolerant to changes in hydrology, geomorphology or water quality. Non-productive strata that do not support groundwater resources. Surface water not designated for relevant features.

Magnitude of impact

19.5.30 Impact magnitude is a function of the duration and scale of the change to the usability or value of the receptor. The magnitude considers whether there is any alteration to the characteristics or features of the receptor's character or its designation or classification status (distinctiveness).

19.5.31 Table 19-11 provides full definitions of each scale of magnitude (as set out in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume 6)) for water resources and flood risk receptors.

Table 19-11 Definition of terms relating to magnitude of an impact

Magnitude	Summary	Surface and groundwater features and resources	Flood risk
Major	Permanent/irreversible, or large-scale changes, over the whole receptor affecting usability (adverse) or value (adverse or beneficial). Causes fundamental changes to key features of the receptor's character or distinctiveness (adverse). Increases receptors character of distinctiveness (beneficial).	Permanent changes to geomorphology and/or hydrology (adverse or beneficial) that prevent natural processes operating (adverse). Natural processes are enhanced (beneficial). Permanent and/or wide scale effects on water quality or availability (adverse/beneficial). Permanent loss or long-term degradation of a water supply source resulting in prosecution	Permanent or major change to existing flood risk (adverse/beneficial)

Magnitude	Summary	Surface and groundwater features and resources	Flood risk
		(adverse). Increase in water availability (beneficial). Permanent or wide scale degradation (enhancement) of habitat quality (adverse/beneficial).	
Moderate	Partial loss (gain) or noticeable change over the majority of the receptor, and/or discernible alteration to key features of the receptor's character or distinctiveness (adverse). Increased character or distinctiveness of receptor (beneficial). Moderate permanent or long-term reversible change affecting usability or value over the medium-term or local area (adverse). Usability and value of receptor increase locally and over the medium-term (beneficial)	Medium-term effects on water quality or availability (adverse or beneficial). Medium-term degradation of a water supply source, possibly resulting in prosecution (adverse). Medium-term improvement of a water supply source (beneficial) Habitat change over the medium-term (adverse or beneficial).	Medium-term or moderate change to existing flood risk (adverse beneficial). Possible failure of sequential or exception test (if applicable (adverse).
Minor	Discernible temporary change over a minority of the receptor (beneficial), and/or with minimal effect on usability, risk or value (adverse). Also, potential discernible alteration to key features of the receptor's character or distinctiveness (adverse). Receptor's character and distinctiveness increase (beneficial).	Short-term or local effects on water quality (deterioration/improvement) (adverse or beneficial) or availability (reduction/increase (adverse/beneficial). Short-term degradation of a water supply source (adverse). Habitat change over the short-term (adverse or beneficial).	Short-term temporary or minor change to existing flood risk (adverse/beneficial). Passing of sequential and exception test (beneficial).
Negligible	Temporary change, undiscernible over the medium- to long-term, with no effect on usability or value (adverse/beneficial). Slight, or no, alteration to the characteristics or features of the receptor's character or distinctiveness (adverse/beneficial).	Intermittent impact (positive/negative) on local water quality or availability (adverse or beneficial). Intermittent (positive/negative) or no degradation (limited improvement) of a water supply source (adverse or beneficial). Very slight local changes to habitat that have no observable impact on dependent receptors (adverse or beneficial).	Intermittent or very minor change to existing flood risk (adverse/beneficial).

Magnitude	Summary	Surface and groundwater features and resources	Flood risk
No change	No mechanism for the activity to affect the receptor, and/or no discernible change to the receptor over any timescales.	No changes to surface or groundwater features and resources.	No changes to existing flood risk.

Significance of effect

19.5.32 The assessment of significance of an effect is informed by the sensitivity of the receptor and the magnitude of the impact (as described in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume 6)). The determination of significance is guided by the use of the significance of effect matrix, as shown in Table 19-12. Definitions of each level of significance are provided in Table 19-13. For the purpose of this assessment, any effect that is of major or moderate significance is considered to be significant in EIA terms, whether this be adverse or beneficial. Any effect that has a significance of minor or negligible is not significant.

Table 19-12 Definition of terms relating to magnitude of an impact

		Adverse magnitude				Beneficial magnitude			
		Major	Moderate	Minor	Negligible	Negligible	Minor	Moderate	Major
Sensitivity	High	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Table 19-13 Definition of effect significance

Significance	Definition
Major	Very large or large change in receptor condition, which is likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in receptor condition, which is likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.
No change	No impact, therefore, no change in receptor condition.

19.5.33 As described in ES Chapter 5 EIA approach and methodology, Volume I (Document Reference 6.1, Volume 6), subsequent to establishing the receptor or resource sensitivity and magnitude of impact, the significance of effect is predicted using quantitative or qualitative criteria, as well as professional judgement to ensure a robust assessment.

19.6 Assumptions and limitations

19.6.1 This section provides a description of the assumptions and limitations to the water environment assessment. The results presented in the following sections are based on current design assumptions.

Assumptions

19.6.2 Vegetation removal and the potential for soil disturbance and increased sediment supply is based on a worst case scenario for the construction of the Proposed Development and assumes that all land within the Order Limits would be disturbed. This also considers areas of reduced working width captured within the primary mitigation measures as detailed within ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6).

19.6.3 Excavations will be open cut to, or within 300mm of, the minimum required depth (informed by the minimum pipe cover requirements). This is on the basis that the Contractor will look to reduce cut and fill operations, and associated water management. For trenchless operations, the tunnels are assumed to be constructed in the underlying natural strata, with negligible groundwater ingress both during and post-construction.

19.6.4 As set out in the assumptions in ES Appendix 19.3 Hydrological Impact Assessment, Volume II (Document Reference 6.2, Volume 6) the hydrogeological impact assessment assumes there could be variability in the construction depth of the works, and should these change relative to those set out in ES Chapter 3 Description for the Proposed Development, Volume I (Document Reference 6.1, Volume 6), beyond a distance that would alter the hydrogeological impact assessment findings, the mitigation and regulatory requirements are sufficient to prevent material change in the assessment results.

Limitations

Data

19.6.5 The assessment is informed by a range of publicly available information and data sources (as listed in Table 19-8). Although these data sets are considered robust, there are assumptions associated with their use in the assessment. For example, the known characteristics of the drainage network and attributes and conditions specific to water bodies have been used as a proxy to assign value and sensitivity to the wider catchments and the Ordinary Watercourses within them. This is a precautionary approach that ensures value and sensitivity have not been 'under-assessed' within this assessment.

Modelling assumptions and limitations

19.6.6 Whilst the comprehensive modelling approach adopted for the Proposed Development is an accepted method of analysis used to predict general trends in water quality, it is important to note that it has some limitations. As Havant Thicket Reservoir is not yet constructed, it is not possible to calibrate or verify the model using measured water quality data. The modelling is based upon several key

assumptions, agreed between the Applicant and key stakeholders (EA and Portsmouth Water), informed by best available information and expert judgement.

19.6.7 Full details of the assumptions associated with the modelling approach are provided in:

1. ES Appendix 19.5 Eastney Long Sea Outfall Solent dispersion modelling, Volume II (Document Reference 6.2, Volume 6)
2. ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II (Document Reference 6.2, Volume 6)

19.6.8 Contaminants of Emerging Concern (CECs) are chemical substances found in the water environment that could potentially affect water quality, ecology and human health, but are not explicitly regulated under existing environmental laws (i.e. they do not currently have an Environmental Quality Standard (EQS) under the WFD Directions 2015 or other legislation). Due to the current absence of agreed water quality standards for the majority of CECs, these substances have not been considered quantitatively within the assessment presented in section 19.8 of this chapter. However, section 19.8 presents an assessment of the likely risks associated with CECs using the best data that are currently available.

19.7 Baseline conditions

19.7.1 To provide an assessment of the likely significant effects of the Proposed Development (in terms of the water environment), it is necessary to identify and understand the receptors and their respective baseline conditions in the study area. This provides a reference point against which potential changes in the water environment can be assessed.

19.7.2 The baseline for the water environment topic information has been separated into the receptor groups described in section 19.5:

1. Surface water features and resources
2. Groundwater features and resources
3. Flood risk

Current baseline

Surface water features and resources

19.7.3 The Proposed Development crosses a number of river catchments, including lowland, low gradient systems such as the Hermitage Stream, River Wallington and River Hamble, which flow into Langstone Harbour, Portsmouth Harbour and Southampton Water respectively. The Proposed Development is within the catchments of the River Itchen and the River Meon, both of which are sensitive chalk river systems.

Hermitage Stream

19.7.4 The location of the Hermitage Stream catchment in relation to the Order Limits is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The stream rises near Horndean, and its catchment is predominantly urban. The channel is constrained by artificial infrastructure such as

sheet-piled walls and concrete armouring as it flows from Horndean and through Havant. One of the main tributaries of the Hermitage Stream is Riders Lane Stream, which drains the area that will be occupied by Havant Thicket Reservoir, once constructed.

19.7.5 Hermitage Stream's catchment has undergone significant changes during the past 100 years due to a series of flood alleviation schemes, river diversions, and culverting.

19.7.6 Surface water drainage at the site of the Havant Thicket Reservoir is achieved by several headwater Ordinary Watercourses that flow from north to south from the ridge to the north, centred on Horsefoot Hill. Prior to commencement of the construction of Havant Thicket Reservoir, one of these channels feeds a small lake (Upper Lake) which is part of Staunton Country Park. The lake measures approximately 0.63 ha. The headwater channels join near Thicket Bottom to form a single watercourse (Riders Lane Stream) that flows south through Havant before joining Hermitage Stream. At Bell's Copse, several Ordinary Watercourses drain from east to west to join Park Lane Stream, another tributary of Hermitage Stream. The eastern side is drained by Durrants Stream, a tributary of the River Lavant.

19.7.7 A short (approximately 500m) Ordinary Watercourse follows the southern perimeter of the WRP site and drains into the tidal Hermitage Stream. Hermitage Stream flows into Langstone Harbour approximately 180m south of the WRP site. A summary of the main features of this water body is presented in Table 19-14 .

Table 19-14 Summary of surface water features for the Hermitage Stream catchment

Feature	Description
WFD catchment/water body and reference	Hermitage Stream - GB107042016370
Water body status[4] (includes WFD water quality classification information) [46]	Classified as heavily modified[5] and 'Moderate' ecological potential for invertebrates, phosphate, pH and mitigation measures assessment, and a Poor fish classification. Physico-chemical quality -acid neutralising capacity, ammonia, Biological Oxygen Demand (BOD), DO and temperature are all at high status. Chemical status is characterised as 'Fail' due to high levels of priority hazardous substances (mercury and its compounds, Polybrominated diphenyl ethers (PBDE)). Reasons for not achieving good status relate to public domestic misconnections and urbanisation. With respect to chemical status, sector responsible has not been identified.
Consented discharges	There are three combined storm overflows which discharge to the Hermitage Stream catchment within 1km of the Order Limits. These only discharge during periods of wet weather when the sewage system is overloaded.

[4] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

[5] Where the hydromorphology of a surface water body has been significantly altered because of anthropogenic activities, the WFD determines that it can be designated as an Artificial or Heavily Modified Water Body. An alternative environmental objective 'Good' ecological potential applies in these cases.

Feature	Description
Surface water abstractions within 1km of the Order Limits	None
Relevant WFD Protected areas	The Order Limits pass through the Chichester, Langstone and Portsmouth Harbours Eutrophic NVZ (TraC). The Order Limits also pass close to Langstone Harbour therefore see protected areas listed in Table 19-46 for the Harbour water body.
Other designated sites within catchment	Hazelton Common Local Nature Reserve (LNR) and Dell Piece West LNR are located in the upper catchment, 1km upstream of the Proposed Development and they are not hydrologically connected to the site of the Proposed Development, therefore there is no pathway for effect.

19.7.8 A summary of water quality data for the Hermitage Stream at 'B2150 Havant-New Road' monitoring point collected by the EA is presented in Table 19-15.

Table 19-15 Water quality data for the Hermitage Stream at 'B2150 Havant - New Road' monitoring point (EA Water Quality Archive)

Parameter (2024 – 2026)	Minimum	Maximum	Mean	Median
Nitrite as Nitrogen (N) (mg/l)	0.01	0.05	0.02	0.02
Nitrate as N (mg/l)	1.49	3.25	2.24	2.09
Orthophosphate, reactive as Phosphorus (P) (mg/l)	0.05	0.34	0.12	0.08
Oxygen, Dissolved, % Saturation	96.20	209.20	119.03	106.20
Oxygen, Dissolved as O_2 (mg/l)	10.20	16.90	12.51	11.70
Nitrogen, Total Oxidised, as N (mg/l)	1.50	3.30	2.27	2.10
Ammoniacal Nitrogen, as N (mg/l)	0.04	0.07	0.05	0.05
pH	7.97	9.10	8.34	8.20
BOD (mg/l)	1.40	1.90	1.65	1.70

19.7.9 Portsmouth Water has undertaken water quality sampling at three sampling locations within the Hermitage Stream. Sampling was initially undertaken between July 2008 and December 2010 and recommenced in 2018 with monitoring data made available up to April 2020. Data points for analysis vary for each determinant at each Portsmouth Water site as a result of intermittent flow in some reaches (which meant streams could be dry). A summary of the results is presented in Table 19-16.

Table 19-16 Water quality sampling results for Hermitage Stream (Portsmouth Water)

Parameter (2008 – 2020)	Minimum	Maximum	Mean	Median
BOD (mg/l)	1	6	2.13	2
Reactive Phosphorus (µg/l)	60	257	128	111
Ammoniacal nitrogen (mg/l)	0.017	0.122	0.04	0.03
Temperature (°C)	5.2	23	13	14.5

Parameter (2008 – 2020)	Minimum	Maximum	Mean	Median
pH	6.78	9.4	8.56	8.66
Total Iron (µg/l)	60.7	1304	374	245
Total Cadmium (µg/l)	0.01	0.5	0.13	0.11
Total Nickel (µg/l)	0.4	6.03	2.34	2.11
Total Chromium (µg/l)	0.21	2.94	1.02	0.8
Nitrate (mg/l as NO_3)	1	20.8	12.4	13.05
Nitrite (mg/l as NO_2)	0.003	0.219	0.09	0.07
Phosphoros (total) (µg/l as P)	58	274	145	116
Electrical conductivity (µS/cm)	155	699	512	535
Suspended solids (mg/l)	2	101	12.9	7
Turbidity (NTU)	0.98	22.6	6.36	3.3

19.7.10 The Applicant also undertook monthly water quality sampling on the Hermitage Stream at three survey locations and a YSI multi-probe was deployed to take in-situ readings of water quality parameters at each survey location. Sampling was completed over twelve rounds between November 2024 and October 2025. The results are presented in Table 19-17.

Table 19-17 Water quality sampling results for Hermitage Stream (the Applicant))

Parameter (2024 – 2025)	Minimum	Maximum	Mean	Median
Temperature (˚C)	5.9	25.5	13.6	13.1
Dissolved Oxygen (%)	78.9	212	152.4	106.8
Dissolved Oxygen (mg/l)	8.32	23.94	14.5	12.9
Conductivity (SPC)	483.5	2127	811.4	749.0
pH	7.4	9.3	8.3	8.2
Turbidity (NTU)	6.1	635.1	148.3	75.6

Riders Lane Stream

19.7.11 The location of the Riders Lane Stream is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). Riders Lane Stream is the main tributary of Hermitage Stream and drains the area that will be occupied by Havant Thicket Reservoir.

19.7.12 The headwaters of Riders Lane Stream rise as a series of rivulets in the woodlands of Havant Thicket and Hammond Hands Copse to the east of Leigh Park Lake in Staunton Country Park. The two main arms of these headwater sub-tributaries dissect Thicket Lawn and join just north of Middle Park Way, flowing south and west through Great Copse to Dunsbury Way, then south and east via Riders Lane/Purbrook Way to the confluence of Hermitage Stream at Corhampton Crescent.

19.7.13 The channel of Riders Lane Stream is set within mature riparian woodland and has been modified by straightening in places, although there are areas of more natural stream form. The channel is narrow (1-3 m) and flows through clay rich deposits. Downstream parts of the watercourse are heavily influenced by urban development (e.g. culverted in places).

19.7.14 A summary of the main features for the stream is presented in Table 19-18.

Table 19-18 Summary of surface water features for Riders Lane Stream

Feature	Description
WFD catchment/water body and reference	Included within the Hermitage Stream WFD water body catchment GB107042016370
Water body status (includes WFD water quality classification information) [46]	Riders Lane Stream is included within the Hermitage Stream WFD water body catchment – see Table 19-14 .
Consented discharges	None
Abstractions	None
Relevant WFD Protected areas	Riders Lane Stream is included within the Hermitage Stream WFD water body catchment see Table 19-14 .
Other designated sites within catchment	Hazelton Common LNR and Dell Piece West LNR are located in the upper catchment, 1km upstream of the Proposed Development, therefore there is no pathway for effect.

19.7.15 Riders Lane Stream is not monitored by the EA. However, Portsmouth Water has undertaken water quality sampling at four sampling locations within Riders Lane Stream between 2008 and 2020. A summary is presented in Table 19-19.

Table 19-19 Water quality sampling results for Riders Lane Stream (Portsmouth Water)

Parameter (2008 – 2020)	Minimum	Maximum	Mean	Median
BOD (mg/l)	1	7	2.6	2.1
Reactive Phosphorus (µg/l)	20.6	235	94	85
Ammoniacal nitrogen (mg/l)	0.02	2.66	0.37	0.052
Temperature (°C)	1.7	18.4	10.79	11.6
pH	6.74	7.93	7.41	7.49
Total Iron (µg/l)	296	1,544	1031	920
Total Cadmium (µg/l)	0.01	0.5	0.16	0.2
Total Nickel (µg/l)	0.5	4.81	3.41	3.4
Total Chromium (µg/l)	0.4	2.92	1.11	0.8
Nitrate (mg/l as NO_3)	0.9	5.5	2.25	1.9
Nitrite (mg/l as NO_2)	0.0005	0.3	0.07	0.02
Phosphorus (total) (µg/l as P)	66.88	818	148.2	66
Electrical conductivity (µS/cm)	151	607	355.5	319
Suspended solids (mg/l)	2.7	48	14.95	9.05

Parameter (2008 – 2020)	Minimum	Maximum	Mean	Median
Turbidity (NTU)	2.68	26.1	11.12	8.2

19.7.16 Furthermore, the Applicant also undertook monthly water quality sampling on the at three locations on Riders Lane Stream between November 2024 and October 2025. The results are presented in Table 19-20.

Table 19-20 Water quality sampling results for Riders Lane Stream (the Applicant))

Parameter (2024 – 2025)	Minimum	Maximum	Mean	Median
Temperature (˚C)	4.7	21.2	11.4	10.8
Dissolved Oxygen (%)	15.3	160.9	81.5	94.2
Dissolved Oxygen (mg/l)	1.4	13.5	9.2	11.2
Conductivity (SPC)	359.7	2318	831.9	807.5
pH	6.9	8.1	7.6	7.6
Turbidity (NTU)	6.1	1122.3	154.3	80.6

River Lavant (Hants)

19.7.17 The location of the River Lavant (Hants) catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). A part (approximately 0.084km^2) of the Proposed Development crosses into the River Lavant catchment near Rowlands Castle but this overlap is only associated with the Havant Thicket Reservoir boundary and therefore, no direct works will be undertaken within this catchment. There are few permanent watercourses in the catchment and most of the surface water drainage area is characterised by steep sided ephemeral channels that will only flow in periods of wet weather, principally when the groundwater table is high in the winter.

19.7.18 The River Lavant channel becomes a permanent feature identifiable on 1:25,000 Ordnance Survey (OS) mapping just downstream of Finchdean, where a well is marked. Durrants Stream joins the main channel in the lower catchment and there are several other small Ordinary Watercourses that join the River Lavant (some of these are only intermittently marked on OS mapping and possibly semi-permanent features). Near Rowlands Castle, close to the Proposed Development, there are several Ordinary Watercourses which are part of a golf course.

19.7.19 As shown in aerial photography and historical mapping [55] [56], the permanent section of channel downstream of Finchdean appears to have been artificially straightened for most of its length. There is little or no surviving evidence of a sinuous channel on aerial photography and the planform is straight. Through an area of woodland near Rowlands Castle the river channel is only intermittently marked on OS mapping potentially being due to culverting or chalk nature of the catchment. There is a line of swallow holes (solution holes) immediately west of Rowlands Castle. The upper catchment is characterised by ephemeral channels. The channel has been straightened to run alongside a railway line near West Leigh and channel is constrained by urban development as it flows through Havant.

19.7.20 A summary of the main features for this water body is presented in Table 19-21.

Table 19-21 Summary of surface water features for the Lavant (Hants)

Feature	Description
WFD catchment/water body and reference	Lavant (Hants) - GB107042016420
Water body status[6] (includes WFD water quality classification information) [46]	Classified as 'Poor' ecological status for fish adversely affected by physical modifications associated with urban development and barriers. Invertebrates are classified as 'High'. Physico-chemical quality parameters ammonia, DO, phosphate, temperature and pH are all at high status. Chemical status is classified as 'Fail' due to high levels of some priority hazardous substances (mercury and its compounds, PBDE). No sectors have been identified as being responsible.
Consented discharges	One consented discharge associated with a domestic property within 1km of the Order Limit. This discharges to groundwater via infiltration. However, given there are no direct works within this catchment, effects on consented discharges are unlikely.
Abstractions within 1km of the Order Limits	None
Relevant WFD Protected areas	There are no direct works within this water body catchment therefore there are no pathways for effects on protected areas.
Other designated sites within catchment	Butser Hill SSSI, Coulters Dean SSSI, West Harting Down SSSI, Oxbourne Down LNR, Catherington Lith LNR and part of Burington Chalk Pit LNR are located in the upper catchment 6-8km to the north of the Proposed Development – given that there are no works within this catchment and these sites are upstream, there is no hydrological connectivity or mechanism for impact.

19.7.21 A summary of water quality data for the EA's 'R Lavant At Ibm Havant' monitoring point is presented in Table 19-22.

Table 19-22 Water quality data for the 'R Lavant At Ibm Havant' monitoring point (EA Water Quality Archive)

Parameter (2024 – 2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	All values are less than 0.004			
Nitrate as N (mg/l)	6.10	7.80	7.04	7.10
Orthophosphate, reactive as P (mg/l)	0.01	0.02	0.02	0.01
Oxygen, Dissolved, % Saturation	93.10	96.10	94.80	94.70
Oxygen, Dissolved as O_2 (mg/l)	10.20	10.70	10.46	10.40
Nitrogen, Total Oxidised, as N (mg/l)	6.10	7.80	7.04	7.10
Ammoniacal Nitrogen, as N (mg/l)	All values are less than 0.030			
pH	7.32	7.62	7.49	7.49
BOD (mg/l)	1.20	1.60	1.37	1.30

[6] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Potwell Tributary

19.7.22 The location of the Potwell Tributary catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The Potwell Stream catchment is drained by watercourses that rise near Denmead in the north and Waterlooville and Purbrook in the east, before flowing to Southwick where the Potwell Stream joins the Wallington River. The Potwell Stream is approximately 10.9km in length, draining a predominantly agricultural area of 42.2km^2.

19.7.23 Most of the watercourses flow in shallow and narrow valleys between low hills. Planforms are mainly gently sinuous with some more localised areas of meandering upstream of Southwick Park Lake and near Southwick. Artificial planforms (straightened and resectioned) are confined to headwater areas where there are areas of urban development (Between Denmead and Waterlooville). In these locations channels appear to have been straightened over 0.5 to 2km of the valley floor.

19.7.24 The catchment is primarily rural and characterised by mixed farming (arable and pastoral) with notable areas of mixed woodland, through which Potwell Stream flows in places. Potwell Stream is impounded by Southwick Park Lake at Southwick. Nearby infrastructure and communities include Waterlooville and the A3 to the west, Purbrook and Southwick to the south and Denmead to the north. A summary of the main features for this water body is presented in Table 19-23.

Table 19-23 Summary of surface water features for the Potwell Tributary

Feature	Description
WFD catchment/water body and reference	Potwell Trib - GB107042016400.
Water body status[7] (includes WFD water quality classification information) [46]	Heavily modified water body at 'Moderate' ecological potential due to point source pollution from trade and industry, and diffuse pollution from urbanisation and poor soil management. Classification elements affected are phosphate levels (Moderate) and macrophytes and phytobenthos combined (Moderate) (including both sub elements ('Poor' and 'Moderate'). Fish status is also 'Poor' due to physical modifications associated with barriers. Physico-chemical quality parameters ammonia, DO, temperature, pH are at high classification status. Chemical Status is fail associated with mercury, PBDEs, Perfluorooctane sulfonate (PFOS) and Benzo(g-h-i) perylene. Reasons are under investigation, no sector identified as being responsible.
Consented discharges	There are a number of consented discharges within the Potwell Trib catchment but all are to the north of the Order Limits and at least 500m away. As a result, there is no hydrological connectivity or mechanism for impact.
Abstractions within 1km of the Order Limits	Only one within 1km of the Order Limits but this has recently been revoked.

[7] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Feature	Description
Relevant WFD Protected areas	The Order Limits pass through the Chichester, Langstone and Portsmouth Harbours Eutrophic NVZ (TraC).
Other relevant designated sites within catchment	Catherington Down SSSI and LNR, Lye Heath Marsh SSSI and Hook Heath Meadows SSSI and Yeoll's Copse LNR are located in the Potwell Stream catchment. The closest site to the Proposed Development is Hook Heath Meadows (0.68km north). Catherington Down SSSI and LNR and Lye Heath Marsh SSSI are located 1.5km and 8.2km north of the Proposed Development. Yeoll's Copse is located 7km away. Hook Heath Meadows SSSI is located in the catchment of an Ordinary Watercourse that drains an area located within the Order limits of the Proposed Development. However, the Proposed Development does not cross any watercourses that drain to Hook Heath Meadows SSSI. There is no surface water hydrological connectivity with Catherington Down SSSI and LNR, Yeoll's Copse or Lye Heath Marsh SSSI.

19.7.25 A summary of water quality data for the EA's 'Cheesemans Bridge Stream at Potwell' monitoring point is presented in Table 19-24.

Table 19-24 Water quality data for the 'Cheesemans Bridge Stream at Potwell' monitoring point (EA Water Quality Archive)

Parameter (2024 – 2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.10	0.03	0.02
Nitrate as N (mg/l)	1.28	4.59	2.61	2.58
Orthophosphate, reactive as P (mg/l)	0.02	0.16	0.08	0.07
Oxygen, Dissolved, % Saturation	56.00	98.00	80.88	88.00
Oxygen, Dissolved as O2 (mg/l)	5.12	12.10	8.96	9.14
Nitrogen, Total Oxidised, as N (mg/l)	1.30	4.60	2.64	2.60
Ammoniacal Nitrogen, as N (mg/l)	0.04	0.17	0.08	0.07
pH	7.45	8.16	7.75	5.12

River Wallington below Southwick

19.7.26 The location of the River Wallington below Southwick catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The catchment (22.7km^2) is formed downstream of the Upper Wallington and Potwell Tributary catchments, respectively. The river then flows east and south into Fareham and discharges into Portsmouth Harbour. The catchment is predominantly rural with limited urban areas in the south of the catchment on the outskirts of Fareham. Land use is mainly mixed farming with large areas of arable land close to the channel in the lower catchment. The principal tributaries flow south from near North Boarhunt.

19.7.27 The channel's planform is sinuous and appears largely unchanged since the 1856 Ordnance Survey[8]. The floodplain is wide downstream of Boarhunt Mill (100-250m wide). The channel has a well-developed riparian corridor of scrubby vegetation

[8] Historical maps covering the UK are available from the National Library of Scotland website [56]

and trees, and there is a small weir. A summary of the main features for this water body is presented in Table 19-25.

Table 19-25 Summary of surface water features for the River Wallington below Southwick

Feature	Description
WFD catchment/water body and reference	Wallington below Southwick -GB107042016360
Water body status[9] (includes WFD water quality classification information) [46]	'Moderate' ecological status due to point source pollution from private sewage treatment and sewage discharge, and diffuse pollution from poor soil management. Flows are also adversely affected by groundwater abstraction. Phosphate and DO levels are at Moderate status and hydrological regime does not support Good. Physico-chemical parameters -(acid neutralising capacity, ammonia, temperature, pH) and specific pollutants are classified at high status. Chemical status is 'Fail' due to mercury, PBDEs and PFOS
Consented discharges	There are two discharges from domestic properties within 50m to the Order Limits both of which discharge to groundwater. All others are greater than 200m away from the Order Limits and therefore are unlikely to be impacted by the Proposed Development.
Abstractions within 1km of the Order Limits	None
Relevant Protected areas	The Order Limits pass through the Chichester, Langstone and Portsmouth Harbours Eutrophic NVZ (TraC). This catchment is upstream of Portsmouth water body but given that the river would be crossed via trenchless crossing techniques (see ES Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6) effects on downstream water bodies and their associated protected areas are unlikely.
Other relevant designated sites within catchment	None

19.7.28 A summary of water quality data for the 'River Wallington at Newmans Bridge' monitoring point is presented in Table 19-26.

Table 19-26 Water quality data for the 'Wallington Newmans Bridge' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.01	0.01	0.01
Nitrate as N (mg/l)	0.20	6.89	2.32	1.45
Orthophosphate, reactive as P (mg/l)	0.02	0.14	0.07	0.07
Oxygen, Dissolved, % Saturation	44.3	95.90	76.32	81.35

[9] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Oxygen, Dissolved as O2 (mg/l)	4.20	12.00	8.52	8.68
Nitrogen, Total Oxidised, as N (mg/l)	0.20	6.90	2.33	1.45
Ammoniacal Nitrogen, as N (mg/l)	0.04	0.12	0.06	0.06
pH	7.31	8.13	7.60	7.80

River Meon

19.7.29 The location of the River Meon catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The River Meon is a chalk stream that rises from chalk springs on the South Downs near East Meon and flows north and then west before flowing south for most of its length towards Titchfield Haven, south of Fareham. The catchment is narrow (2-4km wide) for most of its area. There are few tributaries on the main channel south of West Meon and the chalk nature of the catchments means that many tributary valleys are seasonally active (winterbournes).

19.7.30 Where the Proposed Development crosses below the River Meon, and upstream and downstream, the channel has a sinuous planform and is characterised by a high width – depth ratio, with a typical bank top width between 7 – 9m and bankfull depth of approximately 0.5–1m. The River Meon has a narrow (40–100m wide) floodplain, and a review of aerial photography and topographic maps indicates good floodplain connectivity.

19.7.31 The valley floor is used for watercress farming in places and there are numerous small lakes in the catchment, the largest (0.013km^2) of which is Chipall Lake. The majority of the catchment is rural with mixed farming land use. Urbanisation is greater in the southern part of catchment as the river reaches Wickham and Fareham.

19.7.32 The upper part of the catchment is underlain by the chalk, but the variable nature of that chalk has a fundamental impact on flows in the River Meon. More clay-like older chalk at East Meon and at Warnford causes springs which increase flow in the river.

19.7.33 Boreholes at the cress beds in Warnford enhance flows in the river at this point. However, where the more permeable younger chalk is located, groundwater levels fall below the bed of the river in the summer months which causes flow in the river to seep back into the chalk. This happens to such an extent between Warnford and West Meon that the river dries up. Downstream of Meonstoke, flows gradually reduce as the river flows over the permeable chalk through Droxford and Soberton. South of Soberton, the river then flows onto the clays, silts and sands of the Hampshire Basin. These deposits provide run-off after rainfall events but do not support river flows during dry periods [57].

19.7.34 A summary of the main features for this water body is presented in Table 19-27.

Table 19-27 Summary of surface water features for the River Meon

Feature	Description
WFD catchment/water body and reference	Meon - GB107042016640

Feature	Description
Water body status[10] (includes WFD water quality classification information) [46]	'Moderate' ecological potential due to groundwater abstraction (water industry) adversely affecting flows – the hydrological regime does not support Good. Biological quality elements for macrophytes and phytobenthos and invertebrates are at 'Good' and 'High' status, respectively. The fish status is 'Moderate' – reason for not achieving 'Good' is not stated. Physico-chemical parameters (acid neutralising capacity, ammonia, DO, temperature, pH) and specific pollutants are assessed as being at 'High' status. Chemical status is 'Fail' associated with mercury and PBDEs. A sector has not been identified as being responsible.
Consented discharges	There are two consented discharges within 20m of the Order Limits. One discharges to land via infiltration, the other to an undefined freshwater river. The other discharge is over 300m away upstream and therefore there is unlikely to be a pathway for effect.
Abstractions within 1km of the Order Limits	Two within 1km of the Order Limits – one for a nursery (1137m^2 per year) and one for a golf club (5000m^3 per year from groundwater).
WFD Protected areas identified for this water body by the EA	The Order Limits cross the Hamble Estuary UWWTD sensitive area and the Hamble Estuary Eutrophic NVZ (TraC). There are no risks to downstream water bodies such as Southampton Water given that the Meon would be crossed via trenchless techniques (see ES Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6).
Other relevant designated sites within catchment	The Meon is designated as a Site of Importance for Nature Conservation (SINC) and the upper third is located in the South Downs National Park. There are several designated sites in the upper Meon catchment (Old Winchester Hill SSSI, Peake Wood SSSI, Beacon Hill, Warnford SSSI, Butser Hill SSSI), although they are not hydrologically connected to the Proposed Development. Botley Wood and Everett's and Mushes Copses SSSI is located 1.3km downstream of the Proposed Development, but it is a steeply sloping site above the river and there is unlikely to be any surface water hydrological connectivity. Berry Coppice LNR is located close to Botley Wood and Everett's and Mushes Copses SSSI. These sites are located on hillsides above the Meon floodplain and there is no hydrological connectivity. Titchfield Haven SSSI is hydrologically connected to the Proposed Development, although it is located 6.7km downstream; the floodplain site is also National Nature Reserve. The River Meon is subject to a compensation agreement arising under the Applicant's agreement signed under section 20 of the Water Resources Act 1991 in 2018. Habitats outside the River Itchen SAC have been identified to offset drought-related abstraction impacts under the Lower Itchen Drought Order. The River Meon has been identified almost entirely as compensatory SAC habitat, supporting salmon (*Salmo salar*) and specific watercourse vegetation communities (*Ranunculion fluitantis* and *Callitricho-Batrachion*).

[10] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Feature	Description
	Compensatory habitat is afforded the same level of protection as SAC-designated habitats. [58]

19.7.35 The main water quality stressors in the catchment are sediment, low flows, phosphorus, organic pollution and pesticides. This indicates that environmental pressures have decreased or remained unchanged at the sites analysed, resulting in improved conditions for those invertebrate communities. A summary of water quality data for the EA 'R. Meon at Titchfield' monitoring point is presented in Table 19-28.

Table 19-28 Water quality data for the 'R.Meon at Titchfield' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.02	0.01	0.01
Nitrate as N (mg/l)	4.89	6.89	6.15	6.29
Orthophosphate, reactive as P (mg/l)	0.03	0.12	0.07	0.06
Oxygen, Dissolved, % Saturation	85.20	104.70	94.63	95.70
Oxygen, Dissolved as O2 (mg/l)	8.24	11.90	10.09	9.73
Nitrogen, Total Oxidised, as N (mg/l)	4.9	6.90	6.16	6.30
Ammoniacal Nitrogen, as N (mg/l)	All values are less than 0.03			
pH	7.86	8.58	8.13	8.11

Moors Stream

19.7.36 The location of the Moors Stream catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). Moors Stream rises from a number of springs located on the southern slopes of the South Downs, south of Bishop's Waltham, and from a number of watercourses that collectively drain the area east of Waltham Chase. The catchment's headwaters are characterised by urban development associated with Bishop's Waltham, Swanmore and Waltham Chase. Downstream of Bishop's Waltham Moors Stream flows in a relatively steep sided, confined valley dominated by mixed farming (grazing and arable). Moors Stream flows into the River Hamble.

19.7.37 The headwater area south of Bishop's Waltham, known as 'The Moors', is formed by a number of channels in a marsh environment. The Moors area is an area of semi-natural woodland, fen, grassland and open water designated as a SSSI and is of national importance for its unusual habitat. Headwater channel areas near Swanmore and Waltham Chase appear to have been straightened associated with urban development. The planform of the main channel downstream of The Moors is gently sinuous and there are areas of riparian woodland. The valley floor is narrow but widens towards the confluence with the River Hamble.

19.7.38 A summary of the main features for this water body is presented in Table 19-29.

Table 19-29 Summary of surface water features for the Moors Stream

Feature	Description
WFD catchment/water body and reference	Moors Stream - GB107042016260
Water body status[11] (includes WFD water quality classification information) [46]	'Good' ecological status. The invertebrate status is 'Good' and the macrophytes and phytobenthos combined status is 'High'. The water body's hydrological regime does not support Good due to groundwater abstraction (water industry). Physico-chemical quality parameters ammonia, DO, phosphate, temperature and pH are classified as being at high status. Chemical status is 'Fail' due to mercury and PBDEs. No specific sector has been identified as being responsible.
Consented discharges	One consented discharge within 1km of the Order Limits associated with domestic sewage. This discharges to an undefined freshwater river but is upstream of the Proposed Development so there is no pathway for effect.
Abstractions within 1km of the Order Limits	None
Relevant WFD Protected areas identified for this water	The Order Limits cross the Hamble Estuary UWWTD sensitive area and the Hamble Estuary Eutrophic NVZ (TraC).
Other relevant designated sites within catchment	The Moors, Bishop's Waltham SSSI and part of Waltham Chase Meadows SSSI are located in the catchment (1.5km away). The Moors, Bishop's Waltham is also a LNR. The designated sites are upstream of the Proposed Development therefore there is no surface water hydrological connectivity.

19.7.39 A summary of water quality data for the EA 'Moors Stream' monitoring point is presented in Table 19-30.

Table 19-30 Water quality data for the 'Moors Stream' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.01	0.01	0.01
Nitrate as N (mg/l)	2.69	6.90	5.92	6.45
Orthophosphate, reactive as P (mg/l)	0.01	0.08	0.03	0.02
Oxygen, Dissolved, % Saturation	94.80	105.80	100.18	99.85
Oxygen, Dissolved as O2 (mg/l)	10.50	11.70	11.23	11.30
Nitrogen, Total Oxidised, as N (mg/l)	2.70	6.90	5.92	6.45
Ammoniacal Nitrogen, as N (mg/l)	All values are less than 0.06			
pH	7.70	8.16	7.98	8.00
BOD (mg/l)	1.00	1.10	1.05	1.05

[11] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Main River Hamble

19.7.40 The location of the River Hamble catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The River Hamble drains an area of 7.2km^2 and the catchment is located immediately downstream of the Upper Hamble and Moors Stream catchments. The channel is located in a relatively narrow valley with steeply sloping valley sides, which widens downstream towards Boorley Green. There are several short Ordinary Watercourses that drain the wider catchment. The catchment is mainly rural with the main urban areas located in the south of the catchment. Land use is mixed farming and there are notable areas of riparian along the valley floor.

19.7.41 Where the Proposed Development crosses below the River Hamble, and upstream and downstream, the channel has a sinuous planform that winds through a narrow floodplain underlain by clays, silts and sands of the London Clay Formation and superficial deposits of alluvium. The channel cross-section shape varies due to the influence of Moors Stream (a tributary of the River Hamble) and the discharge of treated effluent from Bishop's Waltham Wastewater Treatment Works (WTW) (located near the confluence of the two watercourses). Channel width is 3-4m and geomorphic diversity is influenced by the flow conditions with features such as bars, pools, berms and riffles present downstream of the Moors Stream confluence.

19.7.42 Downstream of Boorley Green, several leats that once served Botley Mill flow off the main channel. In the upper catchment the floodplain is crossed by Park Lug, which is the boundary of the medieval deer park. Downstream of the earthwork there are numerous artificial drainage ditches that characterise a well-developed wooded riparian corridor.

19.7.43 A summary of the main features for this water body is presented in Table 19-31.

Table 19-31 Summary of surface water features for the River Hamble

Feature	Description
WFD catchment/water body and reference	Main River Hamble - GB107042016250
Water body status[12] (includes WFD water quality classification information) [46]	'Moderate' ecological status. Most biological and physico-chemical quality elements are at Good or High status. The exceptions being fish and phosphate (both Moderate). Physico-chemical quality parameters (acid neutralising capacity, DO, ammonia, temperature, pH, BOD) and specific pollutants are classified as being at high status. Diffuse and point source pollution from poor livestock management and sewage discharge are adversely affecting phosphate levels, and physical modifications (barriers (ecological discontinuity)) are affecting fish. Chemical status is 'Fail' associated with mercury and PBDEs.
Consented discharges	The nearest consented discharge is located over 1.5km from the Order Limits

[12] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Feature	Description
Abstractions within 1km of the Order Limits	None
Relevant WFD Protected areas	The Order Limits cross the Upper Hamble NVZ, Hamble Estuary Eutrophic NVZ (TraC), River Hamble sensitive area UWWTD.
Other relevant designated sites within catchment	None

19.7.44 A summary of water quality data for the EA 'R.Hamble Durley' monitoring point is presented in Table 19-32.

Table 19-32 Water quality data for the 'R.Hamble Durley' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.02	0.05	0.03	0.03
Nitrate as N (mg/l)	3.58	7.58	5.92	6.26
Orthophosphate, reactive as P (mg/l)	0.06	0.11	0.08	0.08
Oxygen, Dissolved, % Saturation	72.60	96.70	89.73	94.80
Oxygen, Dissolved as O2 (mg/l)	7.63	11.40	10.16	10.80
Nitrogen, Total Oxidised, as N (mg/l)	3.60	7.60	5.95	6.30
Ammoniacal Nitrogen, as N (mg/l)	0.06	0.16	0.10	0.09
pH	7.69	8.00	7.83	7.82
BOD (mg/l)	1.10	1.90	1.50	1.50

River Hamble (Upper)

19.7.45 The location of the River Hamble (upper) catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The River Hamble (upper) drains an area of 38km^2 upstream of the confluence of the River Hamble and Moors Stream. There are two primary watercourses. The eastern branch (Main River) drains the ridge of high ground above Bishop's Waltham and there are two lakes which appear to impound the channel in Bishop's Waltham. The western channel (Ordinary Watercourse) flows to the south of Bishop's Waltham from Wintershill. This channel is also impounded by a lake it its upper course.

19.7.46 In the upper part of the catchment there is a large area of urban development associated with Bishop's Waltham. The rest of the catchment is mainly rural with mixed farming land use; mainly arable below Bishop's Waltham and grazing in headwater areas.

19.7.47 Confined to a relatively narrow floodplain by locally steep topography. Long sections of the channel appear to have been artificially straightened and the channel planform is mostly straight. In the area around Brooklands Farm the narrow channel has a more sinuous planform and there are areas of well-developed riparian woodland. A tributary of the Upper Hamble flows through Bishop's Waltham. The upper reaches of this tributary are confined by urban development and the floodplain is characterised by a series of small lakes.

19.7.48 A summary of the main features for this water body is presented in Table 19-33.

Table 19-33 Summary of surface water features for the River Hamble (Upper)

Feature	Description
WFD catchment/water body and reference	Upper Hamble - GB107042016280
Water body status[13] (includes WFD water quality classification information) [46]	'Moderate' ecological status. Fish status and phosphate status are both Moderate, and the dissolved oxygen status is Poor. Water bodies pressures are a result of diffuse pollution from riparian/in-river activities (including bankside erosion) associated with agriculture. Physical modifications also affect fish (barriers; land-use (improved grassland)). Physico-chemical quality parameters (ammonia, temperature and pH) are classified as being at high status. Chemical status is 'Fail' associated with mercury and PBDEs – no sector identified as being responsible
Consented discharges	There is one consented discharge associated with a domestic property within approximately 150m of the Order Limits. However, this is upstream of the Proposed Development and therefore there is unlikely to be a pathway for effect.
Abstractions within 1km of the Order Limits	None
Relevant WFD Protected areas	Hamble Estuary eutrophic NVZ, Hampshire Chalk NVZ, Upper Hamble NVZ. Hamble UWWTD
Other relevant designated sites within catchment	Galley Down Wood SSSI and Beacon Hill, Warnford SSSI are located in this catchment. They are located 3.6km and 8.1km north-east of the Proposed Development. These sites are upstream of the Proposed Development therefore there is no surface water hydrological connectivity to these SSSIs. Dundridge Meadows LNR, Claylands LNR and Bishop's Waltham Branchline LNR are also located upstream of the Proposed Development, so there is no hydrological connectivity.

19.7.49 A summary of water quality data for the EA 'D/S Of Brooklands Farm House Ford' monitoring point is presented in Table 19-34.

Table 19-34 Water quality data for the 'D/S Of Brooklands Farm House Ford' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.04	0.02	0.01
Nitrate as N (mg/l)	0.23	7.69	3.40	1.39
Orthophosphate, reactive as P (mg/l)	0.01	0.19	0.09	0.09
Oxygen, Dissolved, % Saturation	57.90	101.40	84.85	86.00
Oxygen, Dissolved as O2 (mg/l)	5.23	11.60	9.18	8.84
Nitrogen, Total Oxidised, as N (mg/l)	0.23	7.70	3.41	1.40

[13] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Ammoniacal Nitrogen, as N (mg/l)	0.04	0.15	0.07	0.06
pH	7.74	8.29	7.90	7.86
BOD (mg/l)	1.20	1.40	1.30	1.30

Horton Heath Stream

19.7.50 The location of the Horton Heath Stream catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). Horton Heath Stream drains an area of 15.9km^2. The channel rises at Lower Upham and flows in a generally southerly direction before joining the Main River Hamble catchment. The channel is Main River as far north as Alma Lane. There are several tributaries that join the Main River, which drain southern and eastern areas of the catchment. Although the valley floor is mainly rural, with notable areas of riparian woodland in the southern part of the catchment near the confluence with the River Hamble, there are significant areas of developed (urban) land use in parts if the catchments. These include Lower Upham, Durley Street, Durley, Boorley Green, Horton Heath and Fair Oak.

19.7.51 The floodplain comprises mainly farmland, and the channel appears to have been artificially straightened especially between Lower Upham, where the watercourse rises, and Horton Heath. Downstream of Horton Heath, the floodplain is very narrow as it is constrained by steep topography. As the channel flows around Boorley Green and downstream to the confluence with the Main River Hamble catchment, it changes to a well-developed meandering planform set within an area riparian woodland.

19.7.52 A summary of the main features for this water body is presented in Table 19-35.

Table 19-35 Summary of surface water features for the Horton Heath Stream

Feature	Description
WFD catchment/water body and reference	Horton Heath Stream - GB107042016270
Water body status[14] (includes WFD water quality classification information) [46]	Designated as heavily modified. 'Good' ecological potential. With the exception of the water body's fish status (Moderate), all ecological classification items are at Good or High status. The Moderate classification for fish is due to suspect data (no sector being responsible). Physico-chemical quality parameters (ammonia, DO, temperature and pH) are at high status and phosphate is at good status. Chemical status at 'Fail' due to mercury and PBDEs and no sector has been identified as being responsible
Consented discharges	Three discharges associated with domestic properties are within 1km of the Order Limits. One is within 30m of the Order Limits which discharges domestic sewage to a tributary of Ford Lake River

[14] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Feature	Description
Abstractions within 1km of the Order Limits	Three abstractions within this water body but only one is within 1km of the Order Limits. This abstraction is licenced for Portsmouth Water Ltd for public water supply and is licenced for abstraction of 31,500m^3 per day, 7,487,260m^3 per year from groundwater.
Relevant WFD Protected areas	Hamble Estuary Eutrophic NVZ (Transitional and Coastal Waters (TraC)), Hamble UWWTD
Other relevant designated sites within catchment	Moor Green Meadows SSSI is located in this catchment, 5.6km downstream of the Proposed Development. The designated site is situated in the headwater area of a small tributary of Horton Heath Stream therefore there is no surface water hydrological connectivity with the Proposed Development.

19.7.53 A summary of water quality data for the EA 'Ford Lake' monitoring point is presented in Table 19-36.

Table 19-36 Water quality data for the 'Ford Lake' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.01	0.01	0.01
Nitrate as N (mg/l)	0.93	1.39	1.17	1.19
Orthophosphate, reactive as P (mg/l)	0.03	0.09	0.05	0.04
Oxygen, Dissolved, % Saturation	81.20	95.30	91.23	94.20
Oxygen, Dissolved as O2 (mg/l)	8.55	12.20	10.71	11.05
Nitrogen, Total Oxidised, as N (mg/l)	0.93	1.40	1.18	1.20
Ammoniacal Nitrogen, as N (mg/l)	All values are less than 0.03			0.05
pH	7.34	7.60	7.50	7.53
BOD (mg/l)	1.00	1.70	1.33	1.30

Bow Lake

19.7.54 The location of the Bow Lake catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). Bow Lake drains an area of 37.7km^2 and it is a left bank tributary of the River Itchen, draining the south-western slopes of the South Downs. The catchment is primarily rural and characterised by large areas of arable farming. There some relatively small areas of urban development in the south of the catchment near Colden Common and Stoke Common. Relief in the catchment is typically steep as it drains the South Downs and floodplain areas are generally narrow. There are several large ponds and lakes in the south of the catchment, the largest of which (Fisher's Pond) impounds a tributary valley.

19.7.55 The channel appears to have been artificially straightened over much of its course and there are several notable impoundments (small lakes) in the catchment (e.g. Fisher's Pond). Channel planforms are generally straight throughout the catchment. In the lower part of catchment, the channel is constrained by a large fishery/hatchery - the channel is embanked, and the floodplain is used for hatchery

ponds. Upstream of Fisher's Pond the wider catchment is characterised by a series of narrow ephemeral valleys. The catchment is farmed and there is little riparian structure or riparian woodland.

19.7.56 Bow Lake is essentially a straight, slightly incised watercourse with a channel form that resembles an open trench, with straight, steep banks and a flat bed. Channel width is typically 2-3m wide and 1.52m deep. Downstream of the Proposed Development, Bow Lake transitions from a drain or ditch into a stream as the sinuosity increases and the channel widens

19.7.57 A summary of the main features for this water body is presented in Table 19-37.

Table 19-37 Summary of surface water features for Bow Lake

Feature	Description
WFD catchment/water body and reference	Bow Lake - GB107042016650
Water body status[15] (includes WFD water quality classification information) [46]	'Bad' ecological status. Fish status is Bad, and the invertebrate status is Moderate – the hydrological regime does not support Good. Main pressures in the catchment are caused by diffuse pollution from agriculture (poor soil and nutrient management) and trade/industry point source pollution and physical barriers. Large fishery with hatchery ponds occupies both banks of Bow Lake for some of its lower course. Physico-chemical quality parameters (acid neutralising capacity, temperature, pH) and specific pollutants are assessed as being at high. Physico-chemical quality parameters (ammonia, DO and phosphate) are assessed as being at good status. Chemical status is at Fail due to mercury and PBDEs, PFOS, Benzo(g-h-i) perylene. No sectors have been identified as being responsible.
Consented discharges	WTW (not water company) and a number of domestic property discharges are within 1km of the Order Limits. One relates to private premises discharge which discharges to underground strata (Upham Street). There are three discharges associated with fish farms.
Abstractions within 1km of the Order Limits	Seven abstractions, all associated with fish farms and vary for volumes between 250m^3 per day to 6818m^3 per day.
Relevant WFD Protected areas	The Order Limits cross the Hamble Estuary Eutrophic NVZ (TraC), Bow Lake NVZ and the River Itchen sensitive area UWWTD.
Other relevant designated sites within catchment	None identified within this catchment

19.7.58 A summary of water quality data for the EA 'Bow Lake Stoke Common' monitoring point is presented in Table 19-38.

Table 19-38 Water quality data for the 'Bow Lake Stoke Common' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.00	0.14	0.02	0.01

[15] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrate as N (mg/l)	0.24	8.39	3.70	3.59
Orthophosphate, reactive as P (mg/l)	0.01	0.60	0.08	0.05
Oxygen, Dissolved as O2 (mg/l)	4.66	12.00	9.54	11.00
Nitrogen, Total Oxidised, as N (mg/l)	0.25	8.40	3.79	3.70
Ammoniacal Nitrogen, as N (mg/l)	0.03	7.50	0.30	0.08

River Itchen

19.7.59 The location of the Itchen catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The Itchen catchment measures 119.6km^2 and it is formed downstream of New Arlesford. Headwater tributaries of the Itchen are located in the catchments of Candover Brook, Arle and Itchen (Cheriton Stream). There are numerous shallow ephemeral valleys throughout the catchment that drain mostly arable fields. The valley floor is characterised by floodplain meadows with areas of woodland and numerous leats and ditches. The Itchen Navigation has an offtake on the Itchen downstream of Winchester and continues downstream to Swaythling. Downstream of Winchester the catchment is increasingly urban. In the lower catchment the main tributary is Monk's Brook, which joins the Itchen near Swaythling. The river is designated as a SSSI and SAC.

19.7.60 The SAC objectives [59] are to ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

1. The extent and distribution of qualifying natural habitats and habitats of qualifying species.
2. The structure and function (including typical species) of qualifying natural habitats.
3. The structure and function of the habitats of qualifying species.
4. The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely.
5. The populations of qualifying species.
6. The distribution of qualifying species within the site.

19.7.61 Chalk outcrops in the majority of the catchment, but in the lower valley (in a line from Bishop's Waltham across to Salisbury) Tertiary clays and sands overlie the chalk. Earlier in the Holocene the River Itchen was likely to have been a natural multi-thread (anastomosing) channel. In places some of these channels are still evident but they are generally set within a heavily managed system of leets, weirs, offtakes and numerous artificial ditches and drains that characterise the floodplain. Water is also drawn off the Itchen for the Itchen Navigation, which runs parallel to the river. In the Otterbourne area there are areas of riparian woodland.

19.7.62 The River Itchen has the classic characteristics of a chalk stream, with a gently meandering planform and a channel cross section featuring a high width-to-depth ratio (10–15m wide and 1–2m deep). The riverbed is made up of fine to coarse

gravels, which support instream macrophytes unique to chalk streams. During the survey, some silty patches were observed on the riverbed, and along the channel margins colonised by reeds and sedges. Towards the downstream end of the study reach, there are two mid-channel Islands that add some complexity to the flow, along with a small riffle which was likely created as part of restoration efforts. During the survey, the flow was almost at bankfull, and a significant amount of water was being diverted from the navigation channel to the river through a series of sluices.

19.7.63 A summary of the main features for this water body is presented in Table 19-39.

Table 19-39 Summary of surface water features for River Itchen

Feature	Description
WFD catchment/water body and reference	Itchen - GB107042022580
Water body status[16] (includes WFD water quality classification information) [46]	'Good' ecological status. Physico-chemical quality parameters (acid neutralising capacity, ammonia, BOD, DO, phosphate, temperature, pH) and specific pollutants are classified as being at high status. Chemical Status at 'Fail' due to mercury, PBDEs and Benzo(g-h-i)perylene. No sector has been identified as being responsible.
Consented discharges	The nearest consented discharge is approximately 170m from the Order Limits and is for a domestic discharge.
Abstractions within 1km of the Order Limits	Four associated with transfer between sources and three associated with public water supply – the Applicant.
Relevant WFD Protected areas	The Order Limits cross: the Hamble Estuary Eutrophic NVZ (TraC); Hampshire Chalk NVZ; Itchen Drinking Water Protected Area; River Itchen (Hampshire) sensitive area UWWTD; River Itchen SAC. Offshore water dependent protected areas are also linked to the water body. These are: Solent and Dorset Coast SPA; Southampton Water shellfish waters.
Other relevant designated sites within catchment	River Itchen SSSI (hydrologically connected to the Proposed Development); Shawford Down LNR (located 1.5km upstream of the Proposed Development and not hydrologically connected).

19.7.64 There is little underlying change in chemical status for chemicals that are not uPBT (ubiquitous, persistent, bioaccumulative toxic) in the River Itchen. If uPBT chemicals are excluded, then the chemical status assessment is comparable to previous years' assessments (previously assessed as being at Good status). In common with many rivers, levels of nutrients such as nitrates and phosphates are elevated above natural levels in the River Itchen [60]. High nutrient levels can have impacts on plant species resulting in the dominance of algae, and a loss of characteristic plant species; water quality measurements for the River Itchen within the SAC show phosphorus concentrations to be exceeding the targets in most units [61].

19.7.65 The main sources of point source pollution (single, easily identified points of discharge) to the Itchen include treated wastewater, storm water from sewerage systems, pollution from privately owned sewage treatment works

[16] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

and septic tanks, road run-off and other discharges from trade premises, fish farms and watercress beds in the upper catchment [60].

19.7.66 Diffuse pollution is also listed as another main source of potential pollution to the river. This includes substances, such as car oil [60], which can enter the surface water drainage systems via drains and cause pollution. Rural sources of diffuse pollution are often associated with farming and other land management practices and the maintenance of land drainage systems.

19.7.67 Improvements have been funded for the main sewage treatment works on the River Itchen and permit limits tightened further than in other river systems because of the river's designation as a SAC [60]. Permit limits were set to the technically achievable limit (the best wastewater quality that was achievable with wastewater technology) at the time. Limits for phosphorus have been added to the permits of the larger discharges to prevent nutrient enrichment of the river's ecosystem to protect and improve the condition of the SAC and protect it from deterioration. The EA is also working on producing Drainage and Wastewater Management Plans for the Itchen which will identify risks to the environment from wastewater and drainage and identify where improvements need to be made to prevent deterioration or harm.

19.7.68 Recent water quality measurements for the River Itchen [61] within the SAC show phosphorus concentrations (soluble reactive phosphorus and orthophosphate as reactive phosphorus) to be exceeding the targets in most units. Units that are currently failing to meet targets require between 8% and 63% reductions in phosphorus to achieve compliance.

19.7.69 A summary of water quality data for the EA 'River Itchen at Bishopstoke' monitoring point is presented in Table 19-40.

Table 19-40 Water quality data for the 'River Itchen at Bishopstoke' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.02	0.01	0.01
Nitrate as N (mg/l)	7.39	8.68	8.14	8.24
Orthophosphate, reactive as P (mg/l)	0.02	0.05	0.03	0.03
Oxygen, Dissolved, % Saturation	97.20	117.60	103.45	102.75
Oxygen, Dissolved as O2 (mg/l)	10.00	11.90	10.93	10.85
Nitrogen, Total Oxidised, as N (mg/l)	7.40	8.70	8.15	8.25
Ammoniacal Nitrogen, as N (mg/l)	All value are less than 0.03			
pH	7.95	8.25	8.12	8.14
BOD (mg/l)	1.20	1.50	1.33	1.30

Itchen Navigation

19.7.70 The location of the Itchen Navigation catchment is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The Itchen Navigation is a canal that roughly follows the lower course of the River Itchen. The canal starts in Winchester and flows on the eastern side of the

floodplain as far as the M3 motorway, where it crosses to the west bank as far as Eastleigh. The water body that is assessed by the EA for compliance with the WER only extends as far north as the M3 motorway and measures 7.2km in length. The canal is an artificial watercourse with straight planform with little or no natural geomorphological features. The channel bifurcates from the main River Itchen to the north of the village of Northfields and re-joins the river near Bishopstoke.

19.7.71 The channel has a straight, uniform planform and the banks are steeply graded, approximately 1.5 to 2m high, and buffered by emergent vegetation such as reeds. The channel is approximately 7–8m wide at the bank base and 9-11m wide at the bank top. The bed substrate consists of medium to coarse gravels with fine silt drapes in patches. A series of weirs and sluice gates divert water into the River Itchen, controlling water levels.

19.7.72 The local angling club has installed a series of flow deflectors to provide some flow diversity and encourage fish spawning. Hazel hurdles have also been installed along short lengths of localised bank erosion caused by flow overtopping the bank.

19.7.73 A summary of the main features for this water body is presented in Table 19-41.

Table 19-41 Summary of surface water features for Itchen Navigation

Feature	Description
WFD catchment/water body and reference	Itchen Navigation - GB70710008
Water body status[17] (includes water quality classification information) [46]	'Good' ecological potential. Chemical status is 'Fail' associated with mercury and PBDEs. No sector identified as being responsible.
Consented discharges within 1km of the Order Limits	None
Abstractions within 1km of the Order Limits	None
WFD Protected areas identified for this water body by the EA	See Table 19-39
Other relevant designated sites within catchment	Itchen SSSI, which is hydrologically connected to the Proposed Development.

19.7.74 A summary of water quality data for the EA 'Otterbourne Memorial Garden' monitoring point is presented in Table 19-42.

Table 19-42 Water quality data for the 'Otterbourne Memorial Garden' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrite as N (mg/l)	0.01	0.02	0.01	0.01
Nitrate as N (mg/l)	7.88	8.99	8.39	8.39
Orthophosphate, reactive as P (mg/l)	0.01	0.06	0.03	0.03
Oxygen, Dissolved, % Saturation	96.70	124.10	104.31	102.70
Oxygen, Dissolved as O2 (mg/l)	9.96	12.00	11.19	11.30
Nitrogen, Total Oxidised, as N (mg/l)	7.90	9.00	8.40	8.39

[17] The ecological status of surface waters under the WFD is recorded on a scale of 'high', 'good', 'moderate', 'poor' and 'bad'. The overall environmental objective of reaching Good ecological status applies.

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Ammoniacal Nitrogen, as N (mg/l)	All values are less than 0.03			
pH	8.03	8.39	8.19	8.15
BOD (mg/l)	1.30	1.60	1.47	1.50

Solent/Isle of Wight East

19.7.75 The location of the Solent and Isle of Wight East water bodies are shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The Solent water body is approximately 30km long and varies in width between 4-8km with its narrowest point located between Hurst Castle and Colwell Bay. Tidal currents are strong and rise for approximately six hours with a 'Double High Water' for a further three hours. The 'Stand' is caused by the English Channel's 'closed funnel effect' causing a large volume of water to continue to flow into the Solent's eastern entrance. As a result, the Solent flood lasts for about nine hours and the ebb between three and a half to four hours. The Isle of Wight East water body boundary is located adjacent to the Solent water body.

19.7.76 A summary of the features for these two water bodies is presented in Table 19-43.

Table 19-43 Summary of surface water features for Solent and Isle of Wight

Feature	Description - Solent	Description – Isle of Wight
WFD catchment/water body and reference	Solent GB650705150000	Isle of Wight East GB650705530000
Water body status (includes water quality) [46]	'Heavily modified at Moderate' status. Chemical status is 'Fail' associated with mercury and PBDEs	Heavily modified at Good' status. Chemical status is 'Fail' associated with mercury and PBDEs.
Consented discharges	There are no consented discharges within 1km of the LSO, the nearest is 6km away and is associated with a discharge from a caravan site.	No consented discharges within 1km of the LSO within this water body.
Relevant WFD protected areas – informed by hydrodynamic modelling plume extent (see ES Appendix 19.5 Eastney Long Sea Outfall dispersion modelling, Volume II (Document Reference 6.2, Volume 6))	SAC: South Wight Maritime SPA/Ramsar: Solent and Dorset Shellfish waters: Spithead and Stokes Bay shellfish water Ryde shellfish water Bathing waters: Eastney and Southsea East bathing waters are located 5-6km away from the LSO.	

Feature	Description - Solent	Description – Isle of Wight
Other relevant designated sites	Sinah Common SSSI, Brading Marshes to St Helen's Ledges SSSI. These sites are located 4-5km away from the LSO. Bembridge MCZ (5km away from the Proposed Development). The Proposed Development is not hydrologically connected to designated sites. Model outputs as set out in ES Appendix 19.5 Eastney Long Sea Outfall Solent Dispersion Modelling, Volume II (Document Reference 6.2, Volume 6) show negligible differences between existing Budds Farm WTW release and future release with WRP reject water combined. For chemicals (ES Appendix 19.8 CORMIX Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II), EQS compliance occurs within 1–2 m of the outfall, indicating rapid dilution.	

19.7.77 A summary of water quality data for two EA monitoring points is presented; the 'nr Eastney LSO' monitoring point in Table 19-44 and 'East Brambles' monitoring point in Table 19-45. Further baseline data in terms of chemicals is presented in ES Appendix 19.8 CORMIX Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II (Document Reference 6.2, Volume 6).

Table 19-44 Water quality data for the 'Eastney Long Sea Outfall' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrogen, Dissolved Inorganic as N (mg/l)	0.01	0.28	0.12	0.09
Salinity in situ (ppt)	33.64	34.75	34.26	34.26
Oxygen, Dissolved, % Saturation	88.40	107.90	98.43	97.90
Oxygen, Dissolved as O2 (mg/l)	6.69	9.43	8.19	7.81
Nitrogen, Total Oxidised, Filtered as N (mg/l)	0.01	0.27	0.11	0.07
Ammoniacal Nitrogen, Filtered as N (mg/l)	0.02	0.02	0.02	0.02

Table 19-45 Water quality data for the 'East Brambles' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrogen, Dissolved Inorganic as N (mg/l)	0.03	0.65	0.32	0.21
Salinity in situ (ppt)	31.66	34.54	33.44	33.59
Oxygen, Dissolved, % Saturation	89.20	108.90	99.23	97.80
Oxygen, Dissolved as O_2 (mg/l)	6.78	9.82	8.51	8.86
Nitrogen, Total Oxidised, Filtered as N (mg/l)	0.01	0.63	0.30	0.20
Ammoniacal Nitrogen, Filtered as N (mg/l)	0.01	0.04	0.02	0.02
Nitrite, Filtered as N (mg/l)	0.00	0.01	0.01	0.00

19.7.78 A report addressing the levels of nutrients in the Solent by the EA states that levels of nitrate in the Solent are not high but are sufficiently elevated to stimulate plant

growth in some locations, adversely affecting ecology [62]. It also states that there are much higher nitrate levels elsewhere around the UK (in the Thames estuary for example) but these water bodies do not record adverse effects on ecology. Data collected under the requirements of the WER do not indicate that the Solent suffers from problem phytoplankton blooms [62].

19.7.79 Source apportionment work which informs the report [62] has confirmed that the main sources of nitrogen to Solent and its estuaries are diffuse sources from agriculture (on average approximately 50% nitrogen is from agriculture, often via rivers) and point sources from sewage discharges (on average approximately 10% nitrogen is from sewage). The remainder includes coastal background and urban sources. Coastal background nitrogen is the 'background' concentration of nitrogen in the sea that enters the Solent on each tide and is mostly from the England Channel and is considered to be largely non-anthropogenic [62].

19.7.80 Regulation has significantly reduced nitrogen inputs to the Solent by permits requiring nitrogen reduction from both marine and riverine sewage discharges via the UWWTD and Habitats Directive and reducing inputs from agriculture via the Nitrates Directive. The Nitrates Directive has enabled designation of NVZs and requires farmers to follow specific rules to prevent water pollution from agricultural nitrates. Both Budds Farm and Peel Common WTWs have nitrogen reduction measures in place, that were implemented in 2008. EA data confirms that where permits have been put in place nitrogen concentrations have generally decreased by over half [62].

Langstone Harbour/Langstone Oysterbeds

19.7.81 The location of Langstone Harbour and Langstone Oysterbeds water bodies are shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). The Langstone Harbour water body covers a larger area than the estuary itself. This includes the tidal section of the Hermitage Stream, which has a 20–30m wide, heavily modified trapezoidal channel with a straight planform constrained by artificial banks and other urban infrastructure. During low tide, a 5–8m wide low-flow channel forms meandering between geomorphic features such as gravel emergent berms and mid-channel bars, creating some flow diversity. The channel bed consists of coarse to fine gravels and tidal mud deposits and the banks are heavily armoured with sheet pile and concrete blocks.

19.7.82 The catchment also contains the main harbour and several smaller water courses which discharge into it referred to as the 'onshore coastal catchment' area. This results from the 2015 water body review undertaken by the EA which sought to reduce the number of much smaller water bodies. Many of these smaller water bodies were therefore subsumed into the larger marine water body catchments.

19.7.83 The Langstone Oysterbeds water body is located within Langstone Harbour therefore the overall baseline for the wider harbour body is relevant to the Oysterbeds water body.

19.7.84 This wider onshore coastal catchment is predominantly urban/industrial, with only small areas of undeveloped land near Camp Down and between Bedhampton and Farlington. The main surface water drainage features are the lower (tidal) reaches of Hermitage Stream, Brockhamton Stream and an Ordinary Watercourse that

rises near Camp Down. There is limited natural geomorphological features in the coastal catchment as watercourses are constrained by urban development.

19.7.85 A summary of the features for these two water bodies is presented in Table 19-46.

Table 19-46 Summary of surface water features for Langstone Harbour

Feature	Description
WFD catchment/water body and reference	Langstone Harbour - GB580705130000, Langstone Oysterbeds GB510070073000
Water body status (includes water quality) [46]	Langstone Harbour is 'Heavily modified and at Moderate' potential. Langstone Oysterbeds is classified as artificial. Physico-chemical parameters (dissolved inorganic nitrogen, DO) are at good status and specific pollutants and phytoplankton are at high status in Langstone Harbour. Chemical status for both water bodies is 'Fail' associated with mercury and PBDEs. A sector responsible has not been identified.
Consented discharges	Budds Farm Havant combined emergency overflow (CEO) to Brockhampton Stream which discharges into the Hermitage tidal section of the water body is located on the Order Limit boundary. This discharge location is only used during emergencies. All other consented discharges located away from redline boundary upstream of the Proposed Development and therefore would not have hydraulic connectivity.
Relevant WFD Protected areas identified for this water body	SAC: Langstone Harbour SPA/Ramsar: Chichester And Langstone Harbours Shellfish waters: Langstone Harbour Nutrient sensitive designations: Langstone Harbour UWWTD Chichester, Langstone and Portsmouth Harbours Eutrophic NVZ (TraC)
Other relevant designated sites	Langstone Harbour SSSI (hydrologically connected to the Proposed Development). Portsdown SSSI is also located within this catchment but there is no hydrological connectivity with the Proposed Development and this SSSI.

19.7.86 A summary of water quality data for the EA 'NW Sinah Buoy, Langstone' monitoring point is presented in Table 19-47.

Table 19-47 Water quality data for the 'NW Sinah Buoy Langstone' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	mean	Median
Nitrite filtered as N (mg/l)	0.00	0.01	0.01	0.00
Nitrate as N (mg/l)	0.01	0.26	0.15	0.20

Parameter (2024-2026)	Minimum	Maximum	mean	Median
Orthophosphate, reactive as P (mg/l)	0.01	0.02	0.01	0.01
Oxygen, Dissolved, % Saturation	92.20	112.20	100.43	98.95
Oxygen, Dissolved as O_2 (mg/l)	7.02	9.67	8.47	8.49
Nitrogen, Total Oxidised, as N (mg/l)	0.06	0.27	0.20	0.23
Ammoniacal Nitrogen, as N (mg/l)	0.01	0.03	0.02	0.01

19.7.87 One of the main issues in the harbour is an excess of nutrients which is recognised in the classification of Langstone Harbour as 'eutrophic' under the UWWTD. Nitrogen enrichment (especially nitrate) contributes to the excessive growth of green macroalgae on intertidal mudflats which can have adverse effects on ecology known as eutrophication. The EA undertook modelling work in the Solent to review eutrophication issues, part of which included monitoring of nutrient loads in two different time periods, approximately 20 years apart: 1997-2000 and 2015-2019 [62].

19.7.88 This assessment confirmed significant overall reductions in both nitrogen and phosphorus loads and in Langstone Harbour the nitrogen load decreased by 49% and the phosphorus load by 75%. Source apportionment work as part of the same study confirmed that the main source of nitrogen to Langstone Harbour is diffuse sources from agriculture (on average approximately 50% nitrogen is from agriculture, often via rivers) and coastal background [62]. The report also concluded that there is evidence of a trend of decreasing nutrients in the Solent itself, as well as in the coastal background water, due to nutrient reductions from many sources.

19.7.89 As a consequence of this work, the EA report concludes that encouraging signs of recovery are now apparent and following the most recent classification assessment the EA conclude that in Langstone Harbour, eutrophication is no longer a problem [62].

Southampton Water

19.7.90 The location of Southampton Water is shown on ES Figure 19.1 Surface water features, Volume III (Document Reference 6.3, Volume 6). Southampton water body also covers a larger area than the estuary itself including an 'onshore coastal catchment' area. The geomorphology of Southampton Water is described by the EA as a meso-tidal spit enclosed estuary, draining a catchment of approximately 1,500km^2. For much of its length, it has an artificially deepened channel, with the present-day morphology of the estuary highlighting the constrained nature of the system. Anthropogenic effect of progressive development and reclamation since approximately 1783 has further altered the water body. In Southampton Water the intertidal zone from Highest Astronomical Tide to Mean Low Water Spring covers approximately 13.5km^2.

19.7.91 The Proposed Development crosses an area of onshore coastal catchment south of Waltham Chase and Shirrell Heath that drains to Southampton Water. The upper part of the coastal catchment is mostly rural with notable areas of woodland south of Shedfield. South of the M27 motorway the catchment is mostly urban.

19.7.92 The main drainage feature of the onshore coastal catchment is the lower (freshwater and tidal) course of the River Hamble. A Main River that rises immediately adjacent to the Proposed Development near A334 Winchester Road drains a large area of the eastern catchment. Shawford's Lake (Ordinary Watercourses) drains a large area of the coastal catchment and joins the Main River at Curbridge. Purbrook Lake (Main River) drains a large part of the western area of the catchment in the Hedge End – Botley area. Other sections of Main River drain the southern part of the catchment near Swanwick.

19.7.93 Valley floors in the coastal catchment are constrained in extent by steep topography. Planforms on many of the small watercourses are meandering, most notably in the northern and eastern areas of the catchment. Watercourses in the southern and western areas of the catchment are heavily constrained by urban development and show few natural geomorphological features.

19.7.94 A summary of the features for this water body is presented in Table 19-48.

Table 19-48 Summary of surface water features for Southampton Water

Feature	Description
WFD catchment/water body and reference	Southampton Water - GB520704202800
Water body status (includes water quality) [46]	Heavily modified at 'Moderate' ecological potential. Physico-chemical parameters (DO) and specific pollutants are assessed as being at high status and dissolved inorganic nitrogen is at moderate status, which is considered to be due to poor nutrient management from agriculture and rural land management and point source pollution (water industry) Chemical status is 'Fail' associated with mercury, PBDEs and Benzo(g-h-i)perylene. A sector responsible has not been identified.
Consented discharges	There is one consented discharge for a domestic property approximately 150m from the Order Limits to an unnamed tributary Shawfords Lake.
Relevant WFD Protected areas identified for this water body	Shellfish waters/bathing waters/SPA/SAC: Any potential effects are likely to be limited to the coastal catchment of this water body – no protected areas are identified within the onshore coastal catchment. Nutrient sensitive designations: Chichester, Langstone and Portsmouth Harbours Eutrophic NVZ (TraC)
Other relevant designated sites	Waltham Chase Meadows SSSI is located approximately 400m to the north of the Order Limits within the coastal catchment of this waterbody. Given it is located upstream there is no hydrological connectivity or mechanism for impact. Botley Wood and Everett's and Mushes Copses SSSI is within the coastal catchment of this water body but is located approximately 5km from the Order Limits. The SSSI is located on a hillside above the floodplain. Given the distance to this SSSI and it's setting, there is no mechanism of impact.

19.7.95 A summary of water quality data for the EA 'Southampton Water Hound Buoy' monitoring point is presented in Table 19-49.

Table 19-49 Water quality data for the 'Southampton Water Hound Buoy' monitoring point (EA Water Quality Archive)

Parameter (2024-2026)	Minimum	Maximum	Mean	Median
Nitrogen, Dissolved Inorganic as N (mg/l)	0.13	2.87	0.94	0.62
Oxygen, Dissolved, % Saturation	80.80	107.90	97.88	97.10
Oxygen, Dissolved as O2 (mg/l)	6.11	9.91	8.74	9.26
Nitrogen, Total Oxidised, Filtered as N (mg/l)	0.09	2.80	0.89	0.60
Ammoniacal Nitrogen, Filtered as N (mg/l)	0.01	0.09	0.05	0.05
Nitrate, Filtered as N (mg/l)	0.08	2.79	0.88	0.60
Lead dissolved (µg/l)	0.05	0.11	0.07	0.06
Mercury dissolved (µg/l)	All values are less than 0.01			
Cadmium dissolved (µg/l)	All values are less than 0.03			
Zinc dissolved (µg/l)	1.20	3.90	2.64	2.60
Nickel dissolved (µg/l)	0.34	7.20	1.37	0.63
Arsenic dissolved (µg/l)	1.20	1.60	1.34	1.25
Copper dissolved (µg/l)	0.67	1.80	1.20	1.30

Groundwater features and resources

South East River Basin Management Plan

19.7.96 The Proposed Development is located in the South East River Basin District. The status and objectives are based on those set out in the 2022 RBMP [46].

19.7.97 The study area crosses seven groundwater bodies as shown on ES Figure 19.2 Groundwater features, Volume III (Document Reference 6.3, Volume 6) and detailed in the HIA (refer to ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6):

1. River Itchen Chalk (GB40701G505000)
2. East Hants Chalk (GB40701G502700)
3. Central Hants Bracklesham Group (GB40702G500900)
4. South East Hants Bracklesham Group (GB40702G503000)
5. Central Hants Lambeth Group (GB40702G503800)
6. East Hants Lambeth Group (GB40702G500800)
7. South Hants Lambeth Group (GB40702G503700)

19.7.98 The superficial deposits (including those overlying these groundwater bodies) are not specifically designated as groundwater bodies. However, it is assumed that they are generally hydraulically connected to the relevant underlying designated groundwater bodies, based on the observed groundwater levels and strata permeabilities.

Catchment Abstraction Management Strategy

19.7.99 The Proposed Development is located within two Catchment Abstraction Management Strategy (CAMS) areas (water resource management boundaries as defined by the EA). CAMS help to identify where water may be available for future use but also where water resource demands may be impacting the water balance. The CAMS areas are listed below and illustrated in ES Figure 19.5 Catchment Abstraction Management Strategy, Volume III (Document Reference 6.3, Volume 6):

1. Test and Itchen – Sections L and M of the Pipeline between the WRP site and Otterbourne Water Supply Works (WSW) (west of Lower Upham)
2. East Hampshire – The remainder of the Proposed Development (from Havant to Lower Upham)

19.7.100 The Test and Itchen CAMS covers the Test and Itchen catchments in Hampshire and covers an area in the order of 1,675km^2. Large portions of the catchments are underlain by chalk, which influences the flow regimes and drainage patterns. Many of the tributaries are bournes (intermittent streams flowing from springs), which only flow during high groundwater conditions. For the groundwater units within the study area of the Proposed Development:

1. The groundwater balance for the 'Itchen Chalk' has restricted water available (no new consumptive licenses will be granted).
2. The groundwater balance for the 'Central Hants Bracklesham Group' has water available (new licenses will be considered on a case-by-case basis). Note that the Central Hants Lambeth Group is not included within the CAMS.

19.7.101 The East Hampshire catchment covers an area in the order of 517km^2 consisting of rolling chalk downlands to the north and a heavily urbanised coastal plain to the south. As with the Test and Itchen CAMS, the chalk plays an important role, being an important source of water for many of the streams and wetlands. The CAMS identifies that for the groundwater units located within the study area of the Proposed Development:

1. The groundwater balance for the 'East Hants Chalk' has restricted water available (no new consumptive licenses will be granted).
2. The groundwater balance for the 'South East Hants Bracklesham Group' is illustrated as having water available (new licenses will be considered on a case-by-case basis). However, the CAMS notes that 'it is unlikely that there will be any potential for significant, reliable abstractions from these units. There is no specific policy for these aquifers. Decisions about an application will be made on a case-by-case basis'.

19.7.102 The 'East Hants Lambeth Group' and 'South Hants Lambeth Group' are illustrated as having restricted water available. However, the CAMS notes that 'it is unlikely that there will be any potential for significant, reliable abstractions from these units. There is no specific policy for these aquifers therefore decisions about an application are made on a case-by-case basis'.

Aquifer designations

19.7.103 Aquifers within the study area that have been classified by the EA are listed in the following paragraphs and are presented in ES Figure 19.6 Superficial aquifer designations, Volume III (Document Reference 6.3, Volume 6) and ES Figure 19.7 Bedrock aquifer designations, Volume III (Document Reference 6.3, Volume 6).

19.7.104 The various chalk members of the White Chalk Subgroup are designated by the EA as a Principal aquifer. No superficial deposits are designated as Principal aquifers. Principal aquifers have high permeability, meaning they usually provide a high level of water storage and transmission; supporting water supply and river base flow on a strategic scale.

19.7.105 The Lambeth Group, Bracklesham Group and sand members of the London Clay (e.g. Durley Member and Bognor Member) together with the River Terrace Deposits and Alluvium superficial deposits are designated by the EA as Secondary A aquifers. This designation indicates that the aquifers are permeable layers that can support local water supplies and may form an important source of base flow to rivers [34].

19.7.106 No bedrock or superficial deposits are designated by the EA as a Secondary B aquifer. This designation indicates that aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers [34].

19.7.107 No bedrock is designated as a Secondary undifferentiated aquifer; however, Raised Marine Deposits, Beach and Tidal Flats and Head superficial deposits are designated as Secondary undifferentiated. This designation indicates that it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value [34] Aquifers under each component are summarised in Table 19-50.

Table 19-50 Designated Aquifers

Designated Aquifer	Proposed Development component
Superficial deposits	
River Terrace Deposits and Alluvium - Secondary A	WRP site Pipelines between Budds Farm WTW and the WRP site Pipelines between the WRP site and Bedhampton Springs Pipeline between the WRP site and Otterbourne WSW: • Section D: The WRP site to Portsdown Hill • Section F: Boarhunt to Crockerhill • Section G: Crockerhill to Wickham • Section H: Wickham to Shedfield • Section J: Shedfield to the River Hamble • Section K: The River Hamble to Lower Upham • Section L: Lower Upham to Brambridge

Designated Aquifer	Proposed Development component
	• Section M: Brambridge to Otterbourne Water Supply Works
Raised Marine Deposits, Beach and Tidal Flat Deposits, and Head deposits – Secondary undifferentiated	WRP site Pipelines between Budds Farm WTW and the WRP Pipelines between the WRP site and Bedhampton Springs Pipeline between the WRP site and Otterbourne WSW: • Section D: The WRP site to Portsdown Hill • Section E: Portsdown Hill to Boarhunt • Section F: Boarhunt to Crockerhill • Section G: Crockerhill to Wickham • Section H: Wickham to Shedfield • Section J: Shedfield to the River Hamble • Section K: The River Hamble to Lower Upham • Section M: Brambridge to Otterbourne Water Supply Works
Bedrock	
White Chalk Subgroup and Culver Chalk Formation - Principal	WRP site Pipelines between Budds Farm WTW and the WRP Pipelines between the WRP site to Bedhampton Springs Pipeline between the WRP site and Otterbourne WSW: • Section D: The WRP site to Portsdown Hill • Section E: Portsdown Hill to Boarhunt • Section F: Boarhunt to Crockerhill • Section M: Brambridge to Otterbourne Water Supply Works
Bognor Sand Member, London Clay Formation (sand), Lambeth Group, Whitecliff Sand Member and Wittering Formation - Secondary A	Pipeline between the WRP site and Otterbourne WSW: • Short part in the east of Section E: Portsdown Hill to Boarhunt • Section F: Boarhunt to Crockerhill • Section G: Crockerhill to Wickham • Section H: Wickham to Shedfield • Section J: Shedfield to the River Hamble • Section K: The River Hamble to Lower Upham (access roads only) • Section L: Lower Upham to Brambridge • Section M: Brambridge to Otterbourne Water Supply Works • Use of Havant Thicket Reservoir for the storage of recycled water.

Hydrogeology - Superficial deposits

19.7.108 Flow through the superficial deposit aquifers is dominated by intergranular flow where the permeability will support it. Groundwater flow through the superficial deposits will be locally variable and limited to more permeable zones.

19.7.109 Superficial deposit aquifers are generally anticipated to be unconfined; however, heterogeneity of deposits means localised confinement of water bearing, coarse grained units are likely.

19.7.110 Alluvium and River Terrace Deposits are present across the Proposed Development, associated with main surface watercourses, and are likely to comprise a mixture of clays, silts, sands and gravels. Deposits can be complex with interdigitations of deposits which may develop separate piezometric levels, although they are generally anticipated to be permeable. Due to their permeability, the deposits are anticipated to be in continuity with associated surface watercourses and features and the chalk bedrock where they directly overlie. River Terrace Deposits generally comprise less fines than Alluvium and thus will generally be more permeable.

19.7.111 Head, Raised Marine Deposits and Beach and Tidal Flat Deposits are likely to more variable and heterogenous (which results in their Secondary Undifferentiated designation) although high permeability beds may be encountered. Deposits will be complex with interdigitations of deposits which may develop separate piezometric levels.

19.7.112 The Clay with Flints deposits are anticipated to generally have a low permeability with limited water bearing potential.

Hydrogeology - Bedrock

19.7.113 The chalk bedrock is of hydrogeological importance, providing an important source of supply to public water supply abstractions and surface water features (including environmentally significant chalk streams).

19.7.114 Chalk is generally referred to as a dual porosity aquifer, where main storage of water occurs in the low-transmissivity porous matrix, whilst flow and transport occur primarily in a pervasive high-transmissivity fractures (or solution features) network.

19.7.115 Regional groundwater flow within the chalk bedrock is generally southerly from the elevated chalk hills of the South Downs in the north towards the shallow Langstone Harbour and Solent in the south. The hydraulic heads from the groundwater source in the north result in groundwater flowing beneath the Palaeogene deposits of the Chichester syncline and emerging as springs to the south of the Chichester syncline, as discussed in further detail in the Karst section below.

19.7.116 The hydrogeology of the Portsdown anticline is less studied but is becoming better understood. Groundwater is considered to generally flow radially from the anticline supplying springs along the north coast of Portsmouth Harbour and springs feeding the River Wallington.

19.7.117 Investigations in the region also illustrated variability of aquifer properties with depth, with studies indicating the majority of flow is within the top 40-50m

corresponding with fracture locations with flow generally significantly less below this depth [63].

19.7.118 The weathered chalk may locally play an important role on the hydrogeology and continuity between the chalk and overlying aquifers and receptors. Where weathered, it is common for the chalk to be weathered to a form of chalk clay known as 'Putty Chalk' which can act as an aquitard. Elsewhere, harder chalk deposits may be weathered to a chalk gravel known as 'Chalk Bearings' which can be highly transmissive.

19.7.119 The Lambeth Group comprises a mixture of clays, silts and sands. In some areas of the Hampshire basin, the formation is predominantly clay and unproductive for water supply. Other areas, consist of sandy strata which can yield flows in the order of 100m^3/d. Where sandy basal layers within the group are present, they can be important in relation to the underlying chalk as they are thought to lead to enhanced development of dolines (also known as sinkholes) and other solution features.

19.7.120 The London Clay Formation of the Thames Group is generally of little significance as an aquifer due to its clayey natures. However, a number of lenticular beds of fine to medium grained sands are present which may constitute useful aquifers including the Bognor and Whitecliff sand members.

Karst

19.7.121 Chalk is an unusual karst aquifer in which cave development can be limited, but extensive networks of smaller solutional conduits and fissures that enable rapid groundwater flow are present. The British Geological Society has produced a series of reports which provide an overview of the evidence for karst in the Chalk (as well as Jurassic and Permian limestone) across England, with the C5 (Wessex Basin) [64] and C7 (South Downs) [65] reports relevant to the study area.

19.7.122 Dolines, stream sinks, dissolution pipes and springs are common in chalk bedrock with the Bedhampton and Havant spring complex in Hampshire (within the study area) being one of the best examples of karstic springs in the UK.

19.7.123 Up to 45 stream sinks have been mapped to the north of the study area in the Horndean and Rowlands Castle areas. These are found in the area close to the boundary between the chalk and Palaeogene formations and are critical point sources of recharge for the aquifer, as there are no permanent streams in the area. The water that enters the stream sinks is considered to flow through the chalk beneath the Chichester Syncline and then emerge in the Bedhampton and Havant spring complex to the south (approximately 5-6km distance). Tracer testing undertaken in the 1970s indicated significant groundwater velocities in the order of 2-3km/d and supported the presence of a well-developed conduit system linking the stream sinks north of the Chichester Syncline to the spring complex, with low attenuation and dilution.

19.7.124 Rapid flow has also been detected at Otterbourne. Rapid flow supports the presence of karst features, which has implications for pollution and groundwater quality risks (such as turbidity).

Rainfall and recharge

19.7.125 Average rainfall from a number of the closest Met Office climate stations in the area of the Proposed Development (Thorney Island, Solent MRSC and Southampton W.C) for the 1991-2020 climate period range from 723.48mm to 818.56mm.

19.7.126 Recharge to groundwater is anticipated to be predominantly to the north in the South Downs where infiltration rates will be greater, and karst stream sinks are identified (particularly in the eastern half of the route). The lower permeability deposits (e.g. London Clay and the Lambeth Group) and extensive urbanisation that underlies significant sections of the Proposed Development are anticipated to retard groundwater infiltration rates in these areas.

19.7.127 Due to the karstic nature of the chalk, rainfall in the South Downs is known to have an impact on the groundwater quality with turbidity a particular issue at the Havant Springs and Otterbourne following rainfall (implying rapid recharge or a connection with surface water).

Abstractions and Source Protection Zones

19.7.128 The Proposed Development encroaches on several SPZs as summarised in Table 19-51 and shown in ES Figure 19.8 Water resources, Volume III (Document Reference 6.2, Volume 6). More detailed information is provided in ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6) which identifies Source Protection Zones, licenced abstractions and private water supplies within a 1km buffer of the Order Limits that could be impacted by construction.

Table 19-51 Source Protection Zones

SPZ	Associated licensed abstractions	Proposed Development component
SPZ 1 and SPZ1c[18]	Portsmouth Water - Bedhampton Public Water Supply (PWS) Springs	Pipelines between WRP site and Bedhampton Springs
SPZ 2, 2c and 3	Portsmouth Water - Maindell PWS	Section F of the Pipeline between the WRP site and Otterbourne WSW
SPZ 1c and 2c	Portsmouth Water - Lower Upham water supply	Section K of the Pipeline between the WRP site and Otterbourne WSW
SPZ 1, 1c, 2, 2c and 3	The Applicant - Otterbourne PWS	Section M of the Pipeline between the WRP site and Otterbourne WSW

19.7.129 One licenced groundwater abstraction at Wickham Park Golf Club is located within the Order Limits.

[18] An SPZ with a c suffix refers to an area of SPZ with a protective cover of low permeability sat above a unit of high permeability.

Groundwater-surface water interactions (springs, sinks, karst and GWDTE)

19.7.130 A summary of springs and designated GWDTE that have been identified within the Order Limits are summarised in Table 19-52. This does not include surface water courses, which may also have an element of groundwater-surface water interaction (particularly the chalk streams). Springs and seepages are likely to be present below and in the banks of local surface watercourses. Potential springs within the study area are mapped on ES Figure 19.2 Groundwater features, Volume III (Document Reference 6.3, Volume 6).

19.7.131 More detailed information is provided in ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6) which identifies groundwater-surface water interactions including springs, sinks, karst and GWDTE (designated and potential non-designated) within a 1km buffer of the Order Limits that could be impacted by construction.

Table 19-52 Groundwater-surface water interactions (springs and designated GWDTE) within Order Limits

Receptor group	Name	Proposed Development Component
Designated GWDTE (SSSI)	Langstone Harbour	Pipelines between Budds Farm WTW and the WRP site
	River Itchen	Section M of the Pipeline between the WRP site and Otterbourne WSW
Springs	Bedhampton Springs (used for PWS)	Pipelines between WRP site and Bedhampton Springs

Groundwater quality

19.7.132 Refer to ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, Volume 6), and associated appendices, for information regarding encountered groundwater conditions.

Flood risk

19.7.133 Table 19-53 summarises the flood risk information for each of the surface water features described earlier in this section. Flood Zone 1 is defined as land with less than a 0.1% annual probability of river and sea flooding (less than 0.1%) [66]. Flood Zone 2 is defined as land that has a 1% to 0.1% annual probability of flooding, and a 0.5% to 0.1% annual probability of flooding from the sea); Flood Zone 3 is defined as land that has a 1% or greater annual probability of river flooding, or a 0.5% or greater annual probability of flooding from the sea. Fluvial and coastal flood risk is shown in ES Figure 19.9 Fluvial and coastal flood risk, Volume III (Document Reference 6.3, Volume 6); pluvial flood risk is shown in ES Figure 19.10 Pluvial flood risk, Volume III (Document Reference 6.3, Volume 6); reservoir flood risk is shown in ES Figure 19.11 Reservoir flood risk, Volume III (Document Reference 6.3, Volume 6); the potential for groundwater flooding is shown in ES Figure 19.12 Groundwater flooding susceptibility, Volume III (Document Reference 6.3, Volume 6).

Table 19-53 Summary of flood risk for each surface water (river and canal) receptor

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
Hermitage Stream	Majority is in Flood Zone 1. Areas of Flood Zone 2 and 3 are restricted by the artificially constrained (urban) nature. Narrow areas of mostly Flood Zone 3 and peripheral areas of Flood Zone 2 are associated with Rider's Lane Stream downstream of Havant Thicket Reservoir, and on Hermitage downstream of the confluence with Rider's Lane Stream. There is a more extensive area of Flood Zone 3 near Bedhampton upstream of the A27, and south of Brockhampton near Budds Farm. The WRP site is located at the edge of Flood Zone 2 and Flood Zone 3, which are confined to the channel of Hermitage Stream to the east. Budds Farm WTW is located in Flood Zones 2 and 3. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	The main high risk areas are located: • At the confluence of Hermitage Stream and Riders Lane Stream • Downstream of Bancroft Way in Havant on Riders Lane Stream, to Bedhampton Budds Farm WTW is mainly at very low risk and there are three very small areas of low to medium risk at the WRP.	No areas currently at risk of reservoir flooding. However, the construction of Havant Thicket Reservoir will introduce a new risk of reservoir flooding to downstream receptors in the future, which is therefore considered as part of the future baseline. This was considered in the ES for Havant Thicket Reservoir, which was subject to a separate consenting process.
Lavant (Hants)	Flood Zones 2 and 3 are confined by relatively steep topography in the catchment. In the upper catchment Flood Zone 3 is restricted to narrow ephemeral channel areas. There is a more extensive area at risk of flooding in Flood Zone 3 immediately upstream of Rowlands Castle and adjacent to the Proposed Development. A small section of Flood Zone 2 and 3 overlaps the Order Limits near Durrants. At the confluence of Durrants	Surface water flood risk is concentrated in ephemeral channel areas in the upper catchment. Several surface water flow paths originate very close to the Order Limits upstream of Rowlands Castle. A notable surface water flow path originates within the Order Limits in Hermitage Stream's catchment and crosses into the Lavant catchment to contribute to Durrants Stream. This indicates that the water body	No areas of risk.

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
	Stream and the Lavant there is a wider area in Flood Zone 3. Through Havant Flood Zone 3 is intermittent due to the channel being culverted. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	catchment boundaries of Hermitage Stream and the Lavant are difficult to define in this area. There is an extensive area of surface water flood risk at the confluence of Durrants Stream and the Lavant.	
Potwell Tributary	Majority of catchment is in Flood Zone 1. Higher risk areas (Flood Zone 2 and 3) are located adjacent to watercourses and are relatively confined by topography – the southern part of the catchment slopes steeply from Ports Down. The most extensive area of Flood Zone 3 is west of Waterlooville associated with a straightened section of channel. Not tidally influenced so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	The most extensive areas of flood risk (mainly low) are near Waterlooville. More spatially restricted but high risk flow paths are located along the main watercourses and especially near Southwick.	Both of the main watercourses in the catchment are at risk from existing reservoir flooding (from Southwick Lake) when river levels are normal (dry day scenario) and when there is also flooding from rivers (wet day scenario). Flood risk is related to several small water bodies in the upper catchment.
River Wallington	Below Southwick part of the catchment is in Flood Zone 1. The active floodplain is typically 100 to 300m in width and the majority of this area is in Flood Zone 3 with peripheral areas in Flood Zone 2. Higher risk areas (Flood Zone 2 and 3) are located adjacent to watercourses and are relatively confined by topography.	High risk flow paths are located adjacent to the River Wallington near North Fareham. High risk flow paths also flow south form near Noar Boarhunt and north and north-west from Boarhunt.	At risk from existing reservoir flooding (Southwick Lake) when river levels are normal (dry day scenario) and when there is also flooding from rivers (wet day scenario). Flood risk is related to several small water bodies in the upper catchment.

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
	Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.		
River Meon	Due to the narrow, topographical constrained valley floor of the Meon, flood risk is relatively uniform throughout most of the catchment. Flood Zone 3 is typically 120m in width throughout the catchment adjacent to the channel. At the point where the valley floor is crossed by the Proposed Development, Flood Zone 3 with peripheral areas of Flood Zone 2 are 35 to 100m wide. Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	Areas adjacent to the channel form high risk flow paths throughout most of the catchment. In addition, shallow ephemeral winterbourne valleys form numerous high risk surface water flow paths. In the area where the Pipeline cross the Meon valley surface water flood risk is typically high beside the main channel with high risk flow paths flowing from west to east and east to west on both sides of the valley.	Downstream of Whickham the Meon is at risk from reservoir flooding when river levels are normal (dry day scenario). Flood risk is related to Hoads Hill No.3 Reservoir.
Moors Stream	Areas at risk of flooding are confined to areas immediately adjacent to the channel as the width of the valley floor is confined by topography. Typically, the area at risk in Flood Zones 2 and 3 is approximately 30-50m in width. The exception to this is near Waltham	High risk flow paths are located adjacent to watercourses, but their spatial extent is restricted by topography. High risk flows paths also originate from the steeply sloping ground to the south of the catchment. One high risk flow path flows from an area close	No areas at risk.

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
	Chase where several tributaries join to create a wider zone. Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	(approximately 200m north) to the Proposed Development.	
River Hamble	Areas at risk of flooding are confined to areas immediately adjacent to the channel as the width of the valley floor is confined by topography. Typically, the area at risk in Flood Zones 2 and 3 is approximately 50-100m in width. The exception to this is Boorley Green where Horton Heath Stream joins the River Hamble. The valley floor and area at risk of flooding in Flood Zone 3 widens to approximately 150m where several tributaries join to create a wider zone at risk of flooding, which characterises the lower catchment downstream of Boorley Green. At the point where the Proposed Development crosses the River Hamble the area in Flood Zone 3 is 80-90m in width. Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea.	The full width of the valley floor is at high risk in many places. In addition, there are numerous medium to high risk flow paths originate from the steeply sloping valley sides on both banks on the main channel. At the point where the Proposed Development crosses the River Hamble, surface water flood risk is high across the floodplain and there are high risk tributary flow paths on both valley sides.	No areas at risk.

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
	The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.		
Upper Hamble	Only the Main River (eastern watercourse) that flows through Bishop's Waltham is in Flood Zones 2 and 3. The rest of the catchment is in Flood Zone 1. The most extensive area of flood risk (Flood Zone 3) is immediately downstream of Bishop's Waltham. The Proposed Development is within 5m of Flood Zone 3 near Brooklands Farm. At the point where the Proposed Development crosses, the area at risk of flooding in Flood Zone 3 is 80-90m in width. Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	Surface water flood risk is typically high across the floodplain of the Upper Hamble, but especially on the western watercourse that drains from near Wintershill. Surface water flood risk is generally medium-low on the Main River (eastern branch) that flows through Bishop's Waltham. The most extensive area of flood risk is immediately downstream of Bishop's Waltham. The Proposed Development crosses the south-western part of the catchment. Surface water flood risk in this area is associated with several high risk flow paths that drain the north-east facing slope of the catchment.	No areas at risk.
Horton Heath Stream	Topography is generally steeply sloping so areas at risk of river flooding are spatially restricted to narrow areas of valley floor. Floodplain widens near Horton Heath and the area at risk of flooding in Flood Zone 3 increases. Downstream the valley floor becomes very narrow and areas at risk of	The floodplains are at high risk of surface water flooding, although as noted for Flood Zones 2 and 3, the spatial extent of flood risk is constrained by topography to relatively narrow areas beside watercourses. The Proposed Development crosses several high risk surface water flow paths near Lower Upham.	None at risk.

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
	flooding are limited to areas immediately adjacent to the channel. Flood risk is also associated with tributary channels in Boorley Green and near Durley (Flood Zone 3). The Proposed Development passes just to the south of Lower Upham in the north of the catchment approximately 1km away from Flood Zones 2 and 3. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones. Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea.		
Bow Lake	Constrained by topography in the catchment, which is relatively steep with confined valley floors. Downstream of Portsmouth Road (B2177) the floodplain of Bow Lake is in Flood Zone 3, with peripheral areas in Flood Zone 2. In the lower part of the catchment, where a large fishery with hatchery ponds occupies both banks of Bow Lake, the channel is embanked and the wider area of hatchery ponds is in Flood Zone 2, with Flood Zone 3 confined to the channel area. Downstream of the fishery, Flood Zone 3 occupies the wider floodplain area.	Upstream of the Portsmouth Road (B2177) the north side is characterised by a series of narrow, steep-sided ephemeral valleys. These areas concentrate flows and the confined valley bottoms are areas of surface water flood risk. The main areas of surface water flood risk are similar to Flood Zone 3, but Proposed Development is crossed by numerous surface water flow paths sourced from ephemeral valleys and Ordinary Watercourses.	The majority of the valley floor downstream of Fisher's Pond is at risk of reservoir flooding under a dry-day scenario, with peripheral areas also at risk under a wet-day scenario.

Surface water receptor	Fluvial and coastal flood risk in catchment	Surface water flood risk	Reservoir flood risk
	Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.		
River Itchen and Itchen Navigation	Majority of the River Itchen floodplain is in Flood Zone 3. Downstream of Shawford the area at risk of flooding is less extensive than upstream areas of the floodplain. The area at risk of flooding in Flood Zone 3 becomes more extensive downstream of Colden Common. Not tidally influenced where crossed by the Proposed Development, so there is no risk of flooding from the sea. The FRA considers potential effects on Flood Zones 3a and 3b, noting that no permanent above-ground infrastructure is proposed for these zones.	Many of the Ordinary Watercourses, including ditches and drains, and ephemeral channels that characterise the wider catchment and floodplain are at risk of surface water flooding.	Downstream of Highbridge there is a risk of flooding form reservoirs under and dry-day and wet-day scenario. Upstream of Highbridge the Itchen Navigation is not as risk of flooding from reservoirs.

Future baseline

Havant Thicket Reservoir

19.7.134 The Proposed Development includes the storage of recycled water in Havant Thicket Reservoir. Prior to the implementation of the Proposed Development, the reservoir will be operated solely by Portsmouth Water as a pumped storage reservoir utilising surplus water from the Havant and Bedhampton Spring source. The baseline eutrophication and WER classifications for Havant Thicket Reservoir were established in the ES supporting the Portsmouth Water planning application for the reservoir [67].

19.7.135 Mass balance modelling presented by Portsmouth Water [67] in support of the planning application for Havant Thicket Reservoir demonstrates that releases from the reservoir (prior to the addition of recycled water from the WRP site by the Proposed Development) are likely to result in small changes in water quality (e.g. a small increase in calcium concentrations, and a small decrease in concentrations of iron, manganese, phosphorus and nitrogen) that are considered to be an improvement in water quality in Riders Lane Stream and Hermitage Stream. These changes are confined to Riders Lane Stream and Hermitage Stream, and do not affect water quality in Langstone Harbour (although the Total Nitrogen (TN) loading from the Hermitage Stream catchment is likely to decrease as a result of the construction of the reservoir [67]).

19.7.136 An additional modelling exercise was completed which focussed on the three main phases of the reservoir; the initial filling phase, the currently consented classic operational phase (i.e. the period during which Havant Thicket Reservoir will operate with water from spring and surface sources only, before water from the WRP is released, currently expected to be April 2032 – September 2033), and the recycled water post-WRP operation phase (October 2033 onwards), to investigate any changes in water quality through these phases and the effect of the source water change on reservoir water quality. The classic operation phase will therefore serve as the future baseline. This is presented in ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II, (Document Reference 6.2, Volume 6).

19.7.137 The model outputs predict that, following an initial period of variation as the reservoir is filled with spring water, rainfall and surface runoff (from what are currently the headwaters of Riders Lane Stream), water quality would stabilise at the beginning of the classic operation phase. The highest stabilisation sediment oxygen demand and dissolved matter (e.g. particulate organic nitrogen and dissolved organic nitrogen) sediment fluxes will occur during the first year that terrestrial soils, organic matter and vegetation are freshly inundated. As filling of the reservoir will occur over three consecutive winters, these high first year fluxes of freshly inundated areas are spread out over time as different depth bands of the reservoir are filled. The ‘fill’ stage is forecast to maintain a vertically well-mixed reservoir that promotes downward fluxes of atmospheric dissolved oxygen (DO) that maintains relatively low sediment fluxes and thereby concentrations of dissolved metals.

Riders Lane Stream and Hermitage Stream

Flow enhancements

19.7.138 Despite the loss of headwater streams that flow into the Riders Lane and Hermitage Streams, there will be compensatory flow from the reservoir and into the Riders Lane Stream. The compensatory flow aims to provide the same volume of water per annum that would naturally occur without the reservoir.

19.7.139 Under the impoundment (empowerment) licence (SO/042/0028/020) for Havant Thicket Reservoir [68], Portsmouth Water will be required to ensure that flow is maintained in Riders Lane Stream. This minimum flow will be calculated using a rolling 7-day normal operation at the EA's gauging station on Hermitage Stream at New Road [69]. The permit requires flows to be discharged in all but the dryest of periods, when flows in the lower Hermitage Stream are below 0.005 m^3s^{-1}.

19.7.140 Currently, the upper reaches of Riders Lane stream are ephemeral, drying up during periods of extended low rainfall. By ensuring a regulated minimum flow (except in periods of severe drought), the stream will no longer dry up regularly and the habitat for many aquatic species in the Riders Lane Stream will be improved. Maintaining a regulated minimum flow will also help transport fine sediment rather than encouraging it to deposit on the channel bed, and there will be less stagnant water, which often has higher levels of organic matter that consume oxygen. Moreover, as the water is moving there will be better aeration as the water mixes with air.

Water quality changes

19.7.141 The Applicant has undertaken hydrodynamic dispersion modelling to assess the potential effects of releases of water from the reservoir on water quality in downstream water bodies, including the Riders Lane Stream and Hermitage Stream (Environmental Water Quality Report, Spring 2025 Consultation [70] [71]). This considered two scenarios:

1. The classic operation phase (March 2029 – May 2032), prior to the input of water from the WRP site. This represents the future baseline scenario, against which the impacts of the Proposed Development have been assessed.
2. The 'post-implementation' scenario, informed by water quality outputs from the reservoir model during the operational phase of the Proposed Development (June 2032 – December 2041), following the input of recycled water from the WRP site.

19.7.142 A change in many parameters in Riders Lane Stream is predicted to occur during the Havant Thicket Reservoir classic operation scenario, before recycled water from the WRP site is introduced [71]. Median alkalinity, pH, and concentrations of orthophosphate, ammonium, nitrate, DO, BOD, DOC and DIC would all increase in Riders Lane Stream once the reservoir becomes operational (i.e. during the classic operational scenario): A small increase in median pH from a measured baseline of 7.4 to 7.9 is predicted. Other changes from the pre to post implementation phases are:

1. Baseline alkalinity (measured as $CaCO_3$) has a measured median of 124mg/l in the Riders Lane Stream and is predicted to increase to 347mg/l.

2. Median DO increases from a measured baseline of 7.4mg/l to 17.5mg/l.
3. Median BOD is predicted to increase from the measured baseline of 3.3mg/l to 5.7mg/l.
4. There is a very small increase in orthophosphate from the current baseline from a median concentration of 0.163mg/l to 0.167mg/l in the classic scenario.
5. Median ammonia is predicted to increase from a measured baseline of 0.26mg/l to 0.34mg/l.
6. Nitrate concentrations are predicted to increase from the baseline of 2.74mg/l to 4.33mg/l in the classic operation scenario.
7. Median concentrations of DOC are expected to increase from a baseline of 14.9mg/l to 15.6mg/l.
8. The median concentration of DIC is expected to increase from the baseline of 9.2mg/l to 61.2mg/l.

19.7.143 Concentrations of these water quality parameters in Hermitage Stream are predicted to be subject to a smaller change over the current baseline than those in Riders Lane Stream, reflecting the fact that the reservoir compensatory flows would represent a smaller proportion of the total flows in the larger watercourse [71]. Once the reservoir is operational (i.e. during the classic operational scenario), the compensatory flows are predicted to result in an increase in median pH, alkalinity, DO, BOD, orthophosphate, ammonium, nitrate, DOC and DIC concentrations in Hermitage Stream:

1. Median pH is predicted to increase from 8.4 in the measured baseline to 9.1.
2. Alkalinity is predicted to increase in the classic operation scenario to a median of 475mg/l, from a measured baseline of 139mg/l.
3. Median DO is predicted to increase from a measured baseline of 6.5mg/l to 15.3mg/l.
4. Median BOD is predicted to increase from a measured baseline of 8.4mg/l to 9.4mg/l.
5. Median orthophosphate concentrations are predicted to increase from the measured baseline of 0.133mg/l to 0.136mg/l.
6. A slight increase in ammonia concentrations is predicted, from the measured baseline of 0.07mg/l to 0.08mg/l.
7. Median nitrate concentrations are predicted to increase from a baseline of 3.9mg/l to 6.2mg/l.
8. Median DOC concentrations are predicted to increase from a baseline of 6.4mgl to 6.7mg/l.
9. Median DIC is expected to increase from 6.4mg/l to 31.1mg/l.

Geomorphological enhancements

19.7.144 The future baseline of Hermitage Stream will be affected by Portsmouth Water's package of river channel improvement measures, which are designed to mitigate the impacts of constructing Havant Thicket Reservoir [72]. This package, which has been agreed with the EA as part of the WER Regulation 19 (formerly WFD Article 4.7) derogation process further to the planning application for Havant Thicket Reservoir, includes a range of geomorphological and habitat

improvements in Hermitage Stream, and its tributaries Riders Lane Stream and Park Lane Stream. The combined length of these improvements will be approximately 5.48km.

19.7.145 Detailed measures aimed at improving ecological resilience within the wider Hermitage Stream catchment (rather than replacing like-for-like habitat which will be lost under the Reservoir footprint) are currently being considered by Portsmouth Water, including:

1. Upper Hermitage Stream at The Queen's Inclosure: Localised tree pollarding/coppicing and installation of leaky woody barriers to improve habitat diversity and slow the flow.
2. Hermitage Stream from Bushy Lease to New Road: Removal of concrete bed and bank protection, and installation of in-channel berms to increase flow sinuosity.
3. Headwaters of Riders Lane Stream: There is potential to construct a pond area so as to create additional water habitat. Further downstream, there is potential to design leaky woody barriers situated together to help slow the flow and create habitat diversity.
4. Park Lane Stream at Waterlooville Gold Club: Re-naturalise the channel through the removal of bank protection, increasing sinuosity, bank re-profiling and de-culverting.
5. Park Lane Stream in Bell's Copse: Slow the flow by installing leaky woody barriers.

19.7.146 These measures will be designed to deliver improvements to the geomorphology of the named watercourses and to the quality of habitats for fish, aquatic invertebrates and macrophyte communities. The baseline conditions of the watercourses are therefore expected to improve in the future. However, the measures are intended to address pressures associated with physical modifications and changes to the hydrological regime associated with construction of the reservoir. They are unlikely to address the water quality pressures that affect the water body, where point source pollution (as set out in 19.7, baseline conditions) is adversely affecting pH and phosphate concentrations.

19.7.147 Under the conditions of its Impoundment License for Havant Thicket Reservoir, Portsmouth Water is also required to deliver fish passage easements at two large weir structures downstream of New Road. Although these easements are likely to deliver considerable benefits for fish passage, they are unlikely to result in significant improvements to the hydrology or geomorphology of the river channel if the structures remain in place.

General changes to water environment receptors

19.7.148 The review of the existing baseline environment in this chapter demonstrates that many of the surface water bodies that could interact with the Proposed Development support limited areas of high-quality natural habitats. Many of these water bodies have experienced physical modification for land drainage and flood risk management, affecting their geomorphology. Water quality is generally moderate but locally poor across the study area. Watercourses are adversely affected by diffuse pollution from agriculture and point source pollution. Some water bodies are affected by saline intrusion and surface water abstraction.

19.7.149 Ongoing measures to reduce existing pressures on geomorphology and water quality as part of the implementation of the WER, Environment Act 2021 and the Environmental Improvement Plan 2025 are likely to improve the condition of surface and groundwater bodies over time as progress is made towards target conditions, or targets are met.

19.7.150 Climate change is likely to result in more extreme weather and increased flood risk (ES Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6)). The hydrology of the surface drainage network is expected to change with higher winter flows and lower summer flows with a greater number of storm-related flood flows. This is likely to lead to changes in the hydrology of the river systems with increased geomorphological activity occurring from storm events. Therefore, the drainage network is unlikely to remain stable over time and may revert to more natural river types in future (e.g. meandering reaches). More natural conditions may lead to an improvement in some water body classification elements (e.g. hydromorphological supporting elements and overall ecological status).

19.7.151 Groundwater resources face pressure from poor livestock and nutrient management. Ongoing initiatives are in place to reduce pressures on groundwater, including increased regulation of agricultural chemicals, to achieve compliance with the WER. Progress towards and meeting the targets of the Environment Act 2021 and the Environmental Improvement Plan 2025 are likely to improve the condition of groundwater resources over time. This would suggest that groundwater quality and quantity is likely to improve in the future, although this would occur over long timescales. This may lead to an improvement in the quantitative, chemical and overall status of groundwater bodies.

19.7.152 The future baseline includes committed developments (i.e. those that have been granted planning permission or are under construction) that will be delivered prior to commencement of construction. Committed developments are set out in ES Chapter 20 Cumulative and in-combination effects, Volume I (Document Reference 6.1, Volume 6), with those that are relevant to the water environment included in the assessment in section 19.8.

Summary of receptors and their values

19.7.153 Table 19-18 provides a summary of the main surface and groundwater receptors identified within the study area, as detailed in ES Appendix 19.3 Hydrological Impact Assessment, Volume II) (Document Reference 6.2, Volume 6) as susceptible to potential impacts, together with their assigned value.

Table 19-54 Water environment receptors values and rationale

Receptor	Value	Rationale	Relevant components/pipeline sections
Surface water: Rivers			
River Lavant	Medium	The River Lavant is at Poor ecological status due to physical modifications (barriers and urban development) adversely affecting fish populations. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds; PBDE). Designated sites within the water body catchment (Butser Hill SSSI, SAC and NNR) are located in the north of the catchment, approximately 7km upstream of the Pipelines between the WRP site to Bedhampton Springs.	Pipelines between the WRP site to Bedhampton Springs
Hermitage Stream	Medium	Hermitage Stream is a heavily modified water body at Poor ecological potential due to point source pollution (misconnections), and physical modifications, which are adversely affecting pH, phosphate levels, fish and invertebrates. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE). There are no designated habitats in the catchment. Parts of the Hermitage Stream and two of its tributaries (Riders Lane and Park Lane Streams) will be enhanced in the future to provide mitigation for the impacts of the construction of Havant Thicket Reservoir in the northern part of the catchment.	WRP site Pipelines between Budds Farm WTW and the WRP site Pipeline between the WRP site to Bedhampton Springs
Potwell Tributary	High	The Potwell Tributary is a heavily modified water body at Moderate ecological potential due to point source and diffuse pollution, which is adversely affecting phosphate levels and macrophytes and phytobenthos. Fish status is Poor due to physical modifications associated with in-channel barriers. The water body is failing to reach chemical status targets due	Section D and Section E of the Pipeline between the WRP site and Otterbourne WSW

Receptor	Value	Rationale	Relevant components/pipeline sections
		to high levels of some priority hazardous substances (mercury and its compounds; PBDE; PFOS). The sensitivity of the water body is considered to be high due to the presence of Hook Heath Meadows SSSI (valley bottom meadow and marsh) approximately 500m downstream of the Pipeline between the WRP site and Otterbourne WSW. Other SSSIs (Lye Heath Marsh: Catherington Down) are significantly upstream or located in upstream tributary valleys.	
River Wallington below Southwick	Medium	The River Wallington is currently at Moderate ecological status due to point source pollution, diffuse pollution, and groundwater abstraction, which are adversely affecting phosphate levels and hydrological regime. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds; PBDE; PFOS). There are no designated habitats in the catchment.	Section E and Section F of the Pipeline between the WRP site and Otterbourne WSW
River Meon	High	The River Meon is an internationally rare chalk stream. It is currently at Moderate ecological status because the hydrological regime is affected by groundwater abstraction. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE). The water body catchment contains multiple designated habitats, including Botley Wood and Everett's and Mushes Copses SSSI within 100m of the Proposed Development, and the Solent and Southampton Water Ramsar and SPA, Titchfield Haven SSSI and NNR further downstream. The River Meon is subject to a compensation agreement arising under the Applicant's agreement signed under section 20 of the Water Resources Act 1991 in 2018, under which the company has committed to improve chalk river habitats that are not significantly affected by abstraction pressures to	Pipeline between the WRP site and Otterbourne WSW: Section G: Crockerhill to WIckham and Section H: Wickham to Shedfield

Receptor	Value	Rationale	Relevant components/pipeline sections
		compensate for abstraction from chalk rivers such as the River Itchen during periods of drought. Sections of compensatory habitat are afforded the same level of protection as SAC-designated habitats.	
Moors Stream	High	Moors Stream is at Good ecological status, although the hydrological regime does not support Good status due to pressures from groundwater abstraction. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds; PBDE). The Moors, Bishop's Waltham SSSI is located within the water body catchment, 1.6km upstream of the Pipeline between the WRP site and Otterbourne WSW. Sensitivity is high due to the Good status of the water body.	Section J of the Pipeline between the WRP site and Otterbourne WSW
River Hamble (upper)	Medium	The upper River Hamble is at Moderate ecological status due to diffuse pollution, physical modifications and groundwater abstraction, which are adversely affecting fish and invertebrates. Natural drought is also adversely affecting invertebrate communities. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds; PBDE). Galley Down Wood SSSI is located in the water body catchment, approximately 3.5km upstream of the Pipeline between the WRP site and Otterbourne WSW.	Section K of the Pipeline between the WRP site and Otterbourne WSW
River Hamble (main)	Medium	The main River Hamble is at Moderate ecological status due to point source and diffuse pollution, and physical modifications, which are adversely affecting phosphate concentrations and fish populations. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds;	Section J and Section K of the Pipeline between the WRP site and Otterbourne WSW

Receptor	Value	Rationale	Relevant components/pipeline sections
		PBDE). There are no designated habitats in the water body catchment.	
Horton Heath Stream	Medium	Horton Heath Stream is a heavily modified water body that is currently at Good ecological potential. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE). Moorgreen Meadows SSSI is located in the water body catchment, 6km downstream of the Pipeline between the WRP site and Otterbourne WSW and in a tributary valley which is 2km upstream of its confluence with Horton Heath Stream.	Section K and Section L of the Pipeline between the WRP site and Otterbourne WSW
Bow Lake	Medium	Bow Lake is a river that is at Bad ecological status due to pressures on fish from diffuse pollution and physical modifications (barriers). The hydrological regime does not support Good status. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE; PFOS; benzo(g-h-i)perylene. There are no designated habitats in the water body catchment.	Section L of the Pipeline between the WRP site and Otterbourne WSW
River Itchen	High	The River Itchen is an internationally rare chalk stream, which is at Good ecological status. The hydrological regime does not support Good due to physical modifications. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds; PBDE; benzo(g-h-i)perylene). The River Itchen is designated as a SAC and SSSI, and is also classified as a GWDTE.	Section L and Section M of the Pipeline between the WRP site and Otterbourne WSW
Itchen Navigation	High	The Itchen Navigation is a heavily modified water body that is at Good ecological potential. The water body is failing to reach chemical status targets due to high levels of some	Section M of the Pipeline between the WRP site and Otterbourne WSW

Receptor	Value	Rationale	Relevant components/pipeline sections
		priority hazardous substances (mercury and its compounds; PBDE). The canal is hydrologically connected downstream to the River Itchen, and hence it is also connected to the River Itchen SAC and SSSI.	
Surface water: Transitional and coastal waters			
Langstone Harbour	High	Langstone Harbour is a heavily modified water body, which is at Moderate ecological potential. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE). The water body forms part of multiple designated habitat sites, including Chichester and Langstone Harbours SPA and Ramsar, Solent Maritime SAC, Langstone Harbour SSSI, and Langstone Harbour Shellfish Waters. The water body is also classified as a GWDTE.	WRP site (including SuDS outfall) Pipelines between Budds Farm WTW and the WRP site Pipelines between the WRP site to Bedhampton Springs
Langstone Oysterbeds	High	Langstone Harbour Oysterbeds is an artificial water body, which is at Good ecological potential due to high levels of priority hazardous substances (mercury and its compounds; PBDE). The Oysterbeds are located within Langstone Harbour and are therefore subject to the same environmental designations.	WRP site (including SuDS outfall) Pipelines between Budds Farm WTW and the WRP site Pipelines between the WRP site and Bedhampton Springs
Southampton Water	High	Southampton Water is a heavily modified water body at Moderate ecological potential due to point source and diffuse pollution, which adversely affect dissolved inorganic nitrogen levels. Furthermore, mitigation measures have not yet been implemented to address pressures from physical modifications. The water body is failing to reach chemical status targets due to high levels of some priority hazardous substances (mercury and its compounds; PBDE; benzo(g-h-i)perylene). The water body is subject to multiple designations, including Solent and Southampton Water SPA and Ramsar, Solent	Section H and Section J of the Pipeline between the WRP site and Otterbourne WSW

Receptor	Value	Rationale	Relevant components/pipeline sections
		Maritime SAC, Hythe to Calshot Marshes SSSI, Lee-on-the Solent to Itchen Estuary SSSI, Lincegrove and Hackett's Marshes SSSI, Eling and Bury Marshes SSSI, Lower Test Valley SSSI, Southampton Water Shellfish Waters and Approaches to Southampton Water Shellfish Waters.	
Solent	High	The Solent is a heavily modified water body at Moderate ecological potential, with pressures on saltmarsh habitats and elevated concentrations of nitrogen. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE). The water body is subject to multiple designations, including Solent and Southampton Water SPA and Ramsar, Solent Maritime SAC, South Wight Maritime SAC, Solent and Isle of Wight Lagoons SAC, Solent and Dorset Coast SPA, Chichester and Langstone Harbours SPA, and multiple designations as Shellfish Waters, Bathing Waters, NVZs and UWWTD sensitive areas.	Use of Eastney LSO for reject water
Isle of Wight East	High	Isle of Wight East is a heavily modified water body at Good ecological potential. The water body is failing to reach chemical status targets due to high levels of priority hazardous substances (mercury and its compounds; PBDE). The water body is subject to multiple designations, including Chichester and Langstone Harbours SPA and Ramsar, Solent and Southampton Water SPA and Ramsar, Solent Maritime SAC, South Wight Maritime SAC, Solent and Dorset Coast SPA, and multiple designations as Shellfish Waters, Bathing Waters, NVZs and UWWTD sensitive areas.	Use of Eastney LSO for reject water
Surface water: Lakes			
Havant Thicket Reservoir	High	Once constructed, Havant Thicket Reservoir will be a lake that provides a supply of potable water and supports open water and marginal wetland habitats. Note that the Havant	Use of Havant Thicket Reservoir for the storage of recycled water

Receptor	Value	Rationale	Relevant components/pipeline sections
		Thicket Reservoir has not yet been constructed, and this receptor therefore applies to the future baseline only (see section 19.7 for additional information). Construction and commissioning are currently expected to be complete by 2029 [73].	
Groundwater			
Aquifer - Principal Bedrock (White Chalk Subgroup)	High	Principal aquifer providing regionally important resource and baseflow to numerous Public Water Supplies, water courses and environmentally designated sites.	WRP site (including SuDS outfall) Pipelines between Budds Farm WTW and the WRP site Pipelines between the WRP site to Bedhampton Springs Pipeline between the WRP site and Otterbourne WSW: • Section D • Section E • Section F • Section M
Aquifer - Secondary A Bedrock Aquifer (Bracklesham Group, Lambeth Group, London Clay Sand Members)	Medium	Permeable layers capable of supporting water supplies at a local scale.	Section E and Section M of the Pipeline between the WRP site and Otterbourne WSW
Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)	Medium	Permeable layers capable of supporting water supplies at a local scale.	WRP site (including SuDS outfall) Pipelines between Budds Farm WTW and the WRP site Pipelines between the WRP site to Bedhampton Springs

Receptor	Value	Rationale	Relevant components/pipeline sections
			Section D, Section F, and Section M of the Pipeline between the WRP site and Otterbourne WSW
Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Head, Raised Marine Deposits)	Medium	Aquifer providing supply to local agriculture or industry, with limited connection to surface watercourses.	WRP site (including SuDS outfall) Pipelines between Budds Farm WTW and the WRP site Pipelines between the WRP site and Bedhampton Springs Section D, Section K, and Section M of the Pipeline between the WRP site and Otterbourne WSW
Consented Discharge A00751: Southern Water Services – Budds Farm WTW – To the Solent/Langstone Harbour	Low	Consented discharge associated with Budds Farm WTW	Pipelines between Budds Farm WTW and the WRP site
Groundwater/Surface Water Interaction (GWSWI) - Bedhampton and Havant Springs	High	Locally important PWS	Pipelines between the WRP site and Bedhampton Springs
GWSWI - Potential Sinks	Medium	Potential sinks	All sections
GWSWI - Potential Springs	Medium	Potential springs. Note Springs that feed GWDTE or provide significant baseflow may be of high value.	All sections
GWSWI - Potential non-designated GWDTE	Medium	Potential GWDTE	All sections

Receptor	Value	Rationale	Relevant components/pipeline sections
Licensed Groundwater (GW) Abstraction – Southwick Estate – Offwell Farm, Southwick (Private Water Supply)	Medium	Residential water supply	Section E of the Pipeline between the WRP site and Otterbourne WSW
Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham Park Golf Club (Spray Irrigation)	Medium	Commercial water supply used for spray irrigation	Section G of the Pipeline between the WRP site and Otterbourne WSW
Licensed GW Abstraction - Fishers Pond Ltd - Fisher Pond Borehole C (Agriculture - Fish Farm/Cress Pond Throughflow)	Medium	Agricultural water supply	Section L of the Pipeline between the WRP site and Otterbourne WSW
Licensed GW Abstraction - Portsmouth Water - Bedhampton PWS Springs No 1 and No 2 and Havant	High	Locally important PWS	Pipelines between the WRP site to Bedhampton Springs
Licensed GW Abstraction - Portsmouth Water - Maindell PWS	High	Locally important PWS	Section F of the Pipeline between the WRP site and Otterbourne WSW
Licensed GW Abstraction - Southern Water Services -	High	Locally important PWS	Section M of the Pipeline between the WRP site and Otterbourne WSW

Receptor	Value	Rationale	Relevant components/pipeline sections
Otterbourne PWS – All Abstraction points			
Licensed Southern Water Abstraction - 11/42/22.9/163: Hampshire Carp Hatcheries - Bow Lake Stream at Soke Common (Agriculture - Fish Farm/Cress Pond Throughflow)	Medium	For agricultural water supply	Section L of the Pipeline between the WRP site and Otterbourne WSW
Licensed Southern Water Abstraction – 31/110: Henry Russell - Black Dyke, Point A (Environmental - Transfer between sources)	High	Water supply – Transfer between sources.	Section M of the Pipeline between the WRP site and Otterbourne WSW
Licensed Southern Water Abstraction – SO/042/0031/023: East Lodge Fisheries - Itchen Navigation at Brambridge (Environmental - Remedial River/Wetland Support [Transfer between sources])	High	Water supply – Transfer between sources	Section M of the Pipeline between the WRP site and Otterbourne WSW
Licensed Southern Water Abstraction – SO/042/0031/020:	High	Water supply – Transfer between sources	Section M of the Pipeline between the WRP site and Otterbourne WSW

Receptor	Value	Rationale	Relevant components/pipeline sections
Malms House Ltd - Lower Itchen Navigation at Shawford (Environmental - Non-remedial water/wetland support [Transfer between sources])			
Licensed Southern Water Abstraction – 11/42/22.6/93: Southern Water Services - River Itchen at the Otterbourne Intake	High	Locally important PWS	Section M of the Pipeline between the WRP site and Otterbourne WSW
SPZ1 and SPZ1c related to Bedhampton-Havant Springs PWS	High	Associated with locally important PWS	Pipelines between the WRP site to Bedhampton Springs
SPZ2 and SPZ2c related to Maindell PWS	High	Associated with locally important PWS	Section F of the Pipeline between the WRP site and Otterbourne WSW
SPZ1, SPZ1c, SPZ2 and SPZ2c related to Otterbourne PWS	High	Associated with locally important PWS	Section M of the Pipeline between the WRP site and Otterbourne WSW
SPZ3 related to Maindell PWS	Medium	Associated with locally important PWS	Section F of the Pipeline between the WRP site and Otterbourne WSW
Unlicensed GW abstraction - The Bungalow (now the Garden House) Private water supply	Low	Private water supply	Pipeline between the WRP site and Otterbourne WSW: Section H: Wickham to Shedfield.

Receptor	Value	Rationale	Relevant components/pipeline sections
Unlicensed GW abstraction - Woodman's Farm House Private Water Supply	Low	Private water supply	Section J of the Pipeline between the WRP site and Otterbourne WSW
Unlicensed GW abstraction – Lowhill Farmhouse Private water supply	Low	Private water supply	Section L of the Pipeline between the WRP site and Otterbourne WSW
Other not identified private water supplies, if within or very close to the Order Limits	Low	Private water supply	All sections

19.8 Assessment of likely significant effects

19.8.1 This section presents the assessment of likely significant effects on the water environment resulting from the construction, operation and decommissioning of the Proposed Development. The likely significant effects of the Proposed Development are identified taking into account primary and tertiary mitigation. Following assessment, the need for further mitigation is considered in section 19.9.

Construction effects

Direct disturbance of surface and groundwater during construction

Description of impact

19.8.2 As outlined in section 19.7, there are a number of Main Rivers and Ordinary Watercourses within the study area for surface waters. Construction activities have the potential to directly alter the geomorphology, hydrology and physical habitat value of surface waters as a result of the installation of pipeline infrastructure.

19.8.3 The selection of the pipeline installation techniques and methodologies at environmentally sensitive locations, such as watercourse crossings, has been subject to engagement with the relevant statutory consultees to determine the most suitable pipeline installation technique. Full details are provided in ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6).

19.8.4 For trenched open-cut methods, it is anticipated that the maximum working width would be 40m allowing for haul roads, construction working areas, storage and trench and soil storage areas. Where sensitive constraints have been identified, a reduced working width of 20m is proposed (see ES Appendix 3.1 Primary mitigation, Volume II (Document Reference 6.2, Volume 6), Topsoil and soil removed from watercourse banks would be managed appropriately and used to backfill following installation of the pipeline within the trench.

19.8.5 Temporary dams would be used to create a dry area of channel in which to excavate a trench and install the pipeline, and river flows would be maintained through the use of pumps, pipes or flumes. These measures are required in the Outline CEMP (under WE5 and WE6) (Document Reference 7.1, Volume 7). In accordance with WE5 of the Outline CEMP, a Construction Drainage Plan will be prepared by the Contactor.

19.8.6 For locations where tunnelling is required (populated residential areas and sensitive environmental features) where the length is too long for trenchless construction, tunnelling sections would be constructed using a segmental tunnel and Tunnel Boring Machine. Shafts would be sunk at each end of the tunnel comprising a launch shaft and a reception shaft. There are a number of possible shaft construction methodologies, these are detailed in ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6).

19.8.7 For some sections of the pipeline, where open-cut excavation would not be suitable (examples include roads, some waterways and sensitive environmental areas) trenchless methods such as microtunelling would be used. This technique uses a microtunnel boring machine that is remote controlled from the surface. It can be

carried out in a broad range of ground conditions from soft alluvial soils to hard rock. There are variants of machine type, face support and spoil management to deal with unstable soils and high groundwater heads. Further detail is provided in ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6), and the preferred options for crossing watercourses are set out in detail in ES Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6). It is assumed that for trenchless construction, the pipeline would be installed at least 2.5m below the watercourse bed level.

19.8.8 The watercourse crossing proposals are set out in detail in ES Appendix 19.4 Watercourse crossing schedule, Volume II (Document Reference 6.2, Volume 6).

19.8.9 The use of trenchless techniques to cross Main Rivers and other sensitive watercourses will avoid the direct disturbance of surface watercourses, and as such no impacts on the geomorphology or hydrology of these features is expected as a result of these activities.

19.8.10 However, open-cut trenching across Ordinary Watercourses is likely to result in the direct disturbance of natural geomorphological features (and associated physical habitat niches) and geomorphological instability (e.g. due to enhanced scour and increased sediment supply). However, this would be a temporary impact given that the bed and banks would be reinstated following pipeline installation. The installation of temporary culverts or bridges to facilitate construction access over Ordinary Watercourses could also directly disturb the bed and banks of the watercourse and result in the direct loss of natural geomorphological features within the footprint of the structure. This impact would be reversible as temporary structures would be removed and the bed and banks reinstated.

19.8.11 The presence of temporary dams (to allow pipeline infrastructure to cross watercourses in dry conditions) and culverts or bridges (used for temporary access) could potentially result in reduced flow and sediment conveyance (particularly of coarse sediment), create upstream impoundment, affect patterns of erosion and sedimentation, impede river continuity, increase turbidity and potentially encourage fine sedimentation on the bed upstream. Changes to flow conditions could also result in a reduction in the dissolved oxygen concentrations supported in the watercourses upstream of the impoundment. These activities could therefore reduce the physical habitat value of the watercourse for fish and aquatic invertebrates, whilst temporary dams could also act as a barrier to the movement of fish and other aquatic organisms (see ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6)). However, these impacts are considered to be temporary (i.e. confined to the duration of construction for the crossing to which they relate) and would be reversed once the temporary impounding structures were removed.

19.8.12 In terms of construction of the SuDS outfall from the WRP site, small scale construction works is likely to require partial removal or modification of the existing concrete revetment on the bank of Hermitage Stream. This could potentially result in the direct disturbance of the tidal Hermitage Stream.

19.8.13 Impacts on specific surface water receptors associated with each component of the Proposed Development are described in Table 19-55. The assessment presented in Table 19-55 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

19.8.14 Construction of the Proposed Development would involve excavation works, piling and subsurface drilling or tunnelling works. These activities have a potential to directly disturb the underlying body of groundwater.

19.8.15 The excavation works would be associated with:

1. Creation of a trench to accommodate construction of the open-cut sections of the Pipelines
2. Construction of shafts or pits in sections where tunnelling or other trenchless method of construction is used (e.g. micro tunnelling (pipe jacking) or directional drilling)
3. Laying reinforced concrete slabs in shallow excavations for the AGP, with the WRP site founded on piled foundations

19.8.16 Groundwater levels can be reduced by excavation below the water table, which may occur particularly in lower topography areas around river crossings. Where groundwater levels are higher than the depth of the excavation, temporary groundwater control (dewatering) would be required. Temporary dewatering could cause drawdown of the local water table, divert water away or bypass part of the groundwater system, and lead to reduced groundwater flow. This could impact groundwater-dependent receptors (e.g. streams, abstractions, springs or GWDTE) within the Zone of Influence (ZoI). The magnitude of impact would depend on the groundwater level reduction and hydraulic properties of the dewatered ground. The assessment of effects presented in Table 19-55 is informed by ES Appendix 19.3 Hydrogeological Impact Assessment, Volume II (Document Reference 6.2, Volume 6). The majority of abstractions[19] required for dewatering will be subject to relevant licences (abstraction) and permits (discharge), which will include measures and limits to protect the water environment. The Outline CEMP (Document Reference 7.1, Volume 7) sets out control measures, aimed at mitigating potential impacts from groundwater control and drainage operations.

19.8.17 As presented in section 19.4, all trenchless crossings of watercourses and tunnels utilise a methodology that excludes groundwater. Therefore, limited impacts on groundwater levels or flows are anticipated. Drilling could however lead to an impact on groundwater quality. This is considered in the section for 'Release of contaminants to surface and groundwaters' below.

19.8.18 Impacts on specific groundwater receptors associated with each component of the Proposed Development are described in Table 19-55. The assessment presented in Table 19-55 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

[19] Abstractions in excess of 20m^3/d (20 000 litres/day) are likely to need an abstraction licence from the Environment Agency, unless the abstraction is subject to an exemption or regulatory position statement.

Table 19-55 Direct disturbance of surface water and groundwater during construction

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Water Recycling Plant site					
Surface water	Langstone Harbour (including onshore coastal catchment)	The WRP site (including the WRP, pumping stations and associated buildings) would be located in the onshore coastal catchment that drains directly into Langstone Harbour. There are no Main Rivers located at the WRP site that would be directly disturbed by trenched watercourse crossings or the installation of temporary culverts or bridges to provide construction access. There is a single Ordinary Watercourse which follows the south-western perimeter of the WRP site. However, no temporary crossings of this watercourse are required to facilitate construction access, and there is no requirement to divert or alter the watercourse. Risks to Langstone Harbour associated with construction of the WRP SuDS outfall would be managed via mitigation measures as detailed in the Outline CEMP (Document Reference 7.1, Volume 7) to reduce any risk of materials being released into the water.	High	Negligible	Minor
Groundwater	Aquifer – Principal Bedrock (White Chalk Subgroup)	Cut and fill will be required to achieve required ground level. Excavations may require temporary dewatering to maintain the water table below excavation.	High	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)	The proposed foundation strategy for the WRP site is to support these structures on piles. It is anticipated that these would only require shallow excavations also to accommodate pile caps or prepare the piling platform. These excavations are unlikely to encounter groundwater and require major groundwater control measures, albeit some, e.g. passive dewatering may still be required to manage perched groundwater. Piling activities would not require dewatering. This may impact the underlying Secondary aquifers and groundwater receptors, although the impact is likely to be localised in nature.	Medium	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body – SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
Pipelines between Budds Farm Wastewater Treatment Works and the Water Recycling Plant site					
Surface water	Hermitage Stream	It is anticipated that the Pipelines would be installed under the tidal section of Hermitage Stream using trenchless construction methods. This method means that the watercourse would not be disturbed. Furthermore, there will be no requirement to install a temporary crossing to provide access across the watercourse as part of this component. In addition to the Pipelines, this component would also require construction of a new pumping station in the existing Budds Farm Wastewater Treatment Works site. This would be located in the onshore coastal catchment that drains directly into Langstone Harbour. There are no Main Rivers or Ordinary Watercourses located at the site that would be directly	Medium	Negligible	Minor
	Langstone Harbour (including onshore coastal catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		disturbed during the construction of the pumping station.			
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The construction of the Pipelines would be undertaken using a trenchless method of construction. This would require excavation of launch/reception shafts within the WRP site and Budds Farm WTW. These penetrate the underlying secondary aquifers as well as the principal chalk aquifer (as well as the landfill in the WRP site as discussed in the ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, Volume 6). Excavations for shafts are likely to encounter groundwater and require groundwater control measures. Without appropriate control measures, this could impact groundwater-dependent receptors within the ZoI, including indirect impacts on the surface water receptor (the stream). Langstone Harbour has a tidal prism[20] of 50,400,000m^3 [74]. Even with a highly conservative abstraction rate for construction dewatering of 22,356m^3 over a tide (500 lit/sec), this is less than 0.05% of the tidal prism. As such, it is considered that any change in baseflow as a result of groundwater control would have a negligible impact on the Langstone Harbour.	High	Negligible	Minor
	Secondary A Superficial Deposits Aquifer (River Terrace Deposits and Alluvium)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor
	Discharge Consent A00751: Southern Water Services – Budds Farm WTW – To the Solent/Langstone Harbour		Low	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body – SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor

[20] Tidal prism is the volume of water that enters and leaves the harbour between mean high water and mean low water during a typical tidal cycle.

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Due to the predominant southerly groundwater flow (i.e. from the hills of the South Downs in the north towards the coast in the south), receptors to the north of the WRP site, such as the Bedhampton-Havant spring complex, are considered to be at limited risk from the Pipelines (not within Source Protection Zone of the abstractions at Bedhampton). This would limit impacts to the groundwater receptors in the immediate vicinity of the WRP site and to the south. An existing Discharge Consent held by the applicant associated with the Budds Farm WTW is within the Order Limits. Construction within the Order Limits has the potential to impact the infrastructure of the discharge (and the ability for the discharge to be operated in line with its existing consent). Impacts to the existing Discharge Consent would be mitigated through avoidance of the infrastructure and measures outlined in the Outline CEMP (Document Reference 7.1, Volume 7) The above impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities.			

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The Outline CEMP sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
Release from Eastney Long Sea Outfall					
Surface water	Solent	No construction works on the existing LSO itself are proposed and there would be no change to the existing Budds Farm WTW release during the construction phase of the Proposed Development.	High	No change	No change
Pipelines between the Water Recycling Plant site and Bedhampton Springs					
Surface water	Langstone Harbour (including onshore coastal catchment)	This comprises a connection between the WRP site and Portsmouth Water's existing pipeline at Bedhampton Springs. Two sections of trenchless construction and one above ground section of pipeline would be used. The first section of trenchless construction would be from the WRP site to the construction compound located west of Mill Lane. The second section of trenchless construction would be to another construction compound located east of Mill Lane. The Pipelines would cross Bedhampton Stream, a Main River that drains directly into the tidal Hermitage Stream. However, given the use of trenchless techniques, there would be no direct disturbance of this watercourse. Furthermore, there would be no requirement to install a temporary crossing to provide access across the watercourse as part of this component. Part of the pipelines would be constructed above-ground to reduce excavation within the SPZ1 which protects groundwater within	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Bedhampton Springs. The above-ground section of the pipelines would be constructed to a connection point with the Portsmouth Water pipeline to connect Bedhampton Springs to Havant Thicket Reservoir. Old Mill Dam, a former mill pond, would be crossed by the above-ground pipeline and as such there would be no direct disturbance of this water body during construction.			
	Hermitage Stream	These Pipelines would not require any direct interaction with watercourses in this receptor.	Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The construction of the Pipelines would be undertaken underground using a trenchless method of drilling in the southern part and then the pipeline would run above-ground. The installation of the Pipelines above-ground reduces the risk to the Bedhampton and Havant springs by avoiding below-ground works within the SPZ1. Trenchless construction would require excavation of shafts. The proposed shafts would penetrate the underlying chalk aquifer and Secondary aquifers. The area around Bedhampton and Havant is particularly sensitive to impacts due to the karstic chalk in the area. The excavations for shafts are likely to encounter groundwater and require groundwater control measures. This could impact groundwater-dependent receptors within the ZoI particularly the Bedhampton PS Springs and associated SPZ1/SPZ1c.	High	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Marine Raised Deposits)		Medium	Negligible	Minor
	GWSWI – Bedhampton and Havant Springs (locally important PWS)		High	Negligible	Minor
	Licensed GW Abstraction – Portsmouth Water – Bedhampton PWS Springs No 1 and No 2 and Havant		High	Negligible	Minor
	SPZ1 and SPZ1c related to Bedhampton-Havant Springs PWS		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Hermitage Stream WER Classified Watercourse (Catchment)	These works may also indirectly impact the surface water receptor (the Hermitage Stream) if the water table is locally lowered. Langstone Harbour has a tidal prism of 50,400,000m^3 [74]. Even with a highly conservative abstraction rate for construction dewatering of 22,356m^3 over a tide (500 lit/sec), this is less than 0.05% of the tidal prism. As such, it is considered that any change in baseflow as a result of groundwater control would have a negligible impact on the Langstone Harbour. The impacts will be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, with the objective of maintaining water balance within the catchment.	Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body – SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
Use of Havant Thicket Reservoir for the storage of recycled water					
Surface water	Havant Thicket Reservoir	This activity is limited to the release of recycled water into Havant Thicket Reservoir and its subsequent abstraction.	High	No change	No change

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The Proposed Development would use pipelines that have been consented by Portsmouth Water (HBC planning application reference APP/25/00405 and APP/24/00405) between Bedhampton Springs and Havant Thicket Reservoir. These pipelines do not form part of the Proposed Development and are assumed to be in place for the purposes of this assessment. The Proposed Development would connect into these pipelines, as described in ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6). Potential construction impacts associated with infrastructure required to connect to these pipelines are considered as part of the Pipelines between the WRP site to Bedhampton Springs.			
Pipeline between Water Recycling Plant site and Otterbourne Water Supply Works					
Section D: The Water Recycling Plant site to Portsdown Hill					
Surface water	Langstone Harbour (including onshore coastal catchment)	The Pipeline would not require any direct interaction with watercourses in this receptor.	High	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The Pipeline would be tunnelled and would require construction of a number of shafts. The shafts would primarily be constructed in the chalk aquifer and therefore these works are likely to directly interact with the underlying Principal aquifer. The proposed shafts are located approximately 500m south of SPZ1/SPZ1c of the Bedhampton PWS Springs.	High	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (beach and Tidal Flat Deposits,		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Head, Marine Raised Deposits)	The excavations for shafts are likely to encounter groundwater and require groundwater control measures. This could impact groundwater receptors within the ZoI such as the SPZ1/SPZ1c. The works associated with the WRP site shaft also are likely to directly interact with the underlying Secondary aquifer or indirectly impact the surface water receptor (the Hermitage stream). The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body – SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
	Potwell Tributary WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Section E: Portsdown Hill to Boarhunt					
Surface water	Potwell Tributary	The Pipeline would not require any direct interaction with watercourses in these catchments.	High	Negligible	Minor
	Wallington River		Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The Pipeline would be constructed using trenched open-cut construction methods. The	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer – Secondary A Bedrock Aquifer (Lambeth Group)	proposed excavations are likely to penetrate the underlying chalk aquifer and Secondary aquifers, where present. Excavations may require temporary dewatering to maintain the water table below excavation, particularly in areas where superficial deposits supporting Secondary aquifers are present. The trench excavations may encounter groundwater, particularly in topographical low points and require groundwater control measures, albeit some e.g. passive dewatering may still be required in all areas to manage perched groundwater. Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as abstraction, SPZs and springs. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.	Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Southwick Estate – Offwell Farm, Southwick (Private water supply)		Medium	Negligible	Minor
	Potwell Tributary WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Wallington below Southwick WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Section F: Boarhunt to Crockerhill					
Surface water	Wallington River	Section F of the Pipeline between the WRP site and Otterbourne WSW would cross the Wallington River, which is designated as a Main River. However, a trenchless technique would be used for this intersection, and there would therefore be no direct disturbance of this watercourse. Furthermore, there would be no requirement to install a temporary crossing to provide access across the watercourse as part of this component.	Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	Apart from the Wallington River intersection, this section would be constructed using trenched open-cut methods (and may require dewatering – see description in Section E of the Pipeline between the WRP site and Otterbourne WSW. The proposed excavations are likely to penetrate the underlying chalk aquifer and Secondary aquifers, where present. Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as surface water courses, abstraction or SPZs. Excavations for shafts are likely to encounter groundwater and to require groundwater control measures. This could impact groundwater-receptors within the ZoI.	High	Negligible	Minor
	Aquifer – Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Portsmouth Water – Maindell PS (PWS)		High	Negligible	Minor
	SPZ2, SPZ2c and SPZ 3 related to Maindell PWS		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Wallington below Southwick WER Classified Watercourse (Catchment)	The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.	Medium	Negligible	Minor
Section G: Crockerhill to Wickham					
Surface water	River Meon	Section G of the Pipeline between the WRP site and Otterbourne WSW would cross the River Meon, which is designated as a Main River, and an Ordinary Watercourse that drains the floodplain adjacent to the crossing location. However, a trenchless technique would be used for both watercourse intersections. Therefore there would be no direct disturbance of either watercourse. There may be a requirement to cross a single Ordinary Watercourse, a tributary of the River Meon, using an open-cut trench technique. This could result in direct impacts on the hydrology and geomorphology of the watercourse. However, the Outline CEMP (Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This will include measures to maintain flows, reduce	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		changes on downstream sediment transport, and ensure that the channel is reinstated appropriately.			
Groundwater	Aquifer – Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)	Apart from the two watercourses detailed above, this section would be constructed using trenched open-cut methods and may require dewatering– see description in Section E of the Pipeline between the WRP site and Otterbourne WSW. The proposed excavations are likely to penetrate the underlying Secondary aquifers, where present. To avoid impact on the Meon River, Hoad's Hill (A32) and Winchester Road (A334), the Pipeline construction in these locations would be undertaken using a trenchless method - see Section F of the Pipeline between the WRP site and Otterbourne WSW for more details. Trenchless construction would require excavation of two shafts/pits on either side of the crossing, the depth of which would be driven by the depth of the crossing. Groundwater control measures could be required where the groundwater level is higher than the depth of excavation. This could impact groundwater receptors within the ZoI such as the licenced water abstraction. The impacts would be mitigated as detailed in section 19.4.	Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham Park Golf Club (Spray Irrigation)		Medium	Negligible	Minor
	River Meon WER Classified Watercourse. (Catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
Section H: Wickham to Shedfield					
Surface water	River Meon	The construction of Section H of the Pipeline between the WRP site and Otterbourne WSW would not require any direct interaction with watercourses in the River Meon catchment.	High	Negligible	Minor
	Southampton Water (including onshore coastal catchment)	Section H of the Pipeline between the WRP site and Otterbourne WSW would require crossings of a single Ordinary Watercourse, which drains into the tidal River Hamble and forms part of the coastal catchment of Southampton Water. The watercourse would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across the watercourse during construction. These activities could potentially result in direct impacts on the hydrology and geomorphology of the watercourse. However, the Outline CEMP (Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This includes measures to maintain flows, reduce changes on downstream sediment	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		transport, and ensure that the channels are reinstated appropriately.			
Groundwater	Aquifer – Secondary A Bedrock Aquifer (Bracklesham Group)	The Pipeline would be constructed using a trenched open-cut method and may require dewatering – see description in Section E of the Pipeline between the WRP site and Otterbourne WSW. The proposed excavations are likely to penetrate the underlying Secondary aquifers, where present. Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as the unlicenced abstraction. To avoid impact on High Street, the Pipeline construction would be undertaken using a trenchless method – see Section F of the Pipeline between the WRP site and Otterbourne WSW for more details. This could impact groundwater receptors within the ZoI such as the unlicenced water abstraction. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities.	Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Unlicensed GW abstraction – The Bungalow (now the Garden House) Private water supply		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
Section J: Shedfield to the River Hamble					
Surface water	Southampton Water (including onshore coastal catchment)	Section J of the Pipeline between the WRP site and Otterbourne WSW would require crossings of three Ordinary Watercourses, each of which drains into the tidal River Hamble and form part of the onshore catchment of Southampton Water. Each watercourse would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across each watercourse during construction. These activities could potentially result in direct impacts on the hydrology and geomorphology of the watercourses. However, the Outline CEMP (Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This includes measures to maintain flows, reduce changes on downstream sediment transport, and ensure that the channels are reinstated appropriately.	High	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor
Groundwater	Aquifer – Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)	The Pipeline would be constructed using a trenched open-cut method and may require dewatering– see description in Section E of the Pipeline between the WRP site and Otterbourne WSW.	Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	(Alluvium, River Terrace Deposits)	The proposed excavations are likely to penetrate the underlying Secondary aquifers, where present. To avoid impact on Portsdown Hill Road (B2177), the Pipeline construction would be undertaken using a trenchless method – see Section F of the Pipeline between the WRP site and Otterbourne WSW for more details. This could impact groundwater receptors within the ZoI such as the unlicenced water abstraction. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Main River Hamble WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Moors Stream WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Unlicensed GW abstraction – Woodman's Farmhouse Private water supply		Medium	Negligible	Minor
Section K: The River Hamble to Lower Upham					
Surface water	River Hamble (upper)	Section K of the Pipeline between the WRP site and Otterbourne WSW would require a single crossing of the River Hamble, which is designated as a Main River. However, a trenchless technique would be employed and	Medium	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		there would therefore be no direct disturbance of the watercourse. Section K of the Pipeline between the WRP site and Otterbourne WSW would also require a crossing of an Ordinary Watercourse, which drains into the River Hamble. This watercourse would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across the watercourse during construction. These activities could potentially result in direct impacts on the hydrology and geomorphology of the watercourses. However, the Outline CEMP (Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This includes measures to maintain flows, reduce changes on downstream sediment transport, and ensure that the channels are reinstated appropriately.			
	Horton Heath Stream	Section K of the Pipeline between the WRP site and Otterbourne WSW would require a crossing of two Ordinary Watercourses, which for part of the headwaters of Horton Heath Stream. These watercourses would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across the watercourse during construction. These activities could potentially result in direct impacts on the hydrology and geomorphology of the watercourses. However, the Outline CEMP	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		(Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This includes measures to maintain flows, reduce changes on downstream sediment transport, and ensure that the channels are reinstated appropriately.			
Groundwater	Aquifer – Secondary A Bedrock Aquifer (London Clay Sand Members)	The Pipeline would be constructed using a trenched open-cut method and may require dewatering– see description in Section E of the Pipeline between the WRP site and Otterbourne WSW. The proposed excavations are likely to penetrate the underlying Secondary aquifers, where present. To avoid direct impact on the Hamble River and on Winters Hill, the Pipeline construction would be undertaken using a trenchless method in these locations – see Section F of the Pipeline between the WRP site and Otterbourne WSW for more details. These works could impact groundwater receptors within the ZoI such as the Secondary aquifers. The impacts would be mitigated as detailed in section 19.4.	Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Horton Heath Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Main River Hamble WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Upper Hamble WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
Section L: Lower Upham to Brambridge					
Surface water	Horton Heath Stream	The construction of Section L of the Pipeline between the WRP site and Otterbourne WSW would not require any direct interaction with watercourses in the Horton Heath Stream catchment.	Medium	Negligible	Minor
	Bow Lake	Section L of the Pipeline between the WRP site and Otterbourne WSW would require a single crossing of Bow Lake, which is designated as a Main River. However, a trenchless technique would be employed and therefore there would be no direct disturbance of the watercourse. Section L of the Pipeline between the WRP site and Otterbourne WSW would also require a crossing of an Ordinary Watercourse, which drains into Bow Lake. This watercourse would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across the watercourse during construction. These activities could potentially result in direct impacts on the hydrology and geomorphology of the watercourses. However, the Outline CEMP	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		(Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This includes measures to maintain flows, reduce changes on downstream sediment transport, and ensure that the channels are reinstated appropriately.			
	River Itchen	Section L of the Pipeline between the WRP site and Otterbourne WSW would require a single crossing of Brambridge Stream, a tributary of the River Itchen that is designated as a Main River. However, a trenchless technique would be employed and therefore there would be no direct disturbance of the watercourse.	High	Negligible	Minor
Groundwater	Aquifer – Secondary A Bedrock Aquifer (Lambeth Group)	The Pipeline would be constructed using a trenched open-cut method and may require dewatering– see description in Section E of the Pipeline between the WRP site and Otterbourne WSW. The proposed excavations are likely to penetrate the underlying Secondary aquifers, where present. Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as abstractions. To avoid direct impact on Winchester Road (B3354), Bow Lake and an upstream tributary of the River Itchen, the Pipeline construction would be undertaken using a trenchless method – see Section F of the Pipeline between the WRP site and Otterbourne WSW for more details.	Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Licensed GW Abstraction – Fishers Pond Ltd – Fisher Pond Borehole C (Agriculture – Fish Farm/Cress Pond Throughflow)		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – 11/42/22.9/163: Hampshire Carp Hatcheries – Bow Lake Stream at Soke Common (Agriculture – Fish		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Farm/Cress Pond Throughflow)	These works are unlikely to encounter the chalk aquifer and would be undertaken in the lower permeability bedrock (non-aquifer) that confines the chalk below. Should dewatering be required, it could impact groundwater receptors within the ZoI albeit it is anticipated to be limited due to the low permeability of the bedrock. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
	Bow Lake WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Horton Heath Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Itchen Protected WER Classified Water Body – SAC, SSSI. Noted as GWDTE.		High	Negligible	Minor
	Unlicensed GW abstraction – Lowhill Farmhouse Private water supply		Medium	Negligible	Minor
Section M: Brambridge to Otterbourne Water Supply Works					
Surface water	River Itchen	Section M of the Pipeline between the WRP site and Otterbourne WSW would require two Main Rivers to be crossed; the River Itchen and the Otterbourne Stream. However, a trenchless technique would be employed and there would therefore be no direct disturbance of either watercourse. Section M of the Pipeline between the WRP site and Otterbourne WSW would also require crossings of three Ordinary	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Watercourses, all of which are directly connected to the River Itchen. These watercourses would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across the watercourse during construction. These activities could potentially result in direct impacts on the hydrology and geomorphology of the watercourses. However, the Outline CEMP (Document Reference 7.1, Volume 7) sets out a series of measures to reduce the impacts of temporary watercourse crossings (section 19.4). This includes measures to maintain flows, reduce changes on downstream sediment transport, and ensure that the channels are reinstated appropriately.			
	Itchen Navigation	Section M of the Pipeline between the WRP site and Otterbourne WSW would require a single crossing of the Itchen Navigation, which is designated as a Main River. However, a trenchless technique would be employed and there would therefore be no direct disturbance of the watercourse.	High	Negligible	Minor
Groundwater	Aquifer – Principal Bedrock (White Chalk Subgroup)	The Pipeline would be constructed using a trenched open-cut method and may require dewatering – see description in Section E of the Pipeline between the WRP site and Otterbourne WSW. The proposed excavations are likely to penetrate the underlying Primary and Secondary aquifers, where present.	High	Negligible	Minor
	Aquifer – Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer – Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)	Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as abstractions. The works associated with the River Itchen trenchless crossing would be located outside of the SPZ or Principal aquifer. These works are unlikely to encounter the chalk aquifer and would be undertaken in the lower permeability bedrock (non-aquifer) that confines the chalk below. Should dewatering be required, it could impact groundwater receptors within the ZoI albeit it is anticipated to be limited due to the low permeability of the bedrock. The minor crossing of the Itchen tributary would however be within the SPZ1 and partially within the Principal aquifer. These works could impact groundwater receptors within the ZoI such as the licenced water abstractions. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction is likely to be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage	Medium	Negligible	Minor
	Licensed GW Abstraction – Southern Water Services – Otterbourne PWS – All abstraction points		High	Negligible	Minor
	Licensed Southern Water Abstraction – 31/110: Black Dyke, Point A (Environmental – Transfer between sources)		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – SO/042/0031/023: East Lodge Fisheries – Itchen Navigation at Brambridge (Environmental – Remedial River/Wetland Support [Transfer between sources])		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – SO/042/0031/020: Malms House Ltd – Lower Itchen Navigation at Shawford (Environmental – Non-remedial water/wetland support [Transfer between sources])		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – 11/42/22.6/93: Southern Water Services –		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	River Itchen at the Otterbourne Intake (PWS)	requirements, aiming to maintain water balance within the catchment.			
	SPZ1 and SPZ1c related to Otterbourne PWS		High	Negligible	Minor
	Itchen Protected WER Classified Water Body – SAC, SSSI. Noted as GWDTE.		High	Negligible	Minor
Above Ground Plant					
Break Pressure Tank and Intermediate Pumping Station E					
Surface water	Potwell Tributary	There are no Main Rivers or Ordinary Watercourses located at the Break Pressure Tank (BPT) and Intermediate Pumping Station (IPS) E (BPT/IPS-E) site that would be crossed or diverted.	High	Negligible	Minor
Groundwater	Aquifer–- Principal Bedrock (White Chalk Subgroup)	Construction of the BPT/IPS-E is likely to involve shallow excavations. Excavations may require temporary dewatering to maintain the water table below excavation, as discussed in Section E of the Pipeline between the WRP site and Otterbourne WSW. Temporary dewatering could impact groundwater-dependent receptors within the ZoI. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction may be subject to an abstraction licence, if greater than 20m^3/d, which	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage requirements, aiming to maintain water balance within the catchment.			
Intermediate Pumping Station F					
Surface water	Wallington River	There are no Main Rivers or Ordinary Watercourses located at the IPS-F site that would be crossed or diverted.	Medium	Negligible	Minor
Groundwater	Aquifer–- Principal Bedrock (White Chalk Subgroup)	Construction of the IPS-F is likely to involve shallow excavations. Excavations may require temporary dewatering to maintain the water table below excavation, as discussed in Section E of the Pipeline between the WRP site and Otterbourne WSW. Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as the Maindell PS and associated SPZs. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction may be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage	High	Negligible	Minor
	Aquifer–- Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer–- Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer–- Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction–- Portsmouth Water–- Maindell PS (PWS)		High	Negligible	Minor
	SPZ2, SPZ2c and SPZ 3 related to Maindell PWS		High	Negligible	Minor
	Wallington below Southwick WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		requirements, aiming to maintain water balance within the catchment.			
Intermediate Pumping Station G					
Surface water	River Meon	There are no Main Rivers or Ordinary Watercourses located at the IPS-G site that would be crossed or diverted.	High	Negligible	Minor
Groundwater	Aquifer–- Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)	Construction of the IPS-G is likely to involve shallow excavations. Excavations may require temporary dewatering to maintain the water table below excavation, as discussed in Section E of the Pipeline between the WRP site and Otterbourne WSW. Temporary dewatering could impact groundwater-dependent receptors within the ZoI such as an abstraction licence. The impact is likely to be of negligible magnitude of impact on the aquifers due to a small scale and temporary nature of likely excavations, however an adverse impact may occur on the nearby abstraction licence. The impacts would be mitigated as detailed in section 19.4. Groundwater abstraction may be subject to an abstraction licence, if greater than 20m^3/d, which would further secure measures and limits on the proposed dewatering activities. The Outline CEMP (Document Reference 7.1, Volume 7) sets out temporary works drainage	Medium	Negligible	Minor
	Aquifer–- Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer–- Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham Park Golf Club (Spray Irrigation)		Medium	Negligible	Minor
	River Meon WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		requirements, aiming to maintain water balance within the catchment.			
Break Pressure Tank K					
Surface water	River Hamble (upper)	There are no Main Rivers or Ordinary Watercourses located at the BPT-K site that would be crossed or diverted.	Medium	Negligible	Minor

Sensitivity of receptor

19.8.19 The sensitivity of the surface water and groundwater receptors that could potentially be impacted by each component is described in Table 19-55. These range in sensitivity from low to high.

Magnitude of impact

19.8.20 The magnitude of impacts resulting from the direct disturbance of surface water and groundwater associated with each component of the Proposed Development are described in Table 19-55. This demonstrates that, following the application of the primary and tertiary mitigation measures described in section 19.4, all impacts would have a negligible (or lower) magnitude.

Significance of effect

19.8.21 The significance of effect associated with each component is described in Table 19-55, which demonstrates that the significance of effect would be minor adverse for the majority of receptors. For some receptors the significance of effect is 'no change'. No significant adverse effects on surface and groundwater receptors are therefore expected as a result of direct disturbance during the construction phase.

Release of contaminants to surface and groundwaters during construction

Description of impact

19.8.22 There is potential for the accidental release of lubricants, fuels and oils from construction machinery being used in and adjacent to surface watercourses and/or from vehicles, through spillage, leakage and/or in-wash from vehicle and equipment storage areas after rainfall. There is also the potential for accidental release of foul waters (from welfare facilities), construction materials (including concrete and breakouts of drilling fluids from trenchless and tunnel crossings) and materials such as fine particulates from broken masonry and metal fragments arising from the demolition of several small structures within the pipeline corridor (including sheds and other storage structures) into the water environment during the construction period.

19.8.23 If a significant leakage or spillage occurs, there is the potential for impacts upon water quality if contaminants enter the surface drainage network or percolate into groundwater. Construction activities which disturb the ground, including excavation, trenchless and tunnel crossings and piling at the WRP site, could potentially introduce contaminants into the underlying groundwater bodies (particularly shallow aquifers). These activities could therefore adversely affect the quality of the underlying groundwater and could impact upon any licensed and unlicensed abstractions within it (including potable water abstractions protected by SPZ1 or SPZ2) or GWDTEs. Works within potentially contaminated soils are assessed in ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, Volume 6).

19.8.24 Where construction of the tunnel or trenchless crossings and associated shafts would be within the chalk aquifer, this is likely to result in temporary increases in turbidity. This could impact groundwater-dependent receptors and have adverse

impact on abstractions. Contaminants could be accidentally released into the underlying groundwater body through tunnelling associated with the transfer from surface excavations, and through use on the boring machine (e.g. release of any drilling fluids associated with the tunnelling process). The change in groundwater quality could have a discernible impact on the aquifer and directly impact the hydraulically connected receptors. The magnitude of impact would be dependent on the permeability, distance to the potential receptor and extent of any spillage/breakout. The Outline CEMP (Document Reference 7.1, Volume 7) requires the Contractor to prepare a Drilling Fluid Management Plan, which will set out measures aimed to reduce fluid losses during tunnelling and trenchless construction works.

19.8.25 Piled foundations would be required to support the construction of the WRP site. The piles would penetrate superficial and the underlying bedrock. Therefore, they are likely to directly interact with the underlying aquifers. The works may result in localised increase in turbidity in the vicinity of the pile as a result of drilling works, particularly in the chalk aquifers.

19.8.26 Depending on the piling technique used, construction of the piles and specifically injection of concrete (used for cast in situ piles), could result in concrete bleeding and migration via groundwater towards hydraulically connected receptors. Concrete escape would be localised. The magnitude of impact would be dependent on the piling methodology and permeability of the surrounding soils or rock, together with measures implemented through the Foundation Works Risk Assessment (FWRA) to be prepared by the Contractor in accordance with the Outline CEMP (Document Reference 7.1, Volume 7). These are likely to reduce the risks associated with concrete escape. These works are likely to result in temporary, possibly discernible, change, particularly in the chalk matrix, but this would not result in a material change in water quality due to its localised extent.

19.8.27 Any intrusive works within areas of identified sources of contamination (e.g. historical landfill sites) have the potential to mobilise contamination, create preferential flow paths, leading to an impact on groundwater quality. The assessment of effects on groundwater quality associated with existing land contamination is presented in ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, Volume 6) and associated appendices.

19.8.28 Groundwater quality could also be affected by saline ingress in relation to subsurface activities. Due to dewatering works a groundwater flow gradient from the marine environment towards the WRP site could be created or increased if already present.

19.8.29 In addition, the construction of the Proposed Development would involve earthworks, excavation and the tracking of large construction machinery. This would create areas of bare ground by removing vegetation cover and topsoil and would increase the potential for the erosion of soil particulates. This could result in an increase in the supply of fine sediment (e.g. clays, silts and fine sands) to surface water bodies (including land drainage channels) through surface runoff and the erosion of exposed soils. Increased sediment supply can affect geomorphology of watercourses by increasing the turbidity of the water column and, where energy is sufficiently low, encouraging increased deposition of fine sediment on the bed of the channel. Further, sediment loads could smother existing bed habitats, reduce light penetration and reduce dissolved oxygen

concentrations, adversely affecting the biota including macrophytes, aquatic invertebrates and fish. This has the overall effect of reducing the quality of in-channel habitats, particularly in sensitive chalk river catchments. Effects on ecology are assessed in ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6).

19.8.30 Any impacts of increased sediment supply would be particularly pronounced in chalk river catchments such as the Rivers Itchen and Meon, which naturally have low suspended sediment loads and coarse bed substrates (i.e. gravels and cobbles) with a low proportion of fine sediment. Many aquatic plant, invertebrate and fish species require these 'clean' substrates for at least part of their life cycle, and as such in-channel habitats for these groups could become degraded as a result of increased sediment supply.

19.8.31 Following the completion of construction works, commissioning of the principal components of the Proposed Development would be required to ensure the components have been installed correctly prior to the commencement of operation. This would firstly comprise pressure testing the pipelines following construction, followed by full system testing.

19.8.32 Pressure testing of the Proposed Development would comprise passing water through all sections of the Pipeline as follows:

1. The Pipelines between Budds Farm WTW and the WRP site would use treated wastewater from Budds Farm WTW.
2. The Pipelines between the WRP site and Bedhampton Springs would use potable water from Otterbourne WSW.
3. The Pipeline between the WRP site and Otterbourne WSW would use potable water from Otterbourne WSW.

19.8.33 The water storage lagoon construction compounds described in paragraph 3.5.113 would store potable water used for commissioning of the Pipeline between the WRP site and Otterbourne WSW. Water would be passed through the pipeline using temporary pumps and pipes, either directly to the Pipelines or using installed washout valves. Once pressure testing has been completed, and the potable water within the water storage lagoons is no longer required, it would be transferred to tankers for de-chlorination and then disposal at a sewer or other suitably licensed disposal facility. Treated wastewater used for pressure testing of the of the Pipelines between Budds Farm WTW and the WRP site would be returned to Budds Farm WTW for release from the Eastney LSO.

19.8.34 Full system testing of the Proposed Development would take place as follows:

1. The Pipelines between Budds Farm WTW and the WRP site would use treated wastewater from Budds Farm WTW.
2. The Pipelines between the WRP site and Bedhampton Springs would use source water from Havant Thicket Reservoir.
3. The Pipeline between the WRP site and Otterbourne WSW would use source water from Havant Thicket Reservoir.

19.8.35 Given the above, the use of washout valves and the potential for effects on surface water quality during commissioning is not considered further.

19.8.36 Impacts of the release of contaminants during construction on specific surface and groundwater receptors associated with each component of the Proposed Development are described in Table 19-56. The assessment presented in Table 19-56 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

Table 19-56 Release of contaminants to surface and groundwaters during construction

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Water Recycling Plant site					
Surface water	Langstone Harbour (including onshore coastal catchment)	Construction activities at the WRP site, including construction of the SuDS outfall, could result in the accidental release of fine sediment and contaminants into the surface drainage network within this catchment and for the outfall, directly into the tidal section of the Hermitage Stream. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	High	Negligible	Minor
Groundwater	Aquifer– Principal Bedrock (White Chalk Subgroup)	The area around Bedhampton and Havant is particularly sensitive to impacts due to the karstic chalk in the area. However, due to the predominant southerly groundwater flow (i.e. from the hills of the South Downs in the north towards the coast in the south), impacts on sensitive receptors to the north of the WRP site (such as the Bedhampton-Havant spring complex) are likely to be limited and of a negligible magnitude of impact (the WRP site is not within the Source Protection Zone of the abstractions at Bedhampton). This would limit impacts to the groundwater receptors in the	High	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Hermitage Stream WER Classified Watercourse (Catchment)	immediate vicinity of the WRP site and to the south. Construction of the piled foundations within the WRP site is likely to directly interact with the underlying Secondary and Principal aquifers. Piling activities could result in localised concrete bleeding and increase in turbidity in the direct vicinity of the piles. Any change in groundwater turbidity could have an impact on the quality of shallow groundwater and adjacent surface waters and may result in temporary and localised discernible change in the quality. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7) Piling works would be subject to a FWRA and detailed Water Monitoring Plan. The FWRA(s) and Water Monitoring Plan will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).	Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body– SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
Pipelines between Budds Farm Wastewater Treatment Works and the Water Recycling Plant site					
Surface water	Hermitage Stream	The Pipelines would be installed using a trenchless technique that would require the construction of shafts and the use of drilling fluids. Construction of the pumping station is	Medium	Negligible	Minor
	Langstone Harbour (including onshore coastal catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		also likely to require ground disturbance and shallow excavations. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within this catchment. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.			
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	Due to the predominant groundwater flow from the hills of the South Downs in the north towards the coast in the south, receptors to the north of the WRP site, such as the Bedhampton-Havant spring complex, are considered to be negligibly impacted by activities at the WRP site (not within Source Protection Zone of the abstractions at Bedhampton). This would limit impacts to the groundwater receptors in the immediate vicinity of the WRP site and to the south. The construction of the Pipeline would be undertaken using a trenchless method, between two excavated shafts. Shaft excavation and trenchless construction is likely to be in the chalk aquifer, which may result in increased turbidity. In addition, there is a risk of accidental release	High	Negligible	Minor
	Secondary A Superficial Deposits Aquifer (River Terrace Deposits and Alluvium)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor
	Consented Discharge A00751: Southern Water Services – Budds Farm WTW – To the		Low	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Solent/Langstone Harbour	of fluids which could pollute the aquifer or dependent receptors. Any change in groundwater turbidity could have an impact on the quality of shallow groundwater and adjacent surface waters and may result in temporary and localised discernible change in the quality, whilst accidental release of fluids could have more significant impacts on the aquifers and adjacent water courses. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The shafts and trenchless construction would be subject to a FWRA, DFMP and detailed Water Monitoring Plan which will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). Due to the proximity of the sea, there is a risk of saline intrusion as a result of the dewatering works during construction of the shafts in the WRP site and Budds Farm area, and this will be a factor in the groundwater control design which will be secured through the appropriate licence and permitting regimes as set out in the Outline CEMP (Document Reference 7.1, Volume 7).			
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body–- SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
Release from Eastney Long Sea Outfall					

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Surface water	Solent	There would be no changes to releases from Eastney LSO from the Proposed Development during the construction phase, and no construction works on the outfall itself are proposed. There would therefore be no impact on the Solent.	High	No change	No change
Pipeline between the Water Recycling Plant site and Bedhampton Springs					
Surface water	Langstone Harbour (including onshore coastal catchment)	Both trenchless construction and above-ground construction of the Pipeline could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	High	Negligible	Minor
	Hermitage Stream		Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The construction of the Pipeline would be undertaken primarily using a trenchless method from the WRP site to south-east of Bedhampton Springs where above-ground construction will be utilised to reduce risks to the Chalk and SPZ as the pipeline gets closer to Bedhampton Springs. Due to the predominant groundwater flow from the hills of the South Downs in the north towards the coast in the south, receptors to the north of the WRP site, such as the Bedhampton-Havant spring complex, are considered to be negligibly	High	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		impacted by activities at the WRP site and the trenchless activities (the Pipeline is not within Source Protection Zone of the abstractions at Bedhampton). This would limit impacts primarily to the groundwater receptors in the immediate vicinity of the WRP site and to the south. Shaft excavation and trenchless construction is likely to be in the chalk aquifer, which may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifer or dependent receptors. Any change in groundwater turbidity could have an impact on the quality of shallow groundwater and adjacent surface waters and may result in temporary and localised discernible change in the quality, whilst accidental release of fluids could have more significant impacts on the aquifers and adjacent watercourses. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The shafts and trenchless construction would be subject to a FWRA, DFMP and detailed Water Monitoring Plan which will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The above-ground works would also be subject to the Water Monitoring Plan, and general pollution prevention measures. Due to the proximity of the sea, there is a risk of saline intrusion as a result of the dewatering works during construction of the shafts in the WRP site and Budds Farm area. This will be a factor in the groundwater control design which will be secured through the appropriate licence and permitting regimes as set out in the Outline CEMP (Document Reference 7.1, Volume 7)			
Use of Havant Thicket Reservoir for the storage of recycled water					
Surface water	Havant Thicket Reservoir	There would be no releases into Havant Thicket Reservoir from the Proposed Development during the construction phase, and therefore no impacts on downstream water receptors such as Riders Lane Stream, hermitage Stream and Langstone Harbour. Impacts associated with the use of the reservoir during operation are considered separately (paragraphs 19.8.60 to 19.8.143).	High	No change	No change
Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works					
Section D: The Water Recycling Plant site to Portsdown Hill					
Surface water	Langstone Harbour (including onshore coastal catchment)	Section D would be installed using a tunnelling technique and would require shafts. Additionally, the use of drilling fluids would be required. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within this catchment.	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7).			
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The Pipeline would be tunnelled. Tunnelling is likely to be entirely in the chalk aquifer and therefore these works are likely to directly interact with the underlying Principal aquifer, and potentially indirectly interact with dependent receptors. The tunnel would run approximately 300m south of the SPZ1 of the Bedhampton PWS Springs. Due to the predominant groundwater flow from the hills of the South Downs in the north towards the coast in the south, the receptors at the Bedhampton-Havant spring complex, are considered to be negligibly impacted by activities at the WRP site and tunnelling activities (not within Source Protection Zone of the abstractions at Bedhampton). The construction of the Pipeline would be undertaken using tunnelling, between a drive and reception shaft (with a potential intervention shaft along the route). Shaft excavation and tunnelling may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifer or dependent receptors in the immediate vicinity (to the east and south).	High	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (beach and Tidal Flat Deposits, Head, Marine Raised Deposits)		Medium	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body– SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
	Potwell Tributary WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Any change in groundwater turbidity could have an impact on the quality of the groundwater and local dependent receptors, which may result in temporary and localised discernible change in the quality, whilst accidental release of fluids could have more significant impacts on the aquifer and dependent receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The shafts and tunnelling activities would be subject to a FWRA, DFMP and detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3) Due to the proximity of the sea, there is a risk of saline intrusion as a result of the dewatering works during construction of the shaft in the WRP site area, which will be a factor in the groundwater control design, and required licences/permits from the Environment Agency, as set out in the Outline CEMP (Document Reference 7.1, Volume 7).			
Section E: Portsdown Hill to Boarhunt					
Surface water	Potwell Tributary	Section E is primarily located within agricultural land, intersects a number of roads and is anticipated to be constructed using trenched	High	Negligible	Minor
	Wallington River		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		open-cut construction. Construction activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.			
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	Section E is primarily located within agricultural land, intersects a number of roads and is anticipated to be constructed using trenched open-cut construction. Open-cut excavation is likely to be above the water table for the majority of the section. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifer or dependent receptors. Any change in groundwater turbidity could have an impact on the quality of the groundwater and	High	Negligible	Minor
	Aquifer – Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer – Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Southwick Estate – Offwell Farm, Southwick (Private water supply)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Potwell Tributary WER Classified Watercourse (Catchment)	local dependent receptors, which may result in temporary and localised discernible change in the quality, whilst accidental release of fluids could have more significant impacts on the aquifer and dependent receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The works would be subject to general pollution prevention measures and a detailed Water Monitoring Plan, to be developed by the Contractor to ascertain the pre-construction baseline and verify predicted impacts to the local surface water and groundwater regime from temporary and permanent construction effects during and post-construction. ES Appendix 19.9 Outline Water Monitoring Plan, Volume II, (Document Reference 6.2, Volume 6) will form the basis of the detailed Water Monitoring Plan and includes trigger levels and action plans (to enable mitigation to be implemented based on the monitored conditions). The detailed Water Monitoring Plan will be submitted for approval in accordance with the corresponding requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).	Medium	Negligible	Minor
	Wallington below Southwick WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Section F: Boarhunt to Crockerhill					
Surface water	Wallington River	Section F intersects the River Wallington and Forest Lane. The remainder of Section F is located within agricultural land. The intersection with the river would be constructed using trenchless construction. The remaining parts of Section F would be constructed using trenched open-cut construction. Apart from the intersection with the river which would be trenchless therefore no disturbance would occur, construction activities would require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	Section F intersects the River Wallington and Forest Lane. The remainder of Section F is located within agricultural land. The intersection with the river would be constructed using trenchless construction methods. The remaining	High	Negligible	Minor
	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)	parts of Section F would be constructed using trenched open-cut construction. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifer or dependent receptors regardless of whether the works are above or below the water table. Where trenchless construction methods are required, these are likely to directly interact with the underlying Chalk Principal aquifer. These works may result in increased turbidity. In addition, there is a risk of accidental release of drilling fluids or other pollutants. The change in groundwater quality could have a discernible impact on the aquifer and the hydraulically connected receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The open-cut excavation works would be subject to general pollution prevention measures and a detailed Water Monitoring Plan to mitigate and manage the risks. The shafts and trenchless activities would be subject to a FWRA, DFMP and a detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
Section G: Crockerhill to Wickham					
Surface water	River Meon	This section intersects with the River Meon where trenchless construction would be used. The remainder of the section would be trenched open-cut construction technique. Construction activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	High	Negligible	Minor
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)	The construction of the majority of the Pipeline in this section would be undertaken using open-cut excavation and is likely to be above the water table for large portions.	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits	Where excavation intercepts the groundwater table, works may result in increased turbidity. In	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer (Alluvium, River Terrace Deposits)	addition, there is a risk of accidental release of fluids which could pollute the aquifers or dependent receptors regardless of whether the works are above or below the water table. In particular, the Wickham Park abstraction is very close to the pipeline route which will be mitigated through measures within the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan, Volume II (Document Reference 6.2, Volume 6). To avoid impact on the Meon River, Hoad's Hill (A32) and Winchester Road (A334), the Pipeline construction would be undertaken using a trenchless method. Trenchless construction and the associated shaft excavations are likely to directly interact with the underlying aquifers, and could indirectly impact other dependent receptors. These works may result in increased turbidity. In addition, there is a risk of accidental release of drilling fluids or other pollutants. The change in groundwater quality could have a discernible impact on the aquifer and the hydraulically connected receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7).			
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham Park Golf Club (Spray Irrigation)		Medium	Negligible	Minor
	River Meon WER Classified Watercourse. (Catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The open-cut excavation works would be subject to general pollution prevention measures included in the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan, Volume II (Document Reference 6.2, Volume 6), to mitigate and manage the risks. The shafts and trenchless activities would be subject to a FWRA, DFMP and detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
Section H: Wickham to Shedfield					
Surface water	River Meon	Section H intersects with High Street and Winchester Road (B2177). The intersection with the roads would be constructed using trenchless construction. The remaining parts of Section H would be constructed using trenched open-cut construction. Small storage structures on the pipeline route near Shirrell Heath would also need to be demolished. Construction activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments.	High	Negligible	Minor
	Southampton Water (terrestrial catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group)	Section H intersects with High Street and Winchester Road (B2177). The intersection with the roads would be constructed using trenchless construction. The remaining parts of Section H would be constructed using trenched open-cut construction. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifers or dependent receptors regardless of whether the works are above or below the water table. Trenchless construction and the associated shaft excavations are likely to directly interact with the underlying aquifers, and could indirectly impact other dependent receptors. These works may result in increased turbidity. In addition, there is a risk of accidental release of drilling fluids or other pollutants. The change in groundwater quality could have a discernible	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Unlicensed GW abstraction– The Bungalow (now the Garden House) Private water supply		Minor	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		impact on the aquifer and the hydraulically connected receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The open-cut excavation works would be subject to general pollution prevention measures included in the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan to mitigate and manage the risks. The shafts and trenchless activities would be subject to a FWRA, DFMP and detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
Section J: Shedfield to the River Hamble					
Surface water	Southampton Water (including onshore coastal catchment)	Section J intersects with St Anne's Lane and Botley Road (B3035) and would be constructed using trenchless methods. The remaining parts of Section J would be constructed using trenched open-cut construction. Small storage structures on the pipeline route near Waltham Chase would also need to be demolished.	High	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Construction activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group)	Section J intersects with St Anne's Lane and Botley Road (B3035) and would be constructed using trenchless methods. The remaining parts of Section J would be constructed using trenched open-cut construction. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifers or dependent receptors regardless of whether the works are above or below the water table. Trenchless construction and the associated shaft excavations are likely to directly interact with the underlying aquifers, and could indirectly impact other dependent receptors.	Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Unlicensed GW abstraction– The Bungalow (now the Garden House) Private water supply		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		These works may result in increased turbidity. In addition, there is a risk of accidental release of drilling fluids or other pollutants. The change in groundwater quality could have a discernible impact on the aquifer and the hydraulically connected receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The open-cut excavation works would be subject to general pollution prevention measures included in the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan to mitigate and manage the risks. The shafts and trenchless activities would be subject to a FWRA, DFMP and detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
Section K: The River Hamble to Lower Upham					
Surface water	River Hamble (main)	Section K intersects the River Hamble and Winters Hill both of which would be constructed using trenchless techniques. The remaining parts of Section K would be constructed using trenched open-cut construction. Construction	Medium	Negligible	Minor
	Horton Heath Stream		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (London Clay Sand Members)	Section K intersects the River Hamble and Winters Hill both of which would be constructed using trenchless techniques. The remaining parts of Section K would be constructed using trenched open-cut construction. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifers or dependent receptors regardless of whether the works are above or below the water table. Trenchless construction and the associated shaft excavations are likely to directly interact	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Horton Heath Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Main River Hamble WER Classified Watercourse. (Catchment)	with the underlying aquifers, and could indirectly impact other dependent receptors. These works may result in increased turbidity. In addition, there is a risk of accidental release of drilling fluids or other pollutants. The change in groundwater quality could have a discernible impact on the aquifer and the hydraulically connected receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The open-cut excavation works would be subject to general pollution prevention measures included in the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan to mitigate and manage the risks. The shafts and trenchless activities would be subject to a FWRA, DFMP and detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).	Medium	Negligible	Minor
	Upper Hamble WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Section L: Lower Upham to Brambridge					
Surface water	Horton Heath Stream	Section L intersects with Winchester Road (B3354), Bow Lake and an upstream tributary of	Medium	Negligible	Minor
	Bow Lake		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	River Itchen	the River Itchen. The intersection with a watercourse and woodland at Store House Gully would be constructed using trenchless construction. The remaining parts of Section L would be constructed using trenched open-cut construction. Small storage structures on the pipeline route near Crowdhill and Highbridge would also need to be demolished. Construction activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within these catchments. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	High	Negligible	Minor
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)	Section L intersects with Winchester Road (B3354), Bow Lake and an upstream tributary of the River Itchen. The intersection with a watercourse and woodland at Store House Gully would be constructed using trenchless construction. The remaining parts of Section L	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Licensed GW Abstraction– Fishers Pond Ltd– Fisher Pond Borehole C (Agriculture– Fish Farm/Cress Pond Throughflow)	would be constructed using trenched open-cut construction. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifers or dependent receptors regardless of whether the works are above or below the water table. Trenchless construction and the associated shaft excavations are likely to directly interact with the underlying aquifers, and could indirectly impact other dependent receptors. These works may result in increased turbidity. In addition, there is a risk of accidental release of drilling fluids or other pollutants. The change in groundwater quality could have a discernible impact on the aquifer and the hydraulically connected receptors. Groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The open-cut excavation works would be subject to general pollution prevention measures included in the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan to mitigate and manage the risks.	Medium	Negligible	Minor
	Licensed Southern Water Abstraction– 11/42/22.9/163: Hampshire Carp Hatcheries– Bow Lake Stream at Soke Common (Agriculture– Fish Farm/Cress Pond Throughflow)		Medium	Negligible	Minor
	Bow Lake WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Horton Heath Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Itchen Protected WER Classified Water Body – SAC, SSSI. Noted as GWDTE.		High	Negligible	Minor
	Unlicensed GW abstraction– Lowhill Farmhouse Private water supply		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The shafts and trenchless activities would be subject to a FWRA, DFMP and a detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
Section M: Brambridge to Otterbourne Water Supply Works					
Surface water	River Itchen	Section M intersects with the River Itchen and an upstream tributary of the River Itchen. These intersections would be installed using trenchless construction methods. The remaining parts of this section would be constructed using trenched open-cut construction. INNS Treatment at Otterbourne WSW may also require limited construction within the boundaries of the existing site. Construction activities would therefore require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network within the River Itchen catchment. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will include measures to limit and control the mobilisation of potential	High	Negligible	Minor
	Itchen Navigation		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.			
Groundwater	Aquifer– Principal Bedrock (White Chalk Subgroup)	Section M intersects with the River Itchen and an upstream tributary of the River Itchen. These intersections would be installed using trenchless construction methods. The remaining parts of this section would be constructed using trenched open-cut construction. Where excavation intercepts the groundwater table, works may result in increased turbidity. In addition, there is a risk of accidental release of fluids which could pollute the aquifers or dependent receptors regardless of whether the works are above or below the water table. The trenchless crossing works associated with the Itchen River would be located outside of the SPZ1, and in a location where the Itchen is not directly underlain by the chalk. These works are unlikely to encounter the chalk aquifer and would be undertaken in the lower permeability bedrock (non-aquifer) that confines the chalk below (chalk bedrock anticipated approximately 35 to 40m below-ground level at the Otterbourne tunnel location; at significant depth compared to anticipated tunnel depth). The minor crossing of the Itchen tributary would however be partially within the Principal aquifer and within the SPZ1 of the Otterbourne PWS. Due to the sensitivity of the Public Water Supply	High	Negligible	Minor
	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction– Southern Water Services– Otterbourne PWS– All abstraction points		High	Minor	Moderate
	Licensed Southern Water Abstraction – 31/110: Black Dyke, Point A (Environmental– Transfer between sources)		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – SO/042/0031/023: East Lodge Fisheries–- Itchen		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Navigation at Brambridge (Environmental– Remedial River/Wetland Support [Transfer between sources])	to relatively small increases in turbidity, the magnitude of impact is considered to be moderate after taking into consideration embedded and tertiary mitigation measures (section 19.4). With the exception of potential turbidity effects on the Otterbourne PWS, groundwater quality impacts will be mitigated by measures set out in the Outline CEMP (Document Reference 7.1, Volume 7). The open-cut excavation works would be subject to general pollution prevention measures secured in the Outline CEMP (Document Reference 7.1, Volume 7) and Outline Water Monitoring Plan to mitigate and manage the risks. The shafts and trenchless activities would be subject to a FWRA, DFMP and detailed Water Monitoring Plan to mitigate and manage the risks. These will be produced by the Contractor and submitted for approval in accordance with the corresponding requirements in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
	Licensed Southern Water Abstraction – SO/042/0031/020: Malms House Ltd– Lower Itchen Navigation at Shawford (Environmental– Non-remedial water/wetland support [Transfer between sources])		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – 11/42/22.6/93: Southern Water Services– River Itchen at the Otterbourne Intake (PWS)		High	Negligible	Minor
	SPZ1 and SPZ1c related to Otterbourne PWS		High	Negligible	Minor
	Itchen Protected WER Classified Water Body– SAC, SSSI. Noted as GWDTE.		High	Negligible	Minor
Above Ground Plant					
Break Pressure Tank and Intermediate Pumping Station E					
Surface water	Potwell Tributary		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Groundwater	Aquifer– Principal Bedrock (White Chalk Subgroup)	Construction of the IPS-E would require ground disturbance and the use of construction materials and plant above and below the ground surface or ground impacting underlying groundwater. This could result in the accidental release of fine sediment and contaminants into the surface drainage network. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	High	Negligible	Minor
Intermediate Pumping Station F					
Surface water	Wallington River	Construction of the IPS-F would require ground disturbance and the use of construction materials and plant above and below the ground surface or ground impacting underlying groundwater. This could result in the accidental release of fine sediment and contaminants into the surface drainage network. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	Medium	Negligible	Minor
Groundwater	Aquifer– Principal Bedrock (White Chalk Subgroup)		High	Negligible	Minor
	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Licensed GW Abstraction–Portsmouth Water– Maindell PS (PWS)		High	Negligible	Minor
	SPZ2, SPZ2c and SPZ 3 related to Maindell PWS		High	Negligible	Minor
	Wallington below Southwick WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Intermediate Pumping Station G					
Surface water	River Meon	Construction of the IPS-G would require ground disturbance and the use of construction materials and plant above and below the ground surface or ground impacting underlying groundwater. This could result in the accidental release of fine sediment and contaminants into the surface drainage network. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	High	Negligible	Minor
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)		Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction– Golfpartners International Limited – Borehole at Wickham		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Park Golf Club (Spray Irrigation)				
	River Meon WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
Break Pressure Tank K					
Surface water	River Hamble (upper)	Construction of BPT-K would require ground disturbance and the use of construction materials and plant above and below the ground surface. This could result in the accidental release of fine sediment and contaminants into the surface drainage network. However, construction will be undertaken in accordance with the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to limit and control the mobilisation of potential contaminants beyond the working areas and ensure that any accidental releases are managed appropriately.	Medium	Negligible	Minor

Sensitivity of receptor

19.8.37 The sensitivity of the surface and groundwater receptors that could potentially be impacted by each component is described in Table 19-56. These range in sensitivity from low to high.

Magnitude of impact

19.8.38 The magnitude of impacts resulting from the release of pollutants to surface and groundwaters during the construction of each component are described in Table 19-56. This demonstrates that, following the application of the primary and tertiary mitigation measures described in section 19.4, all impacts would be of a negligible to minor adverse magnitude.

Significance of effect

19.8.39 The significance of effect associated with each component is described in Table 19-56, which demonstrates that the significance of effect would be minor adverse for all surface water receptors and the majority of groundwater receptors (with the exception of the Otterbourne PWS summarised below).

19.8.40 Likely significant adverse effects may, however, occur as a result of construction of the Pipeline between the WRP site and Otterbourne WSW, due to potential impact on groundwater quality as a result of trenchless construction methods within the chalk aquifer in the area of the Otterbourne PWS.

19.8.41 Additional mitigation measures would be required, which is likely to comprise temporary cessation of abstraction from the shallow adit system at Otterbourne operated by the Applicant, which would be secured through the detailed Water Monitoring Plan to be produced and submitted for approval in accordance with the corresponding requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). With secondary mitigation implemented, this would address the moderate impact and result in a minor adverse residual effect.

19.8.42 The assessment demonstrates that no other significant adverse effects on surface and groundwater receptors are expected as a result of the release of contaminants during the construction phase.

Changes to surface water and groundwater flows and flood risk during construction

Description of impact

19.8.43 Construction activities associated with the above and below-ground infrastructure have the potential to permanently alter surface water flows and drainage patterns by:

1. Altering existing flow paths and changing the distribution of surface drainage across development sites (e.g. through raising or lowering the existing land surface and creating new release locations from temporary site drainage systems).

2. Reducing infiltration and increasing surface runoff resulting from soil compaction by construction vehicles.
3. The development of surface infrastructure also has the potential to change surface flows and infiltration rates resulting from changes to land use (i.e. by increasing the proportion of impermeable surfaces in a drainage catchment) and alter site runoff characteristics. This could impact recharge of the underlying aquifers.
4. Installing structures (e.g. temporary watercourse crossings) across existing surface drainage features that constrain their capacity to convey flows downstream and increase localised flood risk.

19.8.44 The construction of the Proposed Development therefore has the potential to increase surface water runoff, which could adversely affect the hydrology and geomorphology of the surface drainage network (e.g. as a result of increased discharge resulting in bed and bank scour, and the in wash of greater volumes of fine sediment due to increased surface runoff, as discussed in the earlier impact 'Release of contaminants to surface and groundwaters during construction'). This could in turn affect the quality of in-channel habitats for aquatic plants, invertebrates and fish. A detailed assessment of impacts on habitats and species is set out in ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6).

19.8.45 Any changes in surface flows could also increase flood risk in and around the Proposed Development, particularly where receptors are already at increased flood risk (e.g. within Flood Zones 2 or 3 or in areas of increased surface water flood risk).

19.8.46 Water used in the commissioning of the principal components of the Proposed Development prior to the commencement of operation would be stored in lagoons in construction compounds and passed through the pipeline using temporary pumps and pipes, either directly to the Pipelines or using installed washout valves. Once commissioning has been completed, this water would be transferred to tankers for disposal at a sewer or other suitably licenced disposal facility. There is therefore no mechanism for surface water flows and flood risk to be affected by this activity.

19.8.47 Subsurface flow patterns can be altered because of changes to infiltration rates, surface flows and the installation of impermeable subsurface infrastructure, as well as the introduction of underground foundations or structures. Changes to the infiltration rates could also adversely and permanently impact recharge of the underlying aquifer. Temporary works drainage and surface water management measures are secured in the Outline CEMP (Document Reference 7.1, Volume 7) would ensure that water balance within the catchments is maintained.

19.8.48 Groundwater flow paths may also be impacted by physical modifications to the subsurface (e.g. excavations, piling/structures, tunnelling or infilling followed by compaction), which could interrupt the natural groundwater flow pathways by creating barriers.

19.8.49 Construction of shafts and tunnels has the potential to block preferential pathways for groundwater flow towards groundwater dependent receptors, particularly within the chalk aquifer. The area around Bedhampton and Havant is particularly

sensitive to impacts due to the underlying karstic chalk, which has informed the design of the pipeline route and methodologies.

19.8.50 An open-cut method of construction would require excavation of the soils to the proposed invert levels, laying the pipeline with associated engineered bedding materials (typically granular material such as sand) and backfilling with selected material. The backfill material, if shown to be suitable for reuse from engineering and quality perspective, would be site won and in majority of cases would comprise material reused within the area of original excavation. In areas underlain by geology characterised by relatively low permeability e.g. London Clay or alluvium, the pipe bedding may act as a drainage pathway and convey groundwater along the gradient of the pipeline and potentially provide hydraulic connectivity between currently disconnected aquifers. The pipeline gradient would be largely dependent on topographical changes along the pipeline alignment. Any transfer of groundwater is likely to occur on a local scale and therefore have negligible magnitude of impact on the hydrogeology. In other, relatively more permeable, ground conditions, introduction of the pipe bedding is unlikely to act as a preferential flow path. In relation to areas where the Proposed Development is constructed within areas of potential sources of contamination, the assessment of potential effects from creation of preferential flow paths for contamination is considered in ES Chapter 11 Land quality and ground conditions, Volume I (Document Reference 6.1, Volume 6).

19.8.51 Reuse of locally site won materials as trench backfill would maintain like for like hydrogeological conditions, albeit compaction may reduce the permeability of the materials due to reduction of the voids, which could result in the trench acting as a barrier to flow. In areas outside the highways and pavements, the compaction requirements would be less onerous and would only require ensuring a stable ground. In addition, to ensure appropriate reinstatement, in areas of agricultural use a layer of subsoil and topsoil would be required, reducing the compacted general fill thickness. These measures would be embedded within the design in line with industry guidance (such as the Civil Engineering Specification for the Water Industry [75]) and therefore, it is considered that the construction of the Pipeline would result in overall negligible magnitude of impact on groundwater flows.

19.8.52 Depending on the piling technique, construction of the piles and specifically injection of concrete (if required), may result in concrete migration and blockage of groundwater flow pathways in the vicinity of a pile. This may be particularly an issue within the chalk bedrock, where this would block fissures or gaps in the bedrock, which could create potential preferential pathways for groundwater flow towards groundwater dependent receptors. However, piles are also unlikely to block significant flow paths due to the limited diameter. The impact on the shallow Secondary aquifers is likely to be more localised to the immediate surrounding soils of a pile.

19.8.53 Once formed, a pile could impact groundwater flows at local level but would be unlikely to create a barrier resulting in major groundwater flow changes as groundwater is likely to flow around individual piles. The piles (and any escaped concrete) may cause very localised groundwater mounding at the upgradient side of the pile, which is unlikely to result in groundwater flooding.

19.8.54 The magnitude of impact of construction of piled foundation would be dependent on the piling method and permeability of the underlying aquifers. However, overall, construction of piled foundations to structures is likely to have a negligible impact on groundwater flows.

19.8.55 Impacts on specific surface and groundwater receptors associated with each component of the Proposed Development are described in Table 19-57. The assessment presented in Table 19-57 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

Table 19-57 Changes to surface and groundwater flows and flood risk during construction

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Water Recycling Plant site					
Surface water	Langstone Harbour (including onshore coastal catchment)	Construction activities at the WRP site could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This will incorporate measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.	High	Negligible	Minor
Groundwater	Secondary Undifferentiated Superficial Deposits Aquifer (Raised Marine Deposits)	Construction of the buildings and hardstanding associated with the WRP site could reduce infiltration into the ground, potentially adversely impacting recharge of the underlying aquifers. The site is underlain by waste and saturated superficial deposits and therefore reduction in infiltration is unlikely to adversely impact recharge of the chalk aquifer. In addition, the chalk aquifer primary recharge occurs to the north of Havant. Mitigation measures to manage potential impacts associated with the historical landfill on groundwater resources at the WRP are outlined in the Outline CEMP (Document Reference 7.1, Volume 7).	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		The recharge of the underlying superficial deposits comprising the Secondary aquifers would be impacted, however the WRP site area forms a relatively small area of the Secondary Undifferentiated aquifer area, and therefore the impact is considered to be negligible and unlikely to impact associated receptors such as the Hermitage Stream or the Harbour catchments of which extend beyond the Secondary A aquifer's extent.			
	Aquifer– Principal Bedrock (White Chalk Subgroup)	The piled foundations within the WRP site are likely to directly interact with the underlying Secondary and Principal aquifers. As discussed in paragraphs 19.8.52 to 19.8.54, piled foundations are likely to have a negligible impact on groundwater flows and therefore result in a negligible magnitude of impact in groundwater and groundwater dependent receptors.	High	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
Pipeline between Budds Farm Wastewater Treatment Works and the Water Recycling Plant site					
	Hermitage Stream		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Surface water	Langstone Harbour (including onshore coastal catchment)	The Pipelines would be located under the Hermitage Stream and would be constructed using trenchless construction methods. To facilitate trenchless construction a construction compound would be located at the Budds Farm WTW and the construction compound at the WRP site would be used. These works would not require any surface works or infrastructure that could result in changes to surface flows and infiltration.	High	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The construction of the Pipelines would be undertaken using a trenchless method. Trenchless construction is likely to be in the chalk aquifer and the shafts may extend into the chalk, which may result blocked preferential flow paths within the chalk aquifer. The Pipelines would comprise two relatively small diameter pipes therefore unlikely to completely block significant flow paths resulting in a potential negligible reduction in groundwater flows. Flows within secondary superficial aquifers are driven by primary porosity (intragranular flows). Therefore, the introduction of a pipeline would have negligible impact on groundwater flows within the aquifer. The shafts may locally impact groundwater flow paths, although the probability of the presence of significant flow paths associated with the Bedhampton Springs are substantially lower due to the tunnelling being located outside the SPZ	High	Negligible	Minor
	Secondary A Superficial Deposits Aquifer (River Terrace Deposits and Alluvium)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor
	Consented Discharge A00751: Southern Water Services – Budds Farm WTW – To the Solent/Langstone Harbour		Low	Negligible	Negligible
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		and main karst zone, however there may be some flow paths associated with baseflow to the Langstone Harbour. However, groundwater quantity impacts on the Langstone Harbour as a result of the shafts construction are considered to be negligible, due to the scale of the Langstone Harbour and relatively small area of the shafts. Due to the predominant southerly groundwater flow (i.e. from the hills of the South Downs in the north towards the coast in the south), receptors to the north of the WRP site and Budds Farm WTW, such as the Bedhampton-Havant spring complex, have limited hydraulic continuity with the Pipelines (not located within the Source Protection Zone of the abstractions at Bedhampton). This would limit impacts to the groundwater receptors in the immediate vicinity of the WRP site and to the south.			
Release from Eastney Long Sea Outfall					
Surface water	Solent	There would be no changes to releases from Eastney LSO from the Proposed Development during the construction phase, and no construction works on the outfall itself are proposed. There would therefore be no impact on the Solent.	High	No change	No change
Pipeline between the Water Recycling Plant site and Bedhampton Springs					
Surface water	Langstone Harbour (including onshore coastal catchment)	Two sections of trenchless construction and one above-ground section of pipeline would be used. The first section of trenchless construction would be from the WRP site to construction compound located west of Mill Lane. The second section of	High	Negligible	Minor
	Hermitage Stream		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		trenchless construction would be to a construction compound located east of Mill Lane. Part of the pipelines would be constructed above-ground to reduce excavation within the SPZ1 which protects groundwater within Bedhampton Springs. The above-ground section of the pipelines would be constructed to a connection point with the Portsmouth Water pipeline to connect Bedhampton Springs to Havant Thicket Reservoir. Where trenchless techniques are used, there would be no surface works or infrastructure that could result in changes to surface flows and infiltration. The above-ground pipeline would be installed in the final section from the east of Mill Lane to Bedhampton Springs. However, a Construction Drainage Plan will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This will incorporate measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The construction of the majority of the underground section of the Pipelines would be undertaken using a trenchless method with associated launch and reception pits. Trenchless construction is likely to be in the chalk aquifer, with potential impacts as detailed in section ‘Pipeline between Budds Farm WTW and the WRP site’, although the probability of the	High	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Superficial Deposits Aquifer (Marine Raised Deposits)	presence of significant flow paths associated with the Bedhampton Springs is substantially lower due to the tunnelling being located outside the SPZ and main karstic zone. Activities between Mill Lane and Bedhampton Springs as the pipeline enters the SPZ will be subject to a watching brief, and either above-ground or at shallow depth (open-cut). As such the probability of intercepting a significant flow path is substantially reduced, and any features observed would be mitigated in line with the measures set out in the Outline CEMP (Document Reference 7.1, Volume 7).			
	GWSWI– Bedhampton and Havant Springs (locally important PWS)		High	Negligible	Minor
	Licensed GW Abstraction– - Portsmouth Water– Bedhampton PWS Springs No 1 and No 2 and Havant		High	Negligible	Minor
	SPZ1 and SPZ1c related to Bedhampton-Havant Springs PWS		High	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
Use of Havant Thicket Reservoir for the storage of recycled water					
Surface water	Havant Thicket Reservoir	There would be no releases into Havant Thicket Reservoir from the Proposed Development during the construction phase, and therefore no impacts on downstream water bodies that receive compensatory flows Impacts associated with the use of the reservoir during operation are considered separately (paragraphs 19.8.60 to 19.8.143).	High	No change	No change
Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works					
Section D: The Water Recycling Plant site to Portsdown Hill					

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Surface water	Langstone Harbour (including onshore coastal catchment)	Section D would be installed using a tunnelling technique, launched from the WRP site construction compound, and would not require any surface works or infrastructure that could result in changes to surface flows and infiltration.	High	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	The Pipeline would be tunnelled. The pipeline construction would require excavation of shafts of relatively large diameter. Tunnelling is likely to be entirely in the chalk aquifer and therefore these works are likely to directly interact with the underlying Principal aquifer with potential impacts on groundwater flows to receptors around Portsdown Hill, although the probability of the presence of significant karstic flow paths, associated with the Bedhampton Springs is substantially lower, due to the tunnelling being located outside the SPZ. Due to scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structure is low. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors.	High	Negligible	Minor
	Aquifer–- Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer–- Secondary Undifferentiated Superficial Deposits Aquifer (beach and Tidal Flat Deposits, Head, Marine Raised Deposits)		Medium	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body–- SSSI, SPA, Ramsar, SAC. Noted as GWDTEB.		High	Negligible	Minor
	Potwell Tributary WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Section E: Portsdown Hill to Boarhunt					
	Potwell Tributary		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Surface water	Wallington River	Section E is anticipated to be constructed using trenched open-cut construction. The Pipeline would not require any direct interaction with watercourses in these catchments. Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.	Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design measures.	High	Negligible	Minor
	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Southwick Estate – Offwell Farm, Southwick (Private Water Supply)		Medium	Negligible	Minor
	Potwell Tributary WER Classified Watercourse (Catchment)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Wallington below Southwick WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Section F: Boarhunt to Crockerhill					
Surface water	Wallington River	Section F intersects with the River Wallington. This intersection would be constructed using trenchless construction. The remaining parts of Section F would be constructed using trenched open-cut construction. Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the DCO. This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.	Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid direct impact on the Wallington River, the Pipeline construction would be undertaken using a trenchless method. This would also require excavation of shafts on either end of the crossing. Drilling and shafts excavation are likely	High	Negligible	Minor
	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Superficial Deposits Aquifer (Head)	to be in the chalk aquifer with potential impacts as detailed in previous section. Due to scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structures is low. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors (such as the PWS and river).			
	Licensed GW Abstraction– - Portsmouth Water– Maindell PS (PWS)		High	Negligible	Minor
	SPZ2, SPZ2c and SPZ 3 related to Maindell PWS		High	Negligible	Minor
	River Wallington WER Classified Watercourse.		Medium	Negligible	Minor
Section G: Crockerhill to Wickham					
Surface water	River Meon	Section G would cross the River Meon, which is designated as a Main River, and an Ordinary Watercourse that drains the floodplain adjacent to the crossing location. These would be crossed using a trenchless technique, which would avoid direct effects to flows or flood risk in the watercourses. There may be a requirement to cross a single Ordinary Watercourse, a tributary of the River Meon, using an open-cut trench technique. However, temporary measures to maintain flows at open-trenched watercourse crossings will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7).	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid impact on the Meon River, Hoad's Hill (A32) and Winchester Road (A334), the Pipeline construction would be undertaken using a trenchless method. This will also require excavation of shafts on either end of the crossing. Due to scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structures is low. This risk is further reduced due	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham Park Golf Club (Spray Irrigation)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	River Meon WER Classified Watercourse. (Catchment)	to the hydrogeological properties of the secondary aquifers being intercepted. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors (such as the abstraction and river).	Medium	Negligible	Minor
Section H: Wickham to Shedfield					
Surface water	River Meon	The construction of Section H would not require any direct interaction with watercourses in the River Meon catchment. Section H would require crossings of a single Ordinary Watercourse, which drains into the tidal River Hamble and forms part of the coastal catchment of Southampton Water. The watercourse would be crossed using an open-cut trench technique. However, temporary measures to maintain flows at open-trenched watercourse crossings will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). Surface construction activities along this section of Pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). This includes measures to capture	High	Negligible	Minor
	Southampton Water (including onshore coastal catchment)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid impact on High Street, the Pipeline construction would be undertaken using a trenchless method. This will also require excavation of shafts on either end of the crossing. Due to the scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structures is low. This risk is further reduced due to the hydrogeological properties of the secondary aquifers being intercepted. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors (such as the private water supply).	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Unlicensed GW abstraction– The Bungalow (now the Garden House) Private water supply		Medium	Negligible	Minor
Section J: Shedfield to the River Hamble					
Surface water	Southampton Water (including onshore coastal catchment)	Section J would require crossings of three Ordinary Watercourses, each of which drains into the tidal River Hamble and form part of the onshore catchment of Southampton Water. Each watercourse would be crossed using an open-cut	High	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		trench technique. Temporary structures may also be required to provide access across each watercourse during construction. However, temporary measures to maintain flows at open-trenched watercourse crossings will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Bracklesham Group)	As discussed in paragraph 19.8.50,construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid impact on Winchester Road (B2177), the Pipeline construction would be undertaken using a trenchless method. This will also require excavation of shafts on either end of the crossing.	Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Due to scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structures is low. This risk is further reduced due to the hydrogeological properties of the secondary aquifers being intercepted. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors.			
Section K: The River Hamble to Lower Upham					
Surface water	River Hamble (upper)	Section K would require a single crossing of the River Hamble, which is designated as a Main River. However, a trenchless technique would be employed and there would therefore be no direct disturbance of the watercourse. Section K would also require a crossing of an Ordinary Watercourse, which drains into the River Hamble. This watercourse would be crossed using an open-cut trench technique. However, temporary measures to maintain flows at open-trenched watercourse crossings will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to	Medium	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor
	Horton Heath Stream		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (London Clay Sand Members)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid direct impact on the Hamble River and Winters Hill, the Pipeline construction would be undertaken using a trenchless method. This will also require excavation of shafts on either end of the crossing. Due to scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structures is low. This risk is further reduced due to the hydrogeological properties of the secondary aquifers being intercepted. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors.	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Horton Heath Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Main River Hamble WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Upper Hamble WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Section L: Lower Upham to Brambridge					

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Surface water	Horton Heath Stream	The construction of Section L would not require any direct interaction with watercourses in the Horton Heath Stream catchment. Section L would require a single crossing of Bow Lake, and a single crossing of Brambridge Stream, a tributary of the River Itchen, both of which are designated as Main Rivers. However, a trenchless technique would be employed and therefore there would be no direct disturbance of either watercourse. Section L would also require a crossing of an Ordinary Watercourse, which drains into Bow Lake. This watercourse would be crossed using an open-cut trench technique. However, temporary measures to maintain flows at open-trenched watercourse crossings will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate	Medium	Negligible	Minor
	Bow Lake		Medium	Negligible	Minor
	River Itchen		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid direct impacts to Winchester Road (B3354), Bow Lake and an upstream tributary of the River Itchen, the Pipeline construction would be undertaken using a trenchless method. This will also require excavation of shafts on either end of the crossings. Due to the scale of the works relative to the groundwater body, the likelihood of intercepting a significant flow path that could alter groundwater flows outside the immediate vicinity of the structures is low. Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors.	Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Licensed GW Abstraction– - Fishers Pond Ltd–Fisher Pond Borehole C (Agriculture– Fish Farm/Cress Pond Throughflow)		Medium	Negligible	Minor
	Licensed Southern Water Abstraction– 11/42/22.9/163: Hampshire Carp Hatcheries– Bow Lake Stream at Soke Common (Agriculture– Fish Farm/Cress Pond Throughflow)		Medium	Negligible	Minor
	Bow Lake WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Horton Heath Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Itchen Protected WER Classified Water Body–-		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	SAC, SSSI. Noted as GWDTE.				
	Unlicensed GW abstraction– Lowhill Farmhouse Private water supply		Medium	Negligible	Minor
Section M: Brambridge to Otterbourne Water Supply Works					
Surface water	River Itchen	Section M would require two Main Rivers to be crossed; the River Itchen and the Otterbourne Stream. However, a trenchless technique would be employed and there would therefore be no direct disturbance of either watercourse. Section M would also require crossings of three Ordinary Watercourses, all of which are directly connected to the River Itchen. These watercourses would be crossed using an open-cut trench technique. Temporary structures may also be required to provide access across the watercourse during construction. However, temporary measures to maintain flows at open-trenched watercourse crossings will be established, designed according to the good practice principles set out in the Outline CEMP (Document Reference 7.1, Volume 7). Surface construction activities along this section of pipeline could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding	High	Negligible	Minor
	Itchen Navigation		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Groundwater	Aquifer– Principal Bedrock (White Chalk Subgroup)	As discussed in paragraph 19.8.50, construction of the Pipeline using a trenched open-cut method is likely to have negligible magnitude of impact on hydrogeology due to the embedded design and tertiary measures. To avoid direct impact on the River Itchen and an upstream tributary of the River Itchen, the Pipeline construction would be undertaken using a trenchless method. This will also require excavation of shafts on either end of the crossing. The shafts and main drilling works associated with the Itchen River crossing would be located outside of the SPZ1 or Principal aquifer. These works are unlikely to encounter the chalk aquifer and would be undertaken in the lower permeability bedrock (non-aquifer) that confines the chalk below; therefore, unlikely to impact groundwater flows. The minor crossing of the Itchen tributary would however be partially within Chalk, and the Otterbourne SPZ1 where impacts to groundwater flows could occur if a significant flow pathway is intercepted.	High	Negligible	Minor
	Aquifer– Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer– Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer– Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction– Southern Water Services– - Otterbourne PWS– All abstraction points		High	Negligible	Minor
	Licensed Southern Water Abstraction – 31/110: Black Dyke, Point A (Environmental– Transfer between sources)		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – SO/042/0031/023: East Lodge Fisheries– Itchen Navigation at Brambridge		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	(Environmental– Remedial River/Wetland Support [Transfer between sources])	Due to scale of the works relative to the groundwater body and limited evidence of significant karstic features south of Otterbourne, the likelihood of intercepting a significant flow path that could alter groundwater flows sufficient to impact receptors is low, although more robust monitoring will be implemented when working within the Chalk as per ES Appendix 19.9 Outline Water Monitoring Plan, Volume II (Document Reference 6.2, Volume 6). Monitoring would be implemented as per the Water Monitoring Plan to verify impacts on groundwater levels/flows, and at dependent receptors. The detailed Water Monitoring Plan will be produced and submitted for approval in accordance with the corresponding requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3).			
	Licensed Southern Water Abstraction – SO/042/0031/020: Malms House Ltd– Lower Itchen Navigation at Shawford (Environmental– Non-remedial water/wetland support [Transfer between sources])		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – 11/42/22.6/93: Southern Water Services–- River Itchen at the Otterbourne Intake (PWS)		High	Negligible	Minor
	SPZ1 and SPZ1c related to Otterbourne PWS		High	Negligible	Minor
	Itchen Protected WER Classified Water Body– SAC, SSSI. Noted as GWDTE.		High	Negligible	Minor
Above Ground Plant					
Intermediate Pumping Station F					
Surface water	Wallington River	Construction activities at the IPS-F could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.			
Intermediate Pumping Station G					
Surface water	River Meon	Construction activities at the IPS-G could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.	High	Negligible	Minor
Break Pressure Tank and Intermediate Pumping Station E					
Surface water	Potwell Tributary	Construction activities at the BPT/IPS-E could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Break Pressure Tank-K					
Surface water	River Hamble (upper)	Construction activities at the BPT-K could potentially result in changes to the volume and pattern of surface flows, changes to infiltration rates, and corresponding changes to off-site flood risk. However, a Construction Drainage Plan will be produced and submitted for approval in accordance with the corresponding CEMP requirement in Schedule 2 to the draft DCO (Document reference 3.1, DCO Volume 3). This includes measures to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk.	Medium	Negligible	Minor

Sensitivity of receptor

19.8.56 The sensitivity of the surface and groundwater receptors that could potentially be impacted by each component is described in Table 19-57. These range in sensitivity from low to high.

Magnitude of impact

19.8.57 The magnitude of impacts resulting from changes to surface water and groundwater flows and flood risk during construction of each component of the Proposed Development are described in Table 19-57. This demonstrates that, following the application of the primary and tertiary mitigation measures described in section 19.4, all impacts would have a negligible adverse magnitude, except where there is no change.

Significance of effect

19.8.58 The significance of effect associated with each component is described in Table 19-57, which demonstrates that the significance of effect would be minor for all surface water receptors and the majority of groundwater receptors except where it is negligible or there is no change.

19.8.59 This demonstrates that no significant adverse effects on water receptors are expected as a result of changes to surface and groundwater flows during construction.

Operational effects

Continuous releases to surface and groundwaters during operation

Description of impact

19.8.60 There would be three releases during the operational phase: releases of treated water from the WRP into Havant Thicket Reservoir, releases of compensatory flows from Havant Thicket Reservoir to Riders Lane Stream, and releases of reject water from the WRP via the existing Eastney LSO. These are described in more detail in the sections below.

Releases from the Water Recycling Plant into Havant Thicket Reservoir

19.8.61 During the operational phase of the Proposed Development, recycled water from the WRP would be transferred via the Pipeline between Bedhampton Springs and Havant Thicket Reservoir for storage in the reservoir. The recycled water would mix with water from the chalk aquifer (pumped from Bedhampton Springs into the reservoir by Portsmouth Water) and smaller volumes derived from the headwaters of Riders Lane Stream (which would be intercepted by the reservoir) and rainfall. The chemistry of water from the different sources is predicted to be different (e.g. with regards to basic chemical parameters such as temperature, pH, salinity, DO, biochemical oxygen demand, dissolved and total organic carbon, and concentrations of nutrients such as phosphorus and nitrogen) (see section 19.7). Any changes to water chemistry could potentially result in corresponding changes to trophic status and the plant and invertebrate communities supported in the

operational reservoir (see ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6)).

19.8.62 The results of the water quality modelling for Havant Thicket Reservoir presented in ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II, (Document Reference 6.2, Volume 6) indicate that negligible change is predicted to occur in Havant Thicket Reservoir between the classic (i.e. the period of reservoir operation prior to introduction of recycled water from the WRP) and post-WRP (i.e. the period of reservoir operation following introduction of recycled water from the WRP) operation scenarios.

19.8.63 The model predicts the following water quality in the reservoir after the introduction of recycled water:

1. Nutrient concentrations remain low and representative of high-quality water following the introduction of recycled water. Concentrations of reduced nitrogen (ammonia and ammonium, NHx) are forecast as 0.033 mg N/l (annual 90th percentile). These low concentrations are representative of high-quality water. Total phosphorus concentrations during the recycled phase are predicted to be approximately 20 - 24 µg/l, while total nitrogen concentrations are typically approximately 1 mg/l.
2. TP concentrations are forecast as 21 µg P/l (annual mean). These very low concentrations of phosphorus reflect the phosphorus removal measures described in section 19.4.
3. DO concentrations are forecast to be representative of good quality, well-oxygenated water in the reservoir, which reflects the use of a bubbler system to encourage water circulation and mixing. DO concentrations remain high throughout most of the water column, and typically exceed 8 mg/l during the recycled phase. This prevents the development of anoxic conditions and limits the potential for releases of nutrients and metals stored in sediments in the bed of the reservoir. During the summer period (July-August), when higher temperatures naturally reduce the amount of DO that can be held in water, DO concentrations are predicted to remain at 8.0mg/l, which is consistent with high-quality water. Bottom waters in the deepest part of the reservoir (which would be located below the bubbler system) are forecast to be at 5.5 mg/l during July and August. However, the remainder of the reservoir above the bubbler system is predicted to be well mixed and unaffected by the 'pocket' of slightly poorer water isolated in the south of the reservoir. Without the bubbler system, seasonal bottom-water oxygen depletion would occur during summer months.
4. Algal biomass remains relatively low, with summer peaks generally between 10 and 20 µg chlorophyll-a/l. Bubbler operation further suppresses algal growth by reducing stable stratification and increasing light limitation.
5. pH remains stable, generally ranging between 7.8 and 8.5, while alkalinity gradually declines as recycled water becomes a larger proportion of the reservoir volume.
6. Concentrations of iron and manganese are predicted to remain very low because oxygenated conditions prevent their release from sediments.
7. The reservoir model simulates growth of three phytoplankton groups (diatoms, green algae, blue-green algae), which generally reproduce typical seasonal patterns of total algal biomass in temperate lakes and reservoirs. The EQR_{Chl-}

$_{a}$ (Ecological Quality Ratio for Phytoplankton Biomass) is forecast to be consistent with good water quality, with surface annual $EQR_{Chl\text{-}a}$ predicted to be 0.72 in the surface layer of the southern area of the reservoir, and 0.71 in the shallower northern part of the reservoir.

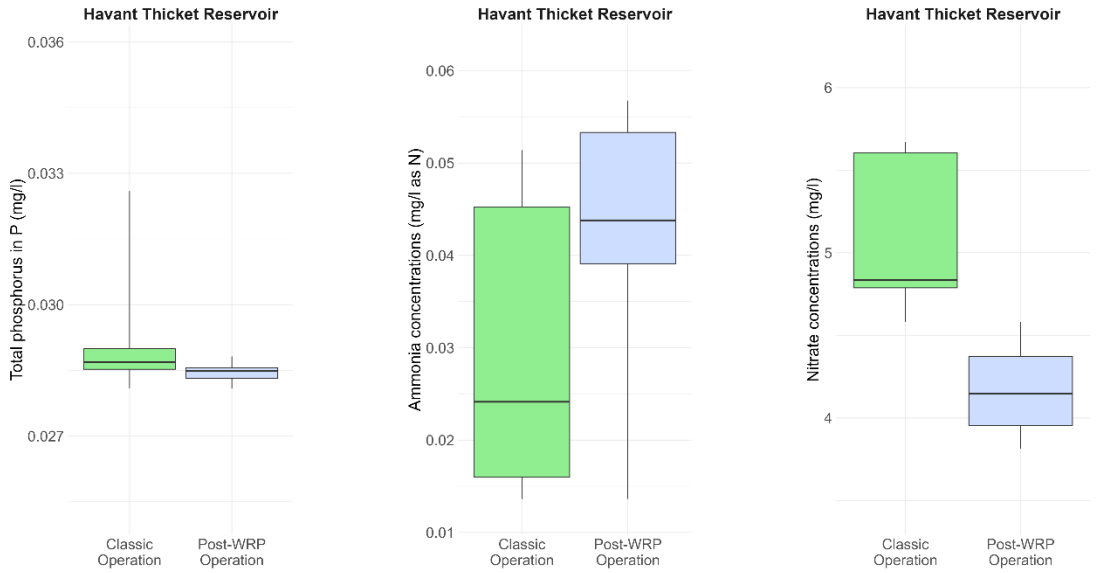
8. With the exception of the conservative forecast of moderate status for DO in the deepest part of the reservoir, water quality in the reservoir following release of treated water from the WRP is expected to be consistent with the definitions of 'high' or 'good' status for a lake water body under the WFD Directions 2015 (considered to be the most appropriate environmental quality standards for a water storage reservoir). Additional information is provided in ES Appendix 19.2 WER Compliance Assessment, Volume II (Document Reference 6.2, Volume 6).

19.8.64 Table 19-58 shows a comparison of median water quality parameters for the classic and post-WRP operational scenarios. Box and whisker plots for determinands during the classic and post-WRP operational phases at Havant Thicket Reservoir are shown in Graphic 19-1 to Graphic 19-3.

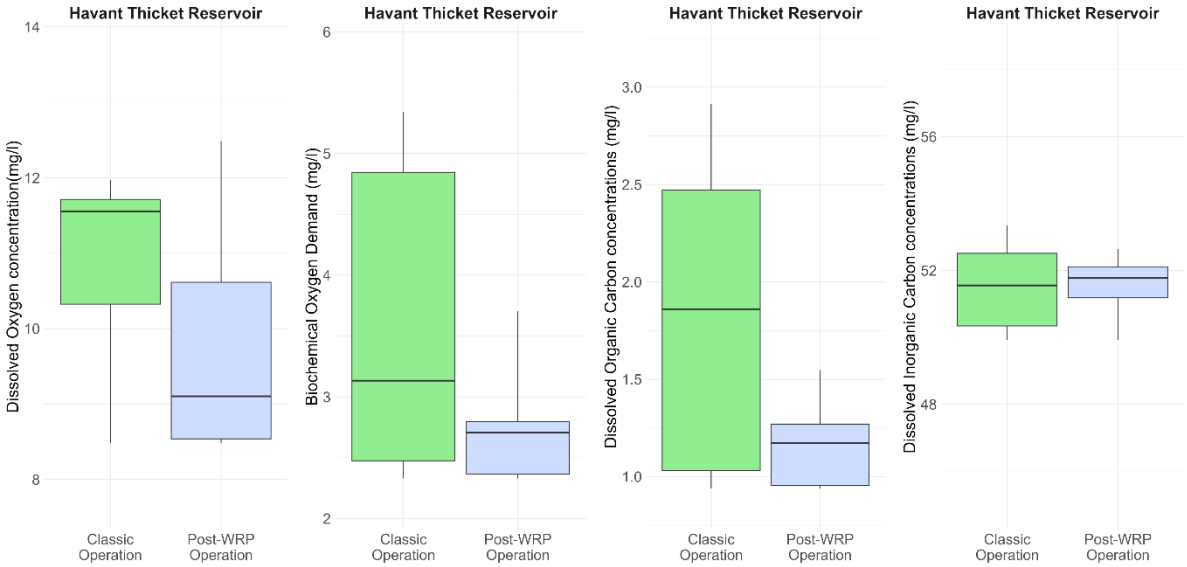
Table 19-58 Median water quality in Havant Thicket Reservoir for the classics and post-WRP operational scenarios

Parameter	Classic operation scenario (median)	Post-WRP operation scenario (median)
Total phosphorus (mg/l as P)	0.029	0.028
Ammonia (mg/l)	0.024	0.044
Nitrate (mg/l)	4.83	4.15
Dissolved Oxygen (mg/l)	11.56	9.10
Biochemical Oxygen Demand (mg/l)	3.13	2.71
Dissolved Organic Carbon (mg/l)	1.86	1.17
Dissolved Inorganic Carbon (mg/l)	51.55	51.77
Alkalinity (mg/l as CaCO3)	212.22	212.91
pH	8.28	8.08

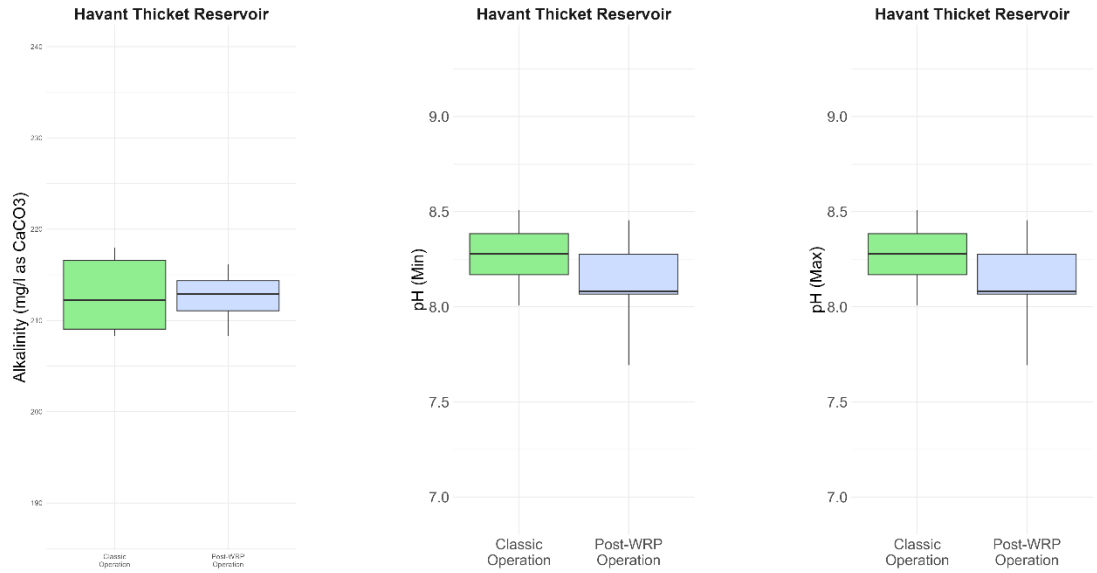
Graphic 19-1 Modelled changes in water quality in Havant Thicket Reservoir: TP, ammonia and nitrate



Graphic 19-2 Modelled changes in water quality in Havant Thicket Reservoir: DO, BOD, DOC and DIC



Graphic 19-3 Modelled changes in water quality in Havant Thicket Reservoir: alkalinity and pH (minimum and maximum)



19.8.65 Median concentrations of Total Phosphorus and nitrate are predicted to reduce from 0.029 mg/l to 0.028 mg/l and 4.83 mg/l to 4.15 mg/l between the classic and post-WRP operation scenarios, respectively. Conversely, the modelling predicts an increase in ammonia concentrations, from 0.024 mg/l in the classic operation scenario to 0.044 mg/l under the post-WRP operation scenario.

19.8.66 Median DO is predicted to reduce from 11.01 mg/l to 9.71 mg/l between the classic and post-WRP operation scenarios, whilst BOD is predicted to decrease from 3.13 mg/l to 2.71 mg/l. The modelling also predicts a small decrease in median DOC (from 1.86 mg/l to 1.17 mg/l), whilst DIC increases very slightly (from 51.55 mg/l to 51.77 mg/l) between the two scenarios. Median alkalinity is predicted to increase very slightly from 212.2 mg/l to 212.9 mg/l, between the classic and post-WRP operation scenarios, reflecting the corresponding increase in DIC. Conversely, the modelling predicts small reductions in median pH (from 8.28 to 8.08) between the classic and post-WRP operation scenarios, respectively.

19.8.67 Overall, the treatment measures at the WRP site (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6) and section 19.4) mean that the proposed releases from the WRP are predicted to result in limited changes in water quality within Havant Thicket Reservoir.

Releases of compensatory flows from Havant Thicket Reservoir

19.8.68 Compensatory flows from the reservoir during its operation (i.e. water released to maintain flows in the surface streams whose headwaters are intercepted by Havant Thicket Reservoir, under Portsmouth Water's existing consent) could affect downstream surface water receptors (i.e. Riders Lane Stream, Hermitage Stream and Langstone Harbour).

19.8.69 Modelling [70] of releases from the WRP into Havant Thicket Reservoir includes a predicted water quality envelope for the compensatory flows. This has been used to define the input parameters for further downstream dispersion modelling to investigate the mixing and dispersion of water released from the reservoir through

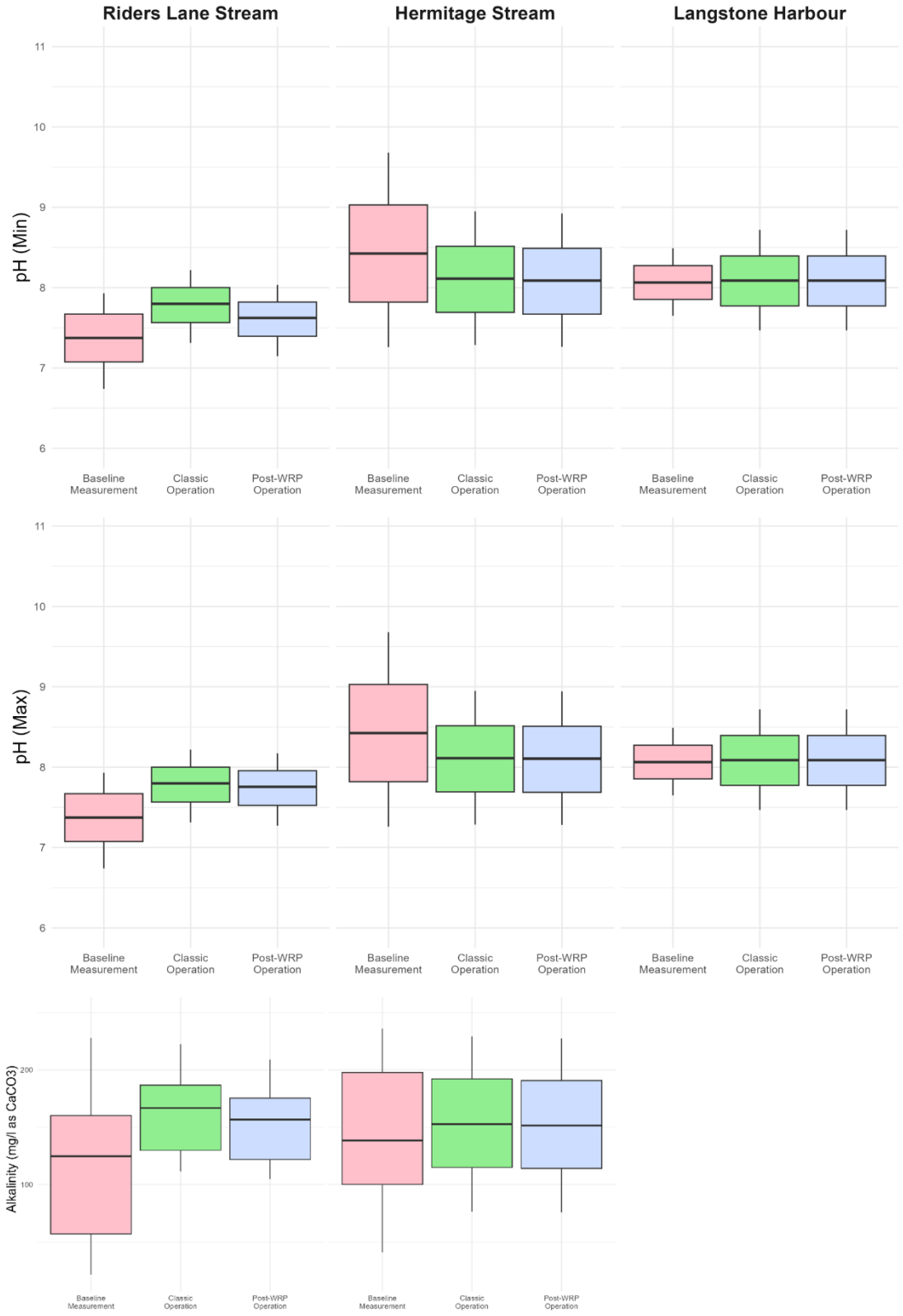
compensatory flows into downstream water bodies (Riders Lane Stream, Hermitage Stream, Langstone Harbour). The results of water quality modelling are presented in full in ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II, (Document Reference 6.2, Volume 6) and are summarised in Table 19-59 and Graphic 19-4 to Graphic 19-7.

Table 19-59 Median water quality in Riders Lane Stream, Hermitage Stream and Langstone Harbour for both baseline and modelled output

Parameter	Measured baseline (median)	Classic operation scenario (median)	Post-WRP operation scenario (median)
Riders Lane Stream			
pH	7.37	7.80	7.76
Alkalinity (mg/l as $CaCO_3$)	124.70	166.68	156.57
Dissolved Oxygen (mg/l)	4.70	7.24	6.58
Biochemical Oxygen Demand (mg/l)	3.30	2.86	2.86
Orthophosphate (mg/l)	0.16	0.08	0.08
Ammonia (mg/l)	0.26	0.15	0.15
Nitrate (mg/l)	2.74	3.29	2.23
Dissolved Organic Carbon (mg/l)	14.91	7.75	7.84
Dissolved Inorganic Carbon (mg/l)	9.26	29.80	26.81
Hermitage Stream			
pH	8.42	8.11	8.11
Alkalinity (mg/l as $CaCO_3$)	138.50	152.59	151.41
Dissolved Oxygen (mg/l)	11.80	9.52	9.45
Biochemical Oxygen Demand (mg/l)	8.40	5.63	5.63
Orthophosphate (mg/l)	0.13	0.11	0.11
Ammonia (mg/l)	0.07	0.11	0.11
Nitrate (mg/l)	3.90	3.60	3.49
Dissolved Organic Carbon (mg/l)	6.46	7.11	7.12
Dissolved Inorganic Carbon (mg/l)	6.46	18.13	17.69
Langstone Harbour			
pH	8.06	8.09	8.09
Dissolved Oxygen (mg/l)	8.76	9.14	9.14
Biochemical Oxygen Demand (mg/l)	9.16	7.39	7.39
Orthophosphate (mg/l)	0.06	0.08	0.08
Ammonia (mg/l)	0.59	0.35	0.35
Nitrate (mg/l)	0.67	2.13	2.13
Dissolved Inorganic Carbon (mg/l)	8.76	13.45	13.44

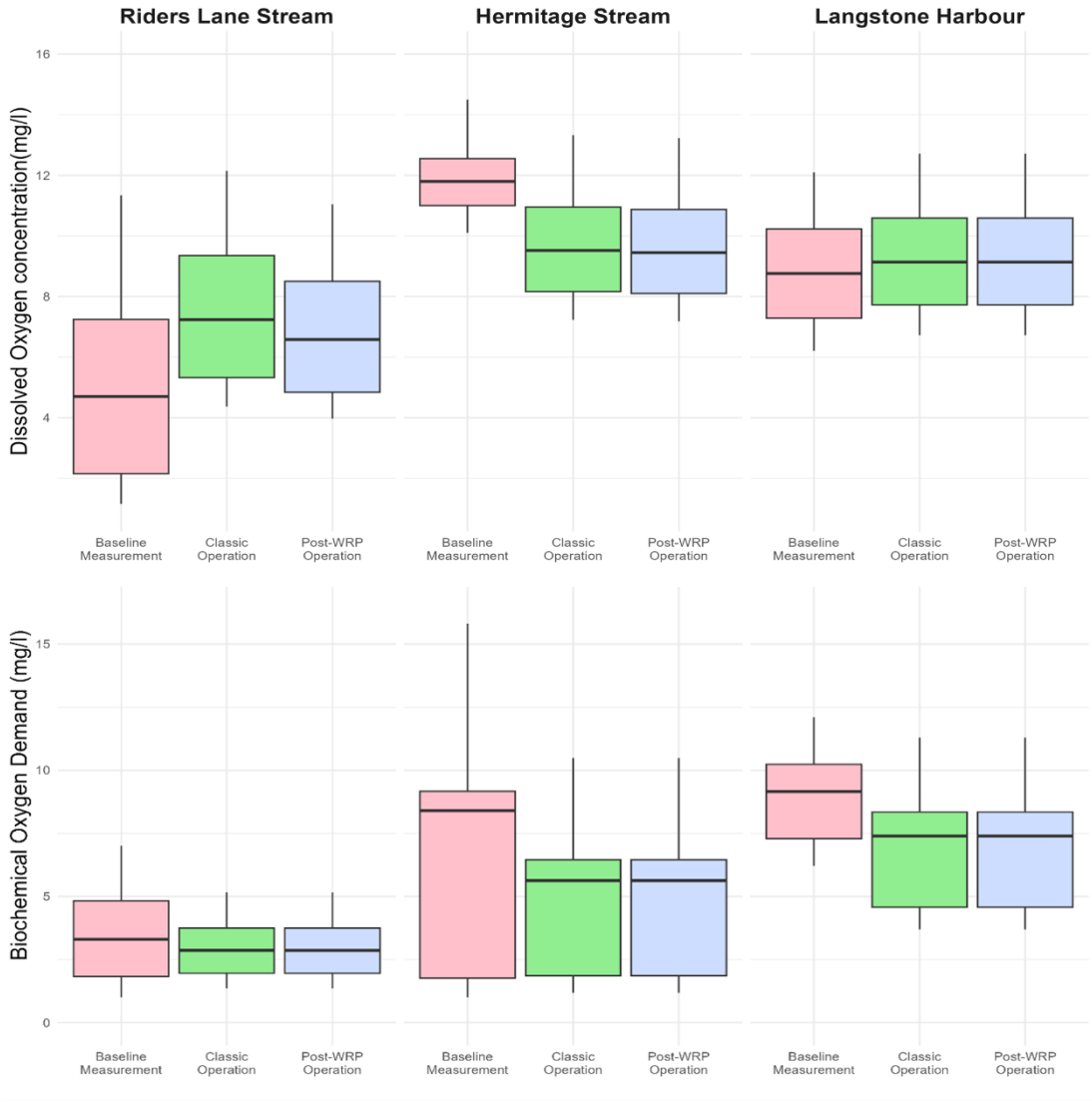
Note that additional statistical summary data (e.g. upper and lower quartiles, range) are provided in Annex A of ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II, (Document Reference 6.2, Volume 6)

Graphic 19-4 Modelled changes in water quality in Riders Lane Stream, Hermitage Stream and Langstone Harbour: pH and alkalinity[21]

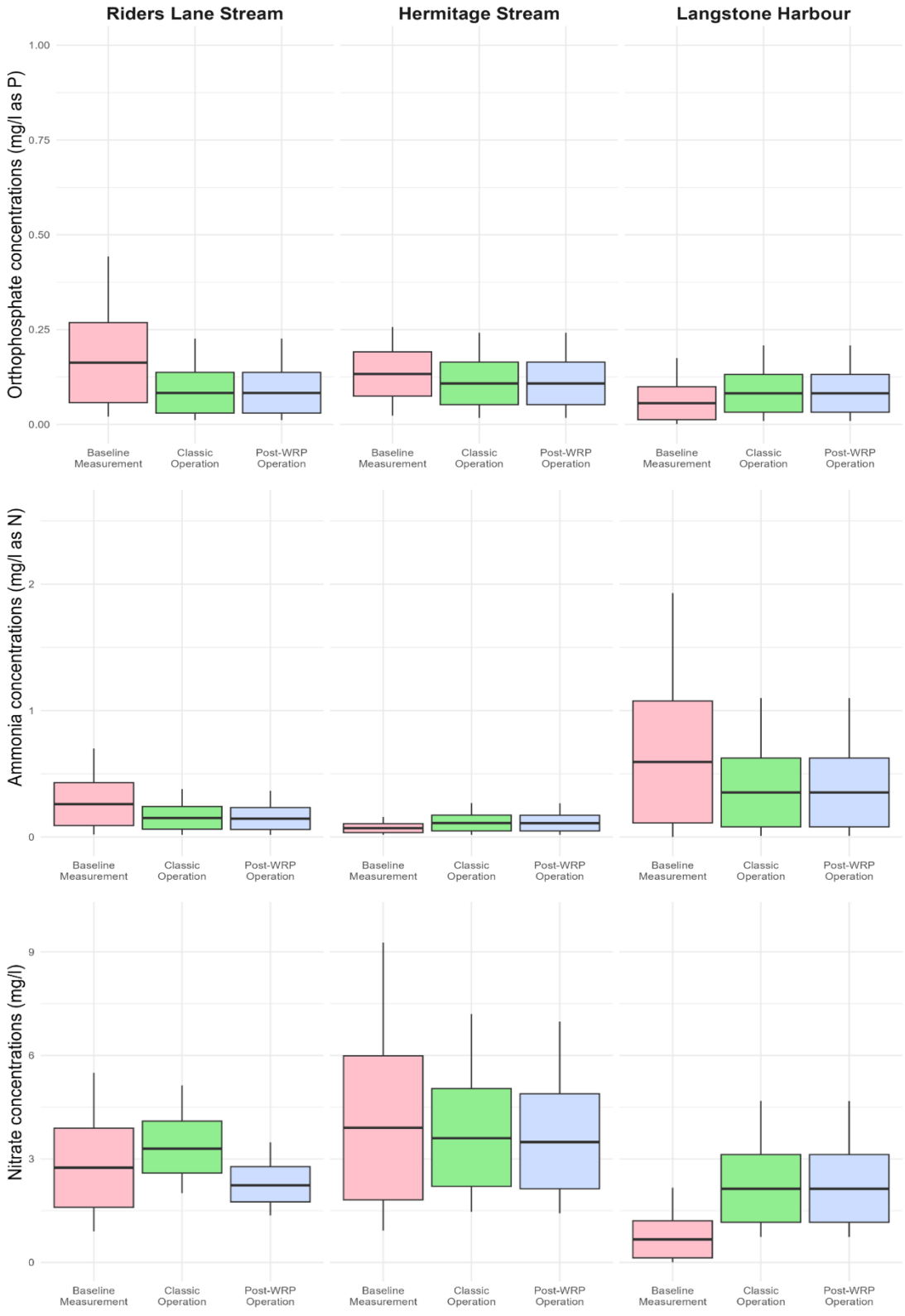


[21] Note that baseline alkalinity data were not available for Langstone Harbour

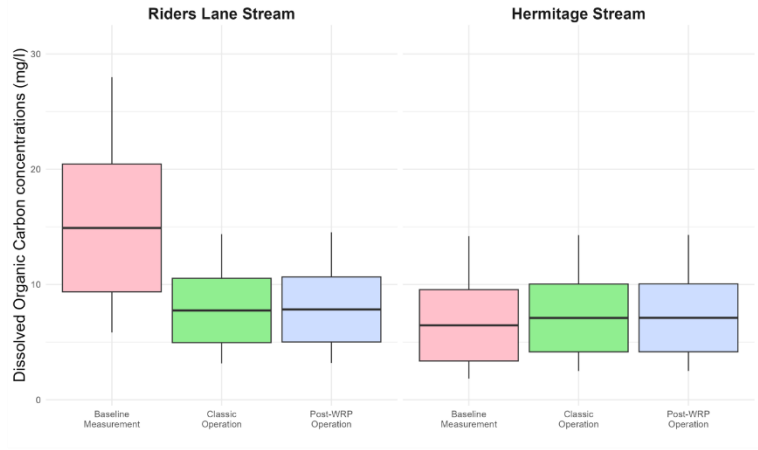
Graphic 19-5 Modelled changes in water quality in Riders Lane Stream, Hermitage Stream and Langstone Harbour: DO and BOD

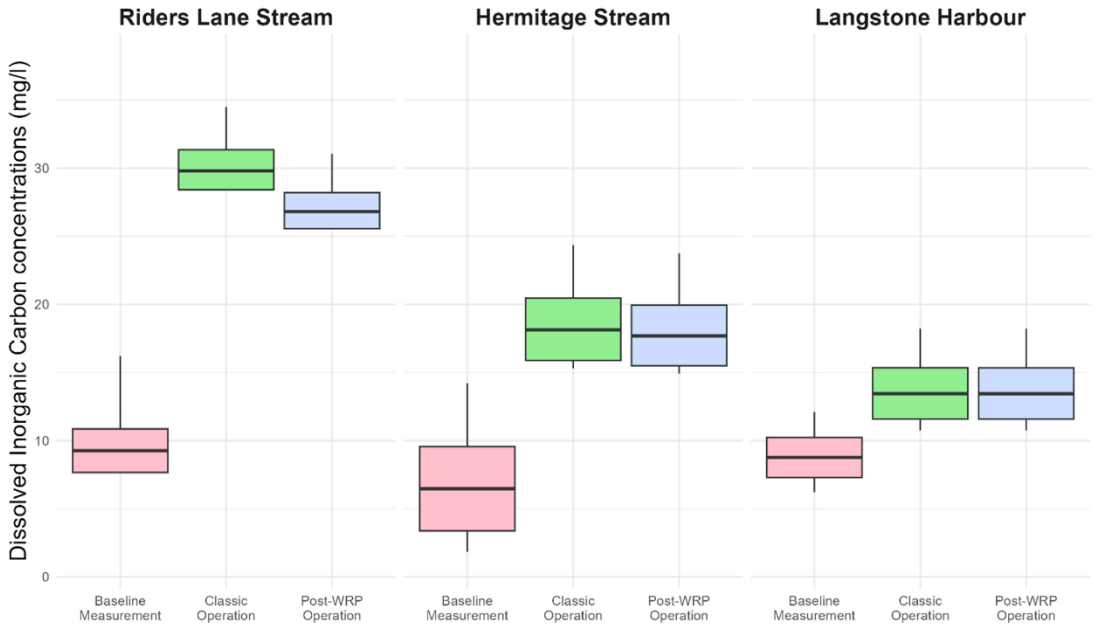


Graphic 19-6 Modelled changes in water quality in Riders Lane Stream, Hermitage Stream and Langstone Harbour: Orthophosphate, ammonia and nitrate



Graphic 19-7 Modelled changes in water quality in Riders Lane Stream, Hermitage Stream and Langstone Harbour: DOC and DIC[22]





[22] Note that baseline DOC data were not available for Langstone Harbour

19.8.70 A change in the majority of parameters measured in Riders Lane Stream is predicted to occur during the Havant Thicket Reservoir classic operation scenario, before recycled water from the WRP is introduced. Median alkalinity (+34%), pH (+6%), and concentrations of DO (+54%), nitrate (+20%) and DIC (+222%) would increase in Riders Lane Stream once the reservoir becomes operational. Ammonia (-42%), orthophosphate (-49%), BOD (-13%) and DOC (-48%) would decrease.

19.8.71 Once recycled water from the WRP is introduced (i.e. during the post-WRP scenario), DO (-9%), alkalinity (-6%), ammonia (-3%), nitrate (-32%) and DIC (-10%) are predicted to decrease. Conversely, DIC is expected to increase by 1%, whilst BOD, pH and orthophosphate are not predicted to change. Overall, the predicted changes are considered to represent a minor improvement in water quality in Riders Lane Stream.

19.8.72 Concentrations of parameters in Hermitage Stream are also predicted to be subject to changes over the current baseline, although they would be smaller than those in Riders Lane Stream. Once the reservoir is operational (i.e. during the classic operation phase), the compensatory flows are predicted to result in an increase in median alkalinity (+10%), ammonia (+58%), DOC (+10%) and DIC (+180%) in Hermitage Stream. Conversely, pH (-4%), BOD (-33%) DO (-19%), nitrate (-8%) and orthophosphate (-18%) are all predicted to decrease.

19.8.73 The introduction of recycled water from the WRP into the reservoir (i.e. during the post-WRP scenario) is predicted to result in a decrease in median nitrate (-3%) and DIC (-3%) in Hermitage Stream. All other parameters would remain at very similar concentrations to those predicted in the classic operation phase. This means that the introduction of recycled water from the WRP is not predicted to result in any significant changes in water quality in Hermitage Stream. This reflects the fact that the reservoir compensation flows would represent a smaller proportion of the total flows in Hermitage Stream than they do in Riders Lane Stream downstream of Havant Thicket Reservoir; Riders Lane Stream represents approximately one third of the total flow in Hermitage Stream at the New Road gauging station, with the remainder made up of the upper Hermitage Stream and Park Lane Stream.

19.8.74 The compensatory flows modelling presented in ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II, (Document Reference 6.2, Volume 6) predicted that there would be small changes in water quality in the northern parts of Langstone Harbour following the inception of the classic operation phase. pH, DO, nitrate and orthophosphate would all be subject to small increases, whilst ammonia and BOD would both decrease; the decrease in BOD and increase in DO are likely to be driven by the predicted decrease in ammonia. DIC concentrations are predicted to increase by approximately 50%. Although DIC is a major control of pH in natural waters, the model indicates that pH would only increase by less than 0.1 pH units. As the reduction in pH is minimal, doubling DIC would not lead to adverse impacts.

19.8.75 The modelling also predicted that there would be very little change in Langstone Harbour between the classic and post-WRP scenarios, with the majority of modelled parameters remaining unchanged between the two scenarios. A very small decrease in nitrate (from 2.27mg/l under the classic scenario to 2.23mg/l under the post-WRP scenario) was predicted in the northern end of the harbour, close to the outlet from Hermitage Stream. This represents a small and spatially-

constrained improvement in water quality under the post-WRP scenario. No changes to water quality were predicted in the lower harbour or in the connecting water body, The Solent.

19.8.76 The results of the water quality modelling therefore indicate that compensatory flows from the reservoir would only result in limited changes to water quality in downstream water bodies during the operational phase of the Proposed Development (i.e. during the post-WRP scenario).

Releases of recycled water from the Water Recycling Plant into Havant Thicket Reservoir and releases of compensatory flows from Havant Thicket Reservoir: Alternative reservoir fill scenario

Analysis of an alternative reservoir fill scenario

19.8.77 As described in the two preceding sections of this chapter, the assessment of operational water quality impacts considers a classic operation scenario (i.e. the period of reservoir operation prior to introduction of recycled water from the WRP) and a post-WRP operation scenario (i.e. the period of reservoir operation following introduction of recycled water from the WRP). Additional information on water quality modelling and associated scenarios is presented in ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II, (Document Reference 6.2, Volume 6) and ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II, (Document Reference 6.2, Volume 6).

19.8.78 An additional worst case scenario has also been considered, where the initial classic operation scenario does not occur (for example, in the event of an extended construction period for Havant Thicket Reservoir) and the filling of the reservoir is achieved through a combination of both spring water and recycled water. This scenario is referred to as the alternative reservoir fill scenario.

19.8.79 In order to determine whether the alternative reservoir fill scenario is likely to result in a change to predicted water quality in Havant Thicket Reservoir or in compensatory flows, water quality predictions for the period following reservoir refill after a major drought with significant drawdown in water levels were compared to those from the corresponding time period from the original assessment scenarios. Specifically, results from the period between the beginning of November 2040 and the end of December 2041 were compared for the alternative reservoir fill scenario and the post-WRP scenario.

19.8.80 This period was selected because, out of all the model scenarios considered in ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II, (Document Reference 6.2, Volume 6), it most closely represents the alternative fill scenario (i.e. it comprises filling of the reservoir with spring and recycled water, rather than recycled water being added to the reservoir when it already contains a large proportion of spring water).

19.8.81 Statistical analysis, including a Wilcoxon signed-rank test[23] and a Cohen's d[24] test, was used to compare the two data sets and determine whether there were any significant differences between scenarios.

[23] Wilcoxon signed-rank test: a non-parametric statistical procedure used to determine if the median difference between paired samples is significantly different from zero, i.e. tests if one group is significantly higher or lower than the other.

[24] Cohen's d test: a statistical test to quantify the size of effect when comparing two groups of data.

Predicted changes in reservoir water quality

19.8.82 The results of the statistical analysis for water in the reservoir are described in ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6). This demonstrates that water quality indicators such as TP and chlorophyll-a would be higher in the alternative reservoir fill scenario than they are for the corresponding period in the post-WRP scenario.

19.8.83 Although TP and chlorophyll-a concentrations are statistically significantly higher in the alternative reservoir fill scenario, they are both still within the range expected for a mesotrophic water body (cf. ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document Reference 6.1, Volume 6). Furthermore, the source water balance would revert to that represented in the post-WRP scenario once the reservoir has been refilled. Any changes to water quality impacts arising from implementation of the alternative reservoir fill scenario are therefore likely to be relatively short-lived, as the enriched water would be flushed from the reservoir within two years, as set out in ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II (Document Reference 6.2, Volume 6). The alternative reservoir fill scenario is therefore not expected to result in a significant change (in EIA terms, as defined in section 19.5) in reservoir water quality in comparison to the post-WRP scenario.

Predicted changes in compensatory flow water quality

19.8.84 The results of the statistical analysis for reservoir withdrawal water, which represents the water released from the reservoir in the form of compensation flows into Riders Lane Stream, are summarised in Table 19-60.

Table 19-60 Statistical comparison of selected compensatory flow water quality parameters for the baseline and alternative fill scenarios

Parameter	Mean concentration (post-WRP) (mg/l)	Mean concentration ('alternative') (mg/l)	Mean difference (mg/l)	Wilcoxon P value
TN	1.270	1.980	0.710	<0.05
NO_3	1.110	1.850	0.738	<0.05
NH_4	0.026	0.017	-0.009	<0.05
TP	0.022	0.023	0.001	<0.05
PO_4	0.004	0.006	0.002	<0.05
DIC	41.501	41.505	-0.004	<0.001
BOD	2.940	2.740	-0.201	<0.001
DO	10.300	10.300	-0.001	<0.001

19.8.85 Table 19-60 demonstrates that the mean values of TN (+0.710 mg/l), NO_3 (+0.738 mg/l), TP (+0.001 mg/l) and PO_4 (+0.002 mg/l) are slightly higher in the alternative reservoir fill scenario than they are for the corresponding period in the post-WRP scenario. Conversely, the mean values of NH_4 (-0.009 mg/l), DIC (-0.004 mg/l), BOD (-0.201 mg/l) and DO (-0.001 g/l) are slightly lower in the alternative reservoir fill scenario than they are in the post-WRP scenario. The low Wilcoxon P values

(i.e. <0.05) reported in Table 19-60 indicate that the difference between the paired samples for each parameter is statistically significant.

19.8.86 However, the differences in predicted concentrations observed for each water quality parameter are very small. In each case, the differences between data pairs are well within the range of observed and predicted concentrations of each parameter and smaller than the very minor differences identified between the different baseline operational scenarios (i.e. the classic and post-WRP operation scenarios).

19.8.87 Furthermore, a sensitivity analysis undertaken as part of the compensatory flows modelling (presented in ES Appendix 19.6 Havant Thicket Reservoir Compensatory Flows water quality modelling, Volume II, (Document Reference 6.2, Volume 6) demonstrated that changes to input concentrations (i.e. reservoir withdrawal water) of a similar magnitude to those described above resulted in very limited differences in water quality in Riders Lane Stream, Hermitage Stream and Langstone Harbour. The magnitude of change is greatest in Riders Lane Stream and decreases with increasing distance downstream from the reservoir input (noting that this is analogous with the predicted changes to water quality from baseline conditions reported above).

19.8.88 This means that, while the data is statistically different across the two scenarios, the impact of that difference in the predicted concentrations of each parameter is limited. The differences between the two scenarios are not therefore considered to be sufficient to alter the findings of the assessments for releases of recycled water from the WRP into Havant Thicket Reservoir or for compensatory flows from the reservoir to downstream water bodies presented earlier in this section. This means that the alternative fill scenario is not considered likely to result in effects on the reservoir itself or on downstream water bodies that would receive compensatory flows that are greater than those considered above.

Additional reservoir completion scenarios

19.8.89 It is possible that other alternative reservoir fill scenarios could arise from programme changes, for example recycled water could be introduced to the reservoir before the initial post-fill stabilisation[25] described in ES Appendix 19.11 Havant Thicket Reservoir water quality modelling, Volume II, (Document Reference 6.2, Volume 6).

19.8.90 While the timing of these source water inputs might change, the quality of the recycled water, spring water and inputs from the hydrological catchment would remain constant. Consequently, reservoir water quality would align with the post-WRP phase of the original operational scenario once the reservoir has stabilised. The analysis presented above for the alternative reservoir fill scenario supports this by demonstrating that any changes in 'post-stabilisation' water quality are very small.

[25] Defined as the initial few years after initial inundation when terrestrial biomass is decomposed or mineralised, resulting in much higher fluxes of organic and inorganic matter than is observed once the reservoir has stabilised.

Releases of reject water from Eastney Long Sea Outfall

19.8.91 The WRP process stages outlined above would each generate reject streams that would be released via the existing Eastney LSO. Drainage of groundwater seepage into the tunnelled sections of the pipe (which is designed to be negligible) would be discharged to the foul sewer network.

19.8.92 Budds Farm WTW currently has a final effluent permit (permit reference: A.751/H/97) which contains specific limits on BOD, COD, suspended solids, total nitrogen and total iron in the treated wastewater. To determine the potential effect on the existing release associated with removal of wastewater for recycling and addition of the reject stream from the WRP, mass balance calculations were undertaken and the output modelled. The full report is presented in ES Appendix 19.5 Eastney Long Sea Outfall Solent dispersion modelling – Chemicals, Volume II (Document Reference 6.2, Volume 6). In addition to the parameters listed above, the effect of changes in salinity was also modelled.

19.8.93 The model outputs show that the differences in the currently consented water quality parameters (and salinity) are insignificant when the existing Budds Farm WTW release and the future release from Budds Farm (once the WRP is in place and reject water is combined) are compared. Where a comparison to baseline data in the receiving waters can be made, predicted parameter changes are within baseline variations experienced within the receiving water. Where baseline receiving water data is not available, such as for the parameter COD for example, comparison of the predicted change against wastewater variability also demonstrates the changes are insignificant.

19.8.94 Also included in the mass balance calculations is the facility to run individual process units to waste within the treatment stages. These smaller flushing points are used as part of normal process operation (e.g. around cleaning operations and duty rotation), and the flow and contaminant load contributions are accounted for in the modelling.

19.8.95 Given the scale of the predicted changes, the addition of the reject water to the existing release would not result in any changes to water quality and changes would not extend into connected water bodies such as Langstone Harbour or the tidally influenced Hermitage Stream.

19.8.96 To address the potential for chemical parameters to be present within the combined release, the process detailed in the EA's guidance [30] was applied. This requires a number of screening tests to check the potential risk from hazardous chemicals using EQS thresholds as set out in the WFD Directions. If screening tests identify a potential risk, then modelling is required. There are three stages to screening:

1. Step 1: Identify the pollutants released – this requires monitoring either of an existing discharge or equivalent discharge (for example a pilot plant).
2. Step 2. Gather data on the pollutants – this requires monitoring of the environment into which the discharge would be made.
3. Step 3: Carry out screening tests for coastal/estuarine waters.

19.8.97 Two operational scenarios were considered in the screening assessment:

1. The first assumes a percentage of removal of each parameter through the WRP membranes which is transferred into the reject water for release via the Eastney LSO. This is referred to as the 'normal operation' scenario and reflects a worst case.
2. The second operational scenario assumes 100% of each parameter is removed via the WRP membranes and transferred to the reject water for release. This operational scenario is referred to as the '100% membrane removal' scenario and allows for a test of sensitivity.

19.8.98 Three flow conditions are considered for each operational scenario as follows:

1. The WRP operating at 60Ml/d (maximum output, expected from early 2040s onwards).
2. The WRP operating at 30Ml/d and Budds Farm WTW operating at Flow to Full Treatment (FFT) (Budds Farm WTW is operating at full capacity).
3. The WRP operating at 30Ml/d and Budds Farm WTW operating at Dry Weather Flow (DWF) (average daily flow to a Budds Farm WTW during a period without rain).

19.8.99 The output and full modelling report is presented in ES Appendix 19.8 Modelling for Chemicals Screened in via the Surface Water Risk Assessment Process, Volume II (Document Reference 6.2, Volume 6).

19.8.100 The parameters screened in are outlined in Table 19-61.

Table 19-61 Summary of parameters screened in for modelling

Scenario	Flow	Screened in parameters
Normal operation	60Ml/d	Copper - dissolved (Dissolved organic carbon (DOC) greater than 1mg/l) Triphenyltin and its derivatives
	30Ml/d FFT	Copper - dissolved (Dissolved organic carbon (DOC) greater than 1mg/l)
	30Ml/d DWF	Copper - dissolved (Dissolved organic carbon (DOC) greater than 1mg/l)
100% membrane removal	60Ml/d	Copper - dissolved DOC greater than 1mg/l Diflubenzuron Triphenyltin and its derivatives
	30Ml/d FFT	Copper - dissolved (Dissolved organic carbon (DOC) greater than 1mg/l)
	30Ml/d DWF	Copper - dissolved (Dissolved organic carbon (DOC) greater than 1mg/l)

19.8.101 Given work undertaken to date indicates mixing occurs in the near field, the US Environmental Protection Agency-supported Cornell Mixing Zone Expert System (CORMIX) mixing zone model software was used.

19.8.102 Using the model output, the required dilution factors (RDF) for each parameter were then calculated relative to the EQS values to obtain the distance at which the EQS is reached. The results are summarised in Table 19-62.

Table 19-62 Distances at which dilution factors meet the EQS for each parameter

Scenario	Flow	Parameters	EQS type	Distance to RDF (m)
Normal operation	60Ml/d	Copper	Annual Average (AA)	0.440
		Triphenyltin and its derivatives	Maximum Allowable Concentration (MAC)	0.257
	30Ml/d FFT	Copper	AA	0.321
	30Ml/d DWF	Copper	AA	0.279
100% membrane removal	60Ml/d	Copper	AA	0.444
		Diflubenzuron	AA	1.029
		Diflubenzuron	MAC	0.171
		Triphenyltin and its derivatives	MAC	0.279
	30Ml/d FFT	Copper	AA	0.323
	30Ml/d DWF	Copper	AA	0.281

19.8.103 For copper, results were compared to the AA EQS as there is no MAC EQS for this parameter. For triphenyltin, the results were compared to the MAC EQS as there is no AA EQS for this parameter. Results indicate that for both operational scenarios and all three flows that, the distance to RDF is less than 0.5m. The mixing zone for these parameters is therefore spatially limited to the immediate area of the outfall, with no changes to water quality apparent outside the 0.5m mixing zone.

19.8.104 For diflubenzuron, both the AA and MAC EQS were assessed but for the '100% membrane removal' only as this parameter was screened out in the 'normal operation' scenario. In line with EA guidance, where baseline data is not available (all baseline samples for this parameter returned below the limit of detection) the baseline was assumed to be 50% of the EQS. Using this baseline, the distance to EQS was calculated at 1.03m and 0.17m for the AA EQS and MAC EQS, respectively. The mixing zone for this parameter is therefore also spatially limited to the immediate area of the outfall. As set out in section 19.4, foul drainage from welfare facilities at the WRP site, IPSs and BPTs would be collected through a mains connection to the existing sewer system or captured on site and tankered to a WTW for treatment, and would not therefore be released into the water environment.

Contaminants of Emerging Concern

19.8.105 CECs are chemical substances found in the water environment that could potentially affect water quality, ecology and human health, but are not explicitly regulated under existing environmental laws (i.e. they do not currently have an EQS under the WFD Directions 2015 or other legislation).

19.8.106 A wide range of chemicals can be considered as CECs, but the term is typically used to refer to the following broad groups of substances:

1. Pharmaceuticals and Personal Care Products: Organic contaminants sourced from pharmaceutical products and their metabolites, cosmetics, soaps and shampoos, which can be found in trace levels in wastewater.
2. Industrial chemicals: Substances such as per- and poly-fluoroalkyl substances (PFAS), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and inorganic contaminants (including some trace metals). Although some specific compounds within these broad categories of chemicals have an established EQS (including some metals, PAHs and several PFAS compounds [76]), this is not the case for the majority of these substances.
3. Agricultural chemicals: Substances such as pesticides and fertilizers that can be found in surface water runoff.

19.8.107 The Applicant has undertaken an extensive programme of monitoring of a wide range of CECs in the final treated effluent from Budds Farm WTW (i.e. a representation of influent water quality to the WRP) and water treated in its pilot treatment plant at Budds Farm WTW. The pilot plant included a Full Advanced Treatment process, comprising integrated membranes followed by an ultraviolet and advanced oxidation process. Although this does not include the granular activated carbon and remineralisation processes that will be present within the WRP, the trial plant included the multi-barrier treatment process that will be primarily responsible for the effective removal of contaminants from the source water. Because some contaminants would also be removed by the granular activated carbon process, the results from the pilot plant therefore represent an underestimate of the performance of the full WRP and are therefore considered to represent the worst case. Additional information can be found in an independent review of the pilot plant performance produced by the University of Brighton [77].

19.8.108 The Applicant's monitoring included a range of potential CECs, with more than 400 substances selected to reflect global best practice for the development of water recycling schemes and risks identified from numerous trade licences in the catchment that contributes wastewater to Budds Farm WTW.

19.8.109 The results of the investigation into pilot plant performance indicate that the Full Advanced Treatment process resulted in a considerable increase in water quality, with the concentration of CECs decreasing after passing through the pilot plant. Over 60% of the CECs measured in the WRP influent decreased to below the limits of detection in the water that had passed through the WRP, with the largest reductions identified for a range of pharmaceuticals, personal care products and pesticides. This suggests that releases from the WRP into Havant Thicket Reservoir and downstream water bodies (Riders Lane Stream, Hermitage Stream and Langstone Harbour) are unlikely to contain the full suite of CECs measured by the Applicant or independently recorded in Langstone Harbour [78] [79] and that any CECs remaining in the WRP output would be present in extremely low concentrations. Significant adverse effects on water quality and biota from CECs are considered unlikely, particularly given that the pilot plant data does not represent the full treatment process that would be in place at the WRP. Further guidance was issued by the Environment Agency in October 2025 [80], requiring the chemicals being considered under Phase 4 of the Chemical Investigations Programme (CIP4) to be sampled in the crude and final effluent of the wastewater

treatment works acting as source water for water recycling, and sampling was refocussed to consider these compounds. The Applicant is continuing to undertake sampling as agreed with the Environment Agency.

Summary of impacts on surface and groundwater receptors

19.8.110 Impacts on specific surface and groundwater receptors associated with each component of the Proposed Development are described in Table 19-63. The assessment presented in Table 19-63 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

Table 19-63 Continuous releases to surface and groundwaters during operation

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Water Recycling Plant site					
Surface water and groundwater	There would be no continuous releases into the water environment directly associated with this component, and therefore no change on water receptors.			No change	No change
Pipelines between Budds Farm Water Treatment Works and the Water Recycling Plant site					
Surface water and groundwater	There would be no continuous releases into the water environment directly associated with this component, and therefore no change on water receptors.			No change	No change
Release from Eastney Long Sea Outfall					
Surface water	Solent (includes Solent and Isle of Wight East water bodies)	Dispersion modelling indicates that the changes in the currently consented parameters would be insignificant compared to natural variation experienced within the receiving water or within variations experienced within the wastewater itself. Significant changes to water quality associated with the currently consented parameters are not predicted. Modelled distance to meet EQS for screened in chemical parameters shows dilution to EQS in the immediate vicinity of the LSO therefore wide scale impacts on water quality are not predicted. Note that the modelled changes and distances to EQS for chemical parameters do not extend into Langstone Harbour or any other water body.	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Pipelines between the Water Recycling Plant site and Bedhampton Springs					
Surface water and groundwater	There would be no continuous releases into the water environment directly associated with this component, and therefore no change on water receptors (excluding the groundwater seepage into the tunnel which is captured and released with the reject water, see paragraph 19.8.91).			No change	No change
Use of Havant Thicket Reservoir for the storage of recycled water					
Surface water	Havant Thicket Reservoir	Although the chemistry of water from the WRP may be slightly different to that of water in situ in the reservoir (derived from groundwater, surface flows and rainfall), it would be treated to a high standard and will not contain elevated concentrations of potential contaminants. It is not considered that there would be a significant adverse effect on water quality in the reservoir as a result of the Proposed Development.	High	Negligible	Minor
	Hermitage Stream	Water would be released from Havant Thicket Reservoir to maintain flows in Riders Lane Stream (a tributary of Hermitage Stream), from where they would enter Hermitage Stream. However, the water quality changes identified for the post-WRP scenario would be minor. It is not considered that there would be a significant adverse effect on water quality in Hermitage Stream as a result of the Proposed Development	Medium	Negligible	Minor
	Langstone Harbour	Water quality modelling of the chemical parameters indicates that there are only very limited changes in water quality in Langstone Harbour from the modelled Havant Thicket Reservoir classic operation and post-WRP operation scenarios. It is not considered that there would be a significant adverse effect on water quality in Langstone Harbour as a result of the Proposed Development	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works					
Surface water and groundwater	There would be no continuous releases into the water environment directly associated with this component, and therefore no change on water receptors (excluding the groundwater seepage into the tunnel which is captured and discharged into the foul sewer network; see paragraph 19.8.91).			No change	No change
Above Ground Plant					
Surface water and groundwater	There would be no continuous releases into the water environment directly associated with all of the IPS or BPT, and therefore no change on water receptors.			No change	No change

Sensitivity of receptor

19.8.111 The sensitivity of the surface and groundwater receptors that could potentially be impacted by each component is described in Table 19-63. These range in sensitivity from medium to high.

Magnitude of the impact

19.8.112 The magnitude of impacts resulting from continuous releases to surface and groundwaters during the operation of each component are described in Table 19-63. This demonstrates that, following the application of the primary and tertiary mitigation measures described in section 19.4, all impacts would have a negligible magnitude.

Significance of the effect

19.8.113 The significance of effect associated with each component is described in Table 19-63, which shows that the significance of effect would be minor adverse for all receptors except where there is no change. This demonstrates that no significant adverse effects on surface and groundwater receptors are expected as a result of continuous releases during the operational phase.

Intermittent or unplanned releases to surface and groundwaters during operation

Description of impact

19.8.114 The operational stage of the Proposed Development could result in intermittent releases or unplanned releases into the water environment resulting from routine operations and unplanned maintenance, which are outlined in this section.

19.8.115 Intermittent releases are distinct from the continuous releases from the WRP into Havant Thicket Reservoir, Havant Thicket Reservoir to downstream watercourses and water bodies, and of reject water via the Eastney LSO, which are discussed in the previous section on operational impacts (continuous releases to surface and groundwaters during operation).

Surface water runoff and pollution management at the WRP site

19.8.116 The design for the WRP includes a dedicated surface water collection system capturing surface water from rainfall which would be released intermittently to the lower reach of the Hermitage Stream via a new outfall downstream of Bedhampton Springs and the tidal limit of the watercourse. This reach of Hermitage Stream, which flows along the eastern boundary of the WRP site into Langstone Harbour, is therefore tidally influenced. The proposed outfall would be located on the right (western) bank of Hermitage Stream upstream of the Harts Farm Way road bridge.

19.8.117 Chemical dosing would be required at the WRP site, with chemicals such as hydrogen peroxide stored on-site in holding tanks and storage units. Therefore, there is the potential for the supply of contaminants to surface water and groundwater during operation through the accidental spillage or leakage of treatment chemicals.

19.8.118 The SuDS design at the WRP includes a range of control measures such as filter strips, swales and a detention basin, to mitigate for reducing contaminants in the runoff. The SuDS design also includes control measures suitable for the pollution hazard index. As such, effects on receiving water quality associated with contaminants are not predicted (ES Appendix 19.12 Water Recycling Plant site Sustainable Drainage System dispersion modelling (Document Reference 6.2, Volume 6)).

19.8.119 Release of rainfall water via the SuDs Outfall does, however, have the potential to reduce salinity within the Hermitage Stream given that it would be at a lower salinity than that in the receiving brackish water.

19.8.120 To assess this change, modelling using a calibrated MIKE21 hydraulic model has been undertaken. Full details are provided in Appendix 19.12 Water Recycling Plant site Sustainable Drainage System dispersion modelling, Volume II (Document Reference 6.2, Volume 6). In summary, the change in salinity associated with the intermittent release, compared with the natural fluctuations in ambient salinity levels throughout the tidal cycle is insignificant (less than 0.1 Practical Salinity Unit (PSU)), with greater differences confined to small areas of the tidal Hermitage Stream.

Surface water and pollution management at Above Ground Plant

19.8.121 Small volumes of fuel, lubricants and material from tyres and braking systems from vehicles visiting above-ground infrastructure, including the BPTs and IPSs, could potentially leak onto the ground surface. These could be entrained by surface water flows, migrate into the ground and enter groundwater via leakages from the drainage system, and thereby enter the water environment.

19.8.122 However, drainage at each AGP site would be channelled through SuDS prior to release into the wider environment. The drainage system will be designed to good practice and incorporates measures to intercept sediment and contaminants (section 19.4). Additional information is provided in the SuDS Drainage Strategy within Appendix 19.1 Flood Risk Assessment, Volume II (Document Reference 6.2, Volume 6).

Operational maintenance

19.8.123 The WRP would have a design life of approximately 60 years. During this period, routine maintenance would be required comprising monitoring, testing and the replacement of equipment. Proposed maintenance activities include calibration and/or replacement of instrumentation for sampling and control, media regeneration (such as granular activated carbon) and replacement of membranes. The condition of the assets within the WRP site would be reviewed at the end of the operational period to determine whether maintenance activities are required (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)).

19.8.124 The Pipeline and tunnels would have a design life of approximately 100 years. The condition of the Pipeline and tunnels would be reviewed at the end of the operational period to determine whether maintenance activities are required (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)).

19.8.125 The IPSs would have a design life of approximately 60 years, and the BPTs would have a design life of approximately 100 years. At the end of these periods the condition of the AGP would be reviewed to inform any maintenance activities. However, some specific assets within each AGP are predicted to have a design life that is shorter than the design life of the AGP as a whole (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). This means that there may be a requirement for maintenance activities at each AGP that could require ground disturbance and the use of construction materials and plant and could potentially result in localised increases in the supply of fine sediment, fuel and lubricants into the surface drainage network. This could potentially affect water quality in receiving watercourses and connected groundwaters.

19.8.126 During normal operation, the washout valves would be inspected and tested to check the valves are functional. Testing of washout valves during normal operation could require the release of source water within the Pipeline. Any releases of source water resulting from the testing of washout valves would be collected directly by a tanker, with no source water released to the environment (land or watercourse). This could require the installation of temporary works to connect the tanker to the washout valve. Testing of a washout valve would result in the release of up to approximately 4.5m^3 of water from the Pipeline, requiring only one tanker. Testing of washouts would be required approximately every six months. Because water released from the washout valves would be captured, there is therefore no mechanism to impact on the hydrology and geomorphology of surface watercourses (e.g. as a result of rapid releases into a river channel) or affect water quality (e.g. as a result of differences in water chemistry). Additional information on the operating regime of the isolation valves, air valves and washout valves is set out in the OEMP (Document Reference 7.7, Volume 7) submitted with the DCO application.

Leakages from pipeline into groundwater

19.8.127 Leakage of water from/into the pipeline(s) or associated infrastructure has the potential to alter the groundwater chemistry or lead to dissolution when within the chalk, particularly if the leakages are large or long-term. The tunnel drainage would intercept any water leaking out of the pipes or water leaking into the tunnel and this would be released together with the reject water as outlined above. However, in the Pipelines sections (both open-cut and trenchless crossings) any water leaking from the pipelines would ultimately release directly into the ground. Water conveyed by the pipelines could have a different chemistry to the underlying aquifer, and therefore could lead to an impact on groundwater chemistry. Leak detection would be present on the pipeline transfer, either via flow and pressure monitoring or active acoustic monitoring. This will be designed to automatically shut the pipeline system down in the event a leak starts. Therefore, no long-term leakages are likely to occur.

19.8.128 Note that the potential impacts associated with emergency scenarios (e.g. pipe bursts) are considered separately in ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, Volume 6).

19.8.129 Impacts on specific surface and groundwater receptors associated with each component of the Proposed Development are described in Table 19-64. The

assessment presented in Table 19-64 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

Table 19-64 Intermittent or unplanned releases to surface and groundwaters during operation

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Water Recycling Plant site					
Surface water	Langstone Harbour (including onshore coastal catchment)	Site drainage from the WRP site would be channelled through SuDS prior to release into the wider environment. The drainage system will be designed to good practice and incorporates measures to intercept sediment and contaminants (section 19.4). The release from the WRP SuDS would be at a lower salinity than that in the receiving brackish water in the tidal Hermitage Stream (part of Langstone Harbour) given that it would be derived from rainfall. Water quality modelling [71]indicates that these releases would result in highly localised changes in salinity and would not extend further into Langstone Harbour. There would not be a significant adverse effect on salinity in the receiving water. Good practice pollution prevention and control measures will be incorporated into the design of the WRP site, which will ensure that any accidental chemical spillages are contained (section 19.4). Maintenance activities are expected to follow good industry practice in place at the time in line with the OEMP (Document Reference 7.7, Volume 7).	High	Negligible	Minor
Groundwater	Aquifer - Principal Bedrock (White Chalk Subgroup)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Pipelines between Budds Farm Wastewater Treatment Works and the Water Recycling Plant site					
Surface water	Hermitage Stream	Washout valves could potentially be located in this section of Pipeline. However, release of water from	Medium	Negligible	Minor
	Langstone Harbour		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	High	Negligible	Minor
	Secondary A Superficial Deposits Aquifer (River Terrace Deposits and Alluvium)		Medium	Negligible	Minor
	Secondary Undifferentiated Superficial Deposits Aquifer (Beach and Tidal Flat Deposits, Raised Marine Deposits)		Medium	Negligible	Minor
	Consented Discharge A00751: Southern Water Services – Budds Farm WTW – To the Solent/Langstone Harbour		Low	Negligible	Negligible
Release from the Eastney Long Sea Outfall					
Surface water	Solent	Releases of reject water from the WRP site are considered as part of the previous impact, (continuous releases to surface and groundwaters during operation).	High	No change	No change
Pipeline between the Water Recycling Plant site Bedhampton Springs					
Surface water	Langstone Harbour (terrestrial catchment)	Washout valves could potentially be located in this section of Pipeline. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational	High	Negligible	Minor
	Hermitage Stream		Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer - Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)	conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Marine Raised Deposits)		Medium	Negligible	Minor
	GWSWI - Bedhampton and Havant Springs (locally important PWS)		High	Negligible	Minor
	Licensed GW Abstraction - Portsmouth Water - Bedhampton PWS Springs No 1 and No 2 and Havant		High	Negligible	Minor
	SPZ1 and SPZ1c related to Bedhampton-Havant Springs PWS		High	Negligible	Minor
Use of Havant Thicket Reservoir for the storage of recycled water					
Surface water	Havant Thicket Reservoir	Releases of recycled water from the WRP site into the reservoir are considered as part of the previous impact (continuous releases to surface and groundwaters during operation). There would be no further releases into the reservoir.	High	No change	No change
Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works					
Section D: The Water Recycling Plant site to Portsdown Hill					
Surface water	Langstone Harbour (including onshore coastal catchment)	Washout valves could potentially be located in this section of Pipeline. However, release of water from washouts would be collected in a tanker during	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	High	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (beach and Tidal Flat Deposits, Head, Marine Raised Deposits)		Medium	Negligible	Minor
	Hermitage Stream WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
	Langstone Harbour (Catchment)		High	Negligible	Minor
	Protected WER Transitional Water Body - SSSI, SPA, Ramsar, SAC. Noted as GWDTE.		High	Negligible	Minor
	Potwell Tributary WER Classified Watercourse (Catchment)		Medium	Negligible	Minor
Section E: Portsdown Hill to Boarhunt					
Surface water	Potwell Tributary	Multiple washout valves could potentially be located in Section E. However, release of water from	High	Negligible	Minor
	Wallington River		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)	washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	High	Negligible	Minor
	Aquifer - Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Southwick Estate – Offwell Farm, Southwick (Private water supply)		Medium	Negligible	Minor
Section F: Boarhunt to Crockerhill					
Surface water	Wallington River	Multiple washout valves could potentially be located in Section F. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	Medium	Negligible	Minor
Groundwater	Principal Bedrock Aquifer (White Chalk Subgroup)		High	Negligible	Minor
	Aquifer - Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction - Portsmouth Water - Maindell PS (PWS)		High	Negligible	Minor
	SPZ2, SPZ2c and SPZ 3 related to Maindell PWS		High	Negligible	Minor
Section G: Crockerhill to Wickham					
Surface water	River Meon	A small number of washout valves could potentially be located in Section G. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	High	Negligible	Minor
Groundwater	Aquifer - Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Park Golf Club (Spray Irrigation)				
Section H: Wickham to Shedfield					
Surface water	River Meon	A small number of washout valves could potentially be located in Section H. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	High	Negligible	Minor
	Southampton Water (terrestrial catchment)		High	Negligible	Minor
Groundwater	Aquifer - Secondary A Bedrock Aquifer (Bracklesham Group)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Unlicensed GW abstraction - The Bungalow (now the Garden House) Private water supply		Medium	Negligible	Minor
Section J: Shedfield to the River Hamble					
Surface water	Southampton Water (terrestrial catchment)	Multiple washout valves could potentially be located in Section J. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational	High	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor
Groundwater	Aquifer - Secondary A Bedrock Aquifer (Bracklesham Group,		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	London Clay Sand Members)	conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.			
	Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Main River Hamble WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Moors Stream WER Classified Watercourse. (Catchment)		Medium	Negligible	Minor
	Unlicensed GW abstraction - Woodman's Farmhouse Private water supply		Medium	Negligible	Minor
Section K: The River Hamble to Lower Upham					
Surface water	River Hamble (upper)	Multiple washout valves could potentially be located in Section K. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any	Medium	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor
	Horton Heath Stream		Medium	Negligible	Minor
Groundwater	Aquifer - Secondary A Bedrock Aquifer (London Clay Sand Members)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer (River Terrace Deposits, Alluvium)	releases into the water environment and there would not be any significant adverse effects.			
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
Section L: Lower Upham to Brambridge					
Surface water	Horton Heath Stream	Multiple washout valves could potentially be located in Section L However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	Medium	Negligible	Minor
	Bow Lake		Medium	Negligible	Minor
	River Itchen		High	Negligible	Minor
Groundwater	Aquifer - Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Licensed GW Abstraction - Fishers Pond Ltd - Fisher Pond Borehole C (Agriculture - Fish Farm/Cress Pond Throughflow)		Medium	Negligible	Minor
	Licensed Southern Water Abstraction - 11/42/22.9/163: Hampshire Carp Hatcheries - Bow Lake Stream at Soke Common (Agriculture -		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Fish Farm/Cress Pond Throughflow)				
Section M: Brambridge to Otterbourne Water Supply Works					
Surface water	River Itchen	Multiple washout valves could potentially be located in Section M. However, release of water from washouts would be collected in a tanker during routine operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). There would not be any releases into the water environment and there would not be any significant adverse effects.	High	Negligible	Minor
	Itchen Navigation		High	Negligible	Minor
Groundwater	Aquifer - Principal Bedrock (White Chalk Subgroup)		High	Negligible	Minor
	Aquifer - Secondary A Bedrock Aquifer (Lambeth Group)		High	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (River Terrace Deposits, Alluvium)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction - Southern Water Services - Otterbourne PWS - All abstraction points		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – 31/110: Black Dyke, Point A (Environmental - Transfer between sources)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Licensed Southern Water Abstraction – SO/042/0031/023: East Lodge Fisheries - Itchen Navigation at Brambridge (Environmental - Remedial River/Wetland Support [Transfer between sources])		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – SO/042/0031/020: Malms House Ltd - Lower Itchen Navigation at Shawford (Environmental - Non-remedial water/wetland support [Transfer between sources])		Medium	Negligible	Minor
	Licensed Southern Water Abstraction – 11/42/22.6/93: Southern Water Services - River Itchen at the Otterbourne Intake (PWS)		Medium	Negligible	Minor
	SPZ1 and SPZ1c related to Otterbourne PWS		High	Negligible	Minor
	Itchen Protected WER Classified Water Body - SAC, SSSI. Noted as GWDTE.		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Above Ground Plant					
Intermediate Pumping Station F					
Surface water	Wallington River	Site drainage from the IPS-F site would be channelled through SuDS prior to release into the wider environment. The drainage system will be designed to good practice and incorporates measures to intercept sediment and contaminants (section 19.4). Maintenance activities are expected to follow good industry practice in place at the time in line with the OEMP (Document Reference 7.7, Volume 7). IPS-F could require a washout valve. Release of water from washouts would be collected in a tanker during operation and maintenance of the washout valves and the IPS, and there would be no releases to surface or groundwater or land during normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)).	Medium	Negligible	Minor
Groundwater	Aquifer - Principal Bedrock (White Chalk Subgroup)		High	Negligible	Minor
	Aquifer - Secondary A Bedrock Aquifer (Lambeth Group)		Medium	Negligible	Minor
	Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)		Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction - Portsmouth Water - Maindell PS (PWS)		High	Negligible	Minor
	SPZ2, SPZ2c and SPZ 3 related to Maindell PWS		High	Negligible	Minor
Intermediate Pumping Station G					
Surface water	River Meon	Site drainage from the IPS-G site would be channelled through SuDS prior to release into the wider environment. The drainage system will be designed to good practice and incorporates measures to intercept sediment and contaminants (section 19.4).	High	Negligible	Minor
Groundwater	Aquifer - Secondary A Bedrock Aquifer (Bracklesham Group, London Clay Sand Members)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
	Aquifer - Secondary A Superficial Deposits Aquifer (Alluvium, River Terrace Deposits)	Maintenance activities are expected to follow good industry practice in place at the time in line with the OEMP (Document Reference 7.7, Volume 7). IPS-G could require a washout valve. Testing of washout valves during maintenance could require the release of source water within the pipelines. Any releases of source water resulting from the testing of washout valves would be collected directly by a tanker, with no source water released to the environment (land, groundwater or watercourse) (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)).	Medium	Negligible	Minor
	Aquifer - Secondary Undifferentiated Superficial Deposits Aquifer (Head)		Medium	Negligible	Minor
	Licensed GW Abstraction – Golfpartners International Limited – Borehole at Wickham Park Golf Club (Spray Irrigation)		Medium	Negligible	Minor
Break Pressure Tank and Intermediate Pumping Station E					
Surface water	Potwell Tributary	Site drainage from the BPT/IPS-E site would be channelled through SuDS prior to release into the wider environment. The drainage system will be designed to good practice and incorporates measures to intercept sediment and contaminants (section 19.4). Maintenance activities are expected to follow good industry practice in place at the time in line with the OEMP (Document Reference 7.7, Volume 7). The BPT/IPS-E could require a washout valve. Release of water from washouts would be collected in a tanker during operation and maintenance of the washout valves and the IPS therefore there would be no release to surface or groundwater or land during	High	Negligible	Minor
Groundwater	Aquifer – Principal Bedrock (White Chalk Subgroup)		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		normal operational conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). System controls would manage water levels within BPT-E. The overflow outlet would not be used as part of normal operation during the life of the Proposed Development.			
Break Pressure Tank-K					
Surface water	River Hamble (upper)	Site drainage from the BPT-K site would be channelled through SuDS prior to release into the wider environment. The drainage system will be designed to good practice and incorporates measures to intercept sediment and contaminants (section 19.4). Maintenance activities are expected to follow good industry practice in place at the time in line with the OEMP (Document Reference 7.7, Volume 7). System controls would manage water levels within BPT-K. The overflow outlet would not be used as part of normal operation during the life of the Proposed Development.	Medium	Negligible	Minor

Sensitivity of receptor

19.8.130 The sensitivity of the surface and groundwater receptors that could potentially be impacted by each component is described in Table 19-64. These range in sensitivity from low to high.

Magnitude of impact

19.8.131 The magnitude of impacts resulting from intermittent releases to surface and groundwaters during the operation of each component are described in Table 19-64. This demonstrates that, following the application of the primary and tertiary mitigation measures described in section 19.4, all impacts would have a negligible magnitude.

Significance of effect

19.8.132 The significance of effect associated with each component is described in Table 19-64, which shows that the significance of effect would be minor adverse for all receptors except where there is no change. This demonstrates that no significant adverse effects on surface and groundwater receptors are expected as a result of intermittent or unplanned releases during the operational phase.

Changes to surface flows, infiltration and flood risk during operation

Description of impact

19.8.133 The above-ground infrastructure could result in permanent changes to land use and a decrease in the runoff and infiltration characteristics of each site. An increase in the proportion of impermeable surfaces in a hydrological catchment would result in a corresponding decrease in local infiltration and an increase in surface runoff. Furthermore, the presence of the buried infrastructure would introduce an impermeable barrier that has the potential to impact upon subsurface flow routes.

19.8.134 There is also potential for the Pipeline to act as a conduit for water during the operational phase as a result of differences in the hydraulic properties of the land disturbed during the construction process and undisturbed ground surrounding it.

19.8.135 There is therefore potential for changes in surface water runoff resulting from the increase in impermeable areas and changes to subsurface flows. These could be sufficient to impact upon the hydrology (e.g. by increasing surface water volumes and flow velocities) of the surface water system and result in permanent changes to geomorphology by increasing rates of bed and bank erosion and encouraging geomorphological adjustment. Impacts on geomorphology and in-channel habitats are likely to be particularly marked if drainage from a large area is released at a discrete location within the existing surface drainage network.

19.8.136 As well as impacts on geomorphology and in-channel habitats, changes to surface drainage patterns could potentially, if unmitigated, also increase flood risk to third party land and property, especially if the release of any drainage is not sufficiently controlled. Furthermore, open-cut watercourse crossing locations have the potential to increase flood risk elsewhere should they not be reinstated to pre-construction channel capacities (i.e. any reductions in channel capacity could increase local flood risk).

19.8.137 Note that there would not be any planned direct disturbance of surface water receptors during the operational phase of the Proposed Development. All pipeline infrastructure would be buried at least 2.5m under watercourses crossed using trenchless techniques (i.e. Main Rivers and large Ordinary Watercourses) and at least 1.5m beneath watercourses crossed by open trenching (i.e. some small Ordinary Watercourses). As such, this activity is not expected to impinge on natural geomorphological processes given the generally low energy characteristics of the watercourses (see section 19.7).

19.8.138 Washout valves would be tested approximately every six months during normal operation. Further releases from the washout valves would not take place will not take place as part of normal operation. Any source water released during routine testing would be collected directly in a tanker, with no source water released to the environment. Because water released from the washout valves would be captured, there is therefore no mechanism to impact on hydrology and flood risk during normal operational conditions. In an emergency scenario, such as in the event of damage to the Pipeline, sections of the Pipeline may need to be drained using the washout valves to facilitate repair. These events are considered operationally exceptional and are not expected during the life of the Proposed Development and are assessed in ES Chapter 14 Major accidents and disasters, Volume I (Document Reference 6.1, Volume 6).

19.8.139 Mitigation for the emergency use of BPT overflows during the operation of the Proposed Development is also detailed in the OEMP (Document Reference 7.7, Volume 7).

19.8.140 Impacts on specific surface and groundwater receptors associated with each component of the Proposed Development are described in Table 19-65. The assessment presented in Table 19-65 assumes that the primary and tertiary mitigation measures described in section 19.4 have been applied.

Table 19-65 Changes to surface flows, infiltration and flood risk during operation

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Water Recycling Plant site					
Surface water	Langstone Harbour (terrestrial catchment)	The WRP site would require permanent above-ground infrastructure, including impermeable surfaces, and as such could potentially change flow patterns, infiltration rates and flood risk. However, a drainage system has been designed to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk (section 19.4).	High	Negligible	Minor
Pipelines between Budds Farm Wastewater Treatment Works and the Water Recycling Plant site					
Surface water	Hermitage Stream	The Pipelines between Budds Farm WTW and the WRP site would consist solely of below-ground infrastructure. This would be installed using a trenchless technique and would not require any surface works or infrastructure that could result in changes to surface flows and infiltration.	Medium	Negligible	Minor
	Langstone Harbour		High	Negligible	Minor
Release from the Eastney Long Sea Outfall					
Surface water	Solent	The Proposed Development would not alter the maximum volume or maximum rate of release from the existing Eastney LSO. There is therefore no mechanism for surface flows or flood risk to be increased.	High	Negligible	Minor
Pipelines between the Water Recycling Plant site to Bedhampton Springs					
Surface water	Langstone Harbour (terrestrial catchment)	The Pipelines between the WRP site and Mill Lane would consist of below-ground infrastructure. This would be installed using trenchless construction methods and would not require any surface works or infrastructure that could result in changes to surface flows and infiltration. East of Mill Lane the Pipelines would consist of a short section of above-ground pipelines within the boundary of the Bedhampton Springs site over a distance of approximately 200m.	High	Negligible	Minor
	Hermitage Stream		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Although this would cross narrow areas at risk of fluvial, coastal and surface water flooding, the raised design of the pipeline means that surface flow paths would not be significantly impeded. The structure itself is not considered to be sensitive to inundation.			
Use of Havant Thicket Reservoir for the storage of recycled water					
Surface water	Havant Thicket Reservoir	The Proposed Development would not alter the volume of water stored within Havant Thicket Reservoir, or the quantity or frequency of releases (compensatory flows) to maintain flows in Riders Lane Stream. Because the operation of the reservoir with regards to compensatory flows would not change, there is no mechanism for surface flows or flood risk to be affected.	High	Negligible	Minor
Pipeline between the Water Recycling Plant site and Otterbourne Water Supply Works					
Section D: The Water Recycling Plant site to Portsdown Hill					
Surface water	Langstone Harbour (terrestrial catchment)	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows.	High	Negligible	Minor
Section E: Portsdown Hill to Boarhunt					
Surface water	Potwell Tributary	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement	High	Negligible	Minor
	Wallington River		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		measures set out in **section** 19.4 would ensure that the operational infrastructure does not become a conduit for flows. Multiple washout valves could potentially be located in Section E. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation and maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.			
***Section F*: Boarhunt to Crockerhill**					
Surface water	Wallington River	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows. Multiple washout valves could potentially be located in Pipeline Section F. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		adverse impacts on surface water flows or flood risk are expected.			
Section G: Crockerhill to Wickham					
Surface water	River Meon	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows. Multiple washout valves could potentially be located in Section G. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	High	Negligible	Minor
Section H: Wickham to Shedfield					
Surface water	River Meon	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		operational infrastructure does not become a conduit for flows.			
	Southampton Water (terrestrial catchment)	Multiple washout valves could potentially be located in Section H However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	High	Negligible	Minor
Section J: Shedfield to the River Hamble					
Surface water	Southampton Water (terrestrial catchment)	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows. Multiple washout valves could potentially be located in Section J. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation, or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	High	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Section K: The River Hamble to Lower Upham					
Surface water	River Hamble (upper)	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows. Multiple washout valves could potentially be located in Section K. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	Medium	Negligible	Minor
	River Hamble (main)		Medium	Negligible	Minor
	Horton Heath Stream		Medium	Negligible	Minor
Section L: Lower Upham to Brambridge					
Surface water	Horton Heath Stream	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above-ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows.	Medium	Negligible	Minor
	Bow Lake		Medium	Negligible	Minor
	River Itchen		High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Multiple washout valves could potentially be located in Section L. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.			
Section M: Brambridge to Otterbourne Water Supply Works					
Surface water	River Itchen	Surface infrastructure along the Pipeline would be limited to the washout and isolation valve chambers that would be finished 300mm above ground level. Given the small scale of this infrastructure, surface water flows, infiltration or flood risk are unlikely to be significantly affected. Furthermore, the post-construction reinstatement measures set out in section 19.4 would ensure that the operational infrastructure does not become a conduit for flows. Multiple washout valves could potentially be located in Section M. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	High	Negligible	Minor
	Itchen Navigation		High	Negligible	Minor
Above Ground Plant					
Intermediate Pumping Station F					

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
Surface water	Wallington River	The IPS-F would require permanent above-ground infrastructure, including impermeable surfaces, and as such could potentially change flow patterns, infiltration rates and flood risk. However, a SuDS will be developed to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk (section 19.4). The IPS-F would require a washout valve. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	Medium	Negligible	Minor
Intermediate Pumping Station G					
Surface water	River Meon	The IPS-G would require permanent above-ground infrastructure, including impermeable surfaces, and as such could potentially change flow patterns, infiltration rates and flood risk. However, a SuDS will be developed to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk (section 19.4). The IPS-G would require a washout valve. Testing of washout valves during maintenance could require the release of source water within the pipelines. Any releases of source water resulting from the testing of washout valves would be collected directly by a tanker, with no source water released to the environment (land, groundwater or watercourse) (see ES Chapter 3	High	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)).			
Break Pressure Tank and Intermediate Pumping Station E					
Surface water	Potwell Tributary	The BPT/IPS-E would require permanent above-ground infrastructure, including impermeable surfaces, and as such could potentially change flow patterns, infiltration rates and flood risk. However, a SuDS will be developed to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk (section 19.4). The BPT/IPS-E would require a washout valve. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.	High	Negligible	Minor
Break Pressure Tank-K					
Surface water	River Hamble (upper)	The BPT would require permanent above-ground infrastructure, including impermeable surfaces, and as such could potentially change flow patterns, infiltration rates and flood risk. However, a SuDS will be developed to capture and attenuate surface runoff and ensure that there are no changes to off-site runoff rates and flood risk (section 19.4). BPT-K would require a washout valve. However, release of water from washouts would be collected in a tanker during regular operational testing of the washout valves, and there would be no requirement for releases to surface	Medium	Negligible	Minor

Receptor type	Receptor	Summary of assessment	Sensitivity of receptor	Magnitude of impact	Significance of effect
		or groundwater during operation or maintenance conditions (see ES Chapter 3 Description of the Proposed Development, Volume I (Document Reference 6.1, Volume 6)). No significant adverse impacts on surface water flows or flood risk are expected.			

Sensitivity of receptor

19.8.141 The sensitivity of the surface and groundwater receptors that could potentially be impacted by each component is described in Table 19-65. These range in sensitivity from medium to high.

Magnitude of impact

19.8.142 The magnitude of impacts resulting from changes to surface flows, infiltration and flood risk during the operation of each component are described in Table 19-65. This demonstrates that, following the application of the primary and tertiary mitigation measures described in section 19.4, all impacts would have a negligible magnitude.

Significance of effect

19.8.143 The significance of effect associated with each component is described in Table 19-65, which shows that the significance of effect would be minor adverse for all receptors. This demonstrates that no significant adverse effects on water receptors are expected as a result of changes to surface flows, infiltration and flood risk during the operational phase.

Decommissioning

19.8.144 Effects from decommissioning of the Proposed Development are considered to be no greater than those identified during the construction phase and are therefore assessed as being the same as construction effects. The significance of effects resulting from decommissioning would therefore be the same as reported for the construction effects.

19.9 Mitigation, monitoring and enhancement

19.9.1 Mitigation measures are defined in ES Chapter 5 EIA approach and methodology, Volume I, (Document Reference 6.1, Volume 6) with primary mitigation and tertiary mitigation for the water environment being presented in section 19.4 of this chapter.

Secondary mitigation

19.9.2 The assessment of likely significant effects on the water environment presented in section 19.8 of this chapter, has identified a likely significant effect when undertaking trenchless excavation within the Chalk south of the Otterbourne PWS (within SPZ1).

19.9.3 Monitoring (as per the Water Monitoring Plan) will inform the requirement for secondary mitigation to be implemented, which is most likely to comprise temporary shut off of the shallow adit system at Otterbourne, which is the most susceptible to turbidity impacts. The detailed Water Monitoring Plan will be produced and submitted for approval in accordance with the corresponding requirement in Schedule 2 of the draft DCO (Document reference 3.1, DCO Volume 3).

19.9.4 On the basis that monitoring and control measures will be implemented to mitigate the potential temporary impacts on the Otterbourne PWS from trenchless excavation in the vicinity, the residual effect would be reduced to minor adverse (not significant).

Monitoring

19.9.5 Due to the spatial and temporal variability of the water environment, monitoring of receptors susceptible to potential impacts is critical; particularly when working in or proximal to high value receptors, or where there is increased uncertainty/risks such as within the karstic chalk aquifer. The Contractor is to produce a detailed Water Monitoring Plan in line with ES Appendix 19.9 Outline Water Monitoring Plan, Volume II (Document Reference 6.2, Volume 6).

19.9.6 This will include general quantity (flows/levels) and quality monitoring requirements, together with specific monitoring requirements at particular component of the Proposed Development, geographic locations, and/or receptors susceptible to specific or increased risks. The monitoring plan will outline trigger levels and action plans (to be agreed with stakeholders) to mitigate any observed impacts.

19.10 Summary of residual effects

19.10.1 Table 19-66 provides a summary of the residual effects relating to the construction, operation and decommissioning of the Proposed Development with regard to water environment receptors.

Table 19-66 Summary of residual effects

Impact	Receptor	Residual effects		
		Construction	Operation	Decommissioning
Direct disturbance	All surface waters	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)
	All groundwaters	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)
Release of contaminants	All surface waters	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)
	Groundwaters (excluding Otterbourne PWS)	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)
	Otterbourne PWS	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)
Changes to flows/flood risk	All surface waters	Minor adverse (not significant)	Minor adverse (not significant)	Minor adverse (not significant)
	Groundwaters (excluding Bedhampton and	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)

Impact	Receptor	Residual effects		
		Construction	Operation	Decommissioning
	Otterbourne PWS)			
	Bedhampton and Otterbourne PWS	Minor adverse (not significant)	Scoped out	Minor adverse (not significant)
Continuous releases	All surface waters	Not applicable	Minor adverse (not significant)	Not applicable
Intermittent or unplanned releases	All surface waters and groundwaters	Not applicable	Minor adverse (not significant)	Not applicable

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