Teddington Direct River Abstraction

Preliminary Environmental Information Report
Chapter 5 – Water Resources and Flood Risk

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5 Water Resources and Flood Risk

5.1 Introduction

5.1.1 This chapter of the Preliminary Environmental Information (PEI) Report provides preliminary information relating to water resources and flood risk, to allow stakeholders and local communities to understand and develop an informed view of the likely significant environmental effects of the Teddington Direct River Abstraction (TDRA) Project (hereafter referred to as 'the Project') at this stage of the programme. This should be read in conjunction with the description of the Project as presented in Chapter 2: Project Description.

5.1.2 This chapter describes the study area and baseline conditions with respect to water resources and flood risk, as they are understood at present. Water resources include groundwater, and the surface water resources sub-matters of hydrodynamics and geomorphology and surface water quality. It identifies the potential likely significant environmental effects of the Project during construction and operation; and the maintenance and mitigation measures to avoid or mitigate these effects.

5.1.3 This chapter is supported by Figure 5.1 in Volume 2 PEI Report Figures; and the following Volume 3 PEI Report Appendices:

a. Appendix 1.2 National Planning Policy and Legislation Context
b. Appendix 5.1 Surface Water and Water Quality Baseline Information
c. Appendix 5.2 Flood Risk Assessment (FRA)
d. Appendix 5.3 Water Framework Directive Screening

5.1.4 Other potential impacts are assessed as follows:

a. Potential impacts on aquatic or hydrologically connected protected sites and aquatic ecology are assessed in Chapter 6: Aquatic Ecology.
b. Potential impacts on groundwater quality as a result of mobilisation of contaminated soil or existing groundwater contamination are assessed in Chapter 10: Ground Conditions and Contaminated Land.
c. Potential water quality impacts on river recreation use are assessed in Chapter 15: Socioeconomics, Community, Access and Recreation.
d. Potential river level and sedimentation impacts on navigation are included in this chapter although the socioeconomic and traffic and transport impacts related to navigation are assessed in Chapter 15: Socioeconomics, Community, Access and Recreation, and Chapter 12: Traffic and Transport.
e. Potential impacts to water resources in relation to climate change are assessed in Chapter 18: Climate Change.

5.1.5 The assessment of water for public supply is subject to separate regulation by the Drinking Water Inspectorate. As such, this chapter does not address drinking water quality requirements of the abstracted water.

5.2 Legislation, policy and guidance

5.2.1 This section examines key legislation and policy frameworks relevant to water resources and flood risk, emphasising alignment with the National Policy Statement (NPS) for Water Resources Infrastructure (Defra, 2023a), the National Planning Policy Framework (NPPF) (MHCLG, 2024a), The London Plan (GLA, 2021a), and local plans. These policies collectively aim to protect water resources and mitigate flood risk. By considering national, regional and local polices, the Project assesses ecological and environmental objectives while addressing site-specific water resource management priorities. Relevant guidance documents relating to the protection of groundwater, the assessment of flood risk and Water Framework Directive (WFD) compliance, and the prevention of pollution are also referenced.

5.2.2 A summary of legislation and policy is provided in Appendix 1.2 National Planning Policy and Legislation Context.

Legislation

5.2.3 The Water Resources Act 1991, as amended by the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019 ('EU Exit Regulations') and the Water Resources Act 1991 (Amendment) (England and Wales) Regulations 2009, governs water resource management, flood risk, pollution prevention, and water conservation in England and Wales, ensuring sustainable use and compliance with environmental objectives. The Act establishes a comprehensive framework for flood risk management that involves stakeholder collaboration and the application of scientific methodologies to enhance resilience against flooding. Any abstraction of water greater than 20m^3/day, requires an abstraction licence.

5.2.4 The Water Resources Act 1991 Part II regulates abstraction, impounding and drought management. Most abstractions or impoundment of water require a licence. Dewatering activities would require an abstraction licence if not covered by an exemption. Licences would include quality and flow conditions and time limits, and exemptions for small abstractions are possible under specific conditions. Variations or revocations may be voluntary or initiated by the Environment Agency. Sections 20, 20A and 158 of the Act enable agreements to mitigate abstraction impacts. Drought orders and permits can modify abstraction controls during droughts. Section 161A allows issuing Works Notices to prevent, mitigate, or remediate activities polluting or likely to pollute controlled waters. Section 93 permits establishing Water Protection Zones to regulate activities within designated areas. The Environment Agency's Permitting service will be consulted on requirements for abstraction licences and discharge permits which would be required by the Project.

5.2.5 The Water Resources (Abstraction and Impounding) Regulations 2006 regulate water abstraction and impounding, ensuring sustainable management, protecting water resources, and mitigating flood risks through licensing and public oversight. De-watering activities would require an abstraction licence if they do not meet the criteria for exemption in the Regulations.

5.2.6 The Water Industry Act 1991 regulates water supply, sewage services, and sustainable resource use, emphasising resilience, quality management, and environmental protection. Part III addresses water supply duties, ensuring quality and sufficiency, while Part IIIA promotes efficient water use alongside supply protection and management. The Act requires water companies to prepare 25-year Water Resources Management Plans (WRMPs), balancing supply and demand sustainably while meeting customer needs and valuing environmental protection. The Environment Agency oversees drought management, ensuring water companies secure supplies while safeguarding the environment. Regional plans and water company Drought Plans in terms of the Act outline actions to minimise environmental impacts and maximise resources. Section 165 of the Act states that discharges shall not damage the works or property of a navigation authority or flood or damage any highway, and that discharges should be free from (as far as is reasonably practicable) mud, silt, solid, polluting, offensive or injurious substances, and any substances prejudicial to fish or spawn, or to spawning beds or food of fish. Section 166 requires consent or a permit for operational (construction or maintenance) discharges relating to water treatment.

5.2.7 The Water Framework Directive (WFD) (2000/60/EC) promotes sustainable water management by protecting water quality, reducing pollution, and enhancing aquatic ecosystems. This European Union (EU) Directive was transposed into law in England and Wales as the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017, herein referred to as the WFD Regulations.

5.2.8 The WFD Regulations and River Basin Management Plans (RBMPs) require projects to prevent habitat deterioration and achieve ecological objectives in line with WFD standards. The WFD Regulations also establish objectives for groundwater quality and quantity, aiming for good status in all groundwater bodies. These regulations guide assessments of chemical status, reversal of pollutant trends, and measures to prevent or limit pollutant inputs. They also regulate hazardous and non-hazardous substances and activities causing accidental losses. The WFD Regulations require consideration of protected areas such as nature conservation designations and drinking water protected areas.

5.2.9 The Environmental Permitting (England and Wales) Regulations 2016 (EPR), as amended, provide an integrated framework for environmental permitting for activities involving wastewater treatment and discharge (Schedule 21), groundwater activities (Schedule 22), waste, industrial emissions (Schedule 15), energy efficiency (Schedule 24), and flood risk activities (Schedule 25). Flood risk activities involve erecting any structure (temporary or permanent) in, over or under a main river or diverting the direction of flow or altering the level in a main river. Certain activities require an environmental permit under the EPR unless exempt. Conducting such activities without a permit is an offence. Permits typically include conditions to prevent pollution, and notices may control

or prohibit activities posing risks to groundwater. A permit is required for activities that are applicable to the Project:

a. On or within 8m of a main river (16m if tidal)

b. On or within 8m of a flood defence structure or culvert (16m if tidal)

c. Involving quarrying or excavation within 16m of any main river, flood defence (including a remote defence) or culvert

d. In a floodplain more than 8m from the river bank, culvert or flood defence structure (16m if a tidal main river) where planning permission has not already been granted.

5.2.10 The Environment Act 2021 enforces regulations for holding water companies and polluters accountable, with legally binding targets for reducing water pollution outlined in the Environmental Improvement Plan. The Act addresses water resources and flood risk through measures to enhance water quality, manage supply sustainably, and mitigate flooding impacts. It sets long-term targets, improves governance, and emphasises collaboration. The Act mandates the Secretary of State (SoS) to establish long-term objectives to improve water quality and availability, including sustainable abstraction levels and reducing pollution. Water quality improvements indirectly address risks by managing runoff and reducing urban and agricultural pollution. The Act mandates plans to reduce storm overflow discharges, annual data publication, real-time spill monitoring, and water quality assessments, enforced via the Water Industry National Environment Programme (Defra, 2022). The Act requires regular monitoring of water quality and ecosystem health, with reporting obligations to ensure progress toward targets, including those related to flood-prone areas. Statutory Drainage and Wastewater Management Plans are required to be developed by Water and Sewerage Companies between 2025 and 2030.

5.2.11 Regulation 85A was inserted into The Conservation of Habitats and Species Regulations 2017 by the Levelling-up and Regeneration Act 2023, and states that the relevant receiving wastewater treatment plant should be assumed to meet the relevant nitrogen or phosphorus pollution standards.

5.2.12 The Water Acts 2003 and 2014, amended by The Floods and Water (Amendment etc.) (EU Exit) Regulations 2019, focus on sustainable water resource management, industry regulation, flood risk management, abstraction licensing, competition, and consumer protection while promoting environmental conservation and resilience to natural hazards. Sections 81 to 83 of the Water Act 2003 require the SoS to promote water conservation and public authorities, including local authorities and statutory undertakers, to consider the importance of conserving water. This includes promoting water efficiency through land use planning, creating development plans, and regulating development.

5.2.13 The Environment (amendment etc.) (EU Exit) Regulations 2019 ensure environmental laws function effectively post-Brexit by amending cross-cutting Acts, statutory instruments, and preventing outdated EU regulations from

automatically becoming UK law. They ensure that water quality, pollution prevention, and flood risk management obligations derived from EU directives remain enforceable. The Retained EU Law (Revocation and Reform) Act 2023 states those regulations which are covered by assimilated law after the end of 2023, including EU legislation and associated case law.

5.2.14 The Water Supply (Water Quality) Regulations 2016 ensure water quality standards will be upheld, safeguarding public health and water supplies. The Regulations establish a risk-based approach to assessment and monitoring of water intended for public supply, requiring water supply operators to consider issues in the environment. Together with The Private Water Supplies (England) Regulations 2016, they mandate safe, wholesome water for domestic and food production purposes. Monitoring is conducted by authorities, with the Drinking Water Inspectorate overseeing public water supplies and advising on private supplies. Drinking water protected areas provide water for drinking and food production. Risk assessments identify risks, safeguard zones focus pollution prevention, and permits address diffuse and point pollution for protection. The assessment of water for public supply is subject to separate regulation by the Drinking Water Inspectorate. As such, this chapter does not address drinking water quality requirements of the abstracted water. A drinking water safety plan will be produced separately through the Regulators' Alliance for Progressing Infrastructure Development (RAPID) process.

5.2.15 The Private Water Supplies (England) Regulations 2016 establish objectives and minimum standards for private drinking water supplies, introducing local authority powers and risk-based assessments to safeguard larger private supplies.

5.2.16 The Water Abstraction and Impounding (Exemptions) Regulations 2017 allow specific exemptions from restrictions on water abstraction and impounding works, covering activities like emergency responses, engineering works, and managed wetland systems, with conditions ensuring environmental protection.

5.2.17 The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 require the evaluation of environmental impacts, including water resources and flood risk, for infrastructure projects, with a focus on mitigation and stakeholder consultation to ensure sustainable development and compliance.

5.2.18 The Environmental Damage (Prevention and Remediation) (England) Regulations 2015 address water resources and flood risk by requiring operators to prevent or remediate damage to water bodies or habitats, focusing on sustainable management, accountability, and restoration.

5.2.19 The Nitrate Pollution Prevention Regulations 2015 seek to control nitrate levels from agricultural sources through restrictions on fertiliser use, Nitrate Vulnerable Zone designations, and sustainable land management practices.

5.2.20 The Flood and Water Management Act 2010 provides for better, more comprehensive management of flood risk for people, homes and businesses,

helps safeguard community groups from unaffordable rises in surface water drainage charges, and protects water supplies to the consumer. It places a duty on all flood risk management authorities to co-operate with each other and provides Lead Local Flood Authorities (LLFAs) and the Environment Agency with power in connection with their flood risk management functions. The Flood and Water Management Act 2010 also requires new developments to incorporate mandatory Sustainable Drainage Systems (SuDS) by 2024 to mitigate flood risks and enhance water quality, in line with National Standards.

5.2.21 The Urban Wastewater Treatment (England and Wales) Regulations 1994, transposed from the EU Directive, Urban Wastewater Treatment Directive 91/271/EEC (as amended) regulate wastewater collection, treatment, and disposal, reducing pollution, and ensuring environmental compliance through monitoring and treatment standards. The Regulations set treatment standards and emission limits based on population and receiving waters' sensitivity.

5.2.22 The Anti-Pollution Works Regulations 1999 address water resources and flood risk by empowering authorities to issue notices for preventing or remedying pollution incidents, ensuring compliance, and safeguarding controlled waters against environmental damage.

5.2.23 The Environment Act 1995 established the Environment Agency to oversee water resource management and flood risk, transferring functions from the National Rivers Authority, including water resources management, pollution control, flood defence, and fisheries protection. It aims to protect and enhance the aquatic environment while promoting sustainable development. Environment Act 1995 Section 6(2) places a duty on the Environment Agency to conserve, redistribute or augment water resources and to secure their proper use including their efficient use.

5.2.24 The Environmental Protection Act 1990 includes provisions for controlling pollution, managing waste, and protecting water quality, emphasising sustainable environmental practices and compliance by regulatory authorities. The Act controls point source discharge from historic contaminated land sites.

5.2.25 The Infrastructure Act 2015 indirectly addresses water resources and flood risk through provisions on sustainable infrastructure development, environmental protection, and efficient resource use, promoting resilience in managing water and mitigating flooding impacts.

5.2.26 The Land Drainage Act 1991 governs water resources and flood risk through internal drainage boards, promoting efficient land drainage, regulating watercourses, and supporting flood prevention strategies to safeguard agricultural and urban areas.

5.2.27 Bathing water quality, regulated by the Bathing Water Regulations 2013, is classified into four categories: excellent, good, sufficient, and poor. The Environment Agency oversees compliance, addressing pollution.

5.2.28 The Thames Conservancy Act 1932 empowers the Conservators of the River Thames to manage navigation, prevent pollution, maintain water flow, and implement flood defence measures along the Thames.

5.2.29 The Marine and Coastal Access Act 2009 establishes the Marine Management Organisation to regulate activities, protect marine ecosystems, manage coastal erosion, and improve flood defences sustainably. Any decision that may affect marine areas must be made in accordance with the marine plans issued in terms of Section 58(1). Projects that require a marine licence are governed by the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended). Any decision that may affect marine areas must be made in accordance with the marine plans issued in terms of Section 58(1).

5.2.30 The Port of London Act 1968, as amended, would apply to the Project through licensing requirements for works in the River Thames, pollution prevention measures, and navigation regulations. The Port of London Authority's (PLA) jurisdiction covers the Thames Tideway, including the area from Teddington Lock to the North Sea, including Richmond Pound.

National policy

National Policy Statement for Water Resources Infrastructure

5.2.31 Key policies relevant to water resources and flood risk set out in the NPS for Water Resources Infrastructure (Defra, 2023a) are provided in Table 5.1, along with an indication of how these matters have been addressed.

5.2.32 The relevant paragraphs from the NPS have been gathered into themes in Table 5.1, with an overview of those themes, to capture the breadth and depth of how the NPS is relevant to the overarching rationale behind the Project for the topics covered in this chapter

Table 5.1 Key policy from the NPS for Water Resources Infrastructure

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
2.1.2, 2.1.3, 2.6.15, 2.6.17 and section 2.3.	Building and maintaining resilience *There is an immediate need to build resilience in the water sector to address pressures on water supplies. Securing long term resilience involves planning for future events (such as drought events) as effectively as we can, to mitigate the impacts whilst ensuring value for money for consumers.* *This could include other options to enhance the storage capability of the water supply system and water available for use, including but not limited to effluent re-use schemes and aquifer re-charge. Whilst not identified as a separate water resource activity in the Planning Act, large scale effluent reuse is likely to result in large transfers and be part of the water resources management plan.*	The Project is being developed to secure long term resilience for future events, specifically drought resilience. Chapter 2: Project Description presents further information on the current design and Chapter 3: Consideration of Alternatives outlines the development of the Project and consideration of alternate options. In summary, the Project provides 75 megalitres per day (Ml/d) water supply, mitigates climate change risks, and incorporates resilient infrastructure design. The Project involves treating wastewater to a higher standard for discharge into the River Thames by passing it through a tertiary treatment facility, enhancing water availability during drought conditions. The Project's water recycling processes are designed to contribute to resilience by maintaining water availability through periods of drought and high demand. The Project is part of Thames Water's WRMP (2025–2030) (Thames Water, 2024), which sets out how sufficient water will be made available to meet anticipated demands, whilst protecting the environment, in line with strategic priorities for Ofwat.
2.2.8 to 2.2.10	Population growth increases water demand *The demand for water is closely linked to population growth.* *The National Framework for water resources estimates that around 1,040 Ml/d of the additional estimated 3,435*	The need for the Project is directly driven by a changing climate and population growth. Chapter 2: Project Description presents further information on the current design and Chapter 3: Consideration of Alternatives outlines the development of the Project and consideration of alternate options.

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
	Ml/d capacity needed by 2050 will be attributable to the growing population. *Some of the driest areas of the country, including the South East and the East are also those forecast to have the highest rates of population growth.*	The Project would contribute to meeting future water demands, addressing population growth and resource planning and promoting sustainable supply by 2050. This chapter also considers the other pressures on water availability including climate change impacts on river flows as well as impacts from abstracting water on the water environment.
2.5.11	Justification for development consent in the context of water resources management plan *When applying for development consent, the applicant must submit a statement with a clear assessment of the proposal in the context of the water resources management plan and summarise the results of the water resources management plan annual review process and anything relevant to the development consent application.*	The Project, part of Thames Water's WRMP (2025–2030) (Thames Water, 2024) approved in 2024, is one of seven collaboratively explored Strategic Resource Options (SRO), identified for implementation by 2033 in the Water Resources South East (WRSE) Regional Plan (WRSE, 2023).
3.7.3 – 3.7.7	Climate change adaptation *Climate change adaptation measures will be essential to the management of the impacts of climate change. These impacts include an increased risk of drought and flooding, drier summers and warmer wetter winters, more intense rainfall events and rising sea levels. Water resources infrastructure will be required to address future pressures on the public water supply, including those from climate change. The contribution that water resources nationally significant infrastructure projects make towards ensuring a resilient water supply and*	The Project is being developed to secure long term resilience for future events, specifically drought resilience. The Flood Risk Assessment presented in Appendix 5.2 which considers the impacts of climate change and mitigation measures to manage flood risk considering climate change throughout the full lifespan of the Project. This has involved the consideration of the credible maximum scenario for nationally significant infrastructure projects to help assess how sensitive essential infrastructure development is to changes in the climate for different future scenarios.

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
	preparedness for drought is set out in section 2 of the NPS. *New water resources infrastructure will typically be a long-term investment which will need to remain operational over many decades. Consequently, the applicant must consider the impacts of climate change at design, build and operational stages.* *Detailed consideration must be given to the range of potential impacts of climate change using the latest UK planning practice guidance on climate change allowances, and to identify appropriate mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure.* *Where water resources infrastructure includes safety critical elements, the applicant should apply the high emissions scenario at different probability levels so as to include high impact, low likelihood scenarios to those elements critical to the safe operation of the infrastructure.* *Any adaptation measures should be based on the latest set of UK Climate Projections, the most recent UK Climate Change Risk Assessment, consultation with statutory consultation bodies, and any other appropriate climate projection data.*	Potential significant effects relating to flood risk and climate change are also included in Section 5.8 with reference to in-combination effects with climate change which are further discussed in Appendix 18.1. The future baseline (Section 5.7) considers the implications of climate change on flood risk.
4.1.2	Consider all relevant infrastructure impacts *Many topics summarise areas of potential significant impacts associated with water resources infrastructure. There may be impacts, for which policy is not set out in*	This chapter seeks to assess water resources and flood risk impacts with the preliminary assessment of likely significant effects presented in Section 5.8 of this Chapter. These assessments are supported by the Appendices to this Project: Appendix 5.1 Surface Water and Water Quality Baseline Information; Appendix 5.2 Flood Risk

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
	the National Policy Statement, which the decision maker will wish to consider when they determine that the impact is relevant and important to their decision.	Assessment (FRA); Appendix 5.3 Water Framework Directive Screening. Potentially significant impacts associated with other environmental aspects are assessed in this PEI Report (Chapters 6 to 19).
4.1.4, 4.10.6, 4.10.7	(In relation to river transport and users of the river) Sufficient information for formal assessments *Applicants should discuss what information is needed with the Planning Inspectorate, statutory bodies and other relevant organisations as early as possible. Any assessment should be based on the most up to date data and guidance.* *Access to high quality open spaces and the countryside and opportunities for sport and recreation can be a means of providing necessary mitigation and/or compensation requirements. Green and blue infrastructure can also enable developments to provide positive environmental, social, health and economic benefits.*	The Navigational Assessment Report produced for RAPID Gate 2 would be updated for the Thames Tideway, discussed with the PLA and published as part of the ES. Appendix 5.1 gives baseline and modelled information on river water levels and sedimentation levels for the freshwater and tidal Thames. This information will be used for (formal) assessments by other disciplines looking at all river users and open space including Chapter 15 – Socioeconomics, Community Access and Recreation.
4.7.4, 4.7.5, 4.7.6, 4.7.7, 4.7.8, 4.7.9, 4.7.10, 4.7.12, 4.7.13, 4.7.15, 4.7.16, 4.7.17,	Flood risks, drainage, climate, mitigation, safety *Applications for infrastructure projects should be accompanied by a flood risk assessment* *The applicant should identify and assess the risks of all forms of flooding to and from the development, and demonstrate how these flood risks will be managed, taking climate change into account.*	The FRA (Appendix 5.2), drainage strategies and outcomes of engagement with the LLFA will be included in the Environmental Statement (ES) for all other sites in Flood Zones 2 and 3, and sites with an area greater than 1ha. Since 2021, regular engagement has been held with the Environment Agency's National Appraisal Unit (NAU), with representatives from the Environment Agency and Natural England. Local Planning Authorities (LPAs) and LLFAs were consulted on flood risks. The relevant

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
4.7.19, 4.7.20, 4.15.11	*The applicant should ensure that the development's design takes into account flood risk and should put forward measures to mitigate the impact of flooding. Mitigation measures will need to be developed as part of the applicant's application for development consent to ensure that it is safe from flooding and will not increase flood risk elsewhere for the proposed development's lifetime, taking into account climate change.*	Strategic Flood Risk Assessment (SFRA) maps were reviewed to assess risks of groundwater flooding. The future baseline (Section 5.7) considers the implications of climate change on flood risk. The FRA shows if the Sequential or Exception tests are required. Chapter 18: Climate Change addresses climate change vulnerabilities – the operational lifetime is 60 years, so design and maintenance must consider extended climate resilience. Level-for-level floodplain compensation, SuDS and other flood risk mitigations would address potential flood impacts and are included in the FRA. A Drainage Strategy would be included in the ES to manage surface water runoff where required to prevent flooding on-site or elsewhere during the operational phase.
4.15.4, 4.15.5, 4.15.6, 4.15.12, 4.15.13, 4.15.14, 4.15.15	Water quality, WFD reporting and permitting *The planning system should contribute to and enhance the natural and local environment. It should do this by preventing both new and existing development from contributing to water pollution so that the environment is not adversely affected or put at unacceptable risk. The government has issued guidance on water supply, wastewater and water quality considerations in the planning system. Water companies have an important role in protecting and enhancing the water environment. The government expects water companies to deliver water environment improvements, such as reduced nutrient pollution and sewage discharges from storm overflows.*	The Project upgrades the Mogden Sewage Treatment Works (STW) with a tertiary treatment plant (TTP), aiming to enhance effluent quality and reduce nutrient pollution using advanced processes such as Moving Bed Biofilm Reactor (MBBR). Pollution control measures be captured in the ES in the Code of Construction Practice (CoCP). Continuous monitoring would ensure compliance, with positive effects predicted by 2032. Environmental assessments would support any relevant permits and licences aligning with regulations. Ongoing engagement with the Environment Agency National Permitting service ensures abstraction and discharge activities comply with environmental regulations. A separate WFD screening and scoping assessment (Appendix 5.3) has been undertaken which follows Planning Inspectorate (PINS) advice. Stage 3 – WFD

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
	Where the proposed development is likely to have adverse effects on the water environment, the applicant should undertake an assessment of the existing status and impacts of the proposed development on water quality, water resources and physical characteristics as part the Environmental Statement. A project specific Water Framework Directive assessment may also be required.	Impact Assessment would follow as a next step for those water bodies where a more detailed impact assessment is required. Water quality impacts are assessed in Section 5.8. As the Project progresses, further engagement would be undertaken with the Environment Agency's Permitting service regarding the abstraction and discharge permits for the Project.

National Planning Policy Framework

5.2.33 The NPPF (MHCLG, 2024a) outlines England's planning policies, emphasising sustainable development. Key considerations include protecting natural, built, and historic environments and improving biodiversity, prudent resource use, reducing waste and pollution, mitigating climate change, transitioning to a low-carbon economy, and implementing planning policies to prevent water pollution. Development plans and decisions support RBMPs by aligning with the NPPF's sustainable development goals, addressing water pollution risks, climate change adaptation, and water infrastructure provision.

5.2.34 The NPPF requires that development should be directed away from areas at highest risk of flooding (whether existing or future) through the sequential test. Where development is necessary in such areas, the development should be made safe for its lifetime without increasing flood risk elsewhere. The FRA considers these potential effects (See Appendix 5.2).

5.2.35 The FRA should highlight when Sequential or Exception tests are required. Exception Tests may need to be applied for developments in Flood Zone 3, depending on the flood risk vulnerability of the proposed development. To pass the Exception Test it should be demonstrated that the development would provide wider sustainability benefits to the community that outweigh the flood risk, and that the development will be safe for its lifetime without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. The FRA must demonstrate that the site can manage residual risks effectively and incorporate SuDS where feasible, with multifunctional benefits, including improving water quality and biodiversity.

5.2.36 The NPPF requires that all developments include SuDS where appropriate, based on advice from the LLFAs, including proposed minimum operational standards, maintenance arrangements for the lifetime of the development, and that the implemented SuDS provide multifunctional benefits, wherever possible. The NPPF advocates for planning for the long-term implications of climate change and for natural flood management as part of an integrated flood risk approach, to complement hard engineering solutions and enhance climate resilience. Depending on assessment conclusions, the development and implementation of SuDS would be considered as further mitigation measures to control water runoff rates and volumes. SuDS must be proportionate, ensure long-term maintenance is agreed, and provide operational standards over the development's lifetime.

Other national policy

5.2.37 The Environment Agency's five-year Water Industry National Environment Programme (Defra, 2022) drives water company environmental improvements, supporting WFD objectives, preventing status deterioration, and aiming to achieve good status, while ensuring compliance with existing permit obligations.

5.2.38 The Department for Environment, Food and Rural Affairs (Defra) 25 Year Environment Plan (UK Government, 2018) (25YEP) and the Environmental

Improvement Plan (UK Government, 2023) commit to leaving the environment in a better state within a generation. The Environmental Improvement Plan (2023) is the first revision of the 25YEP, and it contains 10 goals including clean air, plentiful water, thriving wildlife, enhancing biosecurity, reduced risk of harm and environmental hazards, and climate change adaptation and mitigation. Progress is tracked annually by Defra using the Outcome Indicator Framework. The 25YEP emphasises improving water quality and managing flood risks by:

a. Reducing water pollution from agriculture, industries, and urban areas to ensure clean and plentiful water resources
b. Expanding natural flood management measures and SuDS
c. Protecting water ecosystems through better land use planning and restoring habitats like wetlands and peatlands
d. Enhancing community resilience to flooding through risk assessment and infrastructure planning

5.2.39 On 4 April 2023, the UK Government introduced the Plan for Water (UK Government, 2023a), addressing pollution from storm overflows, agriculture, plastics, road runoff, and chemicals, while tackling climate and population pressures.

5.2.40 Improving water and environmental quality requires collective effort, not solely government action. Defra's Catchment Based Approach (CaBA), established in 2013, supports community-led partnerships across 106 catchments in England, fostering collaboration to identify local issues, prioritise actions, and mobilise resources. CaBA partnerships engage 2,500 organisations, delivering 1,000 projects annually with significant investment returns (UK Government, 2022a).

5.2.41 The Flood and Coastal Erosion Risk Management: Policy Statement (UK Government, 2020) outlines the UK government's goals to reduce flood and erosion risks. It emphasises upgrading infrastructure, promoting nature-based solutions, improving community preparedness, and enabling resilient local plans. A record £5.2 billion investment over six years will fund these initiatives, reducing flood risks and enhancing environmental and economic resilience.

Guidance

5.2.42 Planning Practice Guidance (PPG) (MHCLG, 2024b) emphasises a healthy water environment, adequate infrastructure for sustainable development, adherence to RBMPs, a catchment-based approach, and water supply considerations in planning applications. National PPG on water supply, wastewater and water quality (MHCLG, 2019) emphasises integrating water quality and infrastructure planning to prevent flooding and pollution while ensuring sustainable development. It outlines legal frameworks, mitigation measures like SuDS, wastewater management, environmental assessments, cross-boundary cooperation, and consultation with relevant authorities. The Environment Agency's Approach to Groundwater Protection emphasises safeguarding groundwater as a vital resource (Environment Agency, 2018a) and includes regulations and position statements for pollution prevention, risk-

based management, and restoration. Key areas addressed include source protection zones, groundwater permitting, infrastructure impacts, waste management, effluent discharges, and natural habitat conservation to ensure sustainable water use.

5.2.43 To safeguard river catchments under The Conservation of Habitats and Species Regulations 2017 from nutrient pollution, Natural England and Defra have identified 27 catchments across 74 English LPAs requiring nutrient neutrality measures due to excessive pollution (UK Government, 2023b). Planning permission in nutrient neutrality catchments requires a Habitats Regulations Assessment (HRA) showing neutral nutrient impact. Mitigation measures must demonstrate certainty, with obligated wastewater upgrades by 2030 reducing burdens. Water company pollution reductions lower baselines but do not replace required mitigation (Local Government Association, n.d.).

5.2.44 The guidance on Flood Risk Assessments: Climate Change Allowances (Environment Agency, 2022a) outlines using climate change allowances in flood risk assessments to ensure resilience. Including considerations for peak river flow, rainfall intensity, sea level rise and offshore factors, it provides for early engagement with authorities, applying adaptive approaches, and tailoring assessments for development types and locations, ensuring compliance with Environment Agency standards. This guidance is addressed in the FRA which is provided in Appendix 5.2.

5.2.45 The Flood Risk and Coastal Change guidance (UK Government, 2022b) details the procedures for managing flood risk in line with the NPPF, establishing strict criteria to safeguard people and property. Developments should be refused if these criteria are unmet, safer sites are available, or flood risk cannot be mitigated without affecting other areas. Measures to manage, control, or mitigate flood risk must also avoid exacerbating risks elsewhere. This guidance is addressed in the FRA which is provided in Appendix 5.2.

5.2.46 The guidance ‘Using modelling for flood risk assessments’ (Defra, 2023c) has been applied in the FRA (Appendix 5.2). The guidance outlines how hydrological and hydraulic modelling supports FRAs for planning applications and compliance with Environment Agency standards, using existing data, developing method statements, and quality assurance. The guidance highlights assessing baseline and post-development flood risks, including climate change impacts, and addressing off-site effects to ensure no increased flood risks.

5.2.47 Non-statutory guidance on WFD Assessment in the Nationally Significant Infrastructure Project Advice on the Water Framework Directive (PINS Advice Note 18) explains the preferred methodology for conducting WFD assessments. The WFD assessment for the Project is presented in Appendix 5.3 Water Framework Directive Regulations Screening.

Local and regional policy

5.2.48 In addition to the national policy set out above, the Project must also have regard to the following relevant local plans, policy and projects:

a. The London Plan (GLA, 2021a) - Water Management: Requires sustainable water use, infrastructure efficiency, wastewater systems, and flood risk mitigation.

b. Thames Estuary 2100 Plan (TE2100) - Framework for tidal flood risk management, accelerating upgrades to defences and Thames Barrier (Defra, 2023d).

c. River Thames Scheme (Surrey County Council and Environment Agency, 2025) - Reduces flood risk, enhances green spaces, and promotes sustainable communities.

d. Estuary Edges Guidance (PLA, 2023) - Advocates natural habitat restoration for flood risk reduction and water quality improvement.

e. Thames Landscape Strategy (Thames Landscape Strategy Partnership, 2012) - Focuses on biodiversity, flood mitigation, and reconnecting communities with the Thames.

f. London River Health Initiative (GLA, 2025) - Aims for swimmable waterways by 2034, improving water quality and sewer infrastructure.

g. Port of London Teddington to Broadness Recreation Users Guide (PLA, n.d.) - Ensures sustainable recreational use while protecting water resources.

h. Thames River Basin District (RBD) RBMP (Environment Agency, 2022b) - Reviewed every six years to enhance habitats and flood management. The Thames River Basin District (RBD) RBMP 2027) aims to improve fish passage, remove barriers, and reconnect floodplains.

i. London Sustainable Drainage Action Plan (GLA, 2021b) - Retrofitting SuDS to mitigate flood risks and pollution.

j. Securing London’s Water Future (GLA, 2011a) - Focuses on water efficiency, infrastructure, and flood resilience.

k. London Climate Change Adaptation Strategy (GLA, 2011b) - Improves flood defences and integrates resilience planning.

l. Thames Abstraction Licensing Strategy (ALS) (Environment Agency, 2019) - Ensures sustainable water use while managing flood risks.

m. Thames RBD Flood Risk Management Plan (2021-2027) (Environment Agency, 2022c) - Aims to reduces flood risks for 15 million people with nature-based solutions.

n. Thames Catchment Flood Management Plan (CFMP) (UK Government, 2009) - Addresses flood risks for 135,000 properties using sustainable policies.

o. Kingston Core Strategy (RBK, 2012) - Requires riverside developments to prioritise flood protection and biodiversity.

p. Kingston Local Plan (Draft 2019) (RBK, 2019) - Sets sustainable flood risk management approach.

q. Kingston SFRA Level 1 (RBK, 2024) - Assesses flooding risks and informs local planning policies.

r. London Borough of Richmond Upon Thames Adopted Local Plan (LBR, 2018) - Policies for flood risk and sustainable drainage, and for water resources and infrastructure.

s. London Borough of Richmond Upon Thames Draft Local Plan (LBR, 2023) - Protects the Thames corridor while supporting sustainable flood management.

t. Richmond SFRA Level 1 Update (LBR, 2021) - Identifies high flood risk areas and mitigation strategies.

u. Hounslow Local Plan (2015-2041) (LBH, 2015) - Policies for flood risk management and water body protection.

v. Hounslow Draft Local Plan (2020-2041) (Regulation 19) (LBH, 2024) - Policies for flood risk management and water body protection

w. Hounslow Surface Water Management Plan (LBH, 2021) - Strategic approach to managing surface water flood risks.

x. Hounslow Local Flood Risk Management Strategy (LBH, 2022) - Collaborative framework for local flood risk management.

y. Hounslow SFRA Level 2 (LBH, 2024) - Assesses flood risks for specific high-risk sites.

z. West London SFRA (2018 and 2024 Update) (West London Alliance, 2018) - Strategic flood risk overview for West London boroughs.

5.3 Consultation, engagement and scoping

5.3.1 Table 5.2 presents the section of the Scoping Opinion (PINS, 2024) relating to water resources and flood risk, and our response to those comments.

5.3.2 Additional feedback received from the PLA and the Environment Agency is included after Table 5.2 for completeness.

Table 5.2 Key scoping opinion comments for water resources and flood risk

PINS ID Reference	Comment	Response
PINS (ID 2.1.2)	*Paragraph 2.2.1 of the Scoping Report states that the Proposed Development would intermittently supply up to a maximum of 75Ml/d. The ES should explain the transferral of this water including whether the inflow and outflow would operate at the same time, what the flow rate of transferral would be, if there would be any changes in thermal properties and if this has potential to alter flow rates within the River Thames. This should be used to inform relevant ES aspect assessments such as terrestrial and aquatic ecology, and water environment and flood risk.*	Transferral of water is detailed in Chapter 2: Project Description. All potential effects of the water transfer have already been scoped in for the relevant chapters, but further cross-references to the Project Description have been added within this chapter to provide clarity.
PINS (ID 2.1.3)	*The Proposed Development would connect into existing infrastructure, including at Mogden STW, where modification of storm tanks and the existing embankment is proposed. It would result in abstracted water from the River Thames being conveyed to the existing Lee Valley reservoirs via Lockwood Pumping Station. It may interact with existing flood defences on the Tidal Thames and affect future raising of flood defences, as outlined in the TE2100 Plan.* *The ES should identify and describe all consequential or related works to existing infrastructure and any changes to permits required, including those proposed to be delivered outside of the DCO. It should confirm the mechanism for delivering these works and status of any application(s). Any likely significant effects arising from the cumulation of the Proposed Development and such works during construction, and operation and maintenance, should be assessed in the ES. The ES should explain how any temporary construction activity would be managed to avoid or reduce effects to existing infrastructure.* *The ES should include diagrams and figures to illustrate how the different components of the Proposed Development interact with*	The ES will describe all consequential and related works to existing infrastructure and any changes to permits. The status of permits and secondary consents will be included in documents such as Statements of Common Ground which will be developed alongside the ES. The embedded (primary) and best practice (secondary) mitigation measures discussed in Section 5.4 identify the requirements for permits and secondary consents for construction and operation. This chapter has undertaken the preliminary assessment of likely significant effects which will be further developed in the ES as the design develops. The flood risk and WFD assessments for the project are presented in Appendices 5.2 and 5.2 and

PINS ID Reference	Comment	Response
	existing infrastructure, including modifications required to the existing storm tanks and embankment at Mogden STW.	will also be further developed as the design progresses.
PINS (ID 2.1.13)	*Paragraph 2.4.6 of the Scoping Report states that cofferdams may be required for construction works in the River Thames. Relevant parameters for cofferdams, including the maximum number and dimensions, should be described in the ES. Any likely significant effects associated with use of cofferdams should be assessed in the relevant ES chapters e.g. impacts to flood risk, ecology etc.*	The use of cofferdams is detailed in Chapter 2: Project Description. The effect of construction of cofferdams at the intake and outfall locations is assessed in Section 5.8 of this chapter and within Chapter 6: Aquatic Ecology and would be further considered in the ES.
PINS (ID 2.1.19)	*The ES should include a description of the nature and quantity of natural resources proposed to be used during construction, and operation and maintenance, including:* • *Any additional water supply required (including for concrete production), including the predicted volume and source.* • *Substances required for the water recycling processes, including the predicted volume and source of supply.* • *Energy requirements for the operation of the TTP and effluent pumping station(s), including the predicted demand and source.* • *Any likely significant effects arising from these matters should be assessed in the ES.*	Water demand during construction has been scoped out as discussed in 'Summary of scope of the EIA' section of this chapter. Further details of water demand during construction will be provided in the ES.
PINS (ID 3.8.6)	*Scoping Report paragraph 13.5.6 states that these sites are low risk during construction because they are not hydrologically connected to any watercourses.* *The Inspectorate notes that the EA (Appendix 2 of this Opinion) advises that dewatering of gravels (if required) may be in hydrological continuity with surface waters and the risk of impact has not been considered. Therefore, the Inspectorate does not have enough evidence to scope*	Tudor Drive and Thames Lee Tunnel (TLT) connection pipeline have been scoped in for assessment of potential impacts on groundwater resource. As there are no surface water bodies located in the proximity of the Tudor Drive site, surface water resources have been scoped out due

PINS ID Reference	Comment	Response
	this matter out. The ES should identify if there is hydrological continuity and where there is potential for likely significant effect, this should be assessed in the ES.	to the distance to the nearest surface water receptor (>200m). At Mogden STW, the Duke of Northumberland's River is concrete lined and not in hydraulic connectivity with the groundwater. Therefore, it is scoped out of the PEI Report and ES.
PINS (ID 3.8.9)	*The conveyance tunnel is proposed to be constructed using tunnel boring technique and would be located within London Clay, which is stated to provide an appropriate barrier to underlying aquifers due to its thickness and impermeability. On this basis, the Inspectorate agrees to scope this matter out. However, the ES should confirm the assumptions made about locating the tunnel within London Clay following completion of further ground investigation. If it is subsequently determined that the tunnel needs to enter or pass within influencing distance of underlying Chalk (principal aquifer) or could be affected by piezometric pressure within the aquifers, then this matter should be assessed in the ES supported by a hydrogeological risk assessment.*	Preliminary Ground Investigation (GI) information is presented in Appendix 10.1 London Water Recycling SRO – TDRA Phase 1 Ground Investigation Interim Factual Report. The conveyance tunnel will remain scoped in for assessment until ground conditions are confirmed based on the outcomes of the Phase 2 GI, which is due to be completed prior to the ES. Hydrogeological impact assessment to be undertaken to determine if the tunnel interfaces with the underlying Chalk (principal aquifer) or could be affected by Chalk piezometric pressure. The hydrogeological impact assessment would additionally determine whether sensitive groundwater receptors may be adversely affected by groundwater control during construction activities.

PINS ID Reference	Comment	Response
PINS (ID 3.8.10)	*The Inspectorate considers that where there is potential for significant effects at the intake, it is likely there would be potential for significant effects at the outfall. Scoping Report paragraph 13.5.23 does not explain why the outfall specifically is scoped out of further assessment.* *The Inspectorate agrees that impacts from the operation of the Proposed Development on groundwater sources can be scoped out except for impacts at the intake and outfall, and the area between the two locations and up to Teddington Weir. The ES should either provide evidence that there is no impact pathway for these locations or assess significant effects where they are likely to occur.*	The ES will further assess operational impacts or provide evidence of no impact pathway on groundwater resources at the intake and outfall, as well as the area between the two locations and up to Teddington Weir during operation. Initially this is considered in the Burnell Avenue sections of this report (see Section 5.8).
PINS (ID 3.8.14)	*The Scoping Report states that the Proposed Development will operate at times of low flow but does not define what this constitutes. Paragraph 17.4.27 states that 15 Ml/d could be discharged during operation in periods of non-drought, which could result in a net increase in flow to the River Thames.* *On this basis, the Inspectorate does not agree to scope this matter out. The ES should assess impacts to flood risk from the discharge of water from the outfall during operation where significant effects are likely to occur.*	The discharge of operating flow is assessed within this chapter. The new TTP would recycle up to 75Ml/d of final effluent from Mogden STW. When the Project is operating (during drought conditions), Mogden STW would discharge less water through its existing outfall to the estuarine Thames Tideway. During times when the Project is not operating for the benefit of water resources (i.e. the Project's intake on the River Thames is not in operation, in non-drought periods), the TTP would run at a reduced capacity of 15Ml/d in order to maintain its system. At these times, recycled water produced would be returned to Mogden STW's final effluent channel and discharged at Isleworth Ait, in the Thames Tideway.
PINS (ID 3.8.15)	*When the Proposed Development is not operational, 15 Ml/d would be flushed through the TTP to maintain biomass within the moving bed biofilm reactor, which could result in a net increase in flow to the River Thames at the Mogden STW outfall.* *The ES should assess impacts to flood risk from the discharge of water from the Mogden STW outfall during operation where significant effects are likely to occur.*	

PINS ID Reference	Comment	Response
		There is no net change in the rate of discharge at Isleworth Ait and no discharge to the freshwater River Thames through the Project's outfall when the Project is not in operation or the benefit of water resources. Therefore it has been scoped out of the assessment.
PINS (ID 3.8.16)	*Climate change impacts on the future baseline for flood risk are proposed to be scoped in in Scoping Report paragraph 13.6.89 but there is no reference to other potential effects from climate change such as water availability or water quality which could affect the operation of the Proposed Development and the water environment.* *The ES should assess climate change impacts on the future baseline for water resources where significant effects are likely to occur.*	Section 5.8 includes a preliminary assessment of the in-combination effects with climate change. The ES will further assess climate change impacts on the operation of the Project and the water environment where significant effects are likely to occur.
PINS (ID 3.8.17)	*The Applicant should make effort to agree the study area with the Environment Agency and to confirm that it is based on an appropriate zone of influence.*	The study area is as described in Section 5.6 of this chapter and as shared in the EIA Scoping Report; the baseline conditions of the study area are then described in Section 5.7. The study area has been confirmed through engagement with the Environment Agency and further ongoing engagement will be undertaken through the EIA process.
PINS (ID 3.8.18)	*Scoping Report paragraph 13.6.7 refers to the survey results from RAPID gate reports, which would be used to determine magnitude of effect on the water environment. Where these reports are used, the*	Relevant information from the RAPID Gate reports has been used to inform the baseline and assessment presented in

PINS ID Reference	Comment	Response
	relevant information should be summarised in the ES so that it is clear what is being used to inform the assessment of significant effects.	Appendix 5.1 to inform the assessment of significant effects.
PINS (ID 3.8.19)	*The operation of weirs is proposed to be used to maintain levels and assist navigation.* *Any relevant modelling should take such operation into account.*	The current modelling has taken weir operation into account and this will be continued where modelling is to be developed. The ES will contain modelling updates where applicable.
PINS (ID 3.8.20)	*The Inspectorate notes the advice from London Borough of Richmond upon Thames (Appendix 2 of this Opinion), that the Thames Barrier controls water flow levels in the River Thames and its use is likely to change over time with a changing climate. The ES assessment of water resources and flood risk should account for the impact changing use of the Thames Barrier would have on the operation of the Proposed Development.*	Appendix 5.2 FRA includes an assessment of the changing use of the Thames Barrier.
PINS (ID 3.10.6)	*Scoping Report Table 15.4 sets out the potential impacts from climate change on the vulnerability of the Proposed Development during construction. This is proposed to be scoped out as potential impacts could be managed through embedded mitigation such as best practice measures and on the basis that impacts from flooding are scoped into the ES water environment and flood risk chapter. Considering the potential impacts, the Inspectorate agrees with the approach and agrees to scope this matter out. However, it advises that for construction phase fluvial flood risk, a sensitivity assessment is undertaken based on climate change allowances applied in the FRA for the 2020s epoch.*	A sensitivity assessment-based climate change allowance has been produced in the FRA for the 2020s epoch. This has been referred to and used for assessing the flood risk impacts on the construction phase. A preliminary In-Combination Climate Impacts (ICCI) assessment (Section 5.8) has considered the implications of climate change on the operational phase of the Project.

PINS ID Reference	Comment	Response
PINS (ID 3.15.7)	*The Scoping Report identifies potential for increased navigational hazards for vessels from the presence of temporary and permanent in-water structures but does not state if a navigational risk assessment (NRA) is proposed to inform assessment in the ES. The Inspectorate advises that effort should be made to agree the requirement for an NRA with relevant consultation bodies including the Port of London Authority (PLA).*	The TELEMAC modelling described in Appendix 5.1 has been updated and predicts negligible change in water and sedimentation levels in the Thames Tideway as a result of the Project. The Navigational Assessment Report produced for RAPID Gate 2 would be updated for the Thames Tideway, discussed with the PLA and published as part of the ES. The results as described in Appendix 5.1, together with assessments described in other chapters, would inform consultation with the PLA (for the tidal River Thames) and the Environment Agency navigational team (for the freshwater River Thames) to ensure that all risks associated with in-river construction and operation activities are captured, considered and either eliminated or mitigated both up and downstream of Teddington Weir.
Port of London Authority (PLA) Environment Agency (EA) Navigational Team	*Water Resources and Flood Risk chapter:* • *Must ensure that any impact from increased sedimentation is scoped into the report and adequately evaluated in the ES* • *[…] there are a number of assessments that the PLA will have an interest in commenting on including the Community amenity assessment / accessibility assessment (which will look at Thames navigation para 16.6.27. Depending on scale of potential river use requirements a specific Navigational Risk Assessment (NRA) may need to be a considered as an additional required assessment.* *Navigation impacts during operation: depth, width, extent and nature of protection barrier around outfall.*	

5.3.3 The majority of comments received from the Environment Agency and LBR relate to the scope of the FRA. These comments are addressed in Appendix 5.2, including the following:

a. Climate change implications and the flood risk vulnerability classification
b. Sensitivity assessment
c. Fluvial and tidal flood risks
d. Potential impact on flood defences and the TE2100 Plan
e. Exception Test requirements
f. Floodplain impacts
g. Operational safety
h. Hydraulic modelling information
i. Operational life of 60 years
j. Flood risk assessment guidance
k. Discharge-abstraction continuity and controls
l. Limitations of national-scale surface water flood models
m. Operation of locks and weirs
n. Changes in use of the Thames Barrier

5.3.4 Impacts to surface water quality were raised as a concern by the Environment Agency and the LBR and this is assessed in Section 5.7.

5.3.5 The Environment Agency has recommended a scheme-wide dewatering application would be beneficial for dewatering activities associated with construction.

5.3.6 As the Project progresses, further engagement will be undertaken with the following stakeholders:

a. Environment Agency Permitting service for engagement regarding abstraction and discharge permits for the Project.
b. Continued engagement with the Environment Agency regarding water resources and water quality baseline and assessment for the Project.
c. The Environment Agency for consultation on flood risk and flood defence impacts. This includes the Environment Agency’s National Infrastructure Team.
d. The Environment Agency as navigation authority for the freshwater Thames with regard to navigational impacts.
e. Ongoing coordination with local authorities including LPA Environmental Health Officers and other stakeholders to address concerns related to storm discharges, water quality, and flooding.
f. The LLFA in each LPA which is responsible for the assessment of surface water flood risk and drainage and groundwater flood risk impacts.

g. The Greater London Authority and local authorities for continued engagement to address regional and local concerns.

h. The PLA which manages the tidal River Thames for safety, environmental and economic development, with regard to changes in water and sedimentation levels which could impact navigation.

Summary of scope of the EIA

5.3.7 This section presents a summary of the effects assessed in this chapter. The summary is based on the outcomes of the assessment in the EIA Scoping Report and the Scoping Opinion.

5.3.8 Matters that have been scoped in for assessment are presented in Table 5.3 and Table 5.4, including any changes since the EIA Scoping Report.

5.3.9 Construction phase effects which have been scoped out of the assessment based on proposed design, appropriate construction design and inclusion of a draft CoCP in this PEI Report and the ES are as follows:

a. Impacts on drainage infrastructure, including public and private assets

b. Impacts on flood risk defences through damage from the use of construction machinery and equipment

c. Water demand during construction

d. Effects on public foul water sewer infrastructure

e. Surface water effects at Mogden STW site and Tudor Drive site

f. Flood risk at Tudor Drive site

5.3.10 Whilst water demand during construction has been scoped out of the assessment, it will be described and discussed in the ES.

5.3.11 Operation phase effects which have been scoped out of the assessment in this PEI Report and the ES are as follows:

a. Impact on riverbed and/or bank stability at all above ground sites other than the Burnell Avenue site at the intake and outfall.

b. The discharge of water into the River Thames from the outfall would not increase flood risk, as the volume discharged will match the volume abstracted upstream at the intake.

c. Flood risk effects for the Tudor Drive site.

d. Effects on groundwater flow in superficial deposits with the exception of flow pathways around the intake to TLT conveyance pipeline and the retaining wall for the embankment at Mogden STW site.

e. Impacts on public water supply infrastructure and public foul sewer infrastructure.

5.3.12 Effect on water quality at Thames Water's Lee Valley reservoirs in north-east London as abstraction sources are the same. The Water Framework Directive Screening in Appendix 5.3 includes information on the assessment for physicochemical quality elements for the Lee Valley reservoirs as required under the WFD Regulations .

Table 5.3 Summary of matters scoped in for assessment – construction phase

Matter	Effect	Sites	Changed from Scoping? (Y/N)
Surface Water Resources	Potential hydrodynamic and geomorphological impact on channel bank and bed from in-river construction activities at intake and outfall in freshwater River Thames.	Burnell Avenue	N
Surface Water Resources	Potential temporary impact on surface water quality from construction phase activities (e.g. dewatering and potential contamination).	All above ground sites with pathways to surface waters excluding Mogden STW and Tudor Drive sites.	N
Groundwater Resources	Potential impact on groundwater level and alteration of baseflow components in the Principal and Secondary superficial aquifers.	TLT conveyance pipeline	N
Groundwater Resources	Potential impact on groundwater level, flow and quality from construction phase activities (e.g. excavation and dewatering at shaft locations).	All above ground sites and excavation work (excluding the conveyance tunnel)	N
Groundwater Resources	Potential temporary impact on groundwater quantity and quality from construction activities – impact on local licensed abstractors.	Burnell Avenue	N
Groundwater Resources	Potential impact on groundwater level and water quality from conveyance tunnel construction phase activities (e.g. excavation, dewatering, tunnelling) – Principal bedrock aquifer.	All above ground sites and excavation work	N Geology and design for conveyance tunnel will be confirmed for the ES.

Matter	Effect	Sites	Changed from Scoping? (Y/N)
Flood Risk	Increased flood risk through displacing floodwater elsewhere, changing surface water runoff rates and volumes, as well as from displacement of groundwater and alteration of groundwater flows.	All above ground sites except for Tudor Drive shaft site	N
Flood Risk	Potential impacts on riverbed and/or bank stability of the surrounding watercourses because of the Project - off-site developed areas.	Burnell Avenue	N
Flood Risk	Potential impacts from climate change on the vulnerability of the Project during construction.	All above ground sites and excavation work	Y

Table 5.4 Summary of matters scoped in for assessment – operational phase

Matter	Effect	Sites	Changed from Scoping? (Y/N)
Surface Water Resources	Potential impact on hydrodynamics and geomorphological processes due to abstraction at the intake, and decreased river flow both at the intake and between the intake and outfall.	Burnell Avenue	N
Surface Water Resources	Potential impact on hydrodynamics and geomorphological processes due to input of recycled water at the outfall.	Burnell Avenue	N
Surface Water Resources	Potential for impact on water quality standards, underlying water chemistry and water temperature in the River Thames due to input of recycled water at the outfall.	Burnell Avenue	N
Surface Water Resources	Potential for impact on water quality standards, underlying water chemistry and water temperature in the estuarine Thames Tideway from potential change in water quality passed forward from the freshwater River Thames (by input of recycled water at the outfall).	Burnell Avenue	N
Surface Water Resources	Potential for impact on hydrodynamics and geomorphological processes and salinity in the estuarine Thames Tideway from reductions in volume of final effluent from Mogden STW at Isleworth Ait.	Mogden STW	N
Groundwater Resources	The presence of the intake to TLT conveyance pipeline has the potential to alter groundwater flow paths to the superficial deposits.	Intake to TLT conveyance pipeline at Burnell Avenue	N

5.4 Embedded design (primary) mitigation and standard good practice (tertiary) mitigation

Embedded design (primary) mitigation

5.4.1 The Applicant has worked through the design process to avoid and reduce environmental impacts through the mitigation hierarchy and use of embedded design (primary) mitigation. The mitigation hierarchy is discussed in Sections 4.4.12 to 4.4.14 of Chapter 4: Approach to Environmental Assessment. Chapter 3: Considerations of Alternatives details the design alternatives that have been considered, including the environmental factors which have influenced the decision making.

5.4.2 Embedded design (primary) mitigation relevant to this aspect is summarised in Table 5.5.

Table 5.5 Summary of proposed embedded design (primary) mitigation measures in the construction and operation phases

Component	Embedded design (primary) mitigation measures
Shafts	Construction methodology will include groundwater and surface water controls to avoid cross-contamination of groundwater (Appendix 4.2 Commitments Register, Provisional Commitment Reference (PCR) (PCR 45). Proposed shaft and manhole at Ham Playing Fields site shall be flood resistant and/or resilient to tidal flooding. The manhole would be sealed to prevent ingress of floodwater into the tunnel (PCR 51).
Access covers (all areas)	Access covers shall be sealed for locations within the 1% Annual Exceedance Probability (AEP) flood extent, with a consideration for the climate change allowance outlined in the FRA.. (PCR 119).
Intake and outfall	In-river works would be undertaken using appropriate engineering methods, which could include the use of sheet piled areas for cofferdams where reasonably practicable, to reduce impacts on water quality (PCR 47). The intake and outfall shall be spaced at a distance to ensure no re-circulation from the (downstream) outfall to the (upstream) intake. (PCR 48). The outfall shall be positioned to ensure full mixing of recycled water in the river water prior to Teddington Weir (PCR 49). The intake and outfall design principles ensure that the two infrastructures shall be operated simultaneously. River water would not be abstracted through the intake without discharging the same volume of recycled water at the outfall, and vice versa (PCR 50). The design of the outfall will aim to prevent floodwater from entering the tunnel (PCR 120).
Conveyance tunnel and adit	The conveyance tunnel would be located within the low-permeability London Clay Formation, reducing risks to groundwater resources. The tunnel would be excavated using Tunnel Boring Machine tunnelling

Component	Embedded design (primary) mitigation measures
	methodology which requires intermediate shafts at approximately 2.5km spacing and therefore only one intermediate shaft required along the conveyance route. Conveyance tunnel depth limits interaction with surface water resources and shallow geology to only the shaft sites, which mitigates potential effects to surface water resources and the shallow aquifers along the conveyance route. If bentonite is required during construction of the conveyance route and Thames Lee Tunnel connection, injected volumes will be closely monitored to limit losses to the surrounding ground. The density of any grout used will be varied appropriately to ensure it does not leak into the aquifers, minimising risks of contamination (PCR 43). Conveyance tunnel depth avoids interaction with the River Thames, River Crane and associated flood defences. Modern tunnels experience very little groundwater ingress and as the tunnel would be entirely located in the London Clay and only surcharged during operations, there is not anticipated to be any leakage to surrounding aquifers during operation. The tunnel lining would effectively be watertight and restrict any ingress of groundwater from the surrounding geology and any leakage from the tunnel out to the surrounding geology (PCR 41).
Welfare sites (Ham Playing Fields site)	Temporary welfare sites proposed at the Ham Playing Fields site will be raised above the design flood levels, considering freeboard and climate change allowances set out in the FRA (PCR 107). A barrier around the shaft or other measures to prevent flood water ingress into the shaft during construction will be installed above the design flood levels, considering freeboard and climate change allowances set out in the FRA (PCR 108).
Proposed infrastructure (Burnell Avenue)	All proposed infrastructure at Burnell Avenue site shall be flood resistant and/or resilient to the 1% Annual Exceedance Probability (AEP) flood level, with consideration for appropriate climate change allowance and appropriate freeboard as outlined in the FRA (PCR 52).
Cofferdams (Burnell Avenue)	Finished crest levels of cofferdams, if required, at Burnell Avenue site shall be set in line with the parameters outlined in the FRA, maintaining an appropriate freeboard above the modelled defended or undefended flood levels as agreed with the Environment Agency for each area. (PCR 109)
Major accidents involving TTP operation at Mogden STW	The potential for industrial accidents, including chemical spills, pipeline ruptures, and sewage overflows, due to potential Control of Major Accident Hazards (COMAH) site effects shall be addressed through the site's COMAH requirements. The operator of the TTP shall undertake regular inspections and maintenance in accordance with manufacturers specifications. Monitoring of the TTP equipment will be undertaken using telemetry and auto-sensors to alert operators to faults and maintenance requirements. (PCR 110). Further information is presented in Appendix 4.1 Major Accidents and Disasters.

Component	Embedded design (primary) mitigation measures
On-site utilities	All on-site utilities would be mapped and considered within the design ahead of construction.
Flood plain mitigation	Flood plain mitigation shall be provided to compensate any floodplain volume lost as a result of the proposed works during the operational phase on a level for level basis to avoid fluvial floodwaters being displaced and increasing flood risk elsewhere. This applies to any sites located in the 1% AEP flood extents accounting for the appropriate climate change allowance over the operational phase for each area as detailed in the Flood Risk Assessment. (PCR 42).

5.4.3 As discussed in Chapter 2: Project Description, during normal operation of Mogden STW, part of the final effluent would be treated to a higher standard using a new TTP to be constructed in the Eastern Work Area. The design of the TTP would be developed based on the results of the ongoing pilot plant testing at Mogden STW site.

5.4.4 The pilot plant replicates the proposed process facilities and technologies on a smaller scale to observe and confirm the performance of the proposed treatment process to be included in the TTP. The proposed process technologies will also be reviewed once the requirements for the discharge permit for the Project have been agreed with the Environment Agency. The testing started in September 2024 and is currently proposed to finish in November 2025 covering a range of seasons and therefore different flows and parameters. Following this testing there will be a period of assessment and review.

5.4.5 A review of the initial results from the pilot plant has been undertaken. Although indicative, as the pilot plant activities are still ongoing with processes being calibrated, the results show encouraging trends and projected performance targets (based on similar schemes in development), as summarised below:

a. reduction in average (median) biological oxygen demand, with almost all samples achieving projected performance targets
b. reduction in median suspended solids, with similar percentage of samples achieving performance targets to Mogden STW final effluent.
c. reduction in median total ammonia concentrations, with majority of samples achieving projected performance target
d. reduction in median phosphorus concentration, although no treatment processes targeted at phosphorus included in pilot plant when sampling undertaken
e. reduction in median *Escherichia coli* (E.coli) concentration.

5.4.6 Following completion of the testing in November 2025, the results will be used to inform the next phase of the TTP design.

Standard good practice (tertiary) mitigation

5.4.7 Standard good practice (tertiary) mitigation measures would occur as a matter of course due to legislative requirements or standard sector practices. Measures identified in this section were developed in line with the Water Resources Act 1991, Water Environment Regulations 2017, and Environmental Permitting Regulations 2016 to ensure the protection of water resources and water quality.

5.4.8 Standard good practice (tertiary) mitigation for this aspect during the construction phase includes:

a. Installation of temporary drainage system at all sites as part of the surface water drainage strategy to manage surface water runoff during construction, as detailed in Appendix 5.2 FRA (PCR 53).

b. Surface water and drainage management infrastructure will be designed in accordance with the SuDS Manual (C753) (Construction Industry Research and Information Association (CIRIA), 2015); and supplementary drainage guidance from the LLFAs to ensure that the surface water runoff regime matches pre-development conditions, accounting for the appropriate climate change allowance for each area as detailed in Appendix 5.2 FRA (PCR 44).

c. A Flood Response Plan will be developed for the flood risk management and evacuation response during construction phases at each site within Flood Zones 2 and 3 as set out in Appendix 5.2 FRA (PCR 111).

d. Where compounds are required to be located within Flood Zones 2 and 3, construction design would aim to locate the most flood-sensitive equipment, facilities or materials storage in the areas of lowest flood risk or provide additional flood mitigation measures to manage on-site and off-site flood risk over the duration of the construction period, accounting for the appropriate climate change allowance for each area as detailed in Appendix 5.2 FRA (PCR 112).

e. Should there be a flood event, affected infrastructure would be inspected and repaired when it is considered safe to do so. When it is safe to re-enter the site, the site would be opened, and construction staff can return to the work (PCR 113).

f. Groundwater controls, where required to minimise the ingress of water to any shafts or excavations below the groundwater table, will be undertaken in accordance with Environment Agency abstraction licence and/or discharge permit requirements (see Section 5.11) (PCR 106).

g. Any historical or recent boreholes which have been drilled directly along the route of the conveyance tunnel or pipeline would be backfilled and sealed ahead of construction phase commencing, to limit potential pollution pathways ahead of construction phase commencing (PCR 114).

h. Water generated through construction activities including water from excavation and de-watering is expected to require settlement or other treatment prior to disposal. This will require careful planning with consideration for receptors at each site or setting and may be subject to EA permit. (PCR 54a).

i. Adherence to Guidance Reports from CIRIA including C532: Control of water pollution from construction sites (CIRIA, 2001); C736: Containment systems for the prevention of pollution (CIRIA, 2014); and C811: Environmental good practice on site (CIRIA, 2023) (PCR 54). Examples of measures applicable for the Project include but are not limited to:

    i. Storing chemicals, fuels, and oils in secure containers or bunded areas to prevent leaks or spills from reaching water sources (PCR 54b).

    ii. Any refuelling of plant, maintenance, greasing or oiling to take place over impermeable surfaces with sealed drainage or oil interceptor with no connection to watercourses (PCR 54b).

    iii. Using impermeable liners or barriers to protect groundwater from contamination from site activities, such as during the storage or disposal of hazardous materials (PCR 54b).

    iv. Adherence to The Control of Pollution (Oil Storage) (England) Regulations 2001. Additionally, any oil stored within 10m of a watercourse shall be provided with secondary containment such as bunding (PCR 103).

j. Water management plans shall be implemented for surface water runoff and groundwater, to ensure that pollutants are removed before discharge. (PCR 54b).

5.4.9 Standard good practice (tertiary) mitigation for this aspect during the operational phase includes for example:

a. Any maintenance of structures over water, such as intake and outfall, would, where reasonably practical, only use biodegradable hydraulic oils on equipment working in or over water (PCR 55).

b. A Flood Response Plan will be developed for the flood risk management and safe access and exit arrangements to enable safe operation and maintenance activities at each site over the operational phase (PCR 56) as detailed in Appendix 5.2 FRA.

c. Installation of drainage systems at all sites as part of the surface water drainage strategy to manage surface water runoff during operation, as detailed in Appendix 5.2 FRA (PCR 115).

d. The Environment Agency would regulate the abstraction and discharge licences and permits required for the operation of the Project.

5.5 Assessment methodology

General approach

5.5.1 The water resources and flood risk assessment has been compiled using relevant guidance listed in Section 5.1. The assessment methodology itself is quantitative and qualitative, based on empirical data and professional judgement.

5.5.2 The aims and objectives of the assessment are to:

a. Determine the sensitivity of water resources receptors to be affected by the Project

b. Assess the magnitude of impact on the water resources and characterise the impacts (e.g. extent, magnitude, duration, reversibility, timing and frequency)

c. Identify likely significant effects considering any standard and embedded design (primary) mitigation

d. Identify additional (secondary) mitigation measures to avoid, minimise and/or reduce the likely significant effects and identify additional enhancement measures

e. Establish any residual effects after mitigation measures have been implemented

f. Undertake assessments for construction and operational phases against the baseline and future baseline conditions and considering the impacts of climate change. The future baseline assessment is undertaken in combination with Chapter 18: Climate Change and Appendix 18.1: In-combination Climate Impacts.

5.5.3 To support this assessment the following studies have been undertaken which are summarised in this chapter, in Appendices 5.1 to 5.3 or elsewhere as indicated:

a. A description of the baseline conditions for the assessment has been developed from existing Environment Agency and Thames Water monitoring data, supported by the Project monitoring and survey data, as presented in Appendix 5.1. This illustrates the variations and trends in flow, water levels and surface water quality temporally and spatially within the study area.

b. An evidence-based study to describe and evaluate the existing and potential future flood risk, drainage, hydrodynamics, surface water quality (including chemicals and physico-chemical parameters such as water temperature). The evidence base including all the Project-specific monitoring and surveys undertaken to 31 December 2024 is detailed in Appendices 5.1 to 5.3 and summarised in Section 5.7.

c. Numerical modelling has been undertaken to further develop the understanding of the potential effects of the Project on the water environment, and to provide the evidence to support the assessment. The modelling includes hydrodynamic, water quality, and water temperature modelling in the freshwater Thames and the estuarine Thames Tideway. The hydrodynamic modelling incorporates outfall velocities, draw-down and lock operation. Further numerical modelling will be progressed for the ES to capture design development and support refinement of mitigation measures.

d. The surface water quality impact assessment evaluates the future projected baseline with and without the Project against relevant water quality standards. The impact assessment considers any changes in surface water flows, velocities, riverbed and/or bank stability of the River Thames and Thames Tideway in the study area, as potentially impacted by operation of the Project. The assessment compares any predicted changes to hydrological standards, where available.

e. Groundwater quality impact assessment is undertaken in Chapter 10: Ground Conditions and Contaminated Land.

5.5.4 Engagement with key stakeholders has been used to inform the assessments listed above. This includes input from the PLA, Environment Agency (including Permitting), LLFAs, GLA and local authorities.

5.5.5 It is noted that the Project operational phase was subject to several assessments at RAPID Gate 2, and this allowed the identification of potential effects which supported the identification of alternatives (Chapter 3) and embedded design (primary) mitigation measures (Section 5.4). These assessment reports therefore provide useful evidence which is drawn upon to support assessment within this PEI Report. The RAPID reports are available from Thames Water TDRA website (Thames Water, 2025).

5.5.6 The use of Thames Water's routine modelling of water resources supply and water demand has provided the best available information on likely patterns of the Project operational periods which have been used in this assessment.

Assessing the significance of effects

Determining the sensitivity of receptors

5.5.7 The general approach to assessing the significance of effects is set out in Chapter 4: Approach to Environmental Assessment.

5.5.8 The general approach has broadly been followed, varied slightly to incorporate the 'very high' value category, in accordance with guidance in the Design Manual for Roads and Bridges (Highways England, 2020a). The sensitivity of each identified receptor is assessed based on the criteria set out below in Table 5.6 for hydrodynamics, geomorphology, surface water quality, surface water resources, groundwater resources, groundwater quality and flood risk, as selected for assessment in the EIA Scoping Report.

Determining the magnitude of impacts

5.5.9 Table 5.7 presents criteria used to help determine the magnitude of impact for the water resources and flood risk aspect.

Table 5.6 Criteria for determining the receptor sensitivity on water resources and flood risk

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
Very high	Very high importance and rarity, international scale and very limited potential for substitution.	Geomorphology Conforms most closely to a natural, unaltered state and will often exhibit signs of free meandering and possess well-developed bedforms (point bars and pool-riffle sequences) and abundant bankside vegetation: Modular River Physical Habitat (MoRPH) Survey Conservation Status score of 8-10 (High). WFD hydromorphological designation 'not designated artificial or heavily modified'. Hydromorphological and/or Hydrological Supporting Elements of WFD status 'High'. Water quality WFD water body with 'High' status for water quality related classification elements (e.g. physico-chemical and chemical quality elements). Water quality supports habitats protected/designated under EU habitat legislation (e.g. Special Area of Conservation (SAC), Special Protection Area (SPA)) Drinking Water Protected Area	Groundwater resources Principal aquifer providing a regionally important resource and/or supporting a site protected under UK legislation for ecology and nature conservation. Public water supply - Groundwater Source Protection Zone (SPZ1). Water supporting Groundwater Dependent Terrestrial Ecosystems (GWDTEs) with a high or moderate groundwater dependence, with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and Sites of Special Scientific Interest (SSSIs).	Floodplain or defence protecting more than 100 residential properties from flooding. Areas which are highly vulnerable. These can include essential infrastructure, emergency services and basement dwellings.
High	High importance and rarity, national scale and limited	Geomorphology Shows signs of previous alteration but still retains many natural features or may be recovering towards conditions indicative of the higher	Groundwater resources Secondary A aquifers and other secondary aquifers providing a locally important	Floodplain or defence protecting between 1 and 100 residential properties or

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
	potential for substitution.	category: MoRPH Survey Conservation Status score of 5-7 (Moderate). WFD hydromorphological designation 'not designated artificial or heavily modified'. Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Supports Good'. <u>Water quality</u> WFD water body with 'Good' status for water quality related classification elements (e.g. physico-chemical and chemical quality elements). Water quality supports habitats protected/designated under UK habitat legislation (e.g. SSSI, Local Nature Reserve (LNR).	resource or supporting a river ecosystem. Public water supply – Groundwater SPZ2. Private water supplies for potable use. Water supporting GWDTEs of low groundwater dependence with a high environmental importance and international or national value, such as Ramsar sites, SACs, SPAs and SSSIs; or water feeding highly or moderately GWDTE with a national non-statutory UK Biodiversity Action Plan (BAP) priority.	industrial premises from flooding. Areas which are more vulnerable. These can include hospitals, residential units, educational facilities and waste management sites.
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution	<u>Geomorphology</u> Substantially modified by previous engineering works and likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation: MoRPH Survey Conservation Status score of 2-4 (Low). WFD hydromorphological designation 'heavily modified'.	<u>Groundwater resources</u> Aquifer providing water for agricultural or industrial use with limited connection to surface water. Public water supply - Groundwater SPZ3. Private water supply for industrial or similar use. Water supporting GWDTEs of low groundwater dependence	Floodplain or defence protecting 10 or fewer industrial properties from flooding. Areas which are less vulnerable. These can include retail, commercial and general industrial units,

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
		Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Supports Good'. Water quality WFD water body with 'Moderate' status for water quality related classification elements (e.g. physico-chemical and chemical quality elements).	with a national non-statutory UK BAP priority; or water feeding highly or moderately groundwater-dependent GWDTE sites with no conservation designation.	agricultural/forestry sites and water/sewage treatment plants.
Low	Low or medium importance and rarity, local scale.	Geomorphology Channelised (reaches whose bed and banks are mostly covered by hard protection (e.g. concrete walls or sheet piling): MoRPH Survey Conservation Status score of 1. Culverted (i.e. totally enclosed by hard protection): Conservation Status score of 1. WFD hydromorphological designation 'heavily modified' or 'artificial'. Hydromorphological and/or Hydrological Supporting Elements of WFD status 'Does Not Support Good'. Water quality WFD water body with Poor status for water quality related classification elements (e.g. physico-chemical and chemical quality elements).	Groundwater resources Unproductive strata. Water supporting GWDTEs of low groundwater dependence with no designation or groundwater that supports a wetland not classified as a GWDTE, although may receive some minor contribution from groundwater.	Floodplain with limited existing development. Water compatible development.

Value/ sensitivity	Typical description	Surface water resources	Groundwater resources	Flood risk
Negligible	Very low importance and rarity, local scale.	Geomorphology Reach entirely covered by hard protection; and/or completely culverted. Water quality Non-WFD water body or WFD water body with Bad status for water quality related classification elements (e.g. physico-chemical and chemical quality elements).	Groundwater resources No groundwater present.	No flood risk receptors.

Adapted from Design Manual for Roads and Bridges: LA 113 Road drainage and the water environment (Highways England, 2020a)

Table 5.7 Criteria for determining the magnitude of the impacts on water resources and flood risk

Magnitude	Criteria	Water examples
Major	Beneficial: Results in improvement of attribute and/or quality and integrity of the attribute.	Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Positive change to the environmental status/classification of a water feature, including water quality classification. Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource. Recharge of an aquifer. Creation of flood storage and/or a decrease in flood risk to essential infrastructure, highly vulnerable and more vulnerable receptors on a prolonged or permanent basis.

Magnitude	Criteria	Water examples
Major	Adverse: Results in loss of attribute and/or quality and integrity of the attribute.	Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource. Loss of regionally important public water supply. Negative change to the environmental status/classification of a water feature, including water quality classification. Extensive negative change to the hydrological regimes of rivers and catchments (lowered water levels, for example). Extensive negative change to the geomorphological form and functioning of rivers and catchments (disruption to natural process, for example). Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Potential high risk of pollution to groundwater from routine runoff. Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. Loss or significant damage to major structures through subsidence or similar effects linked to groundwater. Increase in flood risk to essential infrastructure, highly vulnerable, and/or more vulnerable receptors on a prolonged or permanent basis.
Moderate	Beneficial: Affects integrity of attribute, or improvement of part of attribute.	Contribution to improvement in water quality that does not lead to a change in WFD status classification. Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact positively affects the integrity or key characteristics of the resource. Improvement in water body catchment abstraction management strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE.

Magnitude	Criteria	Water examples
		Creation of flood storage, a decrease in flood risk to less vulnerable receptors on a prolonged or permanent basis, or more vulnerable receptors over a short duration.
Moderate	Adverse: Affects integrity of attribute, or loss of part of attribute.	Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact negatively affects the integrity or key characteristics of the resource. Degradation of regionally important public water supply or loss of major commercial/industrial/agricultural supplies. Contribution to reduction in water quality that does not lead to a change in WFD status classification. Moderate changes to the hydrological regime and associated catchments. Moderate changes to the geomorphological form and functioning of rivers and associated catchments. Partial loss or change to an aquifer. Potential medium risk of pollution to groundwater from routine runoff - risk score 150-250. Partial loss of the integrity of GWDTE. Damage to major structures through subsidence or similar effects or loss of minor structures linked to groundwater. Increase in flood risk to less vulnerable receptors on a prolonged or permanent basis or more vulnerable receptors over a short duration.
Minor	Beneficial: Results in some measurable change in attribute's quality or vulnerability.	Permanent addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource. Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding. Creation of flood storage, a decrease in flood risk to water compatible receptors on prolonged or permanent basis, or a decrease in flood risk impacts to less vulnerable receptors over a short duration.

Magnitude	Criteria	Water examples
Minor	Adverse: Results in some measurable change in attributes, quality or vulnerability.	Permanent/irreversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource. Minor changes to the hydrological regime and associated catchments. Minor changes to the geomorphological form and functioning of rivers and associated catchment. Minor effects on water supplies. Potential low risk of some pollution to a surface water body, but insufficient to cause loss in quality. Potential low risk of pollution to groundwater. Minor effects on an aquifer, GWDTEs, abstractions and structures. Increase in flood risk to water compatible receptors on prolonged or permanent basis, or an increase in flood risk to less vulnerable receptors over a short duration.
Negligible	Beneficial: Affects attribute, but of insufficient magnitude to affect the use or integrity.	No measurable impact upon an aquifer. Temporary addition of, improvement to, or restoration of physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource.
Negligible	Adverse: Affects attribute, but of insufficient magnitude to affect the use or integrity.	No measurable effect on the integrity of the water environment. Temporary/reversible damage to physical environment; and the extent, magnitude, frequency, and/or timing of an impact does not affect the integrity or key characteristics of the resource. No measurable impact upon an aquifer and very low risk of pollution to groundwater. Negligible change in flood risk – changes are within modelling numerical tolerance. Negligible change to the hydrological regime and associated catchments. Negligible changes to the geomorphological form and functioning of rivers and associated catchments.

Magnitude	Criteria	Water examples
No change	Results in no change to the receptor.	No effects on water infrastructure. No effects on flood risk impacts.

Adapted from Design Manual for Roads and Bridges: LA 113 Road drainage and the water environment (Highways England, 2020a)

Significance criteria

5.5.10 The matrix in Table 5.8 below would be used to combine the magnitude of the impact and sensitivity of the receptor assessments to determine the overall significance of the effect. Effects which are classified as being moderate or above are considered significant effects, while slight or neutral effects are not significant.

5.5.11 Any effects which are classified 'slight or moderate' have been defined as moderate at this preliminary assessment stage, to ensure that potentially significant effects are not overlooked.

Table 5.8 Matrix to assess the significance of effect on water resource and flood risk receptors*

Sensitivity/value	Magnitude of impact				
	No change	**Negligible**	**Minor**	**Moderate**	**Major**
Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

**Source: From Highways England, 2020b.*

Assumptions and limitations

5.5.12 The Phase 1 interim GI report (Appendix 10.1) has been used in conjunction with British Geological Survey (BGS) (BGS, n.d.) mapping for a preliminary assessment of ground conditions. The Phase 2 GI will provide baseline geological and geotechnical data to support selection of the construction methodology and development of water management plans. For the purpose of the preliminary assessment presented in this PEI Report, a reasonable worst case has been assumed that groundwater control would be required for all below-ground structures (shafts, tunnels, adit and foundation excavations) during their construction.

5.5.13 Assumptions made about locating the conveyance tunnel within London Clay will be revisited following completion of the Phase 2 GI. If it is subsequently determined that the tunnel interfaces with the underlying Chalk (principal aquifer) or could be affected by Chalk piezometric pressure, then this would be assessed in the ES supported by a hydrogeological impact assessment.

5.5.14 For the purposes of this assessment, the cofferdams are considered to be in place for a maximum time of up to 18 months. At the outfall location, the cofferdam is assumed to extend into the river by 20m. At the intake location, the cofferdam has been assumed to extend into the river by 15m.

5.5.15 For the purpose of this assessment the operational life is assumed to be 60 years with a proposed opening year of 2033. Limitations of national-scale surface water flood models have been considered in Appendix 5.2 FRA.

5.5.16 River flow scenarios have been provided by WRSE's water resources model as used for regional water resources planning. The model is parameterised using flows derived from rainfall runoff models, validated against naturalised river flow data for the period 1950-1998. The scenarios provided include 400 stochastic variants of this period for climate change to the 2030s and an appropriate demand for public water supply following Environment Agency Water Resources Management Planning Guidance.

5.5.17 The TELEMAC-2D River Thames hydrodynamic model includes the current infrastructure design at Teddington Weir and an understanding of operation of the gates and sluices in the weir at times of low river flow provided by the Environment Agency Waterways team. The model includes for the thermal properties of water in order to account for plume mixing of the recycled water. Field validation of the baseline water column thermal profile of the River Thames is not feasible, and the model thermal mixing is based on scientific principles alone.

5.5.18 The TELEMAC-3D hydrodynamic and water quality model of the Thames Tideway has a long history of development by the PLA and Thames Water working collaboratively with the Environment Agency. Model bathymetry is from survey information. Current profiles, tidal water levels, salinity and water quality are validated using field data.

5.5.19 It is assumed that any water generated by the Project, through the dewatering of excavations for tunnel or shaft construction, from on-site construction processes, or from site operations, would be appropriately disposed of in accordance with standard good practice (tertiary) measures discussed in Section 5.4.

5.5.20 At each work site, it is assumed that there would be sufficient headroom capacity within the sewer network to take the peak discharge from the sites. The assessment of volumes generated and available for use would be carried out by the engineering team, along with the physical connection of the sites to the sewer network.

5.5.21 It is assumed that water generated during construction would require a degree of pre-treatment to remove suspended solids prior to discharge. This would be achieved by passing the water through settlement tanks, Siltbuster® or similar system. It is also assumed that there would be sufficient space at each work site to install treatment systems of sufficient scale to handle the volumes of water generated at each site.

5.5.22 Following settlement, if required, it is assumed that the water generated through construction would be of sufficient quality, to be discharged directly back to the groundwater or surface water environment. If not, the water would require additional treatment and thus be discharged via the foul water sewer network.

5.5.23 It is assumed that all permits and licences for abstraction and discharge would be granted by the appropriate licensing body.

5.5.24 The pilot plant testing is ongoing through the publication of this report, until November 2025. The results will be used to inform the next phase of the TTP design

5.5.25 It is assumed that there will be no impacts to the operation of Mogden STW arising from the reduction in storm tank capacity during construction. Mogden STW would remain compliant with its current environmental permit with seven operational storm tanks.

5.6 Study area

5.6.1 The study area for the water resources and flood risk aspect area is shown in Figure 5.1 in Volume 2 PEI Report Figures. The above ground sites of the Project include:

a. Mogden STW (including Western Work Area and Eastern Work Area)

b. Ham Playing Fields (including Main Work Area and Support Work Area)

c. Burnell Avenue (including Main Work Area, Northern Work Area and Southern Work Area)

d. Tudor Drive

5.6.2 Potential impacts of the Project activities are assessed on any water features within 2km area of above ground sites and along the route of the conveyance tunnel. The study area includes the River Thames and the Thames Tideway, identified based on professional judgement with regard to sensitive receptors and potential pathways.

5.6.3 The intake and outfall at the Burnell Avenue site are in the freshwater River Thames, specifically the WFD river water body Thames (Egham to Teddington). This reach of freshwater river stretches approximately 26km from Egham to Teddington and is characterised as a wide, slow-flowing lowland river, with water levels controlled by several weirs operated by the Environment Agency.

5.6.4 The study area includes the reach up to 2km upstream of the weir at Teddington. The entire WFD river water body will be considered as part of the WFD assessment which will be submitted alongside the ES.

5.6.5 The study area includes a section of the tidal River Thames and the transitional (estuarine) Thames Upper water body, this is also explained in the WFD assessment. The tidal Thames starts on the downstream side of the Teddington Weir and flows 100km to the North Sea. The narrow upper part of the estuary, with characteristics of a tidal river, is referred to as the Thames Tideway. The

extent of the Thames Tideway included in the study area is coincident with the extent of the Thames Upper water body, which terminates at Battersea Bridge.

5.6.6 The study area includes all groundwater features which could be impacted by the Project, which are described in Section 5.5 of this document.

5.7 Baseline conditions

5.7.1 The baseline conditions for water resources and flood risk associated with the Project have been developed using a combination of desk-based research, surveys, numerical modelling, and consultations. Additionally, the future baseline is addressed, outlining the anticipated conditions influenced by projected climate changes and potential future developments.

5.7.2 Detailed descriptions of the baseline conditions are reported by the following technical appendices:

a. Appendix 5.1 Surface Water and Water Quality Baseline Information
b. Appendix 5.2 Flood Risk Assessment (FRA)
c. Appendix 5.3 Water Framework Directive Regulations Screening

5.7.3 The baseline section has been divided into five parts; data sources, surface water resources, groundwater resources, flood risk and future baseline. Where there is further site-specific detailed information, this has been subdivided by site. This section summarises the key findings of the appendices and forms the baseline evidence base for the impact assessment reported in Section 5.8.

Data sources

5.7.4 The baseline environment has been determined by making use of the data sources shown in Table 5.9. As there is a wide repository of data available for the River Thames and Thames Tideway, these data sources were specifically identified as being relevant to the Project study area, as defined in Section 5.6.

5.7.5 The information includes data which have been collected as part of an extensive ongoing water quality monitoring programme which is used for the assessments in Appendix 5.1 and will be reported in the ES. The monitoring network has been designed through engagement with the Environment Agency during the RAPID gated process. Further description of the monitoring network is provided in Appendix 5.1.

5.7.6 Appendix 5.1 also includes further detail of the baseline data collected, data sources and data ranges. Physical environment data were collated for the period covering 1 January 2010 to 31 December 2024.

Table 5.9 Data sources

Dataset	Dataset description	Data source
Water quality (water temperature; physico-chemical water quality; nutrient concentration; salinity; chemical water quality (human health, ecotoxicology and fish olfaction inhibition); and underlying water chemistry (including pH))	Environment Agency Water Information Management System*	Environment Agency
	Spot samples collected for the Project baseline	Thames Water
	Automatic Water Quality Monitoring Sondes*	Environment Agency
	Continuous Monitoring Sondes	Thames Water
	TELEMAC-3D estuarine quality model	Thames Water
	Catchment Data Explorer (Defra, 2025a)*	Environment Agency
	RBMP (Environment Agency, 2024a)*	Environment Agency
Topographical information	Topographical Mapping*	Ordnance Survey
River maps	OS Open Rivers (Ordnance Survey, 2024)*	Ordnance Survey
Special site designations	SSSI England, Ramsar Sites, Priority River Habitats (Natural England, 2025)*	Natural England
River bank geometry, channel geomorphology and River Morphology Survey	Measured data	Thames Water
Water levels	Teddington Lock; measured data (Defra, 2024a)*	Environment Agency
	Tidal Thames; TELEMAC-3D	Thames Water
Groundwater levels	Hydrology Data Explorer for groundwater monitoring* (Defra, 2024a; Defra, 2025b)	Environment Agency
Flow and discharge flow	19,200 years of stochastic flow predictions for abstraction	Water Resources South-East group
	River flow gauges (Defra, 2024a; Defra, 2025b)*	Environment Agency
	Measured discharge flow data	Thames Water
	TELEMAC-2D river model	Thames Water
	TELEMAC-3D estuarine hydrodynamic model	Thames Water

Dataset	Dataset description	Data source
Abstraction	Surface Water Licences and unlicensed private abstraction	Environment Agency/Local Authority
Discharges	Surface water consents (Defra, 2025c)*	Environment Agency
Geology and hydrogeology	Aquifer Extents and Hydraulic parameters (BGS, n.d.; Environment Agency and BGS, 2024; Natural England, 2025) *	BGS
Phase 1 Interim GI Report	Project Phase 1 Interim GI Report (Appendix 10.1)	Thames Water
Protective designations	Ground Water Special Protection Zone, Nitrate Vulnerable Zone (Defra, 2024b; Natural England, 2025)*	Environment Agency
Flood risk	Flood risk mapping (Environment Agency, 2023; Environment Agency, 2025a; Environment Agency, 2025b)*	Environment Agency

**Publicly available data (also see Appendix 5.1 and Appendix 5.2)*

5.7.7 The TELEMAC-2D model has been developed for the freshwater reach of the River Thames between Molesey and Teddington Weir to support the assessment of the hydrodynamic baseline of the freshwater River Thames and the potential impact of operation of the Project's intake and outfall on river currents, flow velocity, water level and mixing of the discharge from the outfall into the river. The modelling focuses on an extent 270m upstream of the proposed intake and immediately downstream of Teddington Weir.

5.7.8 The TELEMAC-3D model has been developed for the estuarine reach of the Thames Estuary between Teddington Weir and Southend-on-Sea to support the hydrodynamic and water quality baseline, focusing on an extent 22km seawards of Teddington Weir, to Battersea Bridge. The model is used to assess:

a. The potential impact of operation of the Project's outfall on water quality of the estuarine Thames Tideway.

b. The potential impact of operation of the TTP on the discharge volume at Isleworth Ait on tidal elevation, current speed, water temperature, salinity, suspended solids and water quality hydrodynamics, and mixing of the discharge from the outfall into the river.

Surface water resources

5.7.9 The Project is situated within the River Thames river basin, with the intake and outfall located in the freshwater River Thames. The Ham Lands and Mogden STW are in the vicinity of the Upper Thames transitional water body. The freshwater River Thames reach within the study area is identified as the WFD river water body Thames (Egham to Teddington).

5.7.10 The study area also encompasses the Thames Upper, a WFD transitional water body that stretches approximately 22km along the Thames Tideway from the tidal limit at Teddington Weir to Battersea. The Thames Tideway, seawards from the Richmond Half-tide Sluice, experiences the full ebb and flood tidal cycle, with high and low tides occurring twice daily. Teddington Weir typically marks the normal tidal limit between the river and the estuary, but it is observed to overtop during high spring tides.

5.7.11 The existing Mogden STW discharges through a system of outfalls located in the bed of the Thames Tideway at Isleworth Ait.

5.7.12 Table 5.10 summarises the WFD status of the waterbodies and their attributes. It should be noted that the 2019 water body classifications inform RBMP3 (Environment Agency, 2024a). The following sections provide baseline information for the River Thames and Thames Tideway relevant to the Project, with further details provided in Appendices 5.1 and 5.3.

Table 5.10 Summary of Water Framework Directive Regulations surface water bodies in the study area

	Thames (Egham to Teddington)	**Thames Upper**
WFD ID	GB106039023232	GB530603911403
Water body type	River	Transitional water
Hydromorphological designation	Heavily modified	Heavily modified
Length (km)	31.5	-
Surface area (km^2)	-	3.3
Catchment area (km^2)	44.8	-
Water body classification RBMP Cycle 3 (2022)		
Ecological	Poor	Moderate
Chemical	Does not require assessment	Does not require assessment
Physico-chemical quality elements	Moderate	Good

Tidal River Thames (Mogden STW and Ham Playing Fields sites)

5.7.13 The boundary of the Ham Playing Fields site Support Work Area is adjacent to the tidal River Thames with the Main Work Area boundary between 200m to 250m inland from the estuary bank.

5.7.14 Mogden STW is not located in the vicinity of tidal River Thames, but the existing Mogden STW discharge is to the tidal River Thames at Isleworth Ait. The hydrodynamic regime of the tidal River Thames supports the designated (high tide) habitats of Syon Park SSSI.

5.7.15 The current discharge from Mogden STW has a permitted dry weather flow of 559Ml/d. Under average River Thames flow conditions of 3,360Ml/d, and noting these are the two largest flow contributions to the tidal River Thames, the final effluent contribution of flow is around 14% on average. Under low river flows, representative modelled conditions show that the proportion of Mogden STW final effluent as water entering the tidal River Thames can be 30% during low river flow periods every five years, rising towards 50% in rare circumstances once every 20 years.

5.7.16 Tidal range, modelled by the TELEMAC-3D model identifies c.2.5m range in the half-tide Richmond Pound reach between the Teddington Weir and Richmond Half-tide Sluice, between high water and mid tide. Each November, a full tidal range is observed, when the PLA undertake their planned annual maintenance, and the sluice is raised for the whole tidal cycle. Seawards of the Richmond Half-tide Sluice, a full tidal range is observed, modelled as c.3.5m on a neap tide and c.4.0m on a spring tide. The tidal range increases seawards, at Battersea Bridge it is modelled as c.5.0m on a neap tide and c.5.5m on a spring tide. Current speeds are modelled to change with the tide, from near 0m/s at slack water to c.1.0m/s in the Richmond Pound and 1.3m/s at Battersea Bridge.

5.7.17 The surface water quality baseline considers the water temperature, salinity, suspended solids, dissolved oxygen, nutrients and chemical dispersal of the tidal River Thames. The Thames Upper transitional water body RBMP3 status was classified as good physico-chemical water quality, moderate for specific pollutants supporting ecological status, and ‘does not required assessment’ for chemical status. The Environment Agency continuous monitoring sites at Brentford Barge and Kew Barge, and the Project monitoring site at Kew Bridge have been used to evidence the baseline. Further detail on the water quality data is available in Appendix 5.1.

5.7.18 Water temperature is not a WFD status element for transitional water bodies. Review of Environment Agency continuous monitoring of estuarine temperature in 2020-2024 together with river temperature at Teddington from the ongoing monitoring programme, identifies the same seasonal temperature profile but with the tidal River Thames typically slightly warmer than the river. Review of long profile data from the TELEMAC-3D Estuary model between Teddington Weir and Battersea Bridge identifies a distinct temperature elevation around the

existing Mogden STW outfall at Isleworth Ait and some influence of higher temperatures in the middle tidal River Thames.

5.7.19 Salinity modelling of the tidal River Thames using TELEMAC-3D identifies the whole of the Teddington Weir to Battersea Bridge reach as not brackish even at high water on spring tides. There are difficulties corroborating this with measured evidence as the continuous conductivity measurements use a formula that over-represents low salinities. The salinity levels support the designated (high tide) habitats of Syon Park SSSI.

5.7.20 Suspended solids modelling of the tidal River Thames using TELEMAC-3D identifies limited fine sediment movement in the Upper Estuary. The suspended solids content supports the designated (high tide) habitats of Syon Park SSSI.

5.7.21 The Thames RBD 3rd cycle RBMP, herein RBMP3, identifies the Thames Upper water body as without status for dissolved oxygen (2019) with an interim update (2022) of Good status. The Thames Upper water body does not support in-channel habitats protected/designated under UK habitat legislation. Continuous dissolved oxygen monitoring data from an Environment Agency monitoring sonde at Brentford, with 15-minute recording, are used to evidence the baseline. The 2020-2024 data identify dissolved oxygen concentration as routinely consistent with high status. Supersaturation, associated with seasonal algal growth is recorded in the late spring of 2020, 2021 and 2022. This is followed by a seasonal reduction in dissolved oxygen saturation each summer. These summer reductions are the only recorded periods of dissolved oxygen not consistent with high status.

5.7.22 The Thames RBD RBMP3 classification of the Thames Upper transitional water body does not include an assessment of dissolved inorganic nitrogen. The Project monitoring data are consistent with bad status, as presented in Appendix 5.1.

5.7.23 The TELEMAC-3D model has been built to describe the dispersal regime in the tidal River Thames of chemicals entering the estuary either in Mogden STW final effluent at Isleworth Ait or at Teddington Weir. The model shows the dispersal zone moving with the tide and is used as a comparative tool with the Project's scenarios. The Thames Upper water body does not support in-channel habitats protected/designated under UK habitat legislation.

5.7.24 The closest available fine sediment monitoring site subject to tidal conditions has been used to evidence the baseline, noting this Environment Agency Isleworth monitoring site is 4.0km seawards, fully tidal and in proximity to the treated sewage discharge from Mogden STW. Turbidity, as a measure of fine sediment, is reported as variable. Of the 31 turbidity samples in the period 2020-2024, 68% are 25 FTU or less, with the remaining samples up to 100 FTU indicating that values can be considerably higher on occasion.

Freshwater River Thames (Burnell Avenue site)

5.7.25 The Burnell Avenue draft Order limits are adjacent to, and extend within, the river reach. The geomorphological baseline considers the condition of the bank and bed of the river in the draft Order limits.

5.7.26 Teddington Weir forms an artificially wide and deep channel for navigation, measuring approximately 80m in width and 4m in depth, as evidenced from bathymetric survey including the bank areas of the channel in 2024, provided in Appendix 5.1.

5.7.27 The banks are steep and reinforced with concrete or sheet piling, which, combined with the slow-flowing, ponded reach, result in limited natural geomorphological processes. The weir has a considerable influence on the natural functions of the Thames. The Thames (Egham to Teddington) river water body is acknowledged in the Thames RBD RBMP3 as non-natural for flow and geomorphology, designated as a heavily modified water body (HMWB) for the uses of drinking water supply, flood protection and navigation, including ports. According to RBMP3, the Environment Agency states that mitigation measures to reduce the impacts of these designated uses are incomplete and currently technically infeasible.

5.7.28 The hydrodynamic baseline considers the flow regime, river depth and velocity of the freshwater River Thames in the study area. At its normal tidal limit of Teddington Weir, the River Thames drains a catchment area of 9,900km^2. River flow is significantly influenced by upstream abstraction for potable water supply, as recognised in the HMWB designation of the Thames (Egham to Teddington) river water body for drinking water supply.

5.7.29 River flow is gauged by the Environment Agency at Kingston, approximately 1.5km upstream of the Burnell Avenue site. The record of flow gauging started in October 1883 and continues to be updated regularly (Defra, 2025b). Despite upstream abstractions, river flow is highly variable, ranging from 300Ml/d[1] to 27,000Ml/d[2], with a distinct seasonal pattern. Below normal flow in August is 850Ml/d, while in January it is 5,800Ml/d.

5.7.30 Evidence from water resources modelling has been used to describe representative river flow conditions in the River Thames. This is due to the short duration of gauged river flows under the current abstraction management control regime of the River Thames, in place since 2016.

5.7.31 Baseline river low flow conditions are described further as:

a. In the spring, summer and autumn period from 1 March to 31 October there are 10% of days with a flow management control target of 700Ml/d at Teddington. Review of representative conditions identify these as rare in the March to June period.

[1] Q_{99} flow statistic which represents that in the long term, flow is only below this value 1% of the time.

[2] Q_1 flow statistic which represents that in the long term, flow is only above this value 1% of the time.

b. In the spring, summer and autumn periods from 1 March to 31 October there are 1.5% of days with a management target of 300Ml/d at Teddington. Review of representative conditions identify these as rare in the March to June period.

c. In the winter period from 1 November to 28/29 February there are 5% of days with a management target of 600Ml/d at Teddington. Review of representative conditions identify these as rare in the January to February period.

d. In the winter period from 1 November to 28/29 February there are 2.5% of days with a management target of 400Ml/d at Teddington. Review of representative conditions identify these as rare in the January to February period.

e. In the winter period from 1 November to 28/29 February there are less than 1% of days with a management target of 300Ml/d at Teddington. These conditions are very rare.

5.7.32 The TELEMAC-2D model has been used to represent the depth and velocity of the freshwater River Thames. For a representative cross-section midway between the Project intake and outfall, the river is 82m wide at bankfull (between the concrete edges), with a uniform depth of approximately 4.0m for the central 45m of the channel and the following velocities, modelled as slow:

a. 700Ml/d river flow – Flow velocities are predominantly 0.025-0.05m/s, with some slower velocities of 0.01-0.025m/s along the riverbed.

b. 400Ml/d river flow – Flow velocities range from 0.01-0.25m/s uniformly across the section.

c. 300Ml/d river flow – Flow velocity is predominantly 0.01-0.025m/s, with the exception of the area close to the bed of the river where the velocity is 0-0.01m/s.

d. The hydrodynamics supports habitats with no greater importance than local interest.

5.7.33 The surface water quality baseline considers various parameters, including water temperature, general physico-chemical water quality (pH, acid neutralising capacity, oxygen balance and ammonia), nutrient quality (soluble, biologically available forms of phosphorus and nitrogen) and hazardous chemicals.

5.7.34 The Thames (Egham to Teddington) river water body RBMP3 status was classified as moderate physico-chemical water quality, high for specific pollutants supporting ecological status, and ‘does not required assessment’ chemical status.

5.7.35 The Project monitoring site at Teddington Weir has been used to evidence the baseline with data collected from 2020 to 2024 as hourly continuous monitoring for water temperature and dissolved oxygen and monthly spot samples for all other determinands.

5.7.36 The Project evidence is largely consistent with the Thames (Egham to Teddington) river water body status. It is noted that RBMP status is more general for the water body as a whole, 95% of which is upstream of the Burnell Avenue site and therefore not relevant to the Project.

5.7.37 The Project evidence along with earlier Environment Agency evidence from 2010, indicates water temperatures higher than those consistent with Good status for salmonid waters (23ºC as a 98th percentile) during the summers of 2018, 2020, 2021 and 2022. This is consistent with the RBMP3 classification of Moderate status.

5.7.38 The Project evidence for the general physico-chemical determinands (pH, acid neutralising capacity, dissolved oxygen, biochemical oxygen demand and total ammonia) identifies all as consistent with High or Good status in line with the RBMP3 classification for the water body. The Burnell Avenue draft Order limits and the continuation freshwater River Thames to Teddington Weir does not support habitats protected/designated under UK habitat legislation.

5.7.39 The Project evidence indicates nutrient quality consistent with Moderate status, aligning with the RBMP3 classification. Additionally, the evidence shows hazardous chemicals as a mix of high and moderate for specific pollutants.

5.7.40 The baseline fine sediment character of the Burnell Avenue site is based on the Environment Agency and the Project monitoring sites at Teddington Weir. Suspended solids concentration and turbidity are variable. Of the 35 suspended sediment samples taken between 2020 and 2024, 50% are 10mg/l or less, with the remaining samples up to 70mg/l, indicating that values can be considerably higher on occasion. The same pattern of low base and variability to higher values is observed for turbidity from 2021 to 2024.

5.7.41 The Thames RBD RBMP3 identifies the Thames (Egham to Teddington) river water body as having Good status for dissolved oxygen (2019), with an interim update in 2022 also indicating Good status. Continuous dissolved oxygen monitoring data from the Project sonde at Teddington Weir, with hourly recording, are used to evidence the baseline. The 2021-2024 data identify dissolved oxygen saturation as routinely consistent with high status. Supersaturation, associated with seasonal algal growth, was recorded in late spring 2021 and late spring 2022. This was followed by a reduction in dissolved oxygen saturation in early summer 2021, 2022, and to a lesser extent in 2023. These summer reductions, associated with algal die-back, are the only recorded periods of dissolved oxygen not consistent with high status.

5.7.42 There are no active licensed or recorded unlicensed abstractions from or discharges to surface water within the Burnell Avenue study area.

Groundwater resources

Geology

5.7.43 A detailed baseline of the geology underlying the Project is provided in Chapter 10: Ground Conditions and Contaminated Land. The identified artificial, superficial and bedrock geologies extracted from BGS data are listed in Table 5.11.

Table 5.11 Geology of the shafts, tunnel and conveyance route and surrounding areas

Location	Artificial *	Superficial	Bedrock
Mogden STW Western Work Area – drive shaft	Made Ground (anthropogenic ground in which the material has been placed without engineering control, and/or manufactured in some way, or arising from an industrial process)	Taplow Gravel Member Langley Silt Member	London Clay Formation
Mogden STW Eastern Work Area – interception shaft and TTP	Made Ground	Langley Silt Member	London Clay Formation
Conveyance tunnel – route north of the River Thames	Infilled Ground	Langley Silt Member Kempton Park Gravel Member	London Clay Formation
Ham Playing Fields – intermediate shaft	Made Ground – 200m south-west	Kempton Park Gravel Member	London Clay Formation
Conveyance tunnel – south of the River Thames	None within the conveyance route, the draft Order limits or within 250m of the draft Order limits	Alluvium Kempton Park Gravel Member	London Clay Formation
Burnell Avenue – reception shaft, outfall, intake and connection shaft	Made Ground – 165m north-west	Kempton Park Gravel Member Alluvium	London Clay Formation
Tudor Drive – TLT connection shaft	None within the shaft site, the draft Order limits or within 250m of the draft Order limits	Kempton Park Gravel Member	London Clay Formation

** It should be noted that this column reports the mapped areas of artificial ground shown on geological maps. There may be unmapped deposits of Made Ground across all sites, but these are likely to be of limited thickness (less than 1m).*

5.7.44 The Phase 1 interim GI Report (Appendix 10.1) provides additional detail and supports the geological conceptual site model in Chapter 10: Ground Conditions and Contaminated Land. The Phase 1 interim GI Report (Appendix 10.1) indicates that Made Ground has been encountered at various thicknesses in all nine boreholes completed by December 2024. Superficial deposits encountered included the Kempton Park Gravel Formation (a medium dense to dense silty, gravelly Sand), the Langley Silt Member, and interbedded Alluvium and Peat. London Clay underlies the superficial deposits (or underlies Made Ground where superficial deposits are absent), with typical thickness greater than 40m.

5.7.45 A Phase 2 GI is currently underway, which includes groundwater monitoring to provide further information on key aspects that would support the EIA. These investigations are focused on:

a. Confirming the depth and thickness of the London Clay along the conveyance route

b. Confirming the depth and thickness of the geologies at the shaft sites

c. Assessing the groundwater levels in the superficial deposits within the draft Order limits

Hydrogeology

5.7.46 The onshore geological mapping held by the BGS (BGS, n.d.) shows that the bedrock geology underlying the draft Order limits is classified as ‘London Clay Formation - Clay and Silt’. The formation is typically recorded as clay and silt in variable proportions, with occasional cement stone nodules, pockets of sand and flint gravel. This stratum is designated as an unproductive bedrock aquifer with low permeability and little groundwater movement (Natural England, 2025).

5.7.47 The London Clay Formation is underlain by the Harwich Formation, the Lambeth Group and Upper Chalk. From the geological conceptual model in Chapter 10: Ground Conditions and Contaminated Land, the London Clay underlying the draft Order limits is indicated to be approximately 60m to 75m thick, which allows the conveyance tunnel to be routed wholly within London Clay. Additional data collection to facilitate the detailed design is currently ongoing with geotechnical investigation works.

5.7.48 Superficial deposits of the Langley Silt Member are present at Mogden STW and are also present along the conveyance tunnel route north and south of the River Thames. The Langley Silt Member is designated as an unproductive aquifer (Natural England, 2025).

5.7.49 Superficial deposits at the Burnell Avenue and Tudor Drive sites consist of the Kempton Park Gravel Member, which is formed of sand and gravel. The Kempton Park Gravel Member is designated as a Secondary A aquifer (Natural England, 2025) in the vicinity of the Burnell Avenue and Tudor Drive sites, which can support local water supplies and act as important baseflow sources to rivers. This aquifer is designated as a medium vulnerability. However, north

of the River Thames, within the draft Order limits, the Kempton Park Gravel Member is designated as a Principal aquifer of high vulnerability (Environment Agency and BGS, 2024).

5.7.50 The Taplow Gravel Member, which underlies Mogden STW Western Work Area, is designated as a Principal aquifer (Natural England, 2025) of high vulnerability (Environment Agency and BGS, 2024).

5.7.51 Alluvial superficial deposits which largely follow the course of the River Thames within the draft Order limits, are designated as a Secondary (undifferentiated) aquifer of medium vulnerability.

5.7.52 The combined superficial deposits along the west bank of the River Thames within the study area are within the WFD Lower Thames Gravels Groundwater Body (GB40603G000300).

5.7.53 Surface water and shallow groundwater interaction is expected to be notable between the River Thames and the Lower Thames Gravels Groundwater Body. The National River Flow Archive (NRFA) indicates a baseflow index value of 0.63 for the River Thames at Kingston (NRFA, n.d.), also suggesting a significant baseflow component to the river could be present.

5.7.54 No SPZs associated with either public or private water supplies are recorded as being present within the study area (Environment Agency, 2024b). The study area is not within a surface Nitrate Vulnerable Zone (Defra and Environment Agency, 2024b). There are no Groundwater Dependent Terrestrial Ecosystems within the study area, the closest being approximately 4km east of the draft Order limits.

5.7.55 A review was carried out of active and historic groundwater abstractions in proximity to the draft Order limits, provided by the Environment Agency, London Borough of Hounslow Council, London Borough of Richmond upon Thames Council and Wandsworth Borough Council, and Royal Borough of Kingston upon Thames Council. The review identified 19 active abstractions within the study area, of which 11 are licensed abstractions and eight are deregulated abstractions.

5.7.56 Of the 19 licensed and deregulated groundwater abstractions none are for potable use. Eighteen are for the purposes of spray irrigation or horticultural watering. One is used for a stables/livery facility. The closest two abstraction boreholes are located within approximately 400m of the Burnell Avenue site and are licensed abstractions from the Kempton Park Gravel Member.

5.7.57 The Environment Agency holds records of one monitoring borehole near the Burnell Avenue site close to Teddington Weir (Defra, 2024a). The groundwater levels recorded in this well are relatively shallow, typically ranging between 4m and 5m below the existing ground level. Whilst no precise information is currently available regarding the well depth and construction, publicly available borehole records close to the location of this borehole show the geology to be of the Kempton Park Gravel Member, overlying the London Clay, with water

strikes recorded at around 4m below ground level (bgl). This suggests that the groundwater monitored by the Environment Agency is that within the Kempton Park Gravel Member, but further information to confirm this, and the details of nearby abstractions and monitoring wells will be obtained from the Environment Agency for assessment in the ES.

5.7.58 From the Phase 1 interim GI Report in Appendix 10.1, groundwater has been recorded within the draft Order limits in the Kempton Park Gravel Member between 4.8mbgl and 11.6mbgl. Groundwater was recorded in Alluvium at 2.8mbgl.

5.7.59 Groundwater flow direction within the superficial deposits underlying the Mogden STW is currently unknown.

Groundwater flooding

5.7.60 The London Borough of Richmond upon Thames SFRA (2021) indicates that the permeable superficial deposits throughout the study area contribute to an increased potential for elevated groundwater. A borough-wide investigation (Metis, 2021) on potential groundwater flooding was carried out due to concerns of groundwater flooding to basements, which identified that topography, superficial deposits and sub-surface development contribute to groundwater flooding in the borough. Environment Agency mapping showing susceptibility to groundwater flooding within London Borough of Richmond and Thames SFRA (2021) further confirms areas highly susceptible (75% or more) to flooding within the study area.

Flood risk

5.7.61 This section describes the baseline conditions relevant to the flood risks presented to all above-ground sites, excluding Tudor Drive, which has been scoped out (see Section 5.3). Appendix 5.2 FRA provides the full assessment, but the summary below outlines the flood risks presented to each site.

5.7.62 Across all assessed sites, there are no canals in the area that present a flood risk, therefore these have not been considered further. The bedrock geology, superficial geology and aquifer classification at each of the sites is detailed in the groundwater section above and forms the baseline for assessment of groundwater flood risk. It should also be noted that a Phase 2 GI is expected to be completed in summer 2025. The results would feed into the assessment of flood risk presented in the ES.

Mogden STW site

5.7.63 A 1m light detection and ranging (LiDAR) Digital Terrain Model (DTM) shows levels on-site range from approximately 5m Above Ordnance Datum (AOD) around the settlement tanks in the centre-south of the site to 22mAOD on the bank in the west of the site. The site is located in an artificial topographic depression created by raised banks around the perimeter of the site.

5.7.64 Although scoped out of the water resources assessment, the Duke of Northumberland's River is an artificial main river that runs through the centre of the site and discharges into the River Thames, and has been considered as part of the Flood Risk Assessment. The River Crane and the River Thames are located approximately 520m and 860m to the east of the site, respectively. Whitton Brook is located over 180m to the south of the site but drains away to the south-east to join the River Crane. The site contains flood defences on both banks of the Duke of Northumberland's River in both the north and the south of the site. These defences are classified as natural high ground.

5.7.65 During construction, above ground works in and around Mogden STW would be located in Flood Zone 1 for rivers and tidal sources, including both the Western Work Area and Eastern Work Area during the construction phase and the TTP in the east of the site in the operation phase. Flood Zone 3 is confined to the channel of the Duke of Northumberland's River or near bank area. Whilst the Flood Zone 2 extent does include the roundabout to the south of Mogden STW, it is largely contained within the river channel through the Mogden STW site itself. A small portion of the Flood Zone 2 extent extends from the river into the centre of the Mogden STW but does not impact the Western Work Area and Eastern Work Area or the TTP during the operational phase.

5.7.66 The Environment Agency (2025b) present-day surface water flood mapping based on the National Flood Risk Assessment data from January 2025 indicates that the Mogden STW site is entirely located in areas of very low to high risk of surface water flooding. Most of the site is at very low risk (< 0.1% AEP); however surface water ponding is predicted to occur at localised depressions, some road networks and contained areas within Mogden STW such as slurry and digester tanks, storm tanks and cake pads, etc. Some of these areas report a high risk of surface water flooding (and are predicted to flood during the 3.3% AEP and more frequent events), whilst other areas are at Medium (1% AEP) and Low (0.1% AEP) risk of surface water flooding. However, it is understood that all surface water flood risk on site is drained/managed by the on-site stormwater and sewer network.

5.7.67 The majority of sewers, pipes and channels located in Mogden STW are linked to treating and transferring foul water around the Mogden site. Surface water on-site from impermeable areas is drained through road gullies and manholes. Thames Water are responsible for on-site sewers to manage water movements through the STW and prevent any sewer flooding. The stormwater network on site has been considered as part of the surface water flood risk above.

5.7.68 The groundwater flood risk and any associated risk of groundwater emergence causing flooding has already been discussed in the groundwater resources section and is not repeated here.

5.7.69 The Environment Agency (2025b) Reservoir Flood Maps show that the site is located within the maximum flood extents of approximately 10 upstream reservoirs. With reference to the Preliminary Flood Risk Assessment for England (Environment Agency, 2018b), the Environment Agency states that

reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers.

Ham Playing Fields site

5.7.70 The topographical survey shows that the topography across the site is generally flat with a light fall from south-east to north-west. Levels across this area range from a high point of 6.24mAOD in the east of the site to a low point of 4.84mAOD in the north-west of the site. The area is greenfield, so the site is expected to drain according to its topography towards the Tidal Thames, with some surface water also expected to infiltrate into the ground.

5.7.71 The Tidal Thames is located adjacent to the existing Ham Street Car Park and Ham Playing Fields site Support Work Area, but approximately 130m north of the Main Work Area. Water in the Tidal Thames discharges into the Thames Estuary and North Sea. No other watercourses are located within the immediate vicinity of the site. A flood defence embankment is located to the south of the main working area which protects the land to the south but does not protect the Main Work Area and Support Work Area.

5.7.72 The Environment Agency Historic Flood Map has not identified any historic flood events at the site although signage in the Ham Street Car Park and anecdotal reports indicate the area to the north-east of the car park is liable to flooding on high tides.

5.7.73 The Thames (Datchet to Teddington) model (WSP & Binnies UK Ltd, 2023) shows that two floods were predicted to inundate Ham Playing Fields in January 2003 and February 2014, as is confirmed by local media reports. The flood extents from these events encroach on the existing Ham Street Car Park, the Support Work Area and a small area covers the north westerly boundary of the Main Work Area.

5.7.74 The Environment Agency Flood Map for Planning shows the site is located in Flood Zone 3 with a 0.5% or greater AEP of tidally-influenced flooding.

5.7.75 Based on Modelled Maximum Water Levels for Node 2.3 from the Thames Estuary 2100 10-year review study (Jacobs, 2022), Ham Playing Fields, the Main Work Area, and Support Work Area are susceptible to flooding during the 2022 epoch. Similarly, in the Thames (Datchet to Teddington) model (WSP & Binnies UK Ltd, 2023) defended flood extents, flooding is predicted to be partially affected at both sites from the 50% AEP event. Areas to the south of the flood defences at Riverside Drive remain completely unaffected during all events in the present day as topographic levels are greater than 7mAOD.

5.7.76 The Environment Agency surface water present-day flood map indicates that the Ham Playing Fields are located outside of any surface water flood extents, with no flow paths flowing through the site. There is a 1.35m to 1.55m diameter foul water sewer that runs across the site between the north-west and south-west of the site. On-site sewers are the responsibility of Thames Water to

maintain to prevent flooding, which is expected to be carried out as part of routine maintenance. Therefore, there is a low risk of sewer flooding to the site.

5.7.77 The groundwater flood risk and any associated risk of groundwater emergence causing flooding has already been discussed in the groundwater resources section and is not repeated here.

5.7.78 The Environment Agency (2025b) Reservoir Flood Maps show that the site is located within the maximum flood extents of approximately 10 upstream reservoirs. With reference to the Preliminary Flood Risk Assessment for England (Environment Agency, 2018b), the Environment Agency states that reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers.

Burnell Avenue site

5.7.79 The topographical survey shows that the topography across the site generally falls from north-east to south-west where the River Thames is located. Levels across this area range from a high point of 8.58mAOD on the grass in the east of the site to a low point of 3.40mAOD adjacent to the river channel located in the west of the site. The Main, Northern and Southern Work Areas are greenfield, so are expected to drain according to their topography towards the River Thames, with some surface water also expected to infiltrate into the ground.

5.7.80 The River Thames is located in the south-western extents of the site where it flows from south-east to north-west. Teddington Weir is located approximately 40m downstream of the site. Teddington Weir marks the river's usual tidal limit and restricts most of the tidal events upstream. There are no flood defences on-site. There are two connected flood defences located on the opposite bank of the River Thames to the south-west of the site classified as high ground.

5.7.81 The Environment Agency Historic Flood Map (2025) shows no historic flood events at Burnell Avenue. However, on the opposite bank to Burnell Avenue flood outlines have been recorded. There is one recorded flood outline from 2002 for one property on the opposite bank of the River Thames. Floods that occurred before the Thames Barrier such as the Great Flood of 1947 have not been considered.

5.7.82 The Environment Agency Flood Map for Planning shows the south-west area of the site is in fluvial Flood Zone 3, with Flood Zone 2 extending across the centre of the site adjacent to Flood Zone 3. The rest of the site is in Flood Zone 1. The Flood Zone extents are derived from the fluvial River Thames.

5.7.83 Hydraulic model data provided from the Environment Agency and taken from the Thames (Datchet to Teddington) model (WSP & Binnies UK Ltd, 2023) were used to assess fluvial flooding at the site. The modelled outputs showed that Flood Zone 3 is a narrow band along the bank of the River Thames, while Flood Zone 2 extends further up the site. The high ground at the top of the bank and residential areas beyond along Burnell Avenue are in Flood Zone 1.

5.7.84 The present-day surface water flood map indicates that areas within the Burnell Avenue site are partly located in areas defined by the surface water mapping as High (3.3% AEP) to Low (0.1% AEP) surface water flood risk. Flood depths of <0.2m are predicted in the High (3.3% AEP) risk event, and up to 0.3m in both the Medium (1% AEP) and Low (0.1% AEP) risk events. Flood depths in the area of the proposed temporary access road, west of Royal Park gate playground, are predicted to be up to 0.2m in both the High (3.3% AEP) and Medium (1% AEP) risk scenarios, with a depth of up to 0.3m predicted in the Low (0.1% AEP) risk scenario. The remainder of the Burnell Avenue site is unaffected by the present-day surface water extents.

5.7.85 There is a 3.3m diameter surface water sewer that runs north-east to south-west across the site from a path to the south-east of Burnell Avenue to the River Thames where it discharges through an outfall with a flap. No other sewers are located on-site, although it is unknown if the gullies on Burnell Avenue discharge into the 3.3m diameter surface water sewer or if there are any highway drains that run across the site. All on-site utilities would be mapped and considered within the design ahead of construction.

5.7.86 The groundwater flood risk and any associated risk of groundwater emergence causing flooding has already been discussed in the groundwater resources section and is not repeated here.

5.7.87 The Environment Agency (2025b) Reservoir Flood Maps show that the site is located within the maximum flood extents of approximately ten upstream reservoirs. With reference to the Preliminary Flood Risk Assessment for England (Environment Agency, 2018b), the Environment Agency states that reservoir flooding is extremely unlikely to happen. All large reservoirs must be inspected and supervised by reservoir panel engineers.

Future baseline

5.7.88 In general, climate change is expected to lead to an increase in temperatures, with a greater frequency of hotter, drier summers and warmer, wetter, winters. Climate change is also expected to lead to sea level rise which will affect tide levels and associated flood risk within the tidal section of the River Thames as far west as Teddington Weir.

5.7.89 Further information on projected changes in climate parameters is provided in Chapter 18: Climate Change. Projected future changes in climate (e.g. increase in temperatures) have the potential to interact with effects identified within some environmental aspects and exacerbate or diminish their impact. Such combined impacts are termed In-Combination Climate Impacts (ICCI). Consideration of the potential ICCI associated with water resources and flood risk during the operation phase is provided in section 5.8 of this chapter.

5.7.90 The Project has an assumed operational life of 60 years and a proposed opening year of 2033 so climate change should be assessed up to the year 2093. The condition of the components would be reviewed at the end of their anticipated life to determine if they can continue to operate after this time.

Flood risk

5.7.91 The future baseline conditions relevant to flood risks are detailed in the FRA in Appendix 5.2. This has been assessed using the Environment Agency climate change guidance and the flood modelling results available in the TE2100 Plan and Thames (Datchet to Teddington) model (WSP & Binnies UK Ltd, 2023). The paragraphs below provide a summary of the future baseline flood risks.

5.7.92 Climate change is expected to increase sea levels, peak rainfall intensities and peak river flows. These changes are expected to increase the flood risks for the future baseline, with larger flood extents and depths from rivers, sea and surface water.

5.7.93 Using the higher central climate change allowance for the London Management Catchment, peak river flows in the Duke of Northumberland's River at Mogden STW are expected to increase by 14% in the 2020s epoch and 27% in the 2080s epoch. Since the development at Mogden STW is deemed to be essential infrastructure (see Appendix 5.2 FRA), the upper end climate change allowance, with a 54% increase in peak river flow, has been considered as a sensitivity test. The flood defences along the Duke of Northumberland's River are not predicted to overtop with any of these climate change allowances.

5.7.94 Across Mogden STW, the Environment Agency surface water map with climate change (2050s central allowance) has been reviewed to understand the impact that this has on depths and extents in comparison to the present-day event. Extents are shown to be similar at the Western Work Area and Eastern Work Area, with both areas remaining at low risk of surface water flooding. Climate change impacts into the 2070s epoch would require further consideration as the design evolves for the operational scenario at Mogden STW.

5.7.95 The Mogden STW site and the Burnell Avenue site are not located in a policy unit expected to be affected by the proposed TE2100 Plan in the future. The Ham Playing Fields site would be affected by the proposed TE2100 Plan. It is located in the Richmond Policy Unit. For this policy unit, the P5 policy applies for tidal flooding which means further action would be taken to reduce the risk of flooding. The P3 policy applies to fluvial flooding where flood defences would be maintained at their current level and flood risk may increase.

5.7.96 Hydraulic model nodes provided by the Environment Agency from the TE2100 Plan 10-year review study, provide in-channel water levels that consider the operation of the Thames Barrier for future levels at the Ham Playing Fields site. The levels provide the highest water levels for the Tidal Thames that would be permitted by the operation of the Thames Barrier. If the levels are forecast to be higher, the Thames Barrier would close to block the tide and maintain the river levels at a lower level. The Thames Barrier and associated flood defences have a 1 in 1,000 year (0.1% AEP) standard of protection.

5.7.97 Based on the modelled maximum fluvial-tidal flood levels with climate change from the TE2100 Plan 10 year review study, the Ham Playing Fields site is below the modelled maximum water levels in 2022 (6.88mAOD) and 2100

(6.42mAOD) indicating that the entire site is susceptible to flooding during these years in the 2022 and 2100s epochs. For the year 2065, the modelled maximum water level is lower at 5.97mAOD, which would mean that a small area in the south-east of the site would not be flooded in this event. The proposed shaft cap would remain with the future flood extents.

5.7.98 The future fluvial levels also increase flood risk at Burnell Avenue Main, Northern and Southern Work Areas up to 7.98mAOD for the 1% AEP flood with 35% climate change allowance. The flood depths increase along the riverside path, but the flood extents remain within the amenity ground.

5.7.99 Using the Maidenhead and Sunbury Management Catchment and the London Management Catchment, peak rainfall intensities for the Ham Playing Fields and Burnell Avenue sites are expected to increase by 35% for the 3.3% annual exceedance rainfall event and 40% for the 1% annual exceedance rainfall event in the 2070s epoch. The longer-term climate change impacts would be further considered in the ES alongside the latest Environment Agency surface water map with climate change (2050s central allowance) released in 2025.

Baseline receptor valuation

5.7.100 The following table summarises the anticipated value of each of the receptors identified within the study area, along with the name(s) of the work sites from which effects may be caused. The values of the receptors will be discussed further in Section 5.8 of this report and used to assess the significance of potential effects to each receptor.

Table 5.12 Receptors identified within study area

Discipline	Receptor	Value	Applicable work sites
Surface water	Tidal River Thames (water quality)	High	Ham Playing Fields
Surface water	Tidal River Thames (geomorphology)	High	Mogden STW
Surface water	Tidal River Thames (water quality)	Medium	Mogden STW
Surface water	Freshwater River Thames (geomorphology)	Low	Burnell Avenue
Surface water	Freshwater River Thames (water quality)	Medium	Burnell Avenue
Groundwater	Taplow Gravel Formation (Principal aquifer)	Very high	Mogden STW
Groundwater	Kempton Park Gravel Member (Principal aquifer)	Very high	Mogden STW
Groundwater	Kempton Park Gravel Member (Secondary A aquifer)	High	Ham Playing Fields Burnell Avenue Tudor Drive

Discipline	Receptor	Value	Applicable work sites
Groundwater	Alluvium (Secondary Undifferentiated)	Low	Burnell Avenue
Groundwater	Artificial / Made ground (No aquifer classification)	Low	Mogden STW Ham Playing Fields
Groundwater	Langley Silt Member (Unproductive strata)	Low	Mogden STW
Groundwater	London Clay Formation (Unproductive strata)	Low	Mogden STW Ham Playing Fields Burnell Avenue Tudor Drive
Groundwater	Private abstractions (not for human consumption)	Medium	Mogden STW Ham Playing Fields Burnell Avenue Tudor Drive
Flood Risk	Mogden STW as essential infrastructure	Very high	Mogden STW
Flood Risk	Construction equipment	Medium	Mogden STW Ham Playing Fields Burnell Avenue
Flood Risk	Construction workers	Very high	Mogden STW Ham Playing Fields Burnell Avenue
Flood Risk	Playing fields	Low	Ham Playing Fields
Flood Risk	Residential and commercial properties	High	Ham Playing Fields Burnell Avenue
Flood Risk	Site infrastructure (operational)	Low	Ham Playing Fields

5.8 Preliminary assessment of likely significant effects

Construction phase

5.8.1 This section sets out the likely significant effects on water resources and flood risk during construction and is based on the construction activities detailed in Chapter 2: Project Description. The assessment assumes that embedded design (primary) mitigation and standard good practice (tertiary) measures would be implemented, and the results of the assessment then inform the need for any additional (secondary) mitigation requirements during construction.

5.8.2 This preliminary assessment has been undertaken for each site of the Project and further divided into surface water resources, groundwater resources and flood risk for each site. A summary of the outcome of the assessment for the Project construction phase is provided in Table 5.13.

Mogden STW site

5.8.3 The Project construction activities which have been identified to require assessment for likely significant effects on water resources and flood risk at the Mogden STW site are the following:

a. Activities in the Western Work Area including excavation and dewatering for the construction of the drive shaft, as well as the below ground connection from the drive shaft to the recycled water interception shaft in the Eastern Work Area of the site.

b. Activities in the Eastern Work Area including excavation and dewatering for the construction of the recycled water interception shaft.

c. Construction of a wastewater return pipe in the Eastern Work Area to transfer waste flow from the new TTP to the existing Mogden treatment plant and excavation works to support the construction of the TTP and supporting infrastructure.

5.8.4 All of the shafts would be constructed using segmental lining, employing either caisson jacking or underpinning, depending on the ground conditions. Once within the London Clay Formation, the construction methodology could switch to sprayed concrete lining.

5.8.5 The precise methods by which the conveyance tunnel and adit connection are to be constructed have not been confirmed but would similarly be sealed during progression of the excavations to limit the ingress of groundwater.

5.8.6 Any effects associated with ground conditions and presence of contamination during construction works are assessed in Chapter 10: Ground Conditions and Contaminated Land.

Surface water resources

5.8.7 Surface water resources have been scoped out for the Mogden STW site (see paragraph 5.3.9 under ‘Summary of scope of the EIA’).

Groundwater resources

Western Work Area - groundwater flow and levels

5.8.8 Within the areas of works at Mogden STW, the BGS mapping indicates construction of the drive shaft in the Western Work Area would be through Made Ground (no aquifer classification), the underlying Taplow Gravel Member (Principal aquifer) and Langley Silt Member (Unproductive strata) and then into the London Clay Formation (Unproductive strata). The interim GI report also identifies the Kempton Park Gravel Member (Principal aquifer) at this location.

5.8.9 The Taplow Gravel and Kempton Park Gravel Members are considered to be of Very High sensitivity to construction effects due to their Principal aquifer classifications. Artificial Ground, Langley Silt Member and London Clay Formation are considered to be of Low sensitivity based on their classification as Unproductive strata.

5.8.10 Construction of the drive shaft in the Western Work Area is expected to require groundwater control, which may have a temporary impact on groundwater flow and levels in the Taplow Gravel Member and the Kempton Park Gravel Member. The magnitude of impact from dewatering activities within the Western Work Area is deemed to be Minor adverse as any changes in groundwater level and flow are expected to be temporary, localised and short term.

5.8.11 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels from construction groundwater control in the Western Work Area to the most sensitive receptors in this area (the Principal aquifer of the Taplow and Kempton Park Gravel Members) is assessed as Moderate or Large adverse (Significant). The effect on groundwater flows and levels within this aquifer would however be temporary, localised and short term.

Eastern Work Area - groundwater flow and levels

5.8.12 In the Eastern Work Area at Mogden STW, construction would be through Made Ground (no aquifer classification), the underlying Langley Silt Member (Unproductive strata) and the London Clay Formation (Unproductive strata). The interim GI report also identifies Kempton Park Gravel Member (Principal aquifer) to the west and east of this work area and therefore a conservative approach has been adopted for the purposes of this assessment, which assumes the presence of the Kempton Park Gravel Member.

5.8.13 The Kempton Park Gravel Member is considered to be of Very High sensitivity to construction effects due to its Principal aquifer classification. Artificial Ground, Langley Silt Member and London Clay Formation are considered to be of Low sensitivity based on their classification as Unproductive strata.

5.8.14 Within the Eastern Work Area, construction of the TTP and supporting infrastructure and interception shaft would mainly be through Unproductive superficial deposits. However, on the conservative assumption that Kempton Park Gravel Member may also be present in this area, groundwater control may be required, which may have a temporary impact on groundwater flow and levels. The temporary magnitude of impact from activities within the Eastern Work Area is therefore conservatively assessed as Minor adverse as any changes in groundwater level and flow are expected to be temporary, localised and short term.

5.8.15 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels from construction groundwater control in the Eastern Work Area is conservatively assessed, based on the highest sensitivity receptor, as Moderate or Large adverse (Significant). The effect on groundwater flows and levels within this aquifer would however be temporary, localised and short term.

Private water supplies – groundwater levels

5.8.16 The desk-based review identified five active groundwater abstractions within the 2km study area around the Mogden STW site. The closest abstraction is located 1,640m to the east of the Eastern Work Area, on the eastern side of the River Thames. All five abstractions are for spray irrigation purposes, and abstract water from the Kempton Park Gravel Member. They are therefore considered to be of Medium sensitivity.

5.8.17 The magnitude of impact on groundwater levels of private water supplies is assessed as Minor adverse as any potential changes in groundwater levels due to dewatering activities at Mogden STW are expected to be temporary, localised and short term.

5.8.18 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels from construction groundwater control on private water supplies is assessed as Slight adverse (Not Significant).

Recommendation

5.8.19 Due to the sensitivity of the aquifers and other receptors in the vicinity of Mogden STW, it is recommended that a hydrogeological impact assessment is carried out when the preferred method(s) of construction has been developed, to characterise the risk of groundwater control at this location, following engagement with the Environment Agency. The hydrogeological impact assessment will inform the ES.

Flood risk

Modgen STW Site

5.8.20 Mogden STW site can be considered to contain ‘Essential Infrastructure’ as, with reference to Annex 3 of the NPPF (MHCLG, 2024c), it is a ‘*water treatment works that needs to remain operational in times of flood’*. While the STW is designed to manage water, disruption due to flooding of the site could cause wider network impacts and so it is considered to be of Very High sensitivity.

5.8.21 Construction would be located away from the Duke of Northumberland’s River flood extents, so No change in flood risk is expected to be linked to the river. Based on the site’s topography, any surface water runoff from the Western and Eastern Work Areas during construction could impact areas within Mogden STW but would be limited to pre-development rates as part of the sustainable surface water drainage strategy set out in the standard good practice (tertiary). With the drainage strategy in place, surface water would fully contain by the surrounding landscape bund to avoid any impact to the off-site developed areas beyond the sit and deemed to be Negligible.

5.8.22 Based on a Very High sensitivity and Negligible to No change of flood risk, this is assessed as a Neutral (Not Significant) effect.

5.8.23 The Mogden STW site is located away from reservoirs and canals, with a breach in the reservoir's dam upstream considered extremely unlikely. No Change in flood risk impacts is expected to be linked to these artificial sources and with Very High sensitivity due to the number of residential properties affected by reservoir flooding, this is assessed as a Neutral (Not Significant) effect.

5.8.24 There is likely No Significant effect from flood risk during construction at Mogden STW to off-site developed areas.

Construction equipment

5.8.25 Flooding from rivers or surface water would have a negative impact on the construction works if it occurred. Flooding could damage the equipment, plant, materials, as well as the newly constructed development. This would delay the construction temporarily and require replacement equipment, plant and materials to be sourced.

5.8.26 The Eastern and Western Work Areas are located away from the Duke of Northumberland's River flood extents, so No change in flood risk is expected to be linked to the river.

5.8.27 The Environment Agency present-day surface water flood map shows that the Western Work Area at the Mogden STW site is located entirely outside of the predicted surface water extents for the modelled High (3.3% AEP), Medium (1% AEP) and Low (0.1% AEP) risk scenarios. The Eastern Work Area is located above the 0.1% AEP surface water flood levels being located on the platform. As such, the risk of surface water flooding to the Western and Eastern Work Areas can be considered Low sensitivity with Negligible change in flood risk to the construction works. This is assessed as a Neutral (Not Significant) effect.

5.8.28 The site is situated away from reservoirs and canals, making a breach in the reservoir's dam upstream extremely unlikely. Consequently, no change in flood risk impacts is expected from these artificial sources. Given the Medium sensitivity of the on-site receptors once the Flood Response Plan has been enacted, this is considered to result in a Neutral (Not Significant) effect.

5.8.29 There are likely No Significant effects from flood risk during construction at Mogden STW due to construction works.

Construction workers

5.8.30 Construction workers could be at risk of injury on a flooded construction site from both the flood itself and the mobilisation of debris and equipment within the flood. Therefore, construction workers are considered to be of Very High sensitivity. With the standard good practice (tertiary) in place for the Flood Response Plan, construction workers are removed from all sources of flood risk. Therefore, there is No Change in predicted flood risk to construction workers. Considering the Very High sensitivity, this is considered to result in a Neutral (Not Significant) effect.

5.8.31 There are likely No Significant effects from flood risk during construction at Mogden STW to construction workers.

Ham Playing Fields site

5.8.32 The Project construction activities which have been identified to require assessment for likely significant effects on water resources and flood risk at Ham Playing Fields site are the following:

a. Construction of the intermediate shaft impacting on groundwater levels and flows

b. Provision of a temporary pipeline to the River Thames for the discharge of water generated through groundwater control measures

c. Potential temporary impact on surface water quality from construction activities (e.g. contamination)

d. Construction within a flood zone which may impact flood risk through displacing floodwater elsewhere

5.8.33 As detailed in Chapter 2: Project Description, the intermediate shaft for the Project design is located at Ham Playing Fields. A small area adjacent to Ham Street Car Park and an area along Ham Street connecting the Main Work Area to the road, known as Support Work Area, are included in the draft Order limits for additional storage, welfare, contractor parking and surface water discharge connection. These would not have any potential significant effects on water resources and flood risk and therefore the Support Work Area is not included for the assessment in this chapter. The option to construct a temporary pontoon and the use of barge movements for construction materials at Ham Playing Fields site have also been discounted since the EIA Scoping Report.

5.8.34 Surface water resources

5.8.35 The sensitive surface water receptor identified in proximity to Ham Playing Fields site is the tidal River Thames (Thames Upper water body GB530603911403). The water body has ‘Good Status’ water quality related classification elements (dissolved oxygen) and is therefore classified as having High sensitivity.

5.8.36 The Main Work Area of Ham Playing Fields site is approximately 250m from the tidal River Thames and identified as not being in direct hydraulic connectivity with the river, whereas the Support Work Area by Ham Street Car Park is immediately adjacent to the tidal River Thames. Overland flow pathways remain but would be of medium duration from source to receptor. Rainfall-associated contaminant mobilisation from open ground or spoil or fuel leaks, and transfer is a viable risk, but would require considerable volumes of water to be transferred to breach the distance. As such with consideration of standard good practice (tertiary) outlined in Section 5.4, the magnitude is considered No change with Neutral (Not Significant) effect identified for surface water receptors at this site.

5.8.37 The construction of the temporary contingency dewatering pipe may impact the riparian zone, channel banks and potentially the channel bed. There would be

an additional discharge into the tidal River Thames during the construction period which may require a discharge consent from the Environment Agency. The pipe would be removed after construction. Therefore, the magnitude of impact from the construction of the dewatering pipe and the discharge of water is considered to be Minor adverse as any changes are considered to be temporary, localised and short-term, resulting in a Slight adverse (Not Significant) effect.

Groundwater resources

Kempton Park Gravel Member - groundwater flows and levels

5.8.38 In the area of Ham Playing Fields, intermediate shaft construction would be through Made Ground (no classification), the Kempton Park Gravel Member (Secondary A aquifer), Alluvium (Secondary (undifferentiated) aquifer) and the London Clay Formation (Unproductive). In this area, the Kempton Park Gravel Member and are considered to be of High sensitivity due to their Secondary aquifer classifications. The Made Ground and London Clay Formation are considered to be Low sensitivity based on their classification as Unproductive Strata.

5.8.39 Any impact of groundwater control from Alluvium intermediate shaft construction is anticipated to be localised and temporary. As such, the magnitude of impact from the construction of the intermediate shaft at both potential locations is deemed to be Minor adverse, as any changes in groundwater level and flow are expected to be temporary, localised and short term.

5.8.40 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels in the Kempton Park Gravel Member from construction groundwater control is conservatively assessed as Moderate adverse (Significant).

Private water supplies – groundwater levels

5.8.41 The desk-based review identified 13 groundwater abstractions within the 2km study area around the Ham Playing Fields site, of which seven are licensed and six are deregulated abstractions. The aquifer from which the water is abstracted is currently unknown, but is assumed to be the Kempton Park Gravel Member. These abstractions are used for spray irrigation and therefore are considered to be of Medium sensitivity.

5.8.42 Any impact of groundwater control from the construction of the intermediate shaft is anticipated to be localised and temporary. Therefore, the magnitude of impact from the construction of the intermediate shaft is considered to be Minor adverse as any changes in groundwater level and flow are expected to be temporary, localised and short term. Based on the above sensitivity and magnitude, the significance of effect on groundwater flows and levels from construction groundwater control is assessed as Slight adverse (Not Significant).

Recommendation

5.8.43 Due to the sensitivity of the aquifers and other receptors in the vicinity of Ham Playing Fields site, it is recommended that a hydrogeological impact assessment is carried out when the preferred method(s) of construction has been decided, to fully characterise the risk of groundwater control at this location, following liaison with the Environment Agency. The hydrogeological impact assessment will inform the ES.

Flood risk

Off-site developed areas

5.8.44 Off-site developed areas around the Ham Playing Fields site are classified as 'Water Compatible', with reference to Annex 3 of the NPPF (MHCLG, 2024c),due to their designation as a recreational area. Based on available modelled data, the flood defences to the south of the Main Work Area would only overtop in low frequency and high magnitude flood events. Therefore, the receptors are deemed to be limited to the Playing Fields themselves and to be of Low sensitivity.

5.8.45 The site's topography suggests that any flooding from the site would flow over the scrubland and Playing Fields on the south bank of the River Thames (right bank) from both fluvial dominant floods and the Tidal Thames flooding (in the 2020s epoch). However, any change in flood risk would be expected to be limited to Negligible or Minor impacts for the Playing Fields beside the Main Work Area. These have been deemed as Minor as a precautionary approach for the purposes of this assessment, which is subject to refinement due to design development and associated detailed hydraulic assessment.

5.8.46 Based on the potential for the Main Work Area to modify localised flow paths, flood impacts are deemed to be Minor within a Low sensitivity area of the Playing Fields and so the significance of effect on flood risk impacts to off-site receptors is assessed as Slight adverse (Not Significant).

5.8.47 On the northern bank of the River Thames (right bank), residential and commercial properties are present which are classed as more vulnerable development but made more resilient by the presence of flood defences. Therefore, the receptors on the north bank are deemed to be High sensitivity if the flood defences are overtopped.

5.8.48 While it is unlikely that any change to local flow pathways could be changed on the northern bank of the River Thames could be changed by the construction works at Ham Playing Fields site on the opposite bank, any change in flood risk would be expected to be limited to Negligible to Minor impacts subject to additional flood modelling and design development of the construction compound.

5.8.49 Therefore, flood risk impacts to the High sensitivity receptors on the northern river bank, opposite the Ham Playing Fields site, are deemed to be Slight to Moderate Adverse, conservatively assumed Moderate Adverse at this stage

and so potentially Significant taking a precautionary approach based on currently available information but subject to change following additional flood modelling.

5.8.50 The site is located away from reservoirs and canals, with a breach in the reservoir dams upstream considered extremely unlikely. No change in flood risk impacts is expected to be linked to these artificial sources and with High sensitivity for the residential receptors affected in reservoir flooding, this is considered to be a Neutral (Not Significant) effect.

5.8.51 On this basis, there is likely No Significant Effect from flood risk during construction at Ham Playing Fields site, to off-site developed areas.

On-site works

5.8.52 Construction would be located in Flood Zone 3 of the River Thames and a potential risk from more frequent fluvial-tidal flood events to the existing car park area from a 50%AEP flood and the main compound site from the 3.33%AEP flood events .

5.8.53 With the embedded mitigation and standard good practice (tertiary) in place, the proposed shaft and welfare facilities will be removed from flood risk. However, this depth of floodwater could have the potential to cause damage to the construction works and plant, equipment and materials, as well as the potential to mobilise and move the plant within the local vicinity. Therefore, the remaining plant, equipment, and materials not otherwise considered within the embedded mitigation and not removed from Flood Zone 3 in the standard good practice Flood Response Plan, are deemed to be classified as ‘Less Vulnerable’ and of Medium sensitivity.

5.8.54 Without additional (secondary) mitigation for these elements of construction, this presents a Moderate magnitude of flood risk from the River Thames. Given the Medium sensitivity, this is considered to be a temporary, direct, short-term Moderate adverse (Significant) effect without additional (secondary) mitigation.

5.8.55 The FRA indicates that the site is at low risk of surface water flooding at the Ham Playing Fields site Main Work Area, Support Work Area and Ham Street with no surface water flow paths. Therefore, surface water ponding would only occur from rainfall landing on the construction area, which is a small area. As per Section 5.4, a temporary drainage system would be installed and the extent of surface water ponding on-site following standard good practice (tertiary) is expected to have a Negligible adverse impact on surface water flood risk during construction. Based on the Medium sensitivity on-site receptors, this is considered to be a temporary, indirect, short-term Slight adverse (Not Significant) effect.

5.8.56 The site is located away from existing reservoirs and canals external to eth Project. Any potential dam breach of external reservoirs upstream in the Greater London and Thames Valley Area is considered extremely unlikely with the controls and enforcement under the Reservoirs Act 1975. Ham Playing

Fields does not change the likelihood of each a risk occurring or flow paths around the Project. Consequently, No change in flood risk impacts is expected to be linked to these artificial sources. Given the Medium sensitivity of receptors on-site once the standard good practice (tertiary) of the Flood Response Plan has been enacted , this is considered to be a Neutral effect which is Not Significant.

5.8.57 The potential effect of flooding from the River Thames to the construction works at Ham Playing Fields site is likely to be Significant. However, flooding from all other sources to on-site works is assessed as Not Significant.

Construction workers

5.8.58 Construction workers may be at risk of injury on a flooded construction site, both from the floodwaters and the movement of debris and equipment carried by the flood. Therefore, construction workers are considered Very High sensitivity receptors.

5.8.59 Construction would be located in Flood Zones 2 and 3 of the River Thames. The flood levels on-site could have a maximum water depth of between 0.29m and 3.31m within the Main Work Area. This presents a risk of injury and/or risk of fatalities to construction workers (Very High sensitivity) located on-site during a flood event. As embedded mitigation, welfare facilities would be raised above flood levels and a Flood Response Plan will be developed to evacuate the construction workers as part of standard good practice (tertiary). Removal of construction workers from flood risk results in Negligible adverse risk to workers. The effect of flooding to construction workers at Ham Playing Fields site is assessed as Slight adverse (Not Significant).

5.8.60 The FRA indicated that flood risks from all other sources of flood risk including surface water, reservoirs and canals at the site are low to negligible with the standard good practice (tertiary) of a Flood Response Plan in place. The magnitude of impact is therefore considered No change, given the Very High sensitivity. Neutral (Not Significant) effect to construction workers is anticipated.

5.8.61 There are likely No Significant effects from flood risk to construction workers at Ham Playing Fields site.

Burnell Avenue site

5.8.62 The Project construction activities which have been identified to require assessment for likely significant effects on water resources and flood risk at the Burnell Avenue site are the following:

a. Construction of the intake and outfall structures at the bank or near the bank of the River Thames could lead to some localised impact on the geomorphology of the channel bank and bed.

b. Locally at construction sites with pathways to surface waters, there is risk of temporary impacts on surface water quality from construction activities.

c. Excavation works, such as in the construction of the shafts, have the potential to cause localised changes to groundwater resources.

Surface water resources

5.8.63 Based on the criteria for determining sensitivity, the River Thames has Low sensitivity to geomorphology. The banks are steep and reinforced with concrete or sheet piling. The Thames (Egham to Teddington) river water body is acknowledged in the Thames RBD RBMP3 as non-natural for flow and geomorphology, designated as a HMWB for drinking water supply, flood protection and navigation including ports. At RBMP3, the Environment Agency states that mitigation measures to reduce the impacts of these designated uses are not complete and currently technically infeasible.

5.8.64 The Thames (Egham to Teddington) river water body RBMP3 status was classified as moderate physico-chemical water quality, high for specific pollutants supporting ecological status, and fail for chemical status. The Project evidence is largely consistent with water body status. The RBMP status applies broadly to the entire water body, of which 95% is upstream of the Burnell Avenue site and therefore not relevant.

5.8.65 Based on available classifications and evidence and considering that the Burnell Avenue draft Order limits and the reach of the River Thames extending to Teddington Weir do not support habitats protected or designated under UK habitat legislation, the site is assessed as having Medium sensitivity for water temperature, physico-chemical water quality, nutrient quality and hazardous chemicals.

5.8.66 Within the Burnell Avenue site, construction of the intake, outfall (bankside and near bankside in-river options), reception shaft and connection shaft, may impact the surface water of the freshwater River Thames. Construction of the outfall and the intake at the Burnell Avenue site may require cofferdams and cutting through the riverbank. A cofferdam would include temporary support piles and sheet piling with subsequent removal of water from within the structure. Using standard good practice (tertiary) and measures presented in the draftCoCP, release of sediment would be minimised during the installation of any cofferdam, with quantities expected not to be detectable against the natural fluctuations in sediment in the freshwater River Thames and would not have an impact on water quality. This results in a Negligible magnitude of change and is assessed as a Neutral or Slight adverse (Not Significant) effect.

5.8.67 The securing of a dry working area at the intake and outfall would directly impact the bank and bed of the River Thames, however, as the impacted areas are small in the context of the width of the river and not expected to interrupt geomorphological processes outside within the remaining river, the overall impact would be Minor. This would result in minor changes to the geomorphological form and functioning of rivers and associated catchment and is considered to be a Slight adverse (Not Significant) effect.

5.8.68 Construction of the shafts at the Burnell Avenue site would involve excavation through the superficial deposits. Shaft excavation would be undertaken using standard good practice (tertiary) which includes surface water controls,

therefore mitigating mobilisation of soil which could otherwise lead to increased suspended solids within any surface water runoff generated from the area of works. In addition, surface water management good practice includes measures to ensure leaks, spills and construction materials are captured and do not enter the river. Consequently, the magnitude of impact is considered Negligible and is assessed as a Neutral or Slight adverse (Not Significant) effect.

5.8.69 Site dewatering would be subject to licensing or permit requirements as detailed in Section 5.11. As such, the impact on water quality is Negligible and is assessed as a Neutral or Slight adverse (Not Significant) effect.

Groundwater resources

Outfall and intake construction – groundwater flow and levels

5.8.70 The construction activities at Burnell Avenue for the intake, outfall (bankside and near bankside in-river options) would be through the Kempton Park Gravel Member (Secondary A aquifer), Alluvium and the London Clay Formation (Unproductive). In this area, the Kempton Park Gravel Member and Alluvium are considered High sensitivity due to their Secondary A and Secondary (undifferentiated) aquifer classification. The London Clay Formation is considered to be Low sensitivity based on the classification as Unproductive strata.

5.8.71 Groundwater control measures during construction of the outfall (bankside and near bankside in-river options) and the intake, may impact groundwater flow in the Superficial Deposits located immediately on the bank of the Thames, principally the Kempton Park Gravel Member. Construction for both the bankside and near bankside in-river outfall options and the intake could be within a cofferdam structure. The initial construction of the cofferdam would include temporary support piles and sheet piling with subsequent removal of water from within the structure.

5.8.72 After the initial cofferdam construction phase, groundwater control measures would be reduced, ensuring only that inflows through the cofferdam joints, and through the base and sides of the riverbank excavation, are managed to maintain dry conditions for construction. The cofferdam structure may temporarily impede groundwater/surface water interaction between the superficial deposits and the River Thames, potentially lowering groundwater levels in the Kempton Park Gravel Member along the riverbank near the cofferdam. As such, the magnitude of impact to the aquifer is assessed as temporary short-term Minor adverse.

5.8.73 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels from construction groundwater control is conservatively assessed, based on the highest sensitivity receptor as Moderate adverse (Significant).

Shaft and adit construction – groundwater flow and levels

5.8.74 The construction activities at Burnell Avenue for the reception shaft and connection shaft (adit) would be through the Kempton Park Gravel Member (Secondary A aquifer) and then into the London Clay Formation (Unproductive strata). In this area, the Kempton Park Gravel Member is considered High sensitivity due to its Secondary A aquifer classification. The London Clay Formation is considered to be Low sensitivity based on the classification as Unproductive strata.

5.8.75 Excavation and construction of the reception shaft for the proposed outfall and connection shaft for the proposed intake may impact groundwater flow and levels within the Kempton Park Gravel Member at the shaft location, where groundwater controls are anticipated to be required. Impacts to groundwater from the construction of the shaft are anticipated to be localised, temporary and short-term and therefore the magnitude of impact is assessed as Minor adverse.

5.8.76 Based on the above sensitivities and magnitude of impact the significance of effect on groundwater flows and levels from construction groundwater control is conservatively assessed, based on the highest sensitivity receptor as Moderate adverse (Significant).

Private water supplies – groundwater levels

5.8.77 The desk-based review identified 13 abstractions within the 2km study area around the Burnell Avenue site, of which seven are licensed and six are deregulated abstractions. Two abstractions are located within 400m of the Burnell Avenue site, which abstract from the Kempton Park Gravel Member. Both abstractions are for spray irrigation and are considered to be of Medium sensitivity.

5.8.78 The magnitude of impact on groundwater levels of private water supplies is assessed as Minor adverse as any potential changes in groundwater levels due to dewatering activities at the Burnell Avenue site are expected to be temporary, localised and short term.

5.8.79 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels from construction groundwater control on private water supplies is assessed as Slight adverse (Not Significant).

Flood Risk

Off-site developed areas

5.8.80 Receptors at the Burnell Avenue site can be considered to be '*Water Compatible*' with reference to Annex 3 of the NPPF (MHCLG, 2024c), as it is an amenity space for open sport and recreation. Based on the site's topography, any flooding from the site to off-site developed areas would be likely to occur from the River Thames and be classified as either 'Water Compatible' in Annex 3 as it is an 'amenity space for open sport and recreation' in more frequent flood

events up to buildings which can be classed as ‘More Vulnerable’ in rarer flood events.

5.8.81 The initial construction plans indicate that there would be two cofferdams located within the river which would temporarily reduce the cross-sectional area of the river. One cofferdam would be located around the outfall location and is likely to extend into the river up to 20m. The river is approximately 80m wide at this location during non-flood conditions and so this would reduce the flow width by approximately 25%. The other cofferdam would be located around the intake location and is likely to extend into the river by 15m so this would reduce the flow width by approximately 19%.

5.8.82 It is anticipated that the cofferdams would be in place for up to 18 months. The cofferdams may lead to increased water levels and/or flow velocity within the constricted river reach, as well as slightly upstream. In the event of a fluvial flood, this could potentially raise local flood levels and expand flood extents. However, the exact increase in water levels will be determined as the cofferdam design and construction phase schedule develops. Any changes in water level and velocity are expected to dissipate downstream beyond Teddington Weir. Therefore, any impacts on flood risk would be confined to the reach of the River Thames from slightly upstream of the intake cofferdam to Teddington Weir.

5.8.83 Installation of cofferdams could potentially affect the residential dwellings on the opposite bank of the River Thames, which can be classified as ‘More Vulnerable’. However, these properties are currently defended. Further hydraulic assessment would be required to refine the understanding of the impact on water levels for a flood event appropriate for the construction phase as the in-river channel construction works design develops. Based on current information, these off-site developed areas are deemed to be of High sensitivity. The potential impact of a cofferdam is assessed as Moderate on flood levels and velocities locally and is considered to result in a temporary, indirect, short-term Moderate to Large adverse (Significant) effect. The range, Moderate to Large adverse, is selected as a precautionary and conservative approach until further modelling can be undertaken.

5.8.84 Construction would occur in Flood Zone 3 of the River Thames on the bankside area of the Main Work Area. Following the standard good practice (tertiary) outlined in Section 5.4, flood-sensitive equipment, plant, materials and chemicals would be located in the areas of lowest flood risk on the high ground and a sustainable drainage design would be developed for the construction phase to limit any increase in surface water runoff to pre-development rates. Therefore, fluvial flood risk and surface water flood risk elsewhere would not be affected. Based on current information, off-site developments are deemed to be of High sensitivity and there is the potential for the Main Work Area on the river bank to have a Negligible magnitude of impact on flood levels and velocities locally. In turn, this is considered to be a temporary, indirect, short-term Slight adverse (Not Significant) effect.

5.8.85 The site is located away from reservoirs and canals, with a breach in the reservoir's dam upstream considered extremely unlikely. Therefore, No change in flood risk impacts is expected to be linked to these artificial sources. Given the High sensitivity, this is considered to lead to a Neutral (Not Significant) effect.

5.8.86 The flood risk impact to off-site developed areas at Burnell Avenue site during construction is Significant for flooding from the River Thames due to the cofferdam. However, further hydraulic modelling is required to assess localised impacts and changes in water levels. Additional (secondary) mitigation, including further hydraulic modelling, is discussed in Section 5.9. The flood risk presented to off-site developed areas from the construction from all other sources is Not Significant.

On-site works

5.8.87 Flooding would have a negative impact on the construction works if it occurred. Construction would take place in Flood Zones 2 and 3 from the River Thames, including in-river areas. However, the construction works layout locates flood-sensitive equipment, plant and material on high ground outside of Flood Zone 3.

5.8.88 Given the embedded mitigation for the cofferdam design and standard good practice (tertiary) outlined in Section 5.4, this flood risk from the River Thames is assessed as Minor adverse magnitude of change. Given the Medium sensitivity on the on-site receptors after the Flood Response Plan has been enacted, this is considered to lead to a temporary, direct, short-term Slight adverse (Not Significant) effect.

5.8.89 The FRA indicates that the site is primarily at medium to low risk of surface water flooding. A temporary drainage system would be installed to manage surface water flooding from most rainfall events. This would mean that the level of surface water ponding on-site would be considered to be low with a Negligible adverse magnitude of change on surface water flood risk to the construction works. Based on a Medium sensitivity, this is considered to lead to a Slight adverse (Not Significant) effect.

5.8.90 The site is situated away from reservoirs and canals, with a breach in the reservoir's dam upstream considered extremely unlikely. Therefore, No change in flood risk impacts from these artificial sources is expected. Given the Medium sensitivity, this is considered to lead to a Neutral (Not Significant) effect.

5.8.91 The flood risk impact at the Burnell Avenue site during construction works is Not Significant.

Construction workers

5.8.92 Construction workers may be at risk of injury on a flooded construction site, both from the floodwaters and the movement of debris and equipment carried by the flood. Therefore, construction workers are considered Very High sensitivity.

5.8.93 Construction would be located in Flood Zone 3 of the River Thames, where flood levels on-site could have a maximum water depth of up to 2.92m (see paragraph 5.8.87) which could be higher, following works undertaken within the cofferdam. This poses a risk of injury or fatalities to construction workers. However, a Flood Response Plan would be implemented to ensure that all personnel are evacuated as part of standard good practice (tertiary). With no construction workers on-site, this would result in No change and is assessed as a Neutral (Not Significant) effect.

5.8.94 For the above ground sites and routes, surface water flood risk ranges from High (3.3% AEP) to Low (0.1% AEP) scenarios, with flood depths reaching up to 0.3m. A temporary surface water drainage system would be implemented to manage this risk. The FRA indicates that flood risks from reservoirs, and canals at the site are low to negligible. Adhering to the standard good practices outlined in Section 5.4 would ensure the health and safety of construction workers. Therefore, other flood risks are considered to result in a No change impact on construction workers. Given the Very High sensitivity, this is assessed to be a Neutral (not significant) effect.

5.8.95 During construction, the flood risk impact at Burnell Avenue site to construction workers is Not Significant.

Tudor Drive site

5.8.96 The Project construction activities requiring assessment for likely significant effects on water resources and flood risk at the Tudor Drive site are:

a. Potential temporary impact on water resources from construction activities (e.g. groundwater controls and contamination)

b. Construction leaks and spills

5.8.97 Surface water resources and flood risk have been scoped out for the Tudor Drive site (see paragraph 5.3.9 under ‘Summary of scope of the EIA’).

Groundwater resources

Shaft and pipeline construction – groundwater flow and levels

5.8.98 The Tudor Drive connection is proposed as an alternative option to the Burnell Avenue adit option for the TLT connection. At the Tudor Drive site there is potential to either directly connect from the connection shaft at the Burnell Avenue site, to the existing TLT shaft or to connect via a new TLT connection shaft proposed as part of the Project.

5.8.99 Connection to the existing TLT shaft would be via a pipeline located within the superficial Kempton Park Gravel Member (Secondary A aquifer). Construction of the TLT connection shaft would require excavation through the Kempton Park Gravel Member into the London Clay Formation. The depth of the TLT near the River Thames is approximately 40mbgl. The Kempton Park Gravel Member is considered to be of High sensitivity due to its Secondary A aquifer

classification, while the London Clay Formation is considered Low sensitivity as it is classified as Unproductive Strata.

5.8.100 Excavation and construction of a new TLT connection shaft may impact groundwater flow and levels within the Kempton Park Gravel Member at the shaft location, where groundwater controls are anticipated to be required. Impacts to groundwater from the construction of the shaft are anticipated to be localised, temporary and short-term and therefore the magnitude of impact is assessed as Minor adverse. Pipe-jacking techniques used for pipeline connections are considered to have at most, a temporary and local Minor adverse impact on groundwater levels and flows.

5.8.101 Based on the above sensitivities and magnitudes of impact the significance of effect on groundwater flows and levels from construction activities including groundwater control is conservatively assessed, based on the highest sensitivity receptor as Moderate adverse (Significant).

Private water supplies – groundwater levels

5.8.102 The desk-based review identified 13 groundwater abstractions within the 2km study area around the Tudor Drive site, of which seven are licensed and six are deregulated abstractions. The closest abstractions are from the Kempton Park Gravel Member. The abstractions are for spray irrigation and so are considered to be of Medium sensitivity.

5.8.103 Any impact of groundwater control from TLT connection shaft construction is anticipated to be localised and temporary. Likewise, any impacts on groundwater flow and level from pipe-jacking are expected to be very localised, short-term and temporary. The magnitude of impact is deemed to be Minor adverse as any changes in groundwater level and flow are expected to be temporary, localised and short term.

5.8.104 Based on the above sensitivity and magnitude, the significance of effect on groundwater flows and levels from construction groundwater control is assessed as Slight adverse (Not Significant).

Conveyance tunnel

5.8.105 The Project construction activities requiring assessment for likely significant effects on water resources and flood risk along the route of the conveyance tunnel are:

a. Potential temporary impact on water resources from tunnelling activities (e.g. groundwater controls and contamination)

b. Construction leaks and spills

5.8.106 Surface water resources and flood risk have been scoped out for the conveyance tunnel (see paragraph 5.3.9 under ‘Summary of scope of the EIA’).

Groundwater resources

Tunnel construction – groundwater flow and levels

5.8.107 The tunnel is designed to sit within the London Clay Formation, the most suitable tunnelling medium, and has been designed at a constant positive grade to allow the conveyance tunnel to drain recycled water back to Mogden STW when not in use. The tunnel would have an internal diameter of approximately 3.5m and would be constructed using a Tunnel Boring Machine at a depth of approximately 20m to 40mbgl outside of Mogden STW. Within Mogden STW, the depth is greater as the western part of Mogden STW is raised and the tunnel needs to pass under existing piled structures. The base of the drive shaft in the Mogden STW Western Work Area is the deepest point (approximately 60mbgl), while the tunnel would be at its shallowest at Burnell Avenue (approximately 20mbgl). The final depth profile would be adjusted based on GI results and further detailed information to ensure clearance under the foundations of existing facilities in Mogden STW.

5.8.108 The tunnel cannot be guaranteed to be fully watertight, and whilst the specifications of the tunnel have not been determined, the leakage from the tunnel (when fully operational) and to the tunnel (when in stand-by mode) would be minimal. The risks of leakage are further reduced by the tunnels being within the London Clay, which by its nature will limit water flow both into and out of the tunnels.

5.8.109 Until the Phase 2 GI has been completed, enabling the depth profile and tunnelling methodology to be finalised, the potential effects on groundwater resource receptors, along the line of the conveyance tunnel cannot be accurately estimated. As such, this assessment will be undertaken after the completion of the Phase 2 GI and reported in the ES.

Table 5.13 Preliminary assessment of likely significant effects during construction

Site	Receptor	Description of effect	Sensitivity of receptor	Magnitude of impact	Likely significance of effect *
Surface water resources					
Ham Playing Fields	Tidal River Thames	Water quality/contamination	High	No change	Neutral (Not Significant)
Ham Playing Fields	Tidal River Thames	Temporary dewatering/ geomorphology	High	Minor adverse	Slight adverse (Not Significant)
Burnell Avenue	Freshwater River Thames – surface water resources	In-river works	Medium	Negligible	Neutral or Slight adverse (Not Significant)
Burnell Avenue	Freshwater River Thames – geomorphology	In-river works	Low	Minor adverse	Slight adverse (Not Significant)
Burnell Avenue	Freshwater River Thames – surface water resources	Shaft construction	Medium	Negligible	Neutral or Slight adverse (Not Significant)
Groundwater resources					
Mogden STW – Eastern Work Area	Possible Kempton Park Gravel Member – Principal aquifer	Excavation, dewatering and groundwater controls	Very High	Minor adverse	Moderate or Large adverse (Significant)
Mogden STW – Western Work Area	Taplow Member and Kempton Park Gravel Member – Principal aquifers	Excavation, dewatering and groundwater controls	Very High	Minor adverse	Moderate or Large adverse (Significant)
Mogden STW	Private Water Supplies	Excavation, dewatering and groundwater controls	Medium	Minor adverse	Slight adverse (Not Significant)

Site	Receptor	Description of effect	Sensitivity of receptor	Magnitude of impact	Likely significance of effect *
Ham Playing Fields	Kempton Park Gravel Member – Secondary A aquifer	Excavation, dewatering and groundwater controls	High	Minor adverse	Moderate adverse (Significant)
Ham Playing Fields	Private Water Supplies	Excavation, dewatering and groundwater controls	Medium	Minor adverse	Slight adverse (Not Significant)
Burnell Avenue – outfall	Kempton Park Gravel Member – Secondary A aquifer	Excavation, dewatering and groundwater controls	High	Minor adverse	Moderate adverse (Significant)
Burnell Avenue – shaft and adit	Kempton Park Gravel Member – Secondary A aquifer	Excavation, dewatering and groundwater controls	High	Minor adverse	Moderate adverse (Significant)
Burnell Avenue	Private Water Supplies	Excavation, dewatering and groundwater controls	Medium	Minor adverse	Slight adverse (Not Significant)
Tudor Drive	Kempton Park Gravel Member – Secondary A aquifer	Excavation, dewatering and groundwater controls	High	Minor adverse	Moderate adverse (Significant)
Tudor Drive	Private Water Supplies	Excavation, dewatering and groundwater controls	Medium	Minor adverse	Slight adverse (Not Significant)
Flood risk					
Mogden STW	Off-site receptors within wider Mogden water treatment works	Surface water	Very High	Negligible adverse	Slight adverse (Not Significant)
Mogden STW	On-site works	Surface water	Medium	Negligible adverse	Neutral or Slight adverse (Not Significant)
Mogden STW	Construction workers	Safety	Very High	No change	Neutral (Not Significant)

Site	Receptor	Description of effect	Sensitivity of receptor	Magnitude of impact	Likely significance of effect *
Ham Playing Fields	Off-site developed areas- south riverbank	Fluvial/Tidal	Low	Negligible to Minor adverse	Slight adverse (Not Significant)
Ham Playing Fields	Off-site developed areas- north riverbank	Fluvial/Tidal	High	Negligible to Minor Adverse	Moderate adverse (Significant)
Ham Playing Fields	On-site works	Fluvial/Tidal	Medium	Moderate adverse	Moderate adverse (Significant)
Ham Playing Fields	Construction workers	Safety	Very High	No change	Neutral (Not Significant)
Burnell Avenue	Off-site developed areas	Fluvial	High	Moderate adverse	Moderate to Large adverse (Significant)
Burnell Avenue	On-site works	Fluvial	Medium	Minor adverse	Slight adverse (Not Significant)
Burnell Avenue	Construction workers	Safety	Very High	No change	Neutral (Not Significant)

** Some of the Likely Significant Effects are identified as having two potential valuations of effect. With the current level of evidence available, the precautionary and conservative approach is to report both at this stage; the assessment during the ES will further quantify the significance of the effects and narrow the outcome to one value.*

Operation phase

5.8.110 This section sets out the likely significant effects on water resources and flood risk during the operation phase of the Project. The assessment assumes that embedded design (primary) mitigation and standard good practice (tertiary) measures (Section 5.4) would be implemented, and the results of the assessment have informed any additional (secondary) mitigation requirements (Section 5.9).

5.8.111 The preliminary assessment is undertaken for each above ground site, excluding the Tudor Drive site and conveyance tunnel, and further divided into surface water resources, groundwater resources and flood risk per site. No operational activities of the Project have been identified as requiring assessment for likely significant effects on water resources and flood risk at the Tudor Drive shaft site and along the route of the conveyance tunnel. Flood risk and drainage of the access routes and to and from Tudor Drive have been considered in the FRA.

5.8.112 A summary of the outcome of the assessment for the Project operation phase is provided in Table 5.14.

Mogden STW site

5.8.113 The Project operational activities which have been identified to require assessment for likely significant effects at Mogden STW site on water resources and flood risk are the following:

a. Reduction in quantity of existing Mogden STW discharge at Isleworth Ait
b. Change in water quality of existing Mogden STW discharge at Isleworth Ait
c. Changes in shallow groundwater flow regime along the Mogden STW eastern boundary due to a proposed 150m sheet pile retaining wall

Surface water resources

5.8.114 The only sensitive receptor identified in proximity to the Mogden STW site during operation of the TTP and reduction in discharge rate through the existing/Mogden STW outfall at Isleworth Ait is the Thames Upper transitional water body. Noting the hydrodynamic regime of the upper tidal River Thames supports the designated (high tide) habitats of Syon Park SSSI, a High sensitivity to hydrodynamics has been assessed.

5.8.115 The Thames Upper transitional water body RBMP3 status was classified as good physico-chemical water quality, moderate for specific pollutants supporting ecological status, and fail for chemical status. Water temperature is not a WFD status element for transitional water bodies. In the absence of standards, the water temperature sensitivity of the tidal River Thames is considered consistent with the Medium sensitivity assessment of the river temperature sensitivity of the freshwater River Thames at Burnell Avenue. Noting the water quality supports the designated (high tide) habitats of Syon

Park SSSI, a High sensitivity to salinity change and suspended solids change is assessed.

5.8.116 Noting that the Thames Upper water body does not support in-channel habitats protected/designated under UK habitat legislation, the site is assessed as Medium sensitivity for dissolved oxygen. The Project monitoring data are consistent with bad status; therefore, the nutrient quality has negligible sensitivity. With consideration of the different sensitivities, an overall receptor sensitivity for the tidal River Thames for physico-chemical water quality is High.

5.8.117 The TELEMAC-3D model has been built to describe the dispersal regime in the upper tidal River Thames of chemicals entering the estuary either in Mogden STW final effluent at Isleworth Ait or at Teddington Weir. Further details are provided in Appendix 5.1. The model shows the dispersal zone moving with the tide and is used as a comparative tool with the Project scenarios. Noting that the Thames Upper water body does not support in-channel habitats protected/designated under UK habitat legislation, the site is assessed as Medium sensitivity for hazardous chemicals.

5.8.118 Operation of the TTP at Mogden STW may impact the tidal River Thames in two ways:

a. While the Project is in operation, the volume of existing discharge at Mogden STW to the Thames Tideway would be reduced by up to 75Ml/d.

b. While the Project is not in operation, up to 15Ml/d of the Mogden STW discharge would be from the TTP which may result in a change to the water quality of the discharge.

5.8.119 The potential for impact on hydrodynamics and geomorphological processes and salinity in the tidal River Thames from reductions in volume of final effluent from Mogden STW at Isleworth Ait has been assessed through a bespoke TELEMAC-3D hydrodynamic model for specific flow circumstances under which the Project would operate.

5.8.120 Operation of the TTP would result in only very slight changes in tidal elevation and tidal currents in the upper tidal River Thames. As such, a negligible impact on hydrodynamics is assessed. Noting a negligible impact on hydrodynamics, there would be a Slight adverse (Not Significant) effect geomorphological processes.

5.8.121 Likewise, operation of the TTP would result in a negligible impact on salinity, as modelled from representative scenarios over a 365-day period, indicating a Slight adverse (Not Significant) effect on salinity in the tidal River Thames.

5.8.122 The potential for impact on water quality in the tidal River Thames from reductions in volume of final effluent from Mogden STW at Isleworth Ait would be further assessed through a bespoke TELEMAC-3D hydrodynamic and water quality model for specific flow circumstances under which the Project would operate. Initial indicative data from the pilot plant are presented in Section 5.4 and further data are awaited to assess the magnitude of impact, noting operation of the TTP would result in a reduction in the chemical load discharged

to the estuary, and the model results would be interpreted for the magnitude of benefit in the ES.

Groundwater resources

5.8.123 In the Eastern Work Area at Mogden STW, permanent retaining walls would be constructed to stabilise the embankment. The retaining walls may be secant or contiguous piled walls or sheet piles. Depending on the depth of installation, permanent retaining walls may act as a barrier to groundwater flow, with potential for groundwater to mound on the hydraulic upgradient side of the structure.

5.8.124 Retaining walls may intercept either Made Ground (no aquifer classification), the Langley Silt Member (Unproductive strata) or the London Clay Formation (Unproductive strata). The interim GI report also identifies Kempton Park Gravel Member (Principal aquifer) in the vicinity of this site and therefore a conservative approach has been adopted for the purposes of this assessment, which assumes the retaining wall may intercept the Kempton Park Gravel Member. However, any shallow or perched groundwater also present in the Made Ground, Langley Silt Member or London Clay could also be intercepted by the sheet piled wall giving rise to mounded groundwater or poor drainage conditions.

5.8.125 The Kempton Park Gravel Member is considered to be of Very High sensitivity due to its Principal aquifer classification. Artificial Ground, Langley Silt Member and London Clay Formation are considered to be of Low sensitivity based on their classification as Unproductive strata.

5.8.126 A retaining wall, if perpendicular to groundwater flow, may act as a local barrier to groundwater flow, and may locally impact groundwater levels. The magnitude of impact of a retaining wall within the Eastern Work Area is therefore assessed as locally Minor adverse.

5.8.127 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels from a retaining wall in the Eastern Work Area is conservatively assessed, based on the highest sensitivity receptor, as locally Moderate or Large adverse (Significant).

Flood risk

5.8.128 At Mogden STW, the TTP is raised above any flooding on a platform so there is considered to be No change to flood risk.

5.8.129 A drive shaft is proposed to be situated on the west side of the STW for the recycled water conveyance tunnel, while the recycled water interception shaft would be positioned adjacent to the TTP within part of the eastern embankment. Both shaft caps are anticipated to be at the same level as the existing ground and a distance from predicted surface water flooding and any fluvial flooding. It is considered that offsite developments related to flood risk would have Negligible sensitivity, resulting in No change in the magnitude of

impact and assessed as a Neutral (Not Significant) effect, noting this does not consider groundwater which is covered in the section above.

Ham Playing Fields site

5.8.130 The Project operational activities which have been identified to require assessment for likely significant effects on water resources and flood risk at the Ham Playing Fields site are the following:

a. Potential impacts from increased pluvial and fluvial flood risk

5.8.131 Surface water and groundwater resources have been scoped out for the Ham Playing Fields site (see paragraph 5.3.11 under ‘Summary of scope of the EIA’). No potentially significant effects were identified in relation to the operational infrastructure of the intermediate shaft, or operational maintenance activities. There would not be any operational discharge at this site. As groundwater flows and levels are expected to recover quickly following construction, there are no predicted impacts to groundwater resources during operation.

Flood risk

5.8.132 The permanent proposed above-ground development at Ham Playing Fields site would include a manhole cover with limited surrounding hardstanding areas. This manhole cover would be situated above the intermediate shaft but has limited impact on runoff given the small footprint. The remaining area above the intermediate shaft would be buried and returned to playing fields along with the reset of the construction area and return runoff to greenfield rates Due to the development's limited scale and sustainable drainage plan, the impact on surface water flooding is expected to be negligible. Therefore, this is considered to have a Negligible magnitude of change on flood risk to offsite developed areas. Based on a Low sensitivity, this is considered to lead to a Neutral (Not Significant) effect.

5.8.133 Consequently, it is expected that the sensitivity of flood risk impacts on off-site development areas related to flooding from the River Thames is likely to be Negligible sensitivity, resulting in No change in the magnitude of impact and assessed as a Neutral (not significant) effect.

Burnell Avenue site

5.8.134 The Project operational activities which have been identified to require assessment for likely significant effects on water resources and flood risk at Burnell Avenue site are the following:

a. Potential impacts from increased pluvial and fluvial flood risk

b. Potential impact on hydrodynamics and geomorphological processes due to abstraction at the intake, and decreased river flow both at the intake and between the intake and outfall in the River Thames

c. Potential impact on hydrodynamics and geomorphological processes due to input of recycled water at the outfall in the River Thames

d. Potential for impact on water quality standards, underlying water chemistry and water temperature in the freshwater River Thames and tidal River Thames

5.8.135 The assessment of operational activities considers both the options described in Chapter 2: Project Description for the near bankside in-river outfall and the bankside outfall.

Surface water resources

5.8.136 The sensitive receptor identified in proximity to the Burnell Avenue site from operation of the Project's intake and outfall is the Thames (Egham to Teddington) river water body. From review of the flow regime of the freshwater River Thames, together with water depth and velocity, the hydrodynamics supports habitats with no greater than local interest, which as such are assessed as having a Low sensitivity.

5.8.137 The Thames (Egham to Teddington) river water body RBMP3 status was classified as moderate physico-chemical water quality, high for specific pollutants supporting ecological status, and fail for chemical status. The Project evidence is largely consistent with water body status. The RBMP status applies broadly to the entire water body, of which 95% is upstream of the Burnell Avenue site and therefore not relevant.

5.8.138 Based on available classifications and evidence and considering that the Burnell Avenue draft Order limits and the reach of the freshwater River Thames extending to Teddington Weir do not support habitats protected or designated under UK habitat legislation, the site is assessed as having Medium sensitivity for water temperature, physico-chemical water quality, nutrient quality and hazardous chemicals.

5.8.139 The potential impact on hydrodynamics due to abstraction at the intake, and decreased river flow both at the intake and between the intake and outfall, has been assessed through a bespoke TELEMAC-2D hydrodynamic model for specific flow circumstances under which the Project would operate.

5.8.140 Under these circumstances the freshwater River Thames is ponded behind Teddington Weir with a managed water level (for navigation) and very slow flow velocities. Operation of the intake would result in only very slight changes in river currents towards the intake, and only very slight flow velocity reductions between the intake and outfall. There would be no discernible change in water level. As such, a negligible impact on hydrodynamics and geomorphological processes. Therefore, given the low sensitivity of the geomorphology freshwater River Thames a neutral or slight (not significant) effect.

5.8.141 The potential impact on hydrodynamics due to input of recycled water at the outfall has also been assessed through a bespoke TELEMAC-2D hydrodynamic model for specific flow circumstances under which the Project would operate.

5.8.142 Operation of the outfall would result in only very slight changes in river currents away from the outfall in a local area around the near bank, and only very slight

flow velocity increases downstream. There would be no discernible change in water level. Consequently the impact on hydrodynamics and geomorphology is negligible. Given the low sensitivity of the geomorphology freshwater River Thames a neutral or slight (not significant) effect.

5.8.143 All abstractions and discharges would be operated and controlled in accordance with permit licences and conditions agreed with the Environment Agency. For the recycled water, the Environment Agency would issue a discharge permit that sets limits on the quality of water discharged to controlled waters. The risk assessment for the permit would establish which specific determinands require regulation through numeric discharge permit conditions, with the operator of the TTP responsible for managing those risks. As such, once fully mixed into the River Thames, permitted determinands would not pose any additional water quality risk.

5.8.144 The area of the mixing zone depends on the outfall design and the river flow conditions at the time of discharge, but modelling has identified that the recycled water would be fully mixed with River Thames water before Teddington Weir. Outside of the mixing zone there would be negligible impact on water quality for physico-chemical water quality and hazardous chemicals.

5.8.145 The potential for impact on water temperature in the River Thames due to input of recycled water at the outfall has been assessed through a bespoke TELEMAC-2D hydrodynamic model for specific flow circumstances under which the Project would operate.

5.8.146 There are seasonal patterns to both freshwater River Thames water temperature and recycled water temperature, with similar temperatures in summer when temperatures are at their highest, and the river water becoming colder than the recycled water through autumn into winter. Due to the similar water temperatures in summer, there is very low risk that the recycled water would increase the highest temperatures of the river.

5.8.147 There is risk that the water temperature difference in late autumn and winter could increase river temperatures by up to 1.4ºC under extremely low river flows, circumstances that are modelled to occur once every twenty years. Such changes are below the threshold for change in the WFD Directions (2015). These represent mixed temperature changes and the TELEMAC-2D model has been used to assess the distance taken for the plume to mix into the river and the amount of river occupied by the plume.

5.8.148 There is guidance relating to the extent of a channel warmed, and the modelled outfall plume is significantly smaller than the guideline of 25% of the channel warmed by 2ºC and therefore the temperature impacts of the Project are negligible.

5.8.149 The impact on water quality standards, underlying water chemistry and water temperature in the tidal River Thames from potential change in water quality passed forward from the freshwater River Thames (as amended by input of recycled water at the outfall) is considered negligible for water temperature and

negligible for water quality standards and underlying water chemistry, in line with the fully mixed effect at Teddington Weir. These water quality changes have been incorporated into the TELEMAC-3D estuary model as boundary condition changes at the River Thames input to the estuary, but at this PEI Report stage, these impacts have not been fully reviewed.

5.8.150 Based on the above sensitivities and magnitudes, the preliminary risk assessment for all operational phase activities at Burnell Avenue on surface water resources is assessed as Neutral or Slight adverse (Not Significant) effect.

5.8.151 Based on the above sensitivities and magnitudes the preliminary risk assessment for all operational phase activities at Burnell Avenue on water quality is assessed as Neutral or Slight adverse (Not Significant) effect.

Groundwater resources

5.8.152 The intake and outfall structures would be located on or near the bank of the River Thames. There may be some groundwater and surface water interaction within the Kempton Park Gravel Member and Alluvium in the vicinity of the river, with potential for the intake and outfall structures to impact groundwater flow paths to superficial deposits.

5.8.153 Groundwater receptors in the vicinity of the intake and outfall and associated infrastructure include the Kempton Park Gravel Member (Secondary A aquifer), Alluvium and the London Clay Formation (Unproductive). In this area, the Kempton Park Gravel Member and Alluvium are considered High sensitivity due to their Secondary A and Secondary (undifferentiated) aquifer classifications. The London Clay Formation is considered to be Low sensitivity based on the classification as Unproductive strata.

5.8.154 The area occupied by the intake and outfall structures would be negligible compared to the wider area available for surface water and groundwater interaction along the course of the River Thames. During operation of the intake and outfall, the magnitude of impact to groundwater receptors is therefore considered Negligible.

5.8.155 Based on the above sensitivities and magnitude of impact, the significance of effect on groundwater flows and levels in relation to the intake and outfall structures is assessed, based on the highest sensitivity receptor, as Slight adverse (Not Significant).

Flood risk

Off-site developed areas

5.8.156 Based on the site's topography, any flooding from the site to off-site developed areas would be likely to occur via the River Thames down to the Teddington Weir which then becomes the tidal River Thames. This could potentially affect the residential dwelling on the opposite bank of the River Thames, which can be classified as 'More Vulnerable', as per Annex 3 of the NPPF (MHCLG, 2024c).

Therefore, off-site developments are considered to be of High sensitivity for this site.

5.8.157 The proposed intake and outfall structures at the riverbank might raise water levels, potentially affecting the opposite side of the bank. However, this cannot be confirmed until additional hydraulic modelling is conducted.

5.8.158 The proposed outfall and intake are located within 1% AEP flood extent accounting for the appropriate climate change allowance for each area as set out in Appendix 5.2 FRA. Without mitigation, this would reduce the floodplain volume and could displace floodwater elsewhere with the potential for increasing flooding. However, any obstruction by the intake structure is limited in size and volume in comparison with the full floodplain width. Without additional (secondary) mitigation, flood risk impacts are considered to be Minor in magnitude. Given the High sensitivity, this is assessed as a permanent, indirect, short-term Moderate adverse (Significant) effect.

5.8.159 The associated infrastructure to provide operational maintenance access to the intake and outfall structure would lead to an increase in impermeable area which could increase surface water runoff rates when located outside the fluvial flood zones. Standard good practice (tertiary) related to the sustainable drainage plan is outlined in Section 5.4 to limit any runoff from the access infrastructure to pre-development rates. Within Flood Zone 3, fluvial flooding dominates so sustainable drainage solutions are not appropriate. The impermeable areas would have a small increase in Flood Zone 3 from the outfall and intake. Therefore, this is considered to have a Negligible adverse magnitude of change on surface water flood risk to offsite developed areas. Based on a High sensitivity, this is assessed as a permanent, indirect, short-term Slight adverse (Not Significant) effect.

5.8.160 The site is located away from reservoirs and canals, with a breach in the reservoir's dam upstream considered extremely unlikely. Therefore, No change in flood risk impacts is expected to be linked to these artificial sources. Based on a High sensitivity, this is assessed as a Neutral (Not Significant) effect.

Site infrastructure

5.8.161 Flooding could have a negative impact on the site infrastructure if it occurred. However, the site infrastructure at risk of flooding has been designed to be flood resistant and/or resilient and the infrastructure's flood risk vulnerability is classified as 'Water Compatible', as per Annex 3 of the NPPF (MHCLG, 2024c). Therefore, site infrastructure is considered to be of Low sensitivity.

5.8.162 The proposed outfall, intake, diverted path, kiosk, and the south-western part of the access road are located within the flood extents for a flood with a 1% AEP including a 35% allowance for climate change of the fluvial River Thames in the 2070s epoch. Flood risks would be mitigated through the embedded mitigation and standard good practice (tertiary) outlined in Section 5.4. The effect of fluvial flooding from the River Thames is considered to be a Negligible adverse

magnitude of change. Based on a Low sensitivity, this is assessed as a Slight adverse (Not Significant) effect.

5.8.163 All the site infrastructure is located in areas at negligible risk of surface water flooding, apart from the site control equipment kiosk which is located in an area at moderate risk of surface water flooding due to a depression. This is not located in a surface water flow path. Standard good practice (tertiary) for the sustainable drainage plan is outlined in Section 5.4. The effect of surface water flooding is considered to have a Negligible adverse magnitude of change. Based on a Low sensitivity, this is assessed as a Slight adverse (Not Significant) magnitude of effect.

5.8.164 The site is located away from reservoirs and canals, with a breach in the reservoir's dam upstream considered extremely unlikely. Therefore, No change in flood risk impacts is considered to be linked to these artificial sources. Based on a Low sensitivity, this is assessed as a Neutral (Not Significant) magnitude of effect.

5.8.165 Based on the above sensitivities and magnitudes, the preliminary risk assessment for all site infrastructure during the operational phase at Burnell Avenue is assessed as Neutral (Not Significant).

Table 5.14 Preliminary assessment of likely significant effects during operation

Site	Receptor	Description of effect	Sensitivity of receptor	Magnitude of impact	Likely significance of effect *
Surface water resources					
Mogden STW	Tidal River Thames	STW discharge reduction from TTP operation - geomorphology	High	Negligible	Slight adverse (Not Significant)
Mogden STW	Tidal River Thames	STW discharge reduction from TTP operation (salinity and water quality)	Medium	Negligible	Slight adverse (Not Significant)
Burnell Avenue	Freshwater River Thames	Abstraction at intake - geomorphology	Low	Negligible	Neutral or Slight adverse (Not Significant)
Burnell Avenue	Freshwater River Thames	Discharge at outfall - geomorphology	Low	Negligible	Neutral or Slight adverse (Not Significant)
Burnell Avenue	Freshwater River Thames	Discharge at outfall (water quality)	Medium	Negligible	Neutral or Slight adverse (Not Significant)
Burnell Avenue	Freshwater Thames Tideway	Downstream transfer of mixed, discharge water	Medium	Minor adverse	Slight adverse (Not Significant)

Site	Receptor	Description of effect	Sensitivity of receptor	Magnitude of impact	Likely significance of effect *
Groundwater resources					
Mogden STW	Groundwater flow and levels	Permanent retaining wall locally acts as groundwater barrier	Very High	Minor adverse	Moderate or Large adverse (Significant)
Burnell Avenue	Groundwater flows and level	Intake structure	High	Negligible	Slight adverse (Not Significant)
Flood risk					
Ham Playing Fields	Site infrastructure	Fluvial/tidal and surface water flood risk	Low	Negligible	Neutral (Not Significant)
Burnell Avenue	Off-site developed areas	Fluvial flood water displacement by intake or any obstruction of the floodplain	High	Minor adverse	Moderate adverse (Significant)

** Some of the Likely Significant Effects are identified as having two potential valuations of effect. With the current level of evidence available, the precautionary and conservative approach is to report both at this stage; the assessment during the ES will further quantify the significance of the effects and narrow the outcome to one value.*

Cumulative effects

5.8.166 A preliminary assessment of intra-project and inter-project cumulative effects (excluding climate change) for water resources and flood risk is contained in Chapter 19: Cumulative Effects.

In-combination effects with climate change

5.8.167 Climate change could influence the pathways, receptors, and sensitivity of impacts in environmental assessments. Variations in temperature, extreme weather events such as storm surges, changing sea levels over short and long timescales, and higher winter and lower summer rainfall could increase the severity of impacts. Therefore, additional (secondary) mitigation measures to address these changes may be required.

5.8.168 During construction, short-term changes to sea levels and storm surge intensity could increase flood risks experienced by the work sites.

5.8.169 Throughout the operation phase of the Project, long-term changes in the climate could result in a range of effects:

a. Changes to sea levels and the intensity of storm surges could affect existing flood defences, resulting in more frequent over-topping events.

b. Sustainable drainage systems and infrastructure around the intake and outfall structures could be overwhelmed by higher water levels, requiring future adaptation to maintain their functionality.

c. The quality of water within the River Thames and Thames Tideway could be adversely affected by changes in temperature and rainfall patterns, affecting ecological processes within the river, sediment transportation and deposition, and the dilution of chemicals within the water column.

d. Changing rainfall patterns could affect aquifer recharge and thus the availability of water for abstractions and environmental receptors dependent on groundwater.

e. The status of WFD water bodies may be at risk of deterioration if they are not resilient to drought, or if biological status elements are adversely affected by physico-chemical or hydromorphological changes.

5.8.170 Appendix 18.1 of the PEI Report provides further details of the identified ICCI during the construction and operation phases.

5.9 Additional (secondary) mitigation and enhancement measures

Additional (secondary) mitigation

5.9.1 Mitigation measures are defined in Chapter 4: Approach to Environmental Assessment of this PEI Report. Details of embedded design (primary) mitigation and standard good practice (tertiary) specific to this aspect are provided in Section 5.4.

5.9.2 Mitigation for any potentially significant effects would be further refined in the ES, informed by the results of hydraulic modelling and hydrogeological impact

assessments, as shown in Tables 5.15 and 5.16. The outcome of these additional assessments would enable the reduction of any uncertainties in the current assessment and confirm the need and description of any additional (secondary) mitigation measures required.

5.9.3 Opportunities will be explored based on the significance of the impact, the proposals and the site conditions, and provided in the ES and developed as necessary.

Enhancement measures

5.9.4 There are no enhancement measures identified at this stage of the Project. Opportunities will be explored within the scope of the Project, and these would be brought forward by the Applicant in the ES after engagement with the relevant stakeholders.

5.10 Summary of Residual Likely Significant Effects

5.10.1 Table 5.15 and Table 5.16 summarise residual likely significant effects for water resources and flood risk during the construction phase and operation phase, respectively

Table 5.15 Summary of residual likely significant effects for water resources and flood risk during construction phase

Site	Receptor	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
Groundwater resources					
Mogden STW	Possible Kempton Park Gravel – Principal aquifer (Eastern Work Area) Taplow Member and Kempton Park Gravel – Principal aquifer (Western Work Area)	Aquifer: Groundwater flows and levels	Aquifer: Moderate or Large adverse (Significant)	Hydrogeological impact assessment will be conducted to evaluate potential effects on identified receptors, which would inform future embedded or additional (secondary) mitigation measures which will be presented in the ES.	Any additional (secondary) mitigation measures identified are assumed to reduce the likely significance.
Ham Playing Fields	Kempton Park Gravel Member – Secondary A aquifer	Aquifer: Groundwater flows and levels	Aquifer: Moderate adverse (Significant)		
Burnell Avenue	Kempton Park Gravel Member – Secondary A aquifer	Aquifer: Groundwater flows and levels	Aquifer: Moderate adverse (Significant)		
Tudor Drive	Kempton Park Gravel Member – Secondary A aquifer	Aquifer: Groundwater flows and levels	Aquifer: Moderate adverse (Significant)		

Site	Receptor	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
Flood risk					
Ham Playing Fields	Construction works not covered by embedded mitigation – plant, equipment and materials	Fluvial flood damage or mobilisation of plant, equipment and materials	Moderate adverse (Significant)	Further hydraulic modelling to assess localised impacts and changes in water levels. Floodplain mitigation shall be considered to compensate any floodplain volume lost as a result of the proposed works during the operational phase on a level-for-level basis to avoid fluvial floodwaters being displaced and increasing flood risk elsewhere alongside other appropriate flood mitigation measures. This applies to the 1% AEP flood extents accounting for the appropriate climate change allowance over the operational phase for each area as detailed in PEIR Appendix 5.2 Flood Risk Assessment.	Any additional (secondary) mitigation measures identified are assumed to reduce the likely significance of effect. As above
Burnell Avenue	Off-site developed areas	Fluvial obstruction from cofferdam	Moderate to large adverse (Significant)		

Table 5.16 Summary of residual likely significant effects for water resources and flood risk during operation

Site	Receptor	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
Groundwater resources					
Mogden STW	Groundwater flow and levels	Permanent retaining wall locally acts as groundwater barrier	Moderate or Large adverse (Significant)	Hydrogeological impact assessment will be conducted to evaluate potential effects on identified receptors, which would inform future embedded or additional (secondary) mitigation measures, which will be presented in the ES.	Any additional (secondary) mitigation measures identified are assumed to reduce the likely significance of effect.
Flood risk					
Burnell Avenue	Off-site developed areas	Fluvial obstruction from river intake and any site infrastructure that could encroach into the floodplain.	Moderate adverse (Significant)	Further hydraulic modelling to assess localised impacts and changes in water levels. Floodplain mitigation shall be considered to compensate any floodplain volume lost as a result of the proposed works during the operational phase on a level-for-level basis to avoid fluvial floodwaters being displaced and increasing flood risk elsewhere alongside other appropriate flood mitigation measures. This applies to the	Any additional (secondary) mitigation measures identified are assumed to reduce the likely significance of effect.

Site	Receptor	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
				1% AEP flood extents accounting for the appropriate climate change allowance over the operational phase for each area as detailed in PEIR Appendix 5.2 Flood Risk Assessment.	

5.11 Next steps

5.11.1 The Applicant will engage with both statutory and non-statutory consultees throughout the EIA process, sharing progress and findings as relevant. Engagement with stakeholders and local communities will continue as part of the RAPID gated process, the DCO process, and general information sharing.

5.11.2 Local authorities, other stakeholders, and the public will be consulted on the Project during the Statutory Consultation in summer 2025. The PEI Report will be published as part of the Statutory Consultation.

5.11.3 Surveys and assessments will continue, which may identify new issues or provide information that may suggest certain effects identified in this document are unlikely to be significant.

5.11.4 Construction layouts will also develop as the Project progresses. Consequently, the hydraulic model of the River Thames would need to be rerun when these details emerge to determine the impacts of the construction phase at Burnell Avenue site on the water levels of the River Thames for offsite areas during the design flood event. This would confirm if further mitigation is required, and identify suitable mitigation options to reduce any impacts on offsite areas during the construction phase. The hydraulic model may also be needed to assess the impacts of the operational phase at the Burnell Avenue site when further details of the operational layouts emerge.

5.11.5 The hydraulic model may also be needed to assess the impacts of the construction works undertaken at the Ham Playing Fields site to determine the change in water levels at receptors on the opposite bank.

5.11.6 Ground investigations are currently being undertaken to obtain further details about the groundwater baseline and to inform the detailed design and mitigation measures that may be required for groundwater management during the construction and operational phases, including selection of shaft construction method. The Phase 2 GI is expected to be completed in summer 2025 and will form part of the ES. This study would assess the depth of groundwater at each site and provide recommendations for any required mitigation for groundwater flooding, if deemed necessary.

5.11.7 A hydrogeological impact assessment, including mapping of the Langley Silt and Kempton Park Gravel Member would be produced based on the selected construction methodology to further ascertain groundwater risks in the ES.

5.11.8 Implementation of the mitigation measures proposed in this chapter, along with any additional (secondary) mitigation identified in the ES, would likely reduce flood risk and groundwater effects to not significant levels.

5.11.9 Further data are awaited from the pilot plant in order to complete the modelling of the magnitude of potential water quality benefit to the Thames Tideway from reduction in discharge from Mogden STW and operation of the Project's TTP when the Project's outfall and abstraction are not operational.

5.11.10 The Environment Agency would establish temporary limits on the water quality from construction sites through an Environmental Permit, ensuring compliance with required permits/consents. For the recycled water, the Environment Agency would issue a discharge permit that sets limits on the quality of water discharged to controlled waters.

5.11.11 The risk assessment for the operational permit will establish which specific determinands require regulation through numeric discharge conditions, with the operator of the TTP responsible for managing those risks. As such, once fully mixed into the River Thames, permitted determinands would not pose any additional water quality risk.

5.11.12 Further consultation with the Environment Agency's Permitting service would be undertaken to confirm requirements for the operational permit applications. The permit applications will not be part of the ES but the status of permits and secondary consents will be included in documents such as Statements of Common Ground which will be developed alongside the ES to support the DCO application. The data used to support the permit applications would be included in the assessments as part of the ES however.

5.11.13 The time required to process and approve permit applications depends on the complexity of the application, and the need to consult the public and relevant organisations and as such, whilst the permitting process will have started, the necessary permits may not have been decided by the time of publishing the ES.

5.11.14 Construction dewatering activities may require both an abstraction licence and a discharge permit. Where a permit or licence is required for construction activities early engagement with the Environment Agency's Permitting service would be undertaken.

5.11.15 Finally, the Applicant would undertake the next phase of the WFD assessment in line with guidance PINS Advice note 18, which would form part of the ES.

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