

# **Teddington Direct River Abstraction**

# Preliminary Environmental Information Report Chapter 16 – Human Health

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# 16. Human Health

# 16.1 Introduction

- 16.1.1 This chapter of the Preliminary Environmental Information (PEI) Report provides preliminary environmental information relating to human health 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 Project (hereafter referred to as 'the Project') at this stage of the Project's programme. This should be read in conjunction with the description of the Project as presented in Chapter 2: Project Description.
- 16.1.2 The human health assessment uses various terms. Key terms are provided in a glossary at the end of this chapter. The assessment has adopted the World Health Organization (WHO) definition of health, which is 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (World Health Organization, 1946). Health is determined by a complex interaction between individual characteristics, lifestyle and the physical, social and economic environment, which are known as 'wider determinants' of health.
- 16.1.3 The assessment matters (wider determinants of health) scoped into the human health assessment are as follows:
  - a. Recreation, social participation and access to green and blue infrastructure
    - i. Physical activity
    - ii. Open space, leisure and play
    - iii. Attractiveness of area and quality of natural environment
    - iv. Social participation, interaction and support
  - b. Residential amenity and community wellbeing
    - i. Community safety
    - ii. Community identity, culture, resilience and influence
    - iii. Attractiveness of area and quality of built environment
  - c. Biophysical environment
    - i. Climate change mitigation and adaptation
    - ii. Air quality
    - iii. Noise and vibration
    - iv. Water quality
    - v. Land quality
    - vi. Light pollution

- d. Socioeconomic environment
  - i. Education and training
  - ii. Employment and income
  - iii. Wider societal infrastructure and resources
  - iv. Transport modes, access and connections
- 16.1.4 This chapter is supported by the following Volume 2 PEI Report Figures and Volume 3 PEI Report Appendices:
  - a. Figure 16.1 Local Communities Study Area
  - b. Figure 16.2 Local Authorities Study Area
  - c. Figure 16.3 London Water Resource Zone Study Area
  - d. Appendix 16.1 Human Health Policy, Plan and Legislation Review
  - e. Appendix 16.2 Population Health Profile Data
  - f. Appendix 16.3 Preliminary Human Health Assessment Tables
  - g. Appendix 16.4 Approach to Equality Impact Assessment

## 16.2 Legislation, policy and guidance

16.2.1 This section identifies the relevant national and local policies, legislation and guidance that have informed the scope of the human health assessment. Appendix 16.1 Human Health Policy, Plan and Legislation Review includes further detail of some policies, plans and legislation that have been reviewed to inform the understanding of human health assessment priorities.

# Legislation

- 16.2.2 Regulation 5(2)(a) of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 sets the legislative requirement for assessing the direct and indirect significant effects of the Project on population and human health. The human health assessment has been scoped with the aim of meeting this legislative requirement.
- 16.2.3 The human health assessment takes account of relevant legislation that is in place to protect human health. The Water Supply (Water Quality) Regulations 2016 requires that water intended for human consumption is 'wholesome' and sets conditions relating to micro-organisms and certain substances to protect human health. Drinking water quality is therefore managed through water supply legislation and associated standards (see Appendix 16.1 Human Health Policy, Plan and Legislation Review for further information on water industry regulations of relevance to human health).
- 16.2.4 The Health and Safety at Work etc. Act 1974 and the Construction (Design and Management) Regulations 2015 (CDM Regulations) embed requirements for managing workplace and construction-related health and safety risks. On this basis, the human health assessment has scoped out safety impacts on

construction and operational workers as they are not considered relevant to the scope of the EIA as they are managed through other legislative requirements (see paragraph 14.3.3 of the Teddington Direct River Abstraction EIA Scoping Report (October 2024)).

16.2.5 The Health and Social Care Act 2012 sets out the statutory duties of local authorities to improve health and wellbeing, and to appoint directors of public health to oversee this responsibility. The Health and Care Act 2022 requires the establishment of Integrated Care Boards which replaced Clinical Commissioning Groups and are responsible for planning health services for their local population. The human health assessment has sought involvement from the Directors of Public Health at the EIA scoping stage and will continue to engage with the local authorities as the assessment progresses. As statutory undertakers (as defined in the Planning Infrastructure (Applications: Prescribed Forms and Procedure) Regulations 2009 which adopts the meaning set out in section 127 of the Planning Act 2008), the NHS North West London and NHS South West London Integrated Care Boards have been formally consulted on the scope of human health assessment by the Planning Inspectorate prior to adopting its EIA Scoping Opinion.

# National policy

## National Policy Statement for Water Resources Infrastructure

16.2.6 Key policies relevant to human health as set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) are provided in Table 16.1. The NPS sets out Government policies to deliver significant infrastructure projects for water resources in England.

Paragraph(s)	<b>Requirement for the Applicant</b>	How the Project addressed this
3.12.1 and 3.12.2	States that 'The construction and use of water resources infrastructure has the potential to affect people's health, wellbeing and quality-of-life,' and identifies that infrastructure can have potential direct impacts on health because of 'traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust, odour, polluting water discharges, hazardous waste and pests' and indirect impacts for example, 'if they affect access to key public services, local transport, opportunities for cycling and walking,	There are a number of policies and strategies which set out objectives and standards relevant to the protection of health. These are identified where relevant in the associated aspect chapters, such as: Chapter 12: Traffic and Transport Chapter 13: Air Quality Chapter 14: Noise and Vibration Chapter 15: Socioeconomics, Community, Access and Recreation. Reference should be made to those chapters for information on

# Table 16.1 Key policy from the NPS for Water Resources Infrastructure

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
	or the use of open space for recreation and physical activity'.	how the relevant policies and standards would be met through the Project.
3.12.3	States that 'Where the proposed project has likely significant environmental impacts that would have an effect on human population or health, the applicant should identify and set out the assessment of any likely significant health impacts'.	Section 16.8 of this chapter provides a preliminary assessment of likely significant health impacts arising from the Project, while the forthcoming Environmental Statement will set out the completed assessment of likely significant health effects.
3.12.4	Notes that ' <i>impacts may affect</i> people in a cumulative manner'. It states, 'The applicant, the Examining Authority and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health. The applicant should identify measures to avoid, reduce or compensate for adverse health impacts and seek enhancement opportunities as appropriate.' This reflects the requirements of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('EIA Regulations').	Section 16.8 of this chapter has addressed how impacts on the wider determinants of health may interact and affect the health of certain population groups in a cumulative manner. See also Chapter 19: Cumulative Effects for an assessment of how different developments could have a cumulative effect on health.

# National Planning Policy Framework

- 16.2.7 Chapter 8 of the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2024), sets out the overarching policies for '*promoting healthy and safe communities*'. It states planning decisions '*should aim to achieve healthy, inclusive and safe places*' which '*promote social interaction*', '*are safe and accessible*' and '*enable and support healthy lives*'. The NPPF also identifies the importance of access to recreation and open space for the health and wellbeing of communities.
- 16.2.8 This human health assessment has addressed wider determinants of health relating to recreation, social participation and access to green and blue infrastructure. It considers how the Project could impact (beneficially or adversely) some of the considerations in the NPPF relating to the promotion of healthy and safe communities.

# Regional and Local policy

- 16.2.9 In addition to the national policy set out above, the Project must also have regard to relevant London and local plans and policy. A summary of legislation and policy is provided in Appendix 16.1 Human Health Policy, Plan and Legislation Review.
- 16.2.10 London Health Inequalities Strategy (Greater London Authority, 2018a) sets out the priorities to tackle health inequalities in London and recognises the importance of participation and social networks, creating social cohesion and supporting health and wellbeing.
- 16.2.11 The human health assessment considers the potential impacts of the Project on social networks and participation and how these may affect health outcomes.
- 16.2.12 Policy GG3 (Creating a healthy city) of the London Plan (Mayor of London, 2021) focuses on improving health and reducing health inequalities for Londoners, with consideration for the wider determinants of health to improve mental and physical health, promoting increased active and healthy lives, and assessing the potential impacts of development proposals on the mental and physical health and wellbeing of communities *'to mitigate any potential negative impacts, maximise potential positive impacts, and help reduce health inequalities, for example through the use of Health Impact Assessments'.*
- 16.2.13 Certain requirements for Health Impact Assessment (HIA) are also set out in policies contained in the London Borough of Hounslow (LBH) Local Plan Volume One, (LBH, 2015); the emerging Hounslow Local Plan 2020-2041 (LBH, 2024); London Borough of Richmond upon Thames (LBR) Local Plan (LBR, 2018); Kingston Core Strategy (Royal Borough of Kingston upon Thames (RBK), 2012); and the emerging Kingston Local Plan 2019-2041 (RBK, 2022). Each of these local planning authority plans includes various policies for health improvement and health protection, such as encouraging physical activity, providing for access to green and open space, facilitating active travel, and protecting against pollution. Refer to Appendix 16.1 Human Health Policy, Plan and Legislation Review for further information on local planning policies of relevance to the human health assessment. Neighbourhood Plans for Ham and Petersham and North Kingston have also been identified and reviewed, along with Twickenham Area Action Plan (LBR, 2013).
- 16.2.14 While the human health assessment reported within this PEI Report, and to be developed for the forthcoming Environmental Statement, has been prepared to meet the requirements of the EIA Regulations, principles of HIA have been applied as described below in Section 16.5, in recognition of the above local policy aims.

# Guidance

- 16.2.15 Health Impact Assessment in spatial planning A guide for local authority public health and planning teams (Public Health England (PHE), 2020) provides guidance on the use of HIA in the planning system. It also describes how health outcomes can be considered in other impact assessments, such as EIA. Annex 8 of the guidance sets out how an HIA can be integrated into the EIA process. It signposts other guidance on how health should be meaningfully addressed in EIA.
- 16.2.16 The Institute of Environmental Management and Assessment (IEMA) published guidance documents on health in EIA in 2022. These were:
  - a. IEMA Guide: Effective Scoping of Human Health in Environmental Impact Assessment (IEMA, 2022a)
  - b. IEMA Guide: Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022b)
- 16.2.17 These IEMA guides largely informed the scope of the wider determinants of health considered as part of the EIA Scoping Report, as well as the methodology for assessing significance (refer to Section 16.5).
- 16.2.18 IEMA has also recently published the IEMA Guide to: Competent Expert for Health Impact Assessment including Health in Environmental Assessments (IEMA, 2024). It is a requirement of the EIA Regulations that an Environmental Statement should be prepared by 'competent experts'. This preliminary human health assessment has been overseen by an individual who meets the criteria set out in the IEMA guidance.

# 16.3 Consultation, engagement and scoping

# Consultation

- 16.3.1 Non-Statutory Public Consultation was undertaken from October 2023 to December 2023 to seek feedback about the site options for the Project from a variety of people such as landowners, residents, businesses, local authorities, and other statutory bodies which might be affected by or interested in the Project. In relation to human health, responses tended to be general, relaying concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area.
- 16.3.2 On 22 July 2024, engagement was held with public health team representatives from LBR and RBK. There was no representative provided by LBH. The Applicant outlined the baseline environment for human health, the proposed human health assessment methodology and an outline of which matters were proposed to be scoped in and which were proposed to be scoped out of the assessment. During the meeting there was general agreement around the methodology presented with questions raised regarding health concerns around water quality downstream of the proposed outfall with potential effects on people using the river for recreational pursuits. These matters are being

considered as part of the ongoing human health assessment in relation to the water quality health determinant, under the biophysical environment theme (refer to Table D.2 in Appendix 16.3 Preliminary Human Health Assessment Tables for preliminary information on this matter).

16.3.3 Table 16.2 identifies the key feedback received from the EIA Scoping Opinion (Planning Inspectorate, 20 November 2024). This includes comments from the Planning Inspectorate where it disagreed with the proposed scope of assessment for human health as set out in the EIA Scoping Report, as well as some of the comments by LBR which provided the Planning Inspectorate detailed comments on the scope of the human health assessment (included in Appendix 2 of the Planning Inspectorate's Scoping Opinion).

PINS ID reference	Comment	Response
Planning Inspectorate (ID 3.9.4)	The Inspectorate stated that its comments at ID 3.10.7 (see Table 18.2 of Chapter 18: Climate Change) apply equally to the proposal in the Applicant's Scoping Report to scope out the wider determinants of health of 'climate change mitigation and adaptation' and 'water quality and or availability' from the assessment of construction effects. It stated that 'On that basis, the Inspectorate does not agree to scope this matter [climate change, mitigation and adaption, and water quality or availability – construction] out at this stage'.	These matters have been added to the scope of human health assessment and will be reported in the Environmental Statement unless further information can be obtained to justify scoping them out, to the agreement of the Planning Inspectorate.
Planning Inspectorate (ID 3.9.7)	'The Scoping Report seeks to scope this matter [odour] out for operation based on information in the odour risk assessment (Appendix D of the Scoping Report). No justification is presented in Table 14.3 for scoping out construction phase odour. For the reasons presented at ID 3.1.1 of this Opinion, the Inspectorate does not agree that this matter can be scoped out.' The Inspectorate's comments at ID 3.1.1 are presented in Table 13.6 of Chapter 13: Air Quality.	This matter has been added to the scope of human health assessment and will be reported in the Environmental Statement unless further information can be obtained to justify scoping it out, to the agreement of the Planning Inspectorate.
LBR (comment on paragraph 14.6.17 of the	Advised a risk assessment should be provided for the human health risk from aerosols of chemical, viral, and	This risk is under consideration with the intention of providing further information within the

## Table 16.2 Key scoping opinion comments for human health

PINS ID reference	Comment	Response
EIA Scoping Report)	bacterial hazards generated from tertiary treated effluent passing over the Teddington weir during operation.	forthcoming Environmental Statement (see Section 16.8 of this chapter).
LBR (comment on paragraph 14.2.4 of the EIA Scoping Report)	Questioned how people in the Ham or Burnell areas will be able to inform the health assessment.	The approach to participation in the human health assessment is set out in Section 16.5 of this chapter.
LBR (comment on paragraph 14.6.6 of the EIA Scoping Report)	Noted the Ham and Petersham Neighbourhood Plan requires consultation on HIA with the Neighbourhood Forum.	Neighbourhood plans have now been reviewed (Appendix 16.1) and requirements for consultation on the human health assessment are set out in Section 16.5 of this chapter.

# Community participation and engagement

- 16.3.4 A series of surveys with individuals, community groups, clubs and other relevant organisations are being undertaken to inform the understanding of how people currently use the River Thames and surrounding green and recreational spaces. This information will continue to inform the understanding of how the Project may affect people and their health.
- 16.3.5 As noted by LBR in its response to the EIA Scoping Report, people in the Ham and Burnell areas are likely to be affected by above ground works associated with the Project.
- 16.3.6 There has been a non-statutory public consultation as part of the overall Project as set out in Section 4.6 of Chapter 4: Approach to Environmental Assessment which has been used to indicate community outlook when considering population sensitivity in accordance with the methodology described in Section 16.5 (see Table 16.4 for sensitivity criteria based on IEMA guidance (IEMA, 2022b)). The indicative community outlook ascertained from the consultation feedback is included among the health profiles for the Local Communities Study Area provided in the preliminary baseline (Section 16.7).

# 16.4 Embedded design (primary) mitigation and standard good practice (tertiary)

# Embedded design (primary) mitigation

- 16.4.1 The Applicant has worked through the design process to avoid or reduce environmental impacts through the use of embedded design (primary) mitigation. Chapter 3: Consideration of Alternatives details the design alternatives that have been considered, including the environmental factors which have influenced the decision making.
- 16.4.2 Embedded design (primary) mitigation relevant to this aspect includes:
  - a. Removal of the need for pumps at the intake and outfall structures, thereby avoiding noticeable noise impacts
  - b. Use of a tunnel boring machine (TBM) so fewer intermediate shaft sites are required, reducing impacts of land-take
  - c. The TBM launch site being moved to the western side of Mogden Sewage Treatment Works (STW) site, enabling more space for any required mitigation and allowing more distance between most works and nearby residential populations
  - d. The location of the single intermediate shaft site away from residential areas
- 16.4.3 Embedded mitigation as identified in Chapter 5: Water Resources and Flood Risk, Chapter 9: Townscape and Visual Amenity, Chapter 12: Traffic and Transport, Chapter 13: Air Quality, Chapter 14: Noise and Vibration and Chapter 15: Socioeconomics, Community, Access and Recreation are also relevant to this aspect.

# Standard good practice (tertiary)

- 16.4.4 Standard good practice (tertiary) would occur as a matter of course due to legislative requirements or standard sector practices.
- 16.4.5 Relevant health and safety standards, which serve to protect human health have been outlined in Section 16.2 of this chapter with some further information in Appendix 16.1.
- 16.4.6 Standard good practice (tertiary) relevant specifically to this aspect includes statutory community consultation already undertaken as part of the development of the Water Resources Management Plan 2024 (Thames Water, 2024), as well as project-specific non-statutory public consultation with stakeholders and wider local communities that has been and will be undertaken during the DCO pre-application period.
- 16.4.7 Standard good practice (tertiary) mitigation (as identified in Chapter 5: Water Resources and Flood Risk, Chapter 9: Townscape and Visual Amenity, Chapter 12: Traffic and Transport, Chapter 13: Air Quality, Chapter 14: Noise and Vibration, and Chapter 15: Socioeconomics, Community, Access and

Recreation) is also relevant to this aspect by helping to protect health and wellbeing.

# 16.5 Assessment methodology

# Human health assessment principles

- 16.5.1 As proposed in the EIA Scoping Report, the human health assessment for the Project is seeking to integrate HIA into the EIA, which is in accordance with guidance (see Section 16.2). The human health assessment first seeks to meet the statutory requirements of the EIA Regulations. However, the following best practice principles for HIA are also being adopted where practicable within the framework of the EIA process:
  - a. Comprehensive approach to health
  - b. Sustainability
  - c. Participation
  - d. Equity and equality
  - e. Ethical use of evidence (Winkler, 2021)

#### Comprehensive approach to health

16.5.2 As noted in Section 16.1, this human health assessment applies the WHO definition of health, which includes physical, mental and social wellbeing. A comprehensive approach to health recognises that physical, mental and social health and wellbeing are not only determined by personal characteristics and lifestyle choices, but also by health risks and health opportunities present in the physical, social and economic environment. These are referred to as the wider determinants of health.

#### Sustainability

16.5.3 Good population health is essential for sustainable development. This human health assessment therefore considers short and long-term impacts of the Project in light of its contribution to national policies for healthy, resilient and sustainable communities.

#### Participation

16.5.4 As a development for which development consent is required, a substantial amount of pre-application consultation has been, and continues to be undertaken. For example, this PEI Report has been prepared to inform stakeholders including the general public, about the Project and its likely effects on the environment and communities. The statutory pre-application public consultation provides opportunities for people to express their hopes and concerns regarding the Project. The human health assessment will take account of the feedback and seek opportunities to improve health outcomes where appropriate.

16.5.5 The human health assessment will also draw on information from surveys of community and recreational groups as identified in Chapter 15: Socioeconomics, Community, Access and Recreation, and engage with local authority public health teams to help steer the human health assessment.

# Equity and equality

16.5.6 In accordance with guidance, and London and local health policy, this human health assessment considers potential impacts of the Project on health inequalities. This involves the identification of vulnerable groups who would be likely to be affected by the Project and who may be more susceptible to certain health outcomes, as well as the consideration of the distribution of health impacts across the population. Potential reductions in health inequalities would be seen as a beneficial health outcome for the purposes of this assessment. There is a potential link between information to inform the understanding of health inequalities and the Equality Impact Assessment (EqIA) that will be produced alongside the Environmental Statement for the DCO application. Therefore, the human health assessment to be reported in the Environmental Statement. Further information on the proposed approach and scope of the EqIA is included in Appendix 16.4 Approach to Equality Impact Assessment.

## Ethical use of evidence

- 16.5.7 The human health assessment to be reported in the Environmental Statement will be supported by a literature review. The literature review will seek out peerreviewed systematic reviews, where available. Systematic reviews provide a summary of all the literature available on a particular topic that meets predefined eligibility criteria. These are more helpful as an evidence base as they synthesise the available research. This will be important in supporting the assessment of significance with the best available evidence.
- 16.5.8 For this PEI Report, a preliminary understanding of the scientific literature has been applied as the full literature review is yet to be completed.

# Stages of the human health assessment

16.5.9 The overall approach to the human health assessment is illustrated in Plate 16.1. Further details on each stage is set out below.

## Plate 16.1 Stages of human health assessment

Develop population health profiles for study areas					
Identify populations potentiall exposed to impacts of Projec	y t	Develop a health profile of the populations to develop understanding of baseline health sensitivity		Identify vulnerable groups within the population which may have increased susceptibility to certain health impacts	
	ld	entify baseline health	determinan	its	
Obtain data on scoped	in health	determinants with referen	ce to other E	IA assessm	ents where relevant
ld	entify a	nd assess likely signif	icant healtl	h impacts	
Identify how the Project could impact on baseline health determinants and likelihood of exposure to the population Estimate the scale (magnitu and characteristics of impact from the Project with consideration of embedded mitigation and standard goo practice		e the scale (magnitude) aracteristics of impact e Project with oration of embedded on and standard good e	Estimate what proportion of the population is likely to be affected and the likely associated health outcomes		Consider any differences between vulnerable groups and general population and the likelihood that health inequalities could be narrowed or widened
Identify additional mitigation and enhancement measures					
Identify measures which would be likely to reduce negative health impacts and/or improve health outcomes and/or reduce health inequalities					
Determine significance of health effects					
Describe likely residual health outcomes associated with impacts of the Project after mitigation and enhancement measures have been sionificance level guided by			y limitations to the nt and key areas of /		

#### Developing population health profiles for the study areas

16.5.10 For each population health study area (see Section 16.6 for study areas), a population health profile is being developed using publicly available information as well as evidence from other sources such as survey information and consultation feedback (IEMA, 2022a). At this stage, preliminary population health profiles have been developed as data gathering is ongoing to inform the final assessment to be presented in the Environmental Statement. These preliminary population health profiles have been used to support the preliminary health assessment reported in this PEI Report.

assessment criteria

added

- 16.5.11 The preliminary population health profiles have been informed by a combination of census data, the Office for Health Improvement and Disparities' (OHID) Local Health database, and information from the relevant local authority Joint Strategic Needs Assessments and wellbeing strategies.
- 16.5.12 In developing these population health profiles, consideration has been given to the sensitivity criteria from IEMA guidance (IEMA, 2022a) (see Table 16.4) to enable a judgement of population health sensitivity for each population profile to be made. Relevant population groups will be considered, including sub-populations with vulnerability such as the young and old, those who may be socially disadvantaged or those who may have existing poor physical and mental health.
- 16.5.13 The level of data collected is proportionate to the study area for that population, such that for the largest study area (London Water Resource Zone (London WRZ)), the population profile is relatively high level. The baseline preliminary population health profiles for each study area are presented in Section 16.7.

#### Developing baseline for the wider determinants of health in the study areas

- 16.5.14 Relevant wider determinants of health were identified in the EIA Scoping Report with reference to IEMA guidance (IEMA, 2022a) and are listed in Section 16.1. Information relating to many of these wider determinants of health is drawn from other aspect chapters. Environmental assessments, as well as community and recreational surveys, are ongoing at this stage, therefore the baseline for the wider determinants of health is yet to be fully described. For the baseline section of the human health assessment to be reported in the Environmental Statement, further information will be provided on the scientific evidence that links the wider determinants of health to population health outcomes. This will then provide the evidence base against which the significance of changes to the baseline can be assessed in terms of population health outcomes.
- 16.5.15 Preliminary information on the baseline for the wider determinants of health is presented in Section 16.7 Baseline Conditions.

#### Identifying and assessing likely significant health impacts

- 16.5.16 There are several steps to the assessment of health impacts. The first is to determine if there is a plausible health impact through analysis of source-pathway-receptor relationships (Table 16.3). This step was undertaken as part of the EIA Scoping Report.
- 16.5.17 The next step is to determine the nature of the health impacts that could occur and the likely scale of exposure to each health impact in the population. The focus of the assessment is whether there would be an impact on population health rather than an individual's health.
- 16.5.18 The assessment considers whether the impacts would be expected to be widespread or localised, and whether a minority or majority of the population in the relevant study area would be affected. This takes into account whether the embedded design (primary) mitigation and/or standard practice mitigation would

serve to avoid the impact, for example through breaking the source-pathwayreceptor relationship in some way, or would otherwise reduce the impact.

16.5.19 The assessment also has consideration for the health sensitivity of the population and the likelihood of any groups within the population being more sensitive to health impacts than the general population.

Source	Pathway	Receptor	Plausible health impact?	Explanation
×	$\checkmark$	~	No	There is not a clear source from which a potential health impact could originate.
$\checkmark$	×	$\checkmark$	No	The source of a potential health impact lacks a means of transmission to a population.
$\checkmark$	$\checkmark$	×	No	Receptors that would be sensitive or vulnerable to the health impact are not present.
~	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect. Health impacts should be assessed (describing what effect will occur and its likelihood) and likely health effects are then evaluated for significance.

Table 16.3 Example of source-pathway-receptor model for health effects

Source: Cave et al., (2017)

# Identifying additional (secondary) mitigation and enhancement measures

16.5.20 Where likely significant adverse effects on population health are identified, further mitigation measures are identified and recommended to reduce or avoid the impact. Where opportunities to improve health outcomes or reduce health inequalities are identified, enhancement measures have been recommended. At this stage, these are preliminary recommendations for mitigation and enhancement and may be subject to change prior to the preparation of the Environmental Statement.

#### Determining significance of residual health effects

16.5.21 After taking into account all of the recommended additional (secondary) mitigation and enhancement measures, the residual likely significant health effects are described and assessed. The process takes account of the sensitivity of the population, the magnitude of impact and the significance of health effect. The assessment criteria that inform this process are set out below.

# Assessing the significance of effects

#### Determining the sensitivity of receptors

16.5.22 The determination of sensitivity for the population groups likely to be affected is guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022b). Based on this guidance, the judgement of sensitivity involves the consideration of several factors such as deprivation levels, health profile, inequalities, levels of dependency and community outlook (for example, if there is widespread public concern) as shown in Table 16.4.

#### Table 16.4 Health sensitivity criteria

Category/ level	Indicative criteria.** The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the Project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and/or people with a very low capacity to adapt
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt
Very low	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not carers or dependents); people with good health status; and/or people with a very high capacity to adapt

\*\*Judgement based on most relevant criteria. It is likely in any given analysis that some criteria will span categories Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022b).

#### Determining magnitude of impact

16.5.23 The determination of magnitude is guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022b) as shown in Table 16.5. Determining magnitude requires a judgement on the likely level of exposure, duration and frequency of an impact on a health determinant. It also considers the severity of the health outcome, for example, whether associated outcomes relate to a change in mortality, morbidity, or quality of life. Reversibility of the associated health outcomes is also considered.

## Table 16.5 Health magnitude methodology criteria

Category/ level	Indicative criteria**. The narrative explains that the population or sub-population's sensitivity is driven by (select as appropriate):
High	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/injury outcomes; majority of population affected; permanent change; substantial service quality implications
Medium	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality of life; large minority of population affected; gradual reversal; small service quality implications
Low	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality of life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality of life; very few people affected; immediate reversal once activity complete; no service quality implication

\*\*Note: Judgement based on most relevant criteria. It is likely in any given analysis that some criteria will span categories.

Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022b).

#### Definitions of timescales

16.5.24 The IEMA Guide to Determining Significance (IEMA, 2022b) does not define long term, medium term or short term. The timescales as defined in Table 16.6, which are based on professional judgement, have been applied for this preliminary human health assessment.

Timescale	Definition
Long-term	Impacts lasting approximately ten years or more
Medium-term	Impacts which would last approximately three to ten years
Short-term	Impacts which would last approximately six months to three years
Very short-term	Impacts which would last up to six months
Transient	Impacts lasting a matter of hours or up to a weekend

#### Table 16.6 Definitions of timescales of impact

#### Determining likely significant effects

16.5.25 The significance of health effects will be assessed for residual effects (i.e. after taking into account the application of mitigation measures). The determination of significance in the health assessment will involve professional judgement guided by the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment (IEMA, 2022b), using the significance matrix in Table 16.7. The IEMA Guidance states: '*The matrix is only a tool to assist with judgement, there are not clear cut-off points between categories and terminologies, for example the point at which an impact changes magnitude category is a professional judgement and should be supported by evidence and justification*'.

#### Table 16.7 Human health assessment significance matrix

		Magnitude			
		Negligible	Low	Medium	High
Sensitivity	Very low	Negligible	Negligible	Minor/ Negligible*	Minor/ Negligible*
	Low	Negligible	Minor	Minor	Moderate/ Minor*
	Medium	Minor/ Negligible*	Minor	Moderate	Major/ Moderate*
	High	Minor/ Negligible*	Moderate/ Minor*	Major/ Moderate*	Major

Source: IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment

\* Note – for matrix results which have dual classification, i.e. moderate/ minor, expert judgement and contextualised data and information will be considered.

- 16.5.26 The judgement of significance is supported with a narrative that will include the consideration of a range of information such as:
  - a. Scientific literature
  - b. Baseline conditions for the population
  - c. Health priorities in the study area
  - d. Consultation undertaken
  - e. Regulatory standards in England and health policy context in the study areas and England
- 16.5.27 Effects assessed as Moderate or Major will be considered a significant effect.

# Assumptions and limitations

- 16.5.28 This is a preliminary assessment based on preliminary information, much of which was gathered as part of the EIA Scoping Report. The human health assessment will be developed further for the Environmental Statement to reflect further information gathered on baseline conditions and the Project design, the findings of the literature review, and the results of further environmental assessment work.
- 16.5.29 Where there is currently insufficient baseline and/or design information available to determine the likely magnitude of impact of an effect, a rating of 'uncertain' has been applied in place of a significance of effect rating. These effects will be reassessed in the Environmental Statement and a significance assigned at this point.
- 16.5.30 Public consultation and engagement responses have been drawn upon to help understand the health profiles of the local communities and make a judgement of population health sensitivity. The consultation responses listed under each ward in Section 16.7 do not necessarily originate from individuals who live within that particular ward. Responses have rather been included under the ward where the Project element that was the subject of consultation concerns, is located. On this basis it has been assumed that the issues raised are likely to be of relevance to that ward community.
- 16.5.31 The assessment considers health effects and data at a population level, rather than health data and effects relating to individuals. The aggregated data and statistics used to support the assessment cannot be used to make inferences about the health of individuals within the communities assessed.
- 16.5.32 Although the assessment refers to research that demonstrates evidence of association between changes in the wider determinants of health and effects on health, this should not be interpreted as causation. It is not possible to draw conclusions on cause-and-effect relationships for human health using aggregated population-level data.

- 16.5.33 There are difficulties in estimating the level of exposure of the population to impacts on certain wider determinants of health. For example, it is difficult to ascertain what proportion of their lives each individual within a given population spends in a place that is exposed to the impact and also whether individuals have been exposed to other factors also associated with a given health outcome.
- 16.5.34 It is assumed that access along public rights of way and the Thames Path will generally be maintained throughout construction, with potentially localised diversions and/or closures of very short duration.

# 16.6 Study area

- 16.6.1 Since health effects vary spatially depending on the nature of the wider determinants of health to be assessed (IEMA, 2022a), the human health assessment has identified broad study areas for populations that are likely to be within the zone of influence of impacts on one or more of the wider determinants of health included in the scope of this preliminary assessment. These study areas are described in Table 16.8 and the approximate areas are illustrated in Plate 16.1, 16.2 and 16.3 within Volume 2 PEI Report Figures.
- 16.6.2 The study areas applied in the chapters referenced in Section 16.1 are also relevant to the human health assessment. They reflect the expected limits of likely significant effects on the various biophysical, social and economic matters which influence human health (i.e. the wider determinants of health).

Study area	Description
Local Communities Study Area	This study area comprises the wards that coincide with, or are immediately adjacent to, the draft Order limits, as well as the wards within which the river banks of the River Thames between the proposed intake structure site and Richmond Lock (excluding North Richmond on the basis that there is no residential community within 1km of Richmond Lock, therefore no risk of exposure of residents in this ward to the effects of the Project). The Canbury Gardens ward has been added to this study area. These wards have been selected as they encompass the residential communities that are closest to the Project and are therefore representative of the local communities most likely to be exposed to construction impacts and operational impacts on the River Thames. This study area is indicated on Plate 16.1.
Local Authorities Study Area	The population of LBH, LBR and RBK. This is the population most likely to be within the zone of influence of impacts on socioeconomic determinants of health such as education and training, employment and income, and traffic modes, access and connections. This study area is indicated on Figure 16.2: Local Authorities Study Area.

#### Table 16.8 Health study areas

Study area	Description
London Water Resource Zone Study Area	The population within the London WRZ. This is the population within the influence of impacts on wider societal infrastructure and resources, namely water supply infrastructure. This study area is indicated on Figure 16.3: London Water Resource Zone Study Area.

# 16.7 Baseline conditions

- 16.7.1 This section describes the baseline human environment, including the population and communities that have the potential to be exposed to impacts to the wider determinants of health that were scoped into the assessment.
- 16.7.2 Various desk-based sources of information, together with available survey information from other topics, have been used to inform the preliminary understanding of the baseline. These are referenced as appropriate throughout.

# Population health profiles

#### Local Communities Study Area

- 16.7.3 Demographic, health and socioeconomic data for the wards within the Local Communities Study Area (LBH, LBR and RBK) have been collected to understand the health profiles of the local communities. The data are presented in Appendix 16.2 Population Health Profile Data. The health profiles for each of the wards in the study area are summarised below, guided by the sensitivity criteria in IEMA guidance (IEMA, 2022b).
- 16.7.4 Health profile data were obtained from the OHID Local Health database and the Office for National Statistics (ONS) and supplemented with consultation feedback and other sources as referenced below. Demographic data have been obtained to identify any population groups that would have a higher sensitivity to environmental changes associated with the Project compared to the average. Data relating to deaths from causes considered preventable under 75 years, emergency hospital admissions for coronary heart disease, stroke and heart attacks have been obtained because circulatory disease is the leading cause of premature death in the UK. Risk factors for circulatory disease include low levels of physical activity and are therefore relevant to the scope of the Project since the access to recreation in land and water-based facilities may affect physical activity levels.

#### Hounslow South community health profile

16.7.5 This ward encompasses residential communities that surround the northern and western sides of the Mogden STW, including Worton and the Woodlands estate. The ward had a total population of 13,700 at the 2021 National Census. This is the third most densely populated ward in the Local Communities Study Area with a population density of 6,797.2 persons per square kilometre. The ward has comparatively limited areas of green space compared to other wards in the Local Communities Study Area. Areas of green space include some

allotments and a small public park within 500m west of the draft Order limits from Mogden STW and a neighbourhood play space off Glen Walk within 30m of the draft Order limits from Mogden STW. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.

16.7.6 The health sensitivity of this local community population is judged to be Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). Consultation themes relating to health include concerns about local people's health and wellbeing from siting the tertiary treatment plant (TTP) at Mogden STW. The main comments received relating to community impacts were general concerns about impacts on local communities. A key concern was also sewage discharge into local waterways and watercourses. There are also concerns about issues of odour at Mogden STW. The 2021 National Census indicated that 85.2% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward generally scored average or better than average for England (Table A.3, Appendix 16.2 Population Health Profile Data). The 2021 National Census indicated that 3.9% of the ward population rated their health status as 'bad' or 'very bad' health, slightly less than compared with the England rate of 5.2% (Table A.3, Appendix 16.2 Population Health Profile Data). The ward had significantly worse than average for England rates of emergency admissions for coronary heart disease with a standardised admissions ratio (SAR) of 125.1% (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate a proportion of children in the population similar to average for England and London, but a lower than the England average proportion of people aged 65 years or older (slightly higher than the London regional average), suggesting an overall low population of dependants in the ward. 12.1% of the ward population has a disability which is lower than average compared to the England rate (17.3%) (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### Isleworth community health profile

16.7.7 This ward encompasses residential communities that surround the southern and eastern sides of the Mogden STW, extending further to the east of Twickenham Road and north and south of the Duke of Northumberland's River. The ward had a total population of 13,800 at the 2021 National Census (ONS, 2021a). This is the second most densely populated ward in the Local Community Study Area with a population density of 6,882.6 people per square kilometre (ONS, 2021b). The ward has a medium area of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include a public park, a nature park and allotments. There is also a play space in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.

The health sensitivity of this local community population is judged to be High. 16.7.8 This reflects that the deprivation data indicate high levels of income deprivation, affecting 16.5% of the population as compared to 12.9% for England (Table A.2, Appendix 16.2 Population Health Profile Data). Consultation themes relating to health include concerns about local people's health and wellbeing from siting the TTP at Mogden STW. The main comments received relating to community impacts were general concerns about impacts on local communities. A key concern was also sewage discharge into local waterways and watercourses. There are also concerns about issues of odour at Mogden STW. The 2021 National Census indicated that 85.7% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward generally scored similarly to the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). The ward had significantly worse than average for England rates of emergency admissions for chronic obstructive pulmonary disease (COPD) (SAR 124.3). Data indicate the proportion of children in the population is higher than the average for England and London regional average. The proportion of people aged 65 years or older is lower than the average for England, but slightly higher than the London regional average. This suggests an overall low population of dependants in the ward. The ward has disability levels which are lower than the England average but slightly higher than the London regional average levels of disability (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

# Whitton community health profile

- 16.7.9 This ward encompasses residential communities to the south-west of Mogden STW. The above ground sites are not located in this ward. The ward's closest point to the above ground sites is approximately 180m to the south of the draft Order limits from Mogden STW. The ward had a total population of 10,400 at the 2021 National Census (ONS, 2021a). This is a moderately densely populated ward in the Local Community Study Area with a population density of 6,153.9 people per square kilometre (ONS, 2021b). The ward has comparatively limited areas of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include a public park. There are also several play spaces in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- 16.7.10 The health sensitivity of this local community population is judged to be Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data).

Consultation themes relating to health include concerns about local people's health and wellbeing from siting the TTP at Mogden STW. The main comments received relating to community impacts were general concerns about impacts on local communities. A key concern was also sewage discharge into local waterways and watercourses. There are also concerns about issues of odour at Mogden STW. The 2021 National Census indicated that 86.2% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward generally scored similarly to or better than the average for England. The ward had significantly worse than average for England rates of emergency admissions for COPD (SAR 120.5). Data indicate the proportion of children in the population is slightly higher than the average for England and London. The proportion of people aged 65 years or older is lower than the average for England, but higher than the London regional average. This suggests an overall low population of dependants in the ward. The ward has disability levels which are lower than the England average but slightly higher than the London regional average levels of disability (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

## St Margarets and North Twickenham community health profile

- 16.7.11 The ward encompasses residential communities to the south-east of Mogden STW. The main above ground sites are not located in this ward, however, some minor highways amendments proposed to allow for the safe passage of certain vehicles needed to deliver the sections of the TBM to Mogden STW would be within this ward. The ward boundary coincides with the Mogden Lane/Whitton Dene roundabout at the southern entrance of the Mogden STW site. The land use in this area of the ward comprises the Allianz Stadium Twickenham complex. The nearest residential communities in this ward to the Mogden STW site are some 500m south of the Mogden STW boundary. The ward had a total population of 11,900 at the 2021 National Census (ONS, 2021a). This is one of most densely populated wards in the Local Communities Study Area with a population density of 6,271.0 person per square kilometre (ONS, 2021b). The ward has medium areas of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include public parks and recreation grounds. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- 16.7.12 The health sensitivity of this local community population is judged to be Low. This reflects that the deprivation data indicates low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). Consultation themes relating to health include concerns about local people's health and wellbeing from siting the TTP at Mogden STW. The main comments received relating to community impacts were general concerns about impacts on local communities. A key concern was also sewage discharge into local waterways and

watercourses. There are also concerns about issues of odour at Mogden STW. The 2021 National Census indicated that 91.6% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward scored similarly to or significantly better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicates the proportion of children in the population is higher than the average for England and London. The proportion of people aged 65 years or older is lower than the average for England, but slightly higher than the London regional average. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### Ham, Petersham and Richmond Riverside community health profile

- 16.7.13 This ward encompasses residential communities to the south of the above ground site at Ham Playing Fields, and adjacent to the above ground sites at Burnell Avenue and Beaufort Road. The above ground sites are located in this ward. The ward had a total population of 10,800 at the 2021 National Census (ONS, 2021a). This is the least densely populated ward in the Local Communities Study Area with a population density of 1,169.9 people per square kilometer (ONS, 2021b). The ward has large areas of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include parks and fields. There are also several play spaces in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- 16.7.14 The health sensitivity of this local community population is judged to be Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). Concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area were expressed during consultation. Concerns were expressed about how local communities could be impacted. The 2021 National Census indicated that 86.7% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.1), while health indicators for the ward scored similarly to or significantly better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is higher than the average for England and London. The proportion of people aged 65 years or older is slightly lower than the average for England, but higher than the London regional average. This suggests an overall low population of dependants in the ward. The ward has disability levels which are lower than the England average but slightly higher than the London regional average levels of disability (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

## Twickenham Riverside community health profile

- 16.7.15 This ward encompasses residential communities to the south-east of Mogden STW and the ward is bordered to the south and east by the River Thames. The above ground sites are not located in this ward. The ward's closest point to an above ground site is approximately 30m to the north of the draft Order limits from Ham Street Car Park, which is on the opposite side of the River Thames to the ward. The ward had a total population of 11,000 at the 2021 National Census (ONS, 2021a). This is a moderately densely populated ward in the Local Community Study Area with a population density of 6,070.9 people per square kilometre (ONS, 2021b). The ward has medium areas of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include gardens. There are also play spaces in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- 16.7.16 The health sensitivity of this local community population is judged to be Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). The 2021 National Census indicated that 89.6% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward scored similarly to or better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is slightly higher than the average for England and slightly below the London regional average. The proportion of people aged 65 years or older is lower than the average for England, but higher than the London regional average. This suggests an overall low population of dependants in the ward. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### South Twickenham community health profile

16.7.17 This ward encompasses residential communities located on the western side of the River Thames, south of Mogden STW. The above ground sites are not located in this ward. The ward's closest point to an above ground site is approximately 630m west of the draft Order limits from Ham Street Car Park. The ward had a total population of 10,600 at the 2021 National Census (ONS, 2021a). This is one of the more densely populated wards in the Local Communities Study Area with a population density of 6,186.1 people per square kilometre. The ward has a medium area of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include allotments and small parks. There are also play spaces in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.

16.7.18 The health sensitivity of this local community population is judged to be **Low**. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). The 2021 National Census indicated that 90.3% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward scored similarly to or better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is slightly higher than both the average for England and the London regional average. The proportion of people aged 65 years or older is lower than the average for England but higher than the London regional average. This suggests an overall low population of dependants in the ward. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

## South Richmond community health profile

- 16.7.19 The ward encompasses residential communities to the north-east of the above ground site at Ham Street Car Park. The above ground sites are not located in this ward. The ward's closest point to an above ground site is approximately 1.6km to the east of the draft Order limits at Ham Street Car Park. The ward had a total population of 11,100 at the 2021 National Census (ONS, 2021a). This is one of the less densely populated wards in the Local Communities Study Area with a population density of 4,383.5 people per square kilometre (ONS, 2021b). The ward has large areas of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include allotments, gardens and greens. There is also a play space in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- 16.7.20 The health sensitivity of this local community population is judged to be Low. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). The 2021 National Census indicated that 90.1% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward scored similarly to or better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is slightly lower than the average for England and London. The proportion of people aged 65 years or older is slightly lower than the average for England, but higher than the London regional average (Table A.3, Appendix 16.2 Population Health Profile Data). This suggests an overall low population of dependants in the ward. The

ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### Tudor community health profile

- 16.7.21 This ward encompasses residential communities, some of which are adjacent to the above ground sites at Burnell Avenue and Tudor Drive, which are located in this ward. The ward had a total population of 6,900 at the 2021 National Census (ONS, 2021a). This is one of the slightly less densely populated wards in the Local Community Study Area with a population density of 6,023.6 people per square kilometre. The ward has a medium area of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include a recreation ground and allotments. A play space (Royal Park Gate Playground) is also in the ward off Northweald Lane. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- The health sensitivity of this local community population is judged to be 16.7.22 Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). Concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area were expressed during consultation. Concerns were expressed about how local communities could be impacted. The 2021 National Census indicated that 88.9% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.1), while health indicators for the ward generally scored average or better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is higher than the average for England and the London regional average. The proportion of people aged 65 years or older is lower than the average for England, but higher than the London regional average. This suggests an overall medium population of dependants in the ward. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

# Canbury Gardens community health profile

16.7.23 This ward encompasses residential communities, to the south of the draft Order limits at Burnell Avenue and Tudor Drive. The above ground sites are not located in this ward. The ward had a total population of 8,300 at the 2021 National Census. This is the most densely populated ward in the Local Community Study Area with a population density of 10,674.5 people per square kilometre (ONS, 2021b). The ward has a medium area of green space

compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include a gardens and park, with a play space and sports pitch. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.

The health sensitivity of this local community population is judged to be 16.7.24 Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). Concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area were expressed during consultation. Concerns were expressed about how local communities could be impacted. The 2021 National Census indicated that 89.8% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward scored similarly to the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is higher than the average for England and the London regional average. The proportion of people aged 65 years or older is lower than the average for England, but the same as the London regional average. This suggests an overall low population of dependents in the ward. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### Teddington community health profile

- 16.7.25 The ward encompasses residential communities to the south-west of the draft Order limits at Burnell Avenue on the opposite side of the River Thames. The ward had a total population of 10,600 at the 2021 National Census (ONS, 2021a). This is one of the less densely populated wards in the Local Communities Study Area with a population density of 2,475.2 people per square kilometre. The ward has a large area of green space compared to other wards in the Local Communities Study Area (see Plate 16.1). Areas of green space include a large park, gardens and a recreation ground. There are also play spaces in the ward. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- 16.7.26 The health sensitivity of this local community population is judged to be Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.2 Population Health Profile Data). Some concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area were expressed during consultation. The 2021 National Census indicated that 89.7% of the ward population rated their health status as good or very good (Table A.3, Appendix 16.2 Population Health Profile Data), while health indicators for the ward generally scored average or better than average for England (Table A.3, Appendix 16.2 Population Health

Profile Data). Data indicate a proportion of children in the population slightly lower than the average for England and London. The proportion of people aged 65 years or older is slightly higher than the average for England and higher than the London regional average. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### Hampton Wick and South Teddington community health profile

- 16.7.27 The ward encompasses residential communities to the south of the above ground site at Burnell Avenue on the opposite side of the River Thames where works affecting the river are also proposed. The ward had a total population of 10,800 at the 2021 National Census (ONS, 2021a). This is one of the less densely populated wards in the Local Communities Study Area with a population density of 3,916.7 people per square kilometre (ONS, 2021b). The ward has large areas of green space compared to other wards in the Local Communities Study Area (see Plate 16.1), including a large park, allotments, recreation grounds and play spaces. Figure 15.3 of Chapter 15: Socioeconomics, Community, Access and Recreation presents the location of education facilities in the ward where they are within 500m of the above ground sites.
- The health sensitivity of this local community population is judged to be 16.7.28 Medium. This reflects that the deprivation data indicate low levels of income deprivation (Table A.2, Appendix 16.1). Some concerns about people's quality of life, health and wellbeing particularly around the lower River Thames area were expressed during consultation. The 2021 National Census indicated that 88.5% of the ward population rated their health status as good or very good (Table A 16.1.3, Appendix 16.1), while health indicators for the ward scored similarly to or better than the average for England (Table A.3, Appendix 16.2 Population Health Profile Data). Data indicate the proportion of children in the population is slightly higher than the average for England and slightly lower than the London regional average. The proportion of people aged 65 years or older is slightly lower than the average for England, but higher than the London regional average. This suggests an overall low population of dependants in the ward. The ward has disability levels which are lower than both the England average and London regional average levels (Table A.3, Appendix 16.2 Population Health Profile Data). On this basis, the population of this ward is described as slightly limited from undertaking daily activities through interpretation of the sensitivity criteria (Table 16.4).

#### Local Authorities Study Area

- 16.7.29 Table 16.9 sets out population health indicators that have been used to characterise the health profile for the Local Authorities Study Area of LBH, LBR and RBK. The Local Authorities Study Area is indicated on Figure 16.2.
- 16.7.30 Data from the 2021 National Census have been used to describe the following demographics. LBH has the youngest and most ethnically diverse population, with almost 50% of its population of 288,181 reported as from a 'not white' ethnicity. Young people under the age of 15 comprise 20.6% of the population (slightly higher than RBK and LBR), while only 11.8% of the population is aged over 65 years, which is a smaller percentage than for the other boroughs in the Local Authorities Study Area.
- 16.7.31 In contrast, the population of LBR is characterised as being one of the least ethnically diverse amongst boroughs in London with only 19.5% of its population identifying as non-white, which aligns with the national average (19%). LBR has a population of 195,278, of which 16% is aged over 65 years. This is a higher proportion than for LBH and RBK, but lower than average for England as a whole (18.3%).
- 16.7.32 RBK has the smallest population of any borough in London after Kensington and Chelsea with a total of 168,063. Of this population, 19.5% were aged 0-15 years at the 2021 census, making RBK the borough with the lowest proportion of children among the three boroughs of the Local Authorities Study Area. In terms of ethnic diversity, 25.5% of people in RBK identify as non-white, which is higher than the national average but substantially lower than LBH.
- 16.7.33 In terms of general health, LBR had the highest proportion of residents reporting good or very good health and the lowest proportion reporting bad or very bad health for the local authorities' study area. RBK also had high levels reporting good or very good health, and low levels of bad or very bad health compared to the England average (see Table 16.9). LBH had a similar general health level to average for England (see Table 16.9).
- 16.7.34 Based on 2021 census data, the populations of LBH, LBR and RBK are younger than average for England and with a lower proportion of residents classed as disabled under the Equality Act 2010. LBH had the same level of income deprivation as average for England (12.9%) while RBK and LBR had substantially lower levels of income deprivation (7.8% and 6.4%, respectively).
- 16.7.35 LBH had similar life expectancy to the average for England, while RBK and LBR both had longer life expectancy than average. RBK and LBR had lower than average death rates for heart disease, stroke and cancer, as well as lower rates of premature death from all causes. The rates for LBH tended to be closer to average for England, with the death rate for heart disease being slightly higher than average. Based on the review of the population health profiles, the sensitivity of the LBH population is judged to be Medium, while the sensitivity of populations of RBK and LBR are judged to be Very Low.

16.7.36 The baseline population characteristics will be developed further for the Environmental Statement using more defined local area statistics to focus more specifically on the communities most likely to be impacted on by the Project. Where necessary, the data will also reflect any updated health data available, including that provided by local health teams for the affected boroughs.

Indicator	LBH	RBK	LBR	England average
Usual resident population, 2021	288,181	168,063	195,278	N/A
Population density, people per square kilometre, 2021	5,148.0	4,512.1	3,401.9	433.5
Percentage of the total resident population who are 0 to 15 years of age, 2021 (%)	20.6	19.5	20.3	18.5
Percentage of the total resident population who are 65 years and over, 2021 (%)	11.8	14.4	16.0	18.3
Population whose ethnic group is 'not white', 2021 (%)	48.6	25.5	19.5	19.0
Income deprivation, proportion of the population, 2019 (%)	12.9	7.8	6.4	12.9
Percentage of people who reported disabled under the Equality Act 2010, in 2021 (%)	12.2	13.1	12.0	17.3
Life expectancy at birth for males, 2021 (years)	78.7	80.5	82.7	78.7
Life expectancy at birth for females, 2021 (years)	82.9	84.6	85.9	82.8
Percentage of population reporting general health as 'very good' or 'good', 2021	81.7	84.8	87.6	81.7
Percentage of population reporting general health as 'bad' or 'very bad', 2021	5.4	3.9	3.4	5.3
Deaths from all causes, under 75 years, indirectly standardised ratio 2016 to 2020 (Standardised mortality ratio (SMR))	95.9	76.1	70	100.0
Deaths from coronary heart disease, all ages, indirectly standardised ratio, 2016 to 2020 (SMR)	115.6	86.4	73.7	100.0

#### Table 16.9 Local authority population health profile

Indicator	LBH	RBK	LBR	England average
Deaths from stroke, all ages, indirectly standardised ratio, 2016 to 2020 (SMR)	100.4	71.9	75.5	100.0
Deaths from all cancer, all ages, indirectly standardised ratio, 2016 to 2020 (SMR)	86.9	82.1	81.1	100.0
Deaths from causes considered preventable, under 75 years, indirectly standardised ratio, 2016 to 2020 (SMR)	97.1	74.7	68.2	100.0

Source: OHID Local Health and NOMIS Census statistics

# London Water Resource Zone Study Area

- 16.7.37 The London WRZ area is indicated on Figure 16.3. The baseline household population within the London WRZ, as estimated for the base year of 2021-22 to inform Thames Water's Water Resources Management Plan was 8,053,136 (Thames Water, 2024). The average water consumption within the London WRZ (2023-24 average) is 119.3 litres per person per day for households measured with a water meter, and 162.8 litres per person per day for households not measured by a water meter (Thames Water, 2024). The population in the London WRZ is expected to rise to over ten million by 2050, increasing demand on water supplies. As described in further detail under Baseline Biophysical Environment, there is already substantial pressure on water supply in this area, which is anticipated to increase in the future.
- 16.7.38 The London WRZ includes many areas facing high levels of deprivation. Affordability of water services is a key issue, particularly for the income-deprived population. The Consumer Council for Water represents water and sewerage consumers in England and Wales. It carries out an annual 'Water Matters' survey to track the views of household customers on the services they receive from water companies. Although many of the data reported are aggregated for all water customers surveyed in England and Wales, it is expected that the findings can be generalisable to the London WRZ, given the size of the population in the zone. The 2024 Water Matters survey (Consumer Council for Water, 2024) found that 48% of customers across England and Wales said their household financial situation had become either 'slightly' or 'significantly worse' in the past year. The proportion of water customers who agreed their water bill was affordable has dropped from 76% to 72% between 2023 and 2024, while there has been a greater decline in the proportion of customers who thought their bill was fair (down from 64% to 55%). This year has seen the widest gap in the proportion of customers who consider their bills to be affordable, as opposed to fair – a difference of 17%.

- 16.7.39 Affordability, and perceptions of fairness and trust among water customers, are key issues for water companies across England and Wales. Thames Water is among the companies with customers least likely to agree their charges were fair and is among the three companies with the greatest decline in trust rating (Consumer Council for Water, 2024).
- 16.7.40 Based on the above analysis, the sensitivity of the population of the London WRZ is judged to be High. This reflects the reliance on water supply resources, areas of high deprivation (and pockets of deprivation), and the levels of low trust in water companies (indicative of concern in the population).

# Baseline recreation, social participation and access to green and blue infrastructure

- 16.7.41 Locations of green space, including allotments, recreation grounds, play spaces and parks, as mapped by Ordnance Survey's Green Space database, are indicated on Plate 16.1 to provide baseline context with regard to the human health Local Communities Study Area.
- 16.7.42 The River Thames provides an important recreational and community resource. This includes activities such as angling, boating, rowing, canoeing, swimming and other water sports, which in turn support significant levels of social activity and social interaction for communities in the local area. Access to high quality green space, for example, parks, trees and playing fields, and blue space, for example, watercourses and ponds, is associated with multiple health benefits including increased physical activity levels and associated physical and mental health outcomes.
- 16.7.43 An expanding body of evidence highlights the potential benefits of both green and blue spaces, indicating that enhanced environments are linked to better human health outcomes. The evidence indicates a growing association between living in close proximity to (and spending time in) green or blue spaces and a number of benefits including reducing mental health problems and promoting health and wellbeing (Geary *et al*, 2023, WHO, 2023).
- 16.7.44 The evidence also suggests a number of different pathways both direct and indirect, to health and wellbeing impacts from green and blue infrastructure. Direct pathways to impact health include increased physical activity, improved social connections and recreational benefits. Indirect impact pathways include mitigation of noise pollution, water and air quality. Positive health outcomes associated with access to green and blue infrastructure include reduced morbidity and mortality, improved quality of life, reduction in health inequalities and improved mental health (Kirby and Scott, 2023).
- 16.7.45 These associations are being explored further through the literature review to be presented within the forthcoming Environmental Statement.
- 16.7.46 Chapter 15: Socioeconomics, Community, Access and Recreation provides preliminary information on the baseline recreation and social groups and clubs that are likely to be affected by the Project. The matters covered in Chapter 15 are important for understanding the social environment and the baseline context in terms of social participation, interaction and support (important determinants of mental wellbeing) as well as understanding local perceptions on the attractiveness of the area and quality of the natural environment. Figure 15.5 presents the location of recreation receptors as defined in Chapter 15: Socioeconomics, Community, Access and Recreation, and within 500m of the above ground sites.
- 16.7.47 Recreation surveys are being undertaken to better understand how potential impacts on recreational facilities may affect local communities, and recreation and health. These include organisation surveys, public surveys and observational surveys. As of December 2024, two rounds of surveys had been completed: summer 2024 and autumn 2024. Appendix 15.3 to the Socioeconomics, Community, Access and Recreation chapter provides information on the results of these. Further surveys have been completed in winter 2024 and spring 2025 and the results of these will be reported in the Environmental Statement.
- 16.7.48 Surveys included data collection on the purpose of participants' visits to the relevant site. Data has also been collected on participants' purpose for visiting sites, the perceived impact of sites on users' wellbeing and their view of the site's importance as a recreational resource. Information from these surveys, which is relevant to the human health baseline, will be presented in the forthcoming Environmental Statement.

## Baseline residential amenity and community wellbeing

- 16.7.49 At this PEI Report stage, limited information has been gathered to inform the baseline for health relating to this theme. Further survey work of communities and organisations is being planned to help inform the baseline of certain wider determinants of health, such as:
  - a. Community safety
  - b. Community identity and culture
  - c. Social participation, interaction and support
  - d. Perceptions of attractiveness of built environment
- 16.7.50 Mental wellbeing and community safety indicators will be explored and reported in the Environmental Statement, which will provide a comprehensive overview of the mental wellbeing and safety of the community. Consideration will be given to factors such as achieving safe and cohesive communities, minimising actual crime as well as fear of crime, reducing injury risk and further enhancing community identity and culture to contribute to a sense of belonging and sense of control. Other considerations could incorporate opportunities for community participation and interaction, which can impact on mental wellbeing. The IEMA

Guide to Effective Scoping of Human Health in Environmental Impact Assessment (IEMA, 2022a) provides issues to consider for each of these wider determinants of health. Consideration of the issues listed in the guidance will be used to support development of appropriate indicators around which to base the assessment.

## Baseline biophysical environment

16.7.51 For the purposes of this assessment, it is considered appropriate to use the Local Communities Study Area for assessment of effects on biophysical wider determinants of health, with the exception of the climate change mitigation and adaptation determinant for which the London Water Resource Zone Study Area is appropriate. This will be reviewed as the environmental assessment work on air quality, noise and vibration and water resources progresses, and amended if necessary for the Environmental Statement.

## Climate change mitigation and adaptation

- 16.7.52 The London WRZ is supplied mainly by water from the River Thames and River Lee, which is stored in reservoirs in South West London and Lee Valley. Groundwater makes up approximately 20% of the remaining supply. London also has a desalination plant for use during droughts (Thames Water, 2024). As noted in Section 18.7 of Chapter 18: Climate Change, average summer rainfall is expected to fall by over 20% by the 2060s (Table 18.9) which, combined with the increased demand on water supplies from population growth, would increase the likelihood of drought and water supply shortages. Since water is a fundamental requirement for health and wellbeing, this represents a significant public health issue for the population in the London WRZ. This is linked to the information on future baseline set out later in this section.
- 16.7.53 Temperature increases due to climate change are likely to increase risks of heat stress, heat stroke, and heat-related deaths in the local population. Groups more vulnerable to these risks include the elderly, young children, women, and those with certain health conditions (Ebi *et al.*, 2021; Achebak *et al.*, 2018). The green and blue spaces in the Local Study Area will help to mitigate these risks due to the cooling microclimates provided by such spaces (Hunter *et al.*, 2023).

## Air quality and odour

16.7.54 Poor air quality is the largest environmental risk to public health in the UK (PHE, 2017). Potential sources of air pollution from the Project include particulate matter (PM) emissions from construction activities, and particulate matter and nitrogen oxides (NOx) emissions from construction traffic and construction plant. There is good evidence that short and/or long-term exposure to PM and NOx are associated with an increased risk of a range of health outcomes including respiratory mortality, stroke mortality, cardiovascular mortality and asthma exacerbations (Chen and Hoek, 2020; Orellano *et al*, 2020; Huangfu and Atkinson, 2020; and Zheng *et al*. 2021). The WHO revised its guidelines in 2021 for long-term exposure to an annual mean of 5µg/m<sup>3</sup> for PM<sub>2.5</sub> and 15µg/m<sup>3</sup> for PM<sub>10</sub> (WHO, 2021a). These guideline values are substantially more

conservative than the current UK air quality objectives (AQOs), which are  $25\mu g/m^3$  for PM<sub>2.5</sub> and  $40\mu g/m^3$  for PM<sub>10</sub> and reflect more recent scientific evidence. There is no safe level of PM<sub>2.5</sub> and NO<sub>2</sub> pollution below which no health effects are observed in a population and as such they are considered to be non-threshold pollutants.

- 16.7.55 Section 13.7 of Chapter 13: Air Quality provides detailed information on the air quality and odour baseline within the Local Communities Study Area, where traffic emission-related air quality is a particular issue of health concern. The LBH, LBR and RBK local authority areas are all designated as air quality management areas due to road traffic emission-related exceedances of NO<sub>2</sub> and/or PM<sub>10</sub> AQOs. In addition, there are air quality focus areas where both the annual mean NO<sub>2</sub> EU limit value is exceeded and there is high human exposure, within or intersecting the Hounslow South, Twickenham Riverside and South Richmond wards.
- 16.7.56 Although odour complaints have been made regarding the existing Mogden STW, the baseline site visit for the air quality assessment detected very little odour from the final settlement tanks (refer to Section 13.7 of Chapter 13: Air Quality for further information).

## Water quality

- 16.7.57 As described in Chapter 15: Socioeconomics, Community, Access and Recreation, the River Thames is used for wide variety of recreational activities. The importance of physical activity and access to greenspace and blue space for human health is outlined above under 'Baseline recreation, social participation and access to green and blue infrastructure'. As also described there, water quality and availability within the River Thames has potential to affect the attractiveness and amenity of the river for recreation, and could also impact human health through direct exposure to microbiological and chemical hazards.
- 16.7.58 Section 5.7 and Appendix 5.1 of Chapter 5: Water Resources and Flood Risk sets out the detailed water quality baseline for the Local Communities Study Area, which falls within or adjacent to the Thames (Egham to Teddington) and Thames (Upper) (Thames Tideway) Water Framework Directive (WFD) river waterbodies. Whilst both waterbodies are known to be used for a variety of recreational activities, they are not designated bathing waters under The Bathing Water Regulations 2013. Appendix 5.1 provides the water quality baseline for the Thames (Egham to Teddington) with respect to WFD physico-chemical conditions and Environmental Quality Standard (EQS) compliance for WFD specific pollutants and priority hazardous substances. This is based on Thames Water Strategic Resource Option (SRO) monitoring data between 2021 and 2024. As shown in this Annual Average Environmental Quality Standards (AA EQS), exceedances are seen for several compounds including several pesticides and per- and poly-fluoroalkyl substances (PFAS).
- 16.7.59 As well as protecting the environment, EQS are designed to protect human health via consumption of fishery products, but are not explicitly intended to protect human health through contact with or ingestion of water so are not

directly relevant to understanding water quality issues of relevance to recreational use of a waterbody. Microbial water quality hazards are of key relevance to inland waters used for swimming and other recreational water pursuits. Thames Water SRO monitoring data also include faecal indicator bacteria (FIB) abundance which is therefore of use in helping to inform the health impacts of recreational use of the River Thames.

- 16.7.60 Reference has been made to the Guidelines on Recreational Water Quality: Volume 1 Coastal and Freshwaters (WHO, 2021b). An initial list of potentially relevant contaminants is set out below, and will be refined and updated as the literature review process described in paragraph 16.5.6 progresses.
  - a. Indicator species for faecal contamination (Escherichia coli and intestinal enterococci)
  - b. Cyanobacteria
  - c. Cryptosporidium
  - d. Metals including aluminum, arsenic, cadmium, chromium, copper, lead and manganese
  - e. Persistent organic pollutants such as polycyclic aromatic hydrocarbons (PAHs) and a range of pesticides
  - f. Emerging contaminants, including PFAS, endocrine-disrupting substances,1,4-dioxane and N,N-Nitrosodimethylamine (NDMA)
- 16.7.61 For the forthcoming Environmental Statement, baseline FIB and chemical concentrations data, where available, will be compared to the relevant guideline values or limit values set out in the 2021 WHO guidelines. The 2021 WHO Guidelines suggest that a provisional guideline value for recreational waters, based on the relevant difference in exposure between drinking water and recreational water uses, is twenty times the allowable drinking water concentration. For chemicals for which there is no guideline or limit value included in the 2021 WHO guidance, suitable alternative drinking water guideline values will be sought. The understanding of health impacts will be informed by the literature review.

## Land quality

16.7.62 There are several existing sources of land contamination within close proximity to the draft Order limits including four historic landfill sites and areas of made and infilled ground. Section 10.7 of Chapter 7: Ground Conditions and Contaminated Land provides further detail.

#### Noise and vibration

- 16.7.63 Noise pollution remains a major environmental health problem in Europe. Road traffic is the dominant source of noise pollution in Europe and the United Kingdom (European Environment Agency, 2014). Construction noise is considered an important environmental pollutant in urban areas particularly (Mir *et al*, 2023).
- 16.7.64 The majority of the Local Communities Study Area is urban in nature, with the noise environment dominated by road traffic noise and aircraft noise. Noise levels are highest close to larger roads such as the A316 Chertsey Road, A314

Hanworth Road, A310 Twickenham Road and A3004 St Margarets Road, with Noise Important Areas (NIAs) designated along three of these roads. Noise levels will be lower within large areas of open space close to the Thames which are further from the road network and industrial areas, such as Marble Hill Park, Ham Lands and Richmond Park. Section 14.7 of Chapter 14: Noise and Vibration provides a detailed noise baseline.

16.7.65 Chapter 14: Noise and Vibration assumes the baseline vibration level within the Local Communities Study Area to be zero as no potential sources have been identified within that study area.

## Light pollution

16.7.66 As described in Section 9.6 of Chapter 9: Townscape and Visual Amenity, urban areas of the Local Communities Study Area are heavily affected by light pollution, however, areas of open space such Marble Hill Park, Ham Lands and Richmond Park are less affected.

## Baseline socioeconomic environment

## Education and training

- 16.7.67 Chapter 15: Socioeconomics, Community, Access and Recreation provides an overview of the skills and qualification levels, and education facilities within LBH, LBR and RBK. Preliminary information about the skills and education baseline is presented in Chapter 15, including information on school performance levels, levels of school absences, pupil premium funding, and the proportion of young people not in education, employment or training (NEET), as well as key education and skills priorities of the three boroughs. This information is also of relevance to the human health context as education and training are socioeconomic health determinants. Construction skills are included in the 'Employment and Income' section below.
- 16.7.68 The 2021 National Census shows that compared with London, LBH has a lower rate of its population that are 16 years or older and educated to degree level or equivalent, but a higher rate than the national rate. RBK's and LBR's population are above both the London and national rate in this respect. In LBH, the rate of the population that are 16 years or older and do not hold any formal qualifications is slightly higher than the national rate, and RBK's and LBR's rates are below the national rate. LBH has the most pupils eligible for pupil premiums out of the three boroughs, and also has the highest proportion of young people not in education, employment or training, or their activity is not known, compared to RBK, LBR, London or England.

## Employment and income

- 16.7.69 Chapter 15: Socioeconomics, Community, Access and Recreation provides an overview of overall employment levels in LBH, LBR and RBK and the proportion of the workforce employed in the construction sector. This information is also of relevance to the human health context as employment and income are socioeconomic health determinants.
- 16.7.70 The Annual Population Survey (October 2023 September 2024) (ONS, 2024) shows that LBH had a higher percentage of people aged between 16 and 64 in employment, than both the employment rate for the Greater London area and the England average. RBK also had a higher employment rate than both the Greater London area and the England average, and the highest employment rate out of the three boroughs. LBR had the lowest employment rate of the three boroughs and also below the rate for the Greater London area and the England average. The 2021 National Census shows that the percentage of the workforce employment in the construction industry for LBH was 8%, for RBK was 6.7% and for LBR was 5%.
- 16.7.71 Levels of income deprivation for LBH, RBK and LBR are provided in Table 16.9 and at ward level in Table A16.3.2, Appendix 16.2. At local authority level, LBH has the highest proportion of the population experiencing deprivation of the three boroughs and has the same level as the England average. RBK and LBR have lower than the England average proportions of people experiencing deprivation.

#### Wider societal infrastructure and resources

16.7.72 Chapter 15: Socioeconomics, Community, Access and Recreation provides a list of community receptors for its assessment, which cover community services, emergency rescue and medical receptors. Health and social care services, and the built environment have been scoped out of the human health assessment at both the construction and operation stages. Wider societal infrastructure and resources are also scoped out at construction stage. The baseline conditions for the London WRZ, including information on water supply, income deprivation and the affordability of water services, is covered in the section 'London Water Resource Zone Study Area' in this chapter.

#### Transport modes, access and connections

- 16.7.73 Chapter 12: Traffic and Transport describes the transport baseline relevant to the affected road network. The affected road network represents the network of roads that may be impacted by traffic or environmental changes related to the Project, such as pollution or congestion.
- 16.7.74 Tables 12.23 and 12.24 in Chapter 12: Traffic and Transport indicate that most motorised traffic on the affected road network comprises cars, taxis and light goods vehicles. Based on available Department for Transport traffic count data from 2023, Heavy goods vehicles (HGVs) made up less than 3% of motorised traffic on the relevant A-roads with the exception of the A3 Hook Underpass and

A3 Kingston Bypass where they made up 3.4% and 3.5% of overall motorised traffic respectively. On Riverside Drive, between Croft Way and Dukes Avenue, HGVs make up only 0.6% of the motorised traffic. This would suggest that residents in that location (in Ham, Petersham & Richmond Riverside ward) would be sensitive to any increase in HGVs. Bus and rail services relevant to the affected road network are presented in Tables 12.25 and 12.26 of Chapter 12: Traffic and Transport.

16.7.75 In terms of active travel routes, the National Cycle Network (NCN) Route 4 follows the same route as the Thames Path National Trail along the river bank by Burnell Avenue Open Space, within the draft Order limits. Chapter 12: Traffic and Transport identifies where several Transport for London cycle routes and Kingston Cycle Campaign Routes intersect the affected road network. It also identifies PRoW which are linked to or intersect with the local roads within the affected road network (all south of the River Thames). These are indicated on Figure 12.4 which supports Chapter 12.

## Future baseline

- 16.7.76 The future baseline will likely be characterised by population growth. London is projected to grow by 434,000 people by mid-2028 compared to 2018, with a greater proportion of people aged 65 years and over. This demographic trend coupled with climate change and increased risk of extreme weather would increase water demand, as well as the number of people within the London WRZ. This is likely to increase pressure on the healthcare system and impact access to essential services.
- 16.7.77 Impacts of climate change are described above for the health determinant 'climate change mitigation and adaptation'. Further information on projected changes in climate parameters is provided in Chapter 18: Climate Change. Projected changes in climate parameters (e.g. increase in temperatures) have the potential to interact with effects identified within some environmental aspects and exacerbate or diminish their impact on health. Such combined impacts are termed In-Combination Climate Impacts (ICCI). Consideration of the potential ICCI associated with Human Health is provided in Section 16.8.

# 16.8 Preliminary assessment of likely significant effects

## Construction phase

- 16.8.1 This section assesses the likely significant effects on human health during construction of the Project. The assessment assumes that embedded design (primary) mitigation and standard good practice (tertiary) measures in a Code of Construction Practice (CoCP) are in place, and the results of the assessment then inform the need for any additional (secondary) mitigation requirements during construction.
- 16.8.2 The health determinant of community identity, culture, resilience and influence is scoped in to the assessment for Ham Playing Fields and Burnell Avenue site

components of the Project, however, this assessment is reliant upon the results of the community group surveys to be undertaken as part of Chapter 15: Socioeconomics, Community, Access and Recreation. Therefore, at this stage, the health effect is uncertain. Impacts on this health determinant will be fully assessed and reported in the Environmental Statement.

## Mogden STW

- 16.8.3 The preliminary human health assessment (see Table A.1 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on the following wider determinants of health with the potential to affect population health:
  - a. Open space, leisure and play
  - b. Attractiveness of area and quality of the built environment
  - c. Air quality
  - d. Noise and vibration
  - e. Water quality
- 16.8.4 The populations most likely to be affected by these impacts would be those in nearby residential areas in the Hounslow South ward (medium sensitivity) and the Isleworth ward (high sensitivity).

#### Open space, leisure and play

- 16.8.5 The amenity of a small neighbourhood play space by Crofters Close/Glen Walk may be affected by noise and dust from works in the Western Work Area of Mogden STW. It is plausible that impacts could be enough to dissuade use of the playground by some children and their parents or guardians. In the event that some sensitive children are dissuaded, a construction period of two to three years could represent a key developmental stage of childhood. However, it is likely that the existing embankments would provide a barrier to much of the potential environmental impact.
- 16.8.6 The population potentially most affected would be residents of Hounslow South ward (**medium sensitivity**). The impact would be localised and affect very few people within this ward. The health outcome predominantly relates to a minor change in quality of life, with immediate reversal once the construction is complete. On this basis the magnitude of impact on health is negligible. The significance of the health effect is judged to be negligible (Not Significant) for the general population as there is likely to be a very limited change to the health baseline.

#### Attractiveness of area and quality of the built environment

16.8.7 The impact on this health determinant relates to the likelihood that task lighting will be required for 24/7 operation of the TBM machine, and construction of the TTP, which would be up to 15m above ground level, would be visible to residents of neighbourhoods close to the Mogden STW. This may detract from

the attractiveness of the area (refer to Chapter 9: Townscape and Visual Amenity).

16.8.8 The population most affected would be nearby residents in both the Hounslow South ward (medium sensitivity) and the Isleworth ward (high sensitivity). However, from a health perspective, very few people in the population would be affected and the severity of health outcome would predominantly relate to a minor change in quality of life. On this basis the magnitude of impact on health is negligible. For the general population the health effect is judged to be negligible (not significant) as there is likely to be a very limited change to the health baseline. The relationship between changes in visual amenity and health outcomes in a population is not supported by a strong body of evidence. No specific groups vulnerable to this impact have been identified at this stage.

## Air quality

- 16.8.9 There is potential for air quality impacts from construction plant (non-road mobile machinery, generator and combustion plant emissions). These impacts are yet to be modelled and assessed (see Chapter 13: Air Quality). Potential impacts of dust have been determined to be negligible with standard mitigation in place, and the air quality assessment has also identified a negligible risk of odour exposure or effect based on the findings of a ground investigation at the former landfill site at Mogden STW.
- 16.8.10 The potential impacts from construction plant (non-road mobile machinery, generator and combustion plant emissions) will be assessed further in relation to population health for the Environmental Statement once modelling is available from the air quality assessment. Therefore, at this stage the health effect is uncertain but with controls in place the effect is unlikely to be significant.

## Noise and vibration

16.8.11 Chapter 14: Noise and Vibration has predicted significant adverse day-time noise effects during embankment piling and foundation piling works in the Eastern Work Area. The closest residents to these works would be in Bankside Close, Hillary Drive, Trevor Close and Beaumont Place (Isleworth ward) although other residents in the area also have the potential to be affected. Top soil removal for the compound areas in both the Western Work Area and Eastern Work Area is predicted to create day-time noise at a level between the lowest observable adverse effects level LOAEL and the significant observable adverse effects level (SOAEL) but has not been determined likely to be a significant effect for the reasons set out in Section 14.8 of Chapter 14: Noise and Vibration, which relate to the nature and short duration of noise expected. Night-time noise from operation of the TBM in the Western Work Area is predicted to be on the threshold of the SOAEL for night-time noise as set out in Section 14.7 of Chapter 14: Noise and Vibration. The nearest residents to these effects would be on Wainwright Grove and Harvesters Close (Hounslow South ward).

- 16.8.12 The population most affected would include nearby residents in both the Hounslow South ward (medium sensitivity) and the Isleworth ward (high sensitivity). It is currently assumed that exposure to noise effects would be of medium scale and frequent over the three-year construction period. The severity of health outcomes most likely would relate to a potentially major change in quality of life due to some sleep disturbance and annoyance for more sensitive individuals. On this basis, the magnitude of health effect is medium adverse. There is a clear scientific relationship between night-time noise and sleep disturbance, which would predominantly affect some residents in Hounslow South. A small change in health baseline is anticipated here. Annoyance impacts during the day linked to noise could be widespread and cause a small change in health baseline for the Isleworth population. On this basis, the significance of health effect to the general population is judged to be moderate adverse (significant).
- 16.8.13 Vulnerable groups to this impact could include shift workers and people with some mental health conditions as well as some with autism spectrum disorder.

## Water quality

- 16.8.14 It is anticipated that two pairs of existing storm tanks would be decommissioned during the construction of the TTP and recommissioned on completion of the works. Decommissioning of storm tanks could potentially reduce the resilience of the existing Mogden STW to major storm events during the construction phase. However, the work would be carried out while maintaining the required volume under the Environmental Permit within the storm tank provision, within only one storm tank removed from operation at a time. As described in Section 2.5 of Chapter 2: Project Description, the current Mogden STW permit requires seven storm tanks out of the eight total storm tanks to be in operation to meet permit storm storage within the Mogden STW site. Use of the storm tanks to construct the TTP will be conducted in accordance with this permit.
- 16.8.15 On the basis that the storm tank provision will be maintained within permit requirements, it is considered that any impact on water quality from the outfall to Isleworth Ait would relate to occasional storm events. This would represent very little change in water quality from the baseline since only one storm tank would be unavailable and effects would be reversible once the storm is over. Very low exposure to any change in water quality is expected from such low frequency events. On this basis the magnitude is assessed as negligible adverse. The significance of health effect is assessed as negligible adverse (not significant). It is not considered likely that the temporary removal of one storm tank at a time would have an important impact on health priorities relating to water quality.

#### Ham Street Car Park and Playing Fields

16.8.16 The preliminary human health assessment (see Table A.3 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on

several of the wider determinants of health with the potential to affect population health:

- a. Physical activity
- b. Open space, leisure and play
- c. Attractiveness of area and quality of natural environment
- d. Social participation, interaction and support
- e. Community safety
- f. Community identity, culture, resilience and influence
- g. Air quality
- h. Noise and vibration
- 16.8.17 The populations most likely to be affected are those living in the residential areas in the Ham and Petersham ward (medium sensitivity), which directly border the Ham Lands area.
- 16.8.18 It is anticipated that the geographic catchment of users of Ham Playing Fields and the Ham Street Car Park may extend beyond Ham and Petersham ward and the forthcoming results of the recreational surveys will support improved understanding of the affected populations for the assessment presented in the Environmental Statement.

## Physical activity

- 16.8.19 Land take from Ham Playing Fields has potential to affect physical activity for regular users. There are a number of convenient alternative locations to Ham Playing Fields for dog walking and informal recreational facilities in the near vicinity, including King George's Field, Ham Riverside Meadow, Petersham Meadow and Ham Common. The Thames Path within the draft Order limits would generally remain accessible throughout construction, and the footpath that bisects the above ground site within Ham Playing Fields would remain open. It is not considered likely that the adjacent construction activities would deter the use of these routes. Temporary land take from the area of open space surrounding Richmond Drive Play Area for the purposes of temporary compensatory parking is not anticipated to have any notable effects on physical activity levels given the small area affected lies directly adjacent to the road and is therefore likely little used for informal recreational activities.
- 16.8.20 It is expected that only a small population would experience a reduction in physical activity levels as result of this component of the Project given the short-term duration of the impact (up to 27 months) and availability of alternative facilities locally. The magnitude of impact is assessed as low adverse and significance of effect on health is assessed as minor adverse (not significant).

## Open space, leisure and play

As described above under 'Physical activity', land take from Ham Playing Fields 16.8.21 and the reduction in amenity associated with noise, dust and views of construction activities within Ham Playing Fields, RBK footpath 134 and the Thames Path have potential to deter a small minority of the population from using these facilities. However, there are a number of comparable alternative areas of open space available locally that provide opportunities for informal recreation. Temporary land take from the area of open space surrounding Richmond Drive Play Area is not considered to affect access to open space, leisure or play given that the small area affected lies directly adjacent to the road and is therefore likely little used for informal recreational activities. For these reasons, is anticipated that only a very small proportion of the population would be deterred from accessing these facilities. The magnitude of effect is assessed as low adverse given that the duration of the effect on this very small population would be short term (up to 27 months) and limited to a minor change in quality of life. A very limited impact on health outcomes associated with access to open space is anticipated and the significance of effect is assessed as minor adverse (not significant).

## Attractiveness of area and quality of natural environment

- 16.8.22 Noise and dust generated by construction of the Intermediate Shaft, along with the visibility of hoarding around the construction compound and tall construction machinery or stockpile areas would have an adverse impact on the amenity of the areas of Ham Playing Fields that fall outside the draft Order limits for the Project. The laydown area adjacent to Ham Street Car Park would also be visible from the Thames Path, although users of this route would experience this effect on a transient basis. Even regular users of Ham Playing Fields would only be exposed to this impact for a maximum of an hour or two at each visit. Car parking within the area of temporary land take within the open space surrounding Richmond Drive Play Area would have limited impact on the amenity of the area given that under baseline conditions the adjacent road is typically lined with parked cars.
- 16.8.23 Given the availability of alternative facilities for informal recreation available locally (see Physical activity) and short-term nature of these impacts (maximum of 27 months), the magnitude of this impact is assessed as negligible and the significance of effect as negligible (not significant).

## Social participation, interaction and support

16.8.24 Ham Playing Fields and the open space surrounding Richmond Drive Play Area facilitates incidental social interactions through informal recreational activities. Neither facility is currently known to support organised group activities. There is good availability of comparable facilities locally and a very limited population is anticipated to be dissuaded from using these facilities during the construction period considering the reduction in amenity and reduced ease of access. Therefore, only a minor change in quality of life for a very small population is anticipated, and the magnitude of impact is assessed as negligible and the significance of effect as negligible (not significant).

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## Community safety

- 16.8.25 Construction sites, traffic and activities would be planned and managed to ensure community safety. This includes provision of a temporary pedestrian crossing point to Ham Playing Fields as well as allowance in the draft Order limits to allow for safe movement of HGVs along Riverside Drive through the provision of temporary compensatory residential parking. However, there is potential for the site compound and fencing to create areas where there is a lack of visibility, which may increase risks of antisocial behaviour or other safety risks.
- 16.8.26 Further information on the baseline community safety conditions and construction management and security proposals are required to develop this assessment further. At this stage of assessment, the health effect is assessed as uncertain but is unlikely to be significant in terms of population health due to the localised nature of areas of construction works.

#### Air quality

- 16.8.27 Chapter 13: Air Quality has identified a high risk of dust from earthworks, construction and trackout. However, with the implementation of measures recommended in Section 13.10 of Chapter 13: Air Quality and Appendix 13.3, the residual impact would be negligible.
- 16.8.28 There is potential for air quality impacts from construction plant (non-road mobile machinery, generator and combustion plant emissions). The potential impacts from construction plant (non-road mobile machinery, generator and combustion plant emissions) will be assessed further in relation to population health for the Environmental Statement once modelling is available from the air quality assessment.
- 16.8.29 Air pollution causes changes to health outcomes. In the absence of air quality assessment results, the magnitude of impact cannot yet be determined with any confidence. Therefore, at this stage the health effect is uncertain.

#### Noise and vibration

16.8.30 Chapter 14: Noise and Vibration identifies that noise levels would exceed the LOAEL whilst topsoil stripping is underway at Ham Playing Fields. This is not considered a significant effect in the noise assessment given the short duration over which it would occur. Even regular users of Ham Playing Fields and the surrounding recreational facilities are likely only to experience these noise levels on a very limited number of occasions and for a very short period of time (likely a couple of hours maximum) and therefore the magnitude of impact is assessed as negligible. The sensitivity of Ham, Petersham and Richmond ward is medium, and therefore the significance of effect is assessed as negligible (not significant) for the general population of Ham, Petersham and Richmond Riverside ward (medium sensitivity) and for potentially vulnerable groups identified (children and people with mental health conditions).

## Burnell Avenue site

- 16.8.31 The preliminary human health assessment (see Table A.5 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on several of the wider determinants of health with the potential to affect population health:
  - a. Physical activity
  - b. Open space, leisure and play
  - c. Attractiveness of area and quality of the natural environment
  - d. Social participation, interaction and support
  - e. Community safety
  - f. Community identity, culture, resilience and influence
  - g. Climate change mitigation and support
  - h. Air quality
  - i. Noise and vibration
  - j. Water quality
  - k. Light pollution
- 16.8.32 The populations most likely to be affected by these impacts would be those in nearby residential areas in Tudor ward (medium sensitivity), Hampton Wick and South Teddington (medium sensitivity), and Ham, Petersham and Richmond Riverside ward (medium sensitivity).

## Physical activity

- 16.8.33 The diversion of the Thames Path and NCN Route 4 during the construction works has the potential to affect physical activity, particularly for those who use the route for active travel on a frequent basis. Since the length and route of diversion was yet to be determined at the time of this assessment, it is uncertain as to how likely the Project would affect physical activity. It is likely that pedestrians would be more sensitive to the impacts than cyclists, who would pass through a diverted route relatively quickly.
- 16.8.34 A further pathway to impacts on physical activity would be in the event that there is disruption or loss of amenity of the Kingston parkrun to the extent that people are dissuaded from undertaking the parkrun. There are other parkruns in the area.
- 16.8.35 Restricted access to Burnell Avenue Open Space may also affect physical activity levels, for example if children are not able to independently access the nearby alternative locations for informal recreation.
- 16.8.36 These impacts are most likely to affect the populations of the following wards: Tudor; Canbury Gardens; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity). The Project is expected to affect a small minority of the population over the short term. By using diverted routes, most people who use the Thames Path or NCN Route 4 would still be able to

undertake active travel or pursue the recreational route, therefore maintaining physical activity levels. A small minority may be discouraged from the area to the degree that they reduce their physical activity levels, and this has the potential for a minor change in morbidity or moderate change in quality of life. On this basis the magnitude of health impact is judged to be low adverse.

- 16.8.37 It is only suggestive that there may be changes to physical activity levels resulting from impacts on Burnell Avenue Open Space and the diverted Thames Path and NCN Route 4. Since the impact of the Project is short term, it is considered that changes would have a marginal effect on encouraging and promoting physical activity as an important public health intervention. The significance of health effect for the general population is therefore judged to be minor adverse (not significant).
- 16.8.38 A key vulnerable group may be children aged 8 to 13 as this is an age where parents typically permit their children more licence to play or travel independently, but where less than half achieve recommended levels of physical activity (Jago *et al.*, 2009; Schoeppe *et al.*, 2014; OHID, 2022). If parents discourage their children from exercising in the Burnell Avenue site neighbourhood due to concerns over construction impacts, there is a risk that these children will not have alternative opportunities to gain their recommended levels of physical activity.

## Open space, leisure and play

- 16.8.39 During construction, a large proportion of the Burnell Avenue Open Space would be closed to the public to allow space for construction activities, site compound and storage. This would reduce the area of open space available for recreation and play. Areas of green space in adjacent areas such as Ham Lands and Burnell Playing Fields would remain accessible as alternative areas for informal recreation and play. Informal access to the stretch of the River Thames at the Burnell Avenue site would also be restricted, which may limit some water sports and angling (see Chapter 15 Socioeconomics, Community, Access and Recreation for further information on impacts on recreation).
- 16.8.40 These impacts are most likely to affect the populations of the following wards: Tudor; Canbury Gardens; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity). The impact is expected to relate to a moderate change in quality of life for those who use this area of open space and access to the river, most. However, there are alternative areas of open space and recreational sites locally, as well as alternative access points to the river (some of which are formal access points). On this basis it is considered only a small minority of the population would have their opportunities to access open space, leisure and play restricted by the short-term construction and therefore it is judged that the magnitude of impact would be low adverse.
- 16.8.41 It is only suggestive that there may be reductions in people being able to access open space, leisure and play as a result of impacts on Burnell Avenue Open Space and access to the River Thames. Since the construction activity is short term, it is considered that changes would have a marginal effect on health

benefits associated with open space, leisure and play. The significance of health effect for the general population is therefore judged to be minor adverse (not significant).

16.8.42 Any recreational and sporting groups that use the space would be most affected. The forthcoming results of the recreational surveys will inform the assessment for the Environmental Statement. Children may be more vulnerable to the short-term loss of open space as they may not have the permission or independence to access alternative sites for play, particularly as the alternative sites have more tree cover and shading which makes them more difficult for parents to supervise. However, the majority of houses on Burnell Avenue have gardens, meaning most children would still have access to the outdoors.

#### Attractiveness of area and quality of the natural environment

- 16.8.43 The presence of hoarding and safety fencing, together with construction compounds, welfare facilities, earthworks and stockpiles, construction plant, lighting and vegetation removal would detract from the attractiveness of the green space and riverside environment in this location.
- 16.8.44 These impacts are most likely to affect the populations of the following wards: Hampton Wick and South Teddington; Tudor; Canbury Gardens; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity). The construction activity is expected to affect a large minority of the population within these wards, particularly those whose houses face the areas of works, and those for whom the Burnell Avenue Open Space is the nearest area of green space. Given the length of the construction period and time for vegetation to re-establish, this is expected to be a medium-term impact. The health effect would predominantly relate to a moderate change in quality of life and on this basis the magnitude of impact is predicted to be medium adverse.
- 16.8.45 The significance is judged to be moderate adverse (significant). The change to the attractiveness of the green space and riverbank would be highly noticeable to local residents who are likely to be concerned about the Project. This would likely exacerbate psychosocial stress among those most sensitive to the Project. Residents with riverside views are likely to be most sensitive.

## Social participation and support

- 16.8.46 The loss of access to much of the Burnell Avenue Open Space is likely to affect social interaction, particularly during times of good weather and in the event that organised events are unable to go ahead. While there are other locations where people can gather and interact, the Burnell Avenue Open Space is the most geographically convenient location for the neighbourhood between Dukes Avenue, Dysart Avenue and Burnell Avenue.
- 16.8.47 These impacts are most likely to affect the populations of the following wards: Tudor; and Ham, Petersham and Richmond Riverside (both judged to be medium sensitivity). This impact is likely to affect a small minority of the population as there are other areas of public space in the neighbourhoods where people can interact. The severity of health impact would relate to a

moderate change in quality of life in the short term for those affected and therefore a low adverse magnitude of impact is predicted.

- 16.8.48 The significance is judged to be minor adverse (not significant). Restricting access to this area of public space is considered likely to cause only a slight change in health outcomes relating to social participation, interaction and support on the basis that there are other opportunities in the local area.
- 16.8.49 Vulnerable groups would be as for the 'open space, leisure and play' determinant. In particular it is likely to be an important location for children to socially interact.

## Community safety

16.8.50 Construction sites and activities would be planned and managed to ensure community safety. However, the creation of diversion routes and the potential for the site compound and fencing to create areas where there is a lack of visibility, may increase risks of antisocial behaviour or other safety risks. Further information on the baseline community safety conditions and construction activity are required to develop this assessment further. This will be reported in the forthcoming Environmental Statement. Therefore, at this stage the health effect is uncertain but it is unlikely to be a significant population health effect due to the localised nature of the construction works.

#### Climate change mitigation and support

- 16.8.51 Green and blue space is important in mitigating some health effects of climate change such as providing cooling microclimates during heatwaves. However, there are several areas of alternative green space and river access nearby. On this basis, construction at the Burnell Avenue site is expected to have a very limited impact on this health determinant.
- 16.8.52 Any impacts that do occur are most likely to affect the populations of the following wards: Tudor; and Ham, Petersham and Richmond Riverside (both judged to be medium sensitivity). The impact would be short term and restricted to occasional events, such as if a heatwave occurred during the construction period. In such an event, only a small minority of the population is likely to be affected as there are alternative areas where people can benefit from climate change mitigating factors of green and blue space. Furthermore, most houses in the area benefit from gardens which can also help mitigate health effects during heatwaves. Therefore, a low adverse magnitude of health impact is predicted.
- 16.8.53 The change due to the Project is expected to have a marginal effect on the use of green and blue space to help mitigate health effects of climate change. Therefore, the significance of population health effect is judged to be minor adverse (not significant).
- 16.8.54 Vulnerable groups would include those who depend on public spaces for access to green and blue space, which may include residents of flats on Beaufort Road and Beaufort Court who do not benefit from gardens. However,

for these residents, green space at Ham Lands is closer and would not be affected by the Project.

## Air quality

- 16.8.55 Chapter 13: Air Quality has identified a high risk of dust from earthworks, construction and trackout. However, with the implementation of measures recommended in Section 13.10 of Chapter 13: Air Quality and Appendix 13.3, the residual impact would be negligible.
- 16.8.56 There is potential for air quality impacts from construction plant (non-road mobile machinery, generator and combustion plant emissions). The potential impacts from construction plant will be assessed further in relation to population health for the Environmental Statement once modelling is available from the air quality assessment.
- 16.8.57 Air pollution causes a number of health outcomes, therefore it has potential to relate to a change in morbidity. However, in the absence of air quality assessment results, the level of health impact magnitude cannot yet be determined with any confidence. Therefore, at this stage the health effect is uncertain.

#### Noise and vibration

- 16.8.58 Chapter 14: Noise and Vibration has predicted significant adverse effects due to noise at the Burnell Avenue Site for some of the closest residential properties (see Section 14.10 for further details). The impacts would relate to daytime noise from potential piling to construct the cofferdams for the intake and outfall. Chapter 14 predicts that noise impacts at other receptor locations would not be significant after consideration of the various factors set out in the noise assessment methodology.
- 16.8.59 These impacts are most likely to affect the populations of the following wards: Hampton Wick and South Teddington; Tudor; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity). It is currently assumed that a small minority of the local population would be exposed to these significant levels of daytime construction noise for a period of up to 15 months. This is on the assumption that impacts would affect the closest properties and that many residents would be away from their homes during the day. The severity of health outcomes most likely would relate to a moderate change in quality of life due to annoyance. Therefore, a low adverse magnitude of health impact is predicted.
- 16.8.60 Occasional and short-term exposure to construction noise is relatively typical of living in urban environments and it is considered that changes from the Project would have a slight effect on the health baseline of the population due to localised annoyance. Therefore, the significance of population health effect is judged to be minor adverse (not significant).
- 16.8.61 Vulnerable groups to this impact could include shift workers and people with some mental health conditions as well as some with autism spectrum disorder.

## Water quality

- 16.8.62 Chapter 5: Water Resources and Flood Risk sets out that construction of the outfall and intake could require use of cofferdams. Using standard good practice (tertiary), 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 Thames and would not have an impact on water quality. Risks of mobilisation of contaminants or leaks and spills from the construction site would also be controlled through standard mitigation as set out in Chapter 5. However, the visibility of the works in an area well frequented by the public may lead to a degree of public concern around water quality, particularly where some sediment disturbance would likely occur during installation and subsequent removal of the cofferdams.
- 16.8.63 These impacts are most likely to affect the populations of the following wards: Hampton Wick and South Teddington; Tudor; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity) as well as South Twickenham (low sensitivity). It is currently assumed that construction impacts on water quality of the River Thames would be transient to very short-term in nature, relating to occasional events during the construction period. A small minority of the population would be affected. Health impacts would most likely relate to a psychosocial response to the visual appearance of any sediment that has been stirred up. Therefore, the magnitude of health impact is judged to be low adverse.
- 16.8.64 Changes due to the Project construction are likely to have a marginal effect on recreational water quality. Therefore, the significance of health effect is judged to be minor adverse (not significant).
- 16.8.65 Users of the recreational water environment including swimmers, anglers, water sports groups and residents of houseboats or houses on the waterfront, are likely to be most sensitive to this impact.

## Light pollution

- 16.8.66 Task and security lighting has the potential to affect 'attractiveness of area & quality of natural environment' as described above. In terms of light pollution, the standard mitigation (commitment (PCR 39)) would reduce light spill as far as practicable. However, given the limited lighting present on the play space, there is potential for residents and people using routes around the site after dark, to experience obtrusive light.
- 16.8.67 The impacts are most likely to affect people in the Ham, Petersham and Richmond Riverside ward (medium sensitivity). It is assumed that a small minority of the local population has the potential to be affected by any residual light pollution, which would be highly localised. The severity of health outcomes would relate to a minor change in quality of life and the effect would be immediately reversed on completion of construction activities and on this basis a negligible magnitude of impact is predicted.

16.8.68 The localised and temporary lighting in this area is not likely to affect public health priorities and there is little scientific basis for any notable population health effects. On this basis the significance of effect to population health is judged to be negligible (not significant).

## Tudor Drive (Thames Lee Tunnel (TLT) connection)

### Description of impacts

- 16.8.69 The preliminary human health assessment (see Table A.7 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on the following wider determinants of health with the potential to affect population health:
  - a. Physical activity
  - b. Open space, leisure and play
  - c. Attractiveness of area and quality of built environment
  - d. Air quality
- 16.8.70 The populations most likely to be affected by these impacts would be those in nearby residential areas in Kingston (Tudor ward (medium sensitivity), Ham, Petersham and Richmond ward (medium sensitivity) and Canbury Gardens ward (medium sensitivity)).

#### Physical activity

- 16.8.71 It is anticipated that there would be short-term loss of access to the pocket park on the Richmond Road Tudor Drive junction for a period of up to fifteen months whilst the TLT Connection is constructed.
- 16.8.72 The size and nature of this facility means it does not offer meaningful opportunities for physical activity on site, although it may indirectly facilitate active travel journeys by providing an opportunity for respite during journeys between residential areas and community facilities on Richmond Road. Alternative seating is available at the pocket park directly opposite on the northern side of Tudor Drive.
- 16.8.73 The duration over which the pocket park must be closed to facilitate construction is not yet confirmed, but is not currently anticipated to exceed 15 months. The magnitude of impact is assessed as negligible, and significance of effect would be negligible (not significant) for nearby residents from all three wards.

#### Open space, leisure and play

16.8.74 It is anticipated that there would be short term loss of access to Richmond Road Pocket Park for a period of up to fifteen months whilst the TLT Connection is constructed. The duration of impact is short term and is only likely to lead to a very minor change in quality of life for a small population. There is another pocket park located on the northern side of Tudor Drive which provides alternative facilities.

16.8.75 A very limited change to baseline health is anticipated and therefore the magnitude of impact would be negligible and significance of effect negligible (not significant) for all three wards.

## Attractiveness of area and quality of built environment

- 16.8.76 Construction works within Richmond Road Pocket Park would be visible and audible for walkers and cyclists using Tudor Drive and Richmond Road, and for people living, working or accessing community facilities in the immediate vicinity of these routes. However, in the context of a busy urban environment, these are considered unlikely to be particularly noticeable.
- 16.8.77 The duration of impact is short term and would only result, at worst, in minor change of quality of life for a very small number of people. It is anticipated that the magnitude of impact would be negligible, and significance of effect would be negligible (not significant).

## Air quality

- 16.8.78 Chapter 13: Air Quality has identified a high risk of dust from construction of the TLT Connection. However, with the implementation of measures recommended in Section 13.10 of Chapter 13: Air Quality and Appendix 13.3 Odour Risk Assessment Methodology, the residual impact would be negligible.
- 16.8.79 There is potential for air quality impacts from construction plant (non-road mobile machinery, generator and combustion plant emissions). The potential impacts from construction plant will be assessed further in relation to population health for the Environmental Statement once modelling is available from the air quality assessment.
- 16.8.80 Air pollution causes a number of health outcomes, therefore it has potential to relate to a change in morbidity. However, in the absence of air quality assessment results, the magnitude of impact cannot yet be determined with any confidence. Therefore, at this stage the health effect is uncertain.

## **HGV** routes

- 16.8.81 The preliminary human health assessment (see Table A.9 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on the following wider determinants of health with the potential to affect population health:
  - a. Physical activity
  - b. Attractiveness of area and quality of natural environment
  - c. Community safety
  - d. Air quality
  - e. Transport modes, access and connections

16.8.82 No likely significant effects on health from noise from construction traffic are anticipated based on information which is currently only available for A-roads (see Chapter 14: Noise and Vibration) on the basis that construction traffic would make up less than 1% of the traffic volumes on these A-roads. The potential impact of noise will be considered further in the Environmental Statement where data for non A-roads should be available.

### Physical activity

- 16.8.83 Fear and intimidation about traffic conditions is a key dissuasion for many people from participating in active travel, and cycling in particular. Therefore, increases in HGV traffic on the routes to/from construction sites have the potential to increase fear and intimidation of traffic, reducing uptake in active travel and consequently levels of physical activity. However the changes to total volumes of traffic are estimated to be less than 30% on all affected routes and Chapter 12: Traffic and Transport predicts effects on fear and intimidation on the worst-affected routes to be up to minor magnitude.
- 16.8.84 It is not considered likely that the changes to volumes of additional HGV and other roads and crossing points along routes to the north of the River Thames would be noticeable to the extent that it would alter levels of active travel. The wards that would be affected north of the River Thames would be Isleworth (High population sensitivity) and St Margarets and North Twickenham (Low population sensitivity).
- 16.8.85 The most noticeable change in HGV traffic would likely be Riverside Drive, between Croft Way and Dukes Avenue (Ham, Petersham & Richmond Riverside ward – Medium sensitivity) since these routes currently have very little HGV traffic so the construction HGVs would represent a large change from the baseline. However, the numbers of HGV movements per day (maximum of 42 on part of Dukes Avenue) would make up a small proportion of the total traffic volume (up to 5%). Given that there are streets and alternative routes that would not be affected, it is not likely that the construction traffic would cause a noticeable change in active travel among the population.
- 16.8.86 On the above basis it is predicted that the magnitude of change to physical activity levels would be low adverse. Active travel is one form of physical activity and the impact from construction traffic is likely to have a marginal effect on public health priorities to increase physical activity levels in the general population. Therefore the significance of population health effect is minor adverse (not significant).
- 16.8.87 Women, children, the elderly and people with disabilities are likely to be more sensitive to this effect.

## Attractiveness of area and quality of natural environment

- 16.8.88 Chapter 12: Traffic and Transport provides an assessment of amenity for pedestrians and cyclists (using the term non-motorised user (NMU)) for these groups). For most of the HGV routes, amenity impacts are predicted to be minor or negligible due to the very small level of change in traffic volumes. It identifies that the greatest impact on amenity would be for the Thames Path National Trail where the diversion would interact with a construction traffic route and an increase in traffic flows of 60% or more would be encountered. There would also be significant changes in amenity due to traffic in the Ham Street area where there are interactions with public rights of way, King George's Fields and Ham House and Garden (refer to Chapter 15: Socioeconomics, Community, Access and Recreation for further information on effects on amenity for communities and access).
- 16.8.89 These impacts would affect people walking the Thames Path National Trail and residents of Ham, Petersham & Richmond Riverside ward (medium sensitivity). Since the actual vehicle numbers are relatively low (see Table 12.37 in Chapter 12: Traffic and Transport), people walking or cycling along the affected routes would likely encounter one or two vehicles and this would likely represent occasional annoyance for very few people in the context of their use of the routes. On this basis the magnitude of population health effect is negligible adverse. These traffic-related amenity impacts would combine with other construction activities in the Burnell Avenue area. On this basis, the significance of population health effect is minor adverse (not significant) for the worst-affected HGV routes.

## Community safety

- 16.8.90 Some routes have a baseline history of collisions and/or where there are locations where vulnerable groups are more likely to be located, such as schools, doctor's surgeries, playing fields, etc. The routes where safety is predicted to be most affected are identified as having a slight adverse effect as set out in Table 12.42 in Chapter 12: Traffic and Transport.
- 16.8.91 The magnitude of population health effect has been judged to be medium adverse because although traffic collisions can result in mortality or serious injury, the changes to traffic volumes would be low and relate only to the duration of the construction phase, affecting very few people in the population.
- 16.8.92 The significance of population health affect attributed to construction traffic from the Project is judged to be minor adverse (not significant). This reflects that road safety is a matter of importance to community safety and is a public health priority.

## Air quality

16.8.93 The modelling of construction traffic emissions is yet to be undertaken (see Chapter 13: Air Quality). The results of the air quality modelling will be addressed in the forthcoming Environmental Statement, which will allow for the human health assessment. Therefore, at this time, the impact of construction traffic emissions on human health from HGV routes is uncertain.

## Transport modes, access and connections

- 16.8.94 Section 8 of Chapter 12: Traffic and Transport identifies potential mitigation for construction traffic including car sharing for construction sites as well as multimodal journeys, for example by a combination of rail and cycling. The assessment shows that cycling can be a faster way for workers to access train stations than using a shuttlebus. It states that it is expected that the development will provide cycle parking to facilitate an agreed modal share target for pedal cyclists and that this target would be set out in the construction workforce travel plan (CWTP). The Traffic and Transport assessment estimates that the above measures would likely reduce workforce commuting trips by 50%. However, because the Traffic and Transport assessment predicts that the impact of workforce commuting trips on the A-roads is negligible, the health effect of these construction transport modes is not likely to be significant for the general population as construction traffic is not likely to discernibly affect the availability or quality of transport modes. However, the measures are likely to be beneficial for construction workers as a sub-group of the population by providing choice and information on how construction workers can access the sites via a variety of modes, including active travel. Construction workers have been provisionally assigned a high sensitivity as a population on the basis they are associated with poor mental health (Liversedge, 2023). The sensitivity of construction workers and other sub-populations will be reviewed and developed for the Environmental Statement.
- 16.8.95 The magnitude of health impacts is judged to be low beneficial as the measures would be small scale, relate to minor changes in quality of life and affect relatively few people (construction workers on the Project). On this basis the significance of effect is minor beneficial (not significant). The CWTP measures align with public health priorities to promote sustainable modes of transport, but the scale of the predicted impact is not likely to significantly affect population health.

## Project-wide effects

- 16.8.96 The preliminary human health assessment (see Table A.11 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on the following wider determinants of health with the potential to affect population health:
  - a. Education and training
  - b. Employment and income
- 16.8.97 Construction-related project-wide effects have potential to affect populations throughout the Local Authorities Study Area, which comprises the populations of LBH (medium sensitivity), RBK (very low sensitivity) and LRB (very low sensitivity).

## Education and training

- 16.8.98 Thames Water is looking at opportunities to use construction of the Project to support skills and educational attainment locally, and intends to identify local educational facilities and resources as part of a Wider Benefits and Legacy Framework, which will also be developed. Further details are provided in Chapter 15: Socioeconomics, Community, Access and Recreation.
- 16.8.99 It is expected that this determinant would be assessed in relation to impacts on the Local Authorities Study Area population. However, there is currently insufficient detail regarding the nature and extent of the Project to support an assessment of effects on population health. This will be assessed in the Environmental Statement once further information is available. Therefore, at this stage the health effect is uncertain.

#### Employment and income

- 16.8.100 Chapter 15: Socioeconomics, Community, Access and Recreation assesses that construction of the Project is not likely to have significant effect on employment opportunities within the Greater London Area due to the low number of roles created and the low workforce demand for those roles relative to the population. For these reasons it is expected that most roles are likely to be filled through redistribution of existing jobs within the local economy.
- 16.8.101 The human health assessment has assessed this impact in relation to the Local Authorities Study Area population. It is expected that a limited population from each of the LBR, RBK and LRH local authorities would benefit from new employment opportunities as a result of construction of the Project, and those roles which are created would likely be short term in duration. On this basis the magnitude of the beneficial health impact is predicted to be negligible positive.
- 16.8.102 Since few people would benefit from employment opportunities, no noticeable change in the baseline status of health outcomes associated with this determinant is anticipated. Therefore, the significance of health effect is judged to be negligible (not significant).

## **Operation phase**

16.8.103 This section sets out the likely significant effects on human health during operation. The assessment assumes that embedded design (primary) mitigation and standard good practice (tertiary) measures are in place, and the results of the assessment then inform the need for any additional (secondary) mitigation requirements during operation. There is no assessment for HGV routes for the operation phase on the basis that the HGV routes relate to the construction phase only.

## Mogden STW

16.8.104 The preliminary human health assessment (see Table A.2 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified operational

impacts on the following wider determinant of health with the potential to affect population health:

a. Noise and vibration

#### Noise and vibration

- 16.8.105 The assessment in Chapter 14: Noise and Vibration for the operation of the TTP was not available at the time of undertaking the human health assessment. However, it is expected that in the event that operation of the TTP is likely to generate noise over baseline noise levels, then embedded design (primary) mitigation would be possible through appropriate noise insulation of the TTP and specification of plant components. It is judged likely that this would have a low exposure on the population and constitute a minor change in quality of life, given the context of an urban area with surrounding traffic noise.
- 16.8.106 The population most likely to be affected would be nearby residents in Isleworth (high sensitivity) but the magnitude of impact due to low exposure and urban context is predicted to be negligible. The significance of health effect is determined to be minor adverse (not significant) as it is considered unlikely that noise would be of a level associated with any scientific evidence for significant changes to health outcomes to a local community population. Evidence will be further reviewed for the Environmental Statement while also taking account information from the noise and vibration assessment once available.

### Ham Playing Fields

16.8.107 No impacts on wider determinants of health with the potential to affect population health have been identified for this component of the Project in isolation (see Table A.4 in Appendix 16.3 Preliminary Human Health Assessment Tables). Project-wide effects are discussed below.

#### **Burnell Avenue site**

- 16.8.108 The preliminary human health assessment (see Table A.6 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified impacts on several wider determinants of health with the potential to affect population health:
  - a. Open space, leisure and play
  - b. Attractiveness of area and quality of the natural environment
  - c. Social participation and support
  - d. Community identity, culture, resilience and influence
  - e. Water quality

## Open space, leisure and play

16.8.109 During operation, the Burnell Avenue Open Space is likely to be used in the same way as the baseline as shafts would be covered by topsoil and the play space would be restored. However, intake and outfall structures would create

visual and physical impediments to accessing the river, including a loss of usable edge in the river at the intake structure. Furthermore, there is potential to affect the desire to access areas of green and blue space close to the proposed discharge point.

- 16.8.110 These impacts are most likely to affect the populations of the following wards: Hampton Wick and South Teddington; Tudor; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity). The intake and outfall structures would not affect any known formal recreational entry or exit points to the river and on this basis would be expected to affect very few participants in water-based recreation. However, the effect of the discharge on discouraging river-based recreation activity is more uncertain. The findings of the recreational surveys may help inform a better understanding of public perception towards the Project. An assessment will be prepared to inform the Environmental Statement. Therefore, at this stage the health effect is uncertain.
- 16.8.111 Users of the recreational water environment including swimmers, anglers and water sports groups are likely to be those who are most affected by changes.

#### Attractiveness of area and quality of the natural environment

- 16.8.112 The proposed intake and outfall structures would introduce artificial elements to locations where the riverbank is currently relatively natural in appearance. However, the impacts would be very localised.
- 16.8.113 These impacts are most likely to affect the populations of the following wards: Hampton Wick and South Teddington; Tudor; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity). The very localised nature of the impact on the attractiveness of the area is judged likely to affect very few people and would relate to a minor change in quality of life. Therefore, the magnitude of impact is judged to be negligible. This effect is not considered significant to public health. This is on the basis that there would be very limited change to the health baseline of the population. Therefore, the significance of effect is judged to be negligible (not significant).
- 16.8.114 Visitors and members of the Lensbury Hotel and Watersports Centre may be more sensitive than the general population to the visual appearance.

## Social participation, interaction and support

- 16.8.115 There is no likely significant effect on social participation, interaction and support for the Burnell Avenue Open Space during operation. For example, the Kingston Parkrun would be expected to continue as in the baseline. However, in the event that people are discouraged from water-based activities close to the discharge point there may be a reduction in social participation for specific users.
- 16.8.116 These impacts are most likely to affect the populations of the following wards: Hampton Wick and South Teddington; Tudor; and Ham, Petersham and Richmond Riverside (all judged to be medium sensitivity).

- 16.8.117 Even assuming a worst-case scenario whereby some groups stop using the locality for water-based activities, this would have a very small scale effect on the health determinant compared with other opportunities people have for social participation, interaction and support. A small minority of the population may be affected with up to a moderate change in quality of life. On this basis a low adverse magnitude of health impact is predicted.
- 16.8.118 This effect is not considered significant to public health. This is on the basis that there would be very limited change to the health baseline of the population. Therefore the significance of population health effect is judged to be minor adverse (not significant).
- 16.8.119 Users of the recreational water environment including swimmers, anglers, and water sports groups are likely to be most sensitive.

#### Community identity, culture, resilience and influence

16.8.120 The EIA Scoping Report identified that the Project has the potential to have an ongoing influence on civic pride and perceptions of the environmental quality of the River Thames. Further information is required to inform the human health assessment. An assessment will be prepared to inform the Environmental Statement. Therefore, at this stage the health effect is uncertain.

#### Water quality

- 16.8.121 LBR has raised the issue that the treated effluent discharge would result in increased concentrations of certain chemicals and microbial hazards that may have direct health impacts on river users. The Environment Agency's National Permitting Service is developing a list of emerging chemicals that are currently without EQS for risk assessment. This list is not yet available. The Environment Agency has not yet confirmed which physical and chemical conditions will be permitted for the proposed new outfall but it is unlikely to include conditions relating to Bathing Water Quality in the permit since the river is not designated as Bathing Water under the Bathing Water Regulations 2013.
- 16.8.122 Further information is required before an assessment can be made. This will include information on the risk assessment for emerging chemicals, and on the permit requirements, and on the recreational use of the river as informed by the surveys being undertaken to support Chapter 15: Socioeconomics, Community, Access and Recreation. Therefore, at this stage the health effect is uncertain.

## Tudor Drive (TLT Connection)

16.8.123 No impacts on wider determinants of health with the potential to affect population health have been identified for this component of the Project in isolation (see Table A.8 in Appendix 16.3 Preliminary Human Health Assessment Tables). Project-wide effects are discussed below.

## Project-wide effects

- 16.8.124 The preliminary human health assessment (see Table A.12 in Appendix 16.3 Preliminary Human Health Assessment Tables) has identified operational impacts on the following wider determinants of health with the potential to affect population health:
  - a. Climate change mitigation and adaptation
  - b. Education and training
  - c. Employment and income
  - d. Wider societal infrastructure and resources
- 16.8.125 During operation, project-wide effects related to education and training and employment and income have potential to affect populations throughout the Local Authorities Study Area, which comprises the populations of LBH (medium sensitivity), RBK (very low sensitivity) and LRB (very low sensitivity).
- 16.8.126 Project-wide effects related to climate change mitigation and adaptation and wider societal infrastructure and resources would affect the population of the London Water Resource Zone Study Area, which is assessed as having high sensitivity.

#### Climate change mitigation and adaptation

- 16.8.127 The Project is a drought resilience scheme, with the key objective of providing a resilient water supply to London in drought conditions. Continued security of supply of high quality drinking water is highly important to public health, and social and economic wellbeing.
- 16.8.128 The Project would help ensure continued potable water supply during times of drought for the London WRZ population (high sensitivity), and is currently only anticipated to be operational relatively infrequently (once every other year, generally during the late autumn and winter). It would contribute towards resilience of supply for a large population as part of a suite of demand and resource measures implemented through the Applicant's Water Resources Management Plan (Thames Water, 2024). On this basis the magnitude of impact is assessed as medium beneficial and the significance of effect is assessed as moderate beneficial (significant).

## Education and training

16.8.129 The Wider Benefits and Legacy Framework currently being developed (see paragraph 16.8.98) would include a legacy plan for the Project including opportunities for skills development. At this stage of assessment, there is limited detail in the Wider Benefits and Legacy Framework regarding the Project's support for education and training within the study area to enable an assessment of magnitude of impact on population health, and therefore at this stage the health effect is uncertain.

#### Employment and income

- 16.8.130 There is potential for businesses who are reliant on the River Thames corridor downstream of Teddington Lock, such as those who directly or indirectly support water sports and recreational boating, to be adversely affected by any change in perception of the recreational amenity of the River Thames for such activities. The findings of the recreational surveys may help inform a better understanding of public and local business perception towards the Project.
- 16.8.131 There is currently insufficient information available to identify those businesses who may potentially be affected, and therefore at this stage the health effect is uncertain.

#### Wider societal infrastructure and resources

16.8.132 The Project involves the provision of new water supply infrastructure that will play a role in supporting the continued population and economic growth within the London WRZ. The Project would support drought resilience within the London WRZ and is anticipated to be operational once every other year. Whilst it would provide benefit to a very large population, it would only be used intermittently and for short durations, and is only considered likely to contribute to improved quality of life rather than changes in morbidity. For these reasons, the magnitude of impact is assessed as low beneficial and the significance of effect would be minor beneficial (not significant). The contribution which the Project specifically brings to water resource infrastructure within the study area is only considered likely to lead to a slight change in health baseline.

## Cumulative effects

16.8.133 A preliminary assessment of intra-project and inter-project cumulative effects (excluding climate change) for human health is contained in Chapter 19: Cumulative Effects.

## In-combination effects with climate change

- 16.8.134 Chapter 18: Climate Change provides preliminary environmental information on the potential climate change related impacts on the Project as well as potential ICCI (i.e. where possible future changes in climate have the potential to exacerbate or conversely diminish the effect of an existing impact of the Project).
- 16.8.135 Climate change is addressed as a bio-physical environment wider determinant of health in the scope of this human health assessment. It is covered under the sub-heading 'climate change mitigation and adaptation' in the baseline and assessment sections. The assessment will be developed further for the Environmental Statement to identify and assess how the Project could affect public health matters related to climate change. The assessment will cross-refer to Chapter 18: Climate Change where appropriate.
- 16.8.136 In relation to human health, consideration has been given to whether the effects of climate change have the potential to exacerbate or diminish the likely significant effects identified in this human health chapter. There were no likely significant ICCIs for the construction phase. The results of this consideration of

ICCI are reported in Appendix 18.1: In-Combination Climate Impacts, of this PEI Report. The assessment of human health-related ICCI will be developed further and reported in the forthcoming Environmental Statement.

- 16.8.137 Potential ICCI on biophysical environment determinants of health are identified in relation to relevant environmental aspects and also reported in Appendix 18.1. Any health impacts associated with these will be considered and assessed in the forthcoming Environmental Statement.
- 16.8.138 During operation, the public health benefit of the Project in providing drought resilience for potable water supply has been identified and assessed above as a project-wide effect under the biophysical environment health determinant 'climate change mitigation and adaptation'. This impact is likely to become increasingly important as the effects of climate change increase the likelihood and severity of droughts.

## 16.9 Additional (secondary) mitigation and enhancement measures

# Additional (secondary) mitigation

- 16.9.1 Mitigation measures are defined in Chapter 4: Approach to Environmental Assessment. Embedded design (primary) mitigation and standard good practice (tertiary) specific to this aspect are provided in Section 16.4.
- 16.9.2 The most important mitigation for human health relates to the quality of preapplication and post-consent consultation and engagement with affected communities. Specifically, the Project engagement should involve:
  - a. Clear information on the design, consenting and engagement process and related timeframes for the Project in a format suitable for diverse communities
  - b. Clear demonstration that the impacts of the Project and local concerns are being considered and addressed
- 16.9.3 The concerns raised by the local community inform the development of the appropriate mitigation for the Project .
- 16.9.4 During construction, the contractor will appoint a community liaison officer supported by a liaison team as necessary who will (Appendix 4.2 Commitments Register, Provisional Commitment Reference (PCR) 58):
  - a. Liaise with relevant local authorities; other statutory bodies and regulatory authorities; community councils and relevant community groups; and businesses and residents in local communities affected by the construction works
  - b. Notify occupiers of nearby properties in advance of the nature and anticipated duration of planned construction works that may affect them
  - c. Support the production of Project communications which may include updating the Project website and newsletters
  - d. Establish a dedicated telephone helpline together with a dedicated email address and postal address for enquiries and complaints during the

construction phase. The relevant contact numbers, email and postal addresses will be displayed on signs around the construction site where reasonably practicable. Enquiries and complaints will be logged in a register and appropriate action will be taken in response to any complaints

- 16.9.5 Additional (secondary) mitigation measures set out to control dust and emissions (Chapter 13: Air Quality), manage traffic safety (Chapter 12: Traffic and Transport), and reduce exposure to noise (Chapter 14: Noise and Vibration) would all help to protect human health. This would reduce the significance of health effect to Minor adverse (not significant).
- 16.9.6 Chapter 14: Noise and Vibration includes a precautionary assessment of construction noise and vibration. Further measures will be examined to reduce noise and vibration from those activities where significant effects have been identified. At this stage, the significance of health effect is assumed to remain Moderate adverse (significant).
- 16.9.7 Where potential significant adverse severance impacts on PRoW are identified, temporary mitigation such as amended pedestrian and cycle routes; and priority crossing infrastructure may be provided where appropriate and reasonably practicable. (PCR 86)
- 16.9.8 Consideration will be given to the appearance and quality of hoarding around key areas of works, for example at the Burnell Avenue play space, where people are likely to be sensitive to, and curious about, the works. Where reasonably practicable, designs that seek to integrate the hoarding with the surrounding townscape context shall be adopted, with information provided on the purpose and programme of the works to help with awareness among the general public (PCR 59).

## **Enhancement measures**

- 16.9.9 Enhancement measures will be identified through a combination of consultation with community and health stakeholders, and co-ordination with other assessments such as Chapter 15: Socioeconomics, Community, Access and Recreation. For example, this may include opportunities to better enjoy recreational pursuits in and around the River Thames, such as improved points for accessing the river. Consideration is being given to developing the intake structure design to be of more benefit to people, such as through provision of a deck over the structure that would support viewing of the river. Such enhancements could contribute to improvements relating to the wider determinants of health such as physical activity, open space, leisure and play, and social participation, interaction and support.
- 16.9.10 There is potential that the TTP may improve water quality to benefit recreational river users. This is subject to further water quality and design information.

# 16.10 Summary of residual likely significant effects

- 16.10.1 Table 16.10 summarises the significant residual effects for human health that have been identified based on the currently available construction and scheme design information for the Project. There are no residual likely significant effects identified during operation.
- 16.10.2 At this stage of assessment, effects on a number of the wider determinants of health scoped into assessment (including air quality, water quality, community identity, culture, resilience and influence, and education and training) are assessed as uncertain as the information required to understand the severity of potential health effects is not currently available. Population health effects associated with these determinants will be presented in the Environmental Statement.
- 16.10.3 This chapter provides a preliminary understanding of the health effects associated with the Project and the assessment is subject to further change as the construction methodology and scheme design are progressed and refined and information arising from ongoing survey and consultation activities becomes available.

# Table 16.10 Summary of residual likely significant effects for human health during construction

Site	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
Mogde n STW	Significant adverse day-time noise effects during embankment piling and foundation piling works in the Eastern Work Area. The closest residents to these works would be in Bankside Close, Hillary Drive, Trevor Close and Beaumont Place (Isleworth ward) although other residents in the area also have the potential to be affected. Night-time noise from operation of the TBM in the Western Work Area is predicted to be on the threshold of the SOAEL for night- time noise as set out in Section 14.7 of Chapter 14: Noise and Vibration. The nearest residents to these effects would be on Wainwright Grove and Harvesters Close (Hounslow South ward).	Moderate adverse	To be examined further at ES stage.	Moderate adverse
Burnell Avenue site	Medium-term reduction in the attractiveness of the greenspace and riverside environment at Burnell Avenue Open Space due to presence of construction hoarding and safety fencing along with other construction activities, with potential for a moderate change in quality of life and psychosocial stress in sensitive groups for the populations of Hampton Wick and South Teddington, Tudor.	Moderate adverse	Consideration will be given to the appearance and quality of hoarding around Burnell Avenue Open Space, seeking to choose less visually intrusive, or more aesthetically pleasing designs.	Moderate adverse

Site	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
	Canbury Gardens, and Ham, Petersham and Richmond Riverside wards.			

# 16.11 Next steps

- 16.11.1 The next steps are as follows:
  - a. Obtain and analyse further baseline information for relevant wider determinants of health, including water quality
  - b. Obtain and analyse further information on the design of the Project to better understand its health-related impacts
  - c. Continue with community and recreation surveys to better understand community use of areas likely to be affected by the Project, and the views and perceptions of local communities
  - d. Continue to work with the Project designers and wider team to develop and confirm appropriate mitigation measures for health protection
  - e. Undertake further engagement with public health stakeholders to guide the human health assessment and opportunities for health improvement
  - f. Close out any further information gaps before completing the human health assessment for the Environmental Statement
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