Teddington Direct River Abstraction

Preliminary Environmental Information Report

Chapter 14 – Noise and Vibration

Volume: 1

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14. Noise and Vibration

14.1 Introduction

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

14.1.2 Thames Water Utilities Ltd (hereafter referred to as 'Thames Water' or the 'Applicant') has prepared this PEI Report as part of the Environmental Impact Assessment (EIA) for the Project.

14.1.3 Noise and vibration can have an effect on the environment and on the quality of life enjoyed by individuals and communities. It may, in certain circumstances, lead to effects on human, ecological and infrastructure (e.g. buildings) receptors.

14.1.4 This chapter is supported by the following Volume 2 PEI Report Figures:

a. Figure 14.1: Noise and Vibration Study Area, sensitive receptors and the baseline noise survey locations

14.1.5 This chapter is supported by the following Volume 3 PEI Report Appendices:

a. Appendix 14.1: Acoustic Terminology

b. Appendix 14.2: Baseline Noise Survey Results

c. Appendix 14.3: Construction Noise and Vibration Calculations

14.1.6 This chapter uses some technical acoustic terminology. These terms are described in Appendix 14.1: Acoustic Terminology and in the Glossary at the end of this volume.

14.2 Legislation and policy

Legislation

Control of Pollution Act 1974

14.2.1 The Control of Pollution Act 1974 controls waste disposal, water pollution and noise atmospheric pollution.

14.2.2 Under the Control of Pollution Act 1974, the local authority may serve notice imposing requirements as to how and when construction works are carried out, in order to limit construction noise arising from such works and having regard to the need to ensure the best practicable means are employed to minimise noise.

14.2.3 The Control of Pollution Act 1974 sets out the procedure for applying to the local authority for a Section 61 consent prior to carrying out works. The intention of this is to agree noise and vibration limits in advance of works and avoid the need for service of a notice for control of noise under the Control of Pollution Act 1974.

Environmental Protection Act 1990

14.2.4 The Environmental Protection Act 1990 provides for the control of air pollution, land wastes, nuisance and radioactive substances in order to protect the environment. Part III of the Environmental Protection Act 1990 defines what may constitute a statutory nuisance (including noise prejudicial to health), what activities are specifically exempt, the procedures the local authority must follow for service of notices to deal with abatement of statutory nuisances and the penalties payable for conviction of causing a statutory nuisance. Local authorities have a duty under the Environmental Protection Act 1990 to inspect their area from time to time to detect statutory nuisances.

The Environmental Noise (England) Regulations 2006

14.2.5 The Regulations relate to the assessment and management of environmental noise. They require the Secretary of State to: (a) make strategic noise maps showing peoples' exposure to environmental noise from major roads, railways and airports and in urban areas; and (b) draw up and periodically review action plans for places (including for the most important areas) near to major roads. The action plans aim to prevent and reduce environmental noise and its harmful effects on human health, preserve environmental noise quality where it is good, manage noise issues and effects and protect quiet areas against an increase in noise.

14.2.6 Important areas are defined in the strategic noise map as places where the 1% of the population affected by the highest noise levels from roads or major railways are located according to the results of the strategic noise mapping.

National policy

14.2.7 Key policy relevant to noise and vibration set out in the National Policy Statement (NPS) for Water Resources Infrastructure (Department for Environment, Food and Rural Affairs (Defra), 2023) is provided in Table 14.1.

Table 14.1 Key policy from the NPS for Water Resources Infrastructure

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
4.11.3	A noise assessment should include a description of the noise-generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive, low frequency or temporal characteristics of the noise.	A description of the noise generating aspects of the Project is within Section 14.8 with a more detailed description of the Project within Chapter 2: Project Description. Any distinctive tonal, impulsive, low frequency or temporal characteristics of the noise generated by the operation of the Project will be considered within the assessment following the procedures within BS 4142:2014 +A1:2019 Methods for rating and assessing industrial and commercial sound (British Standards Institution (BSI), 2019) and reported in Section 14.8.
4.11.3	A noise assessment should include identification of noise-sensitive receptors and noise-sensitive areas that may be affected.	Individual or groups of noise sensitive receptors and areas are identified within Section 14.6.

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
4.11.3	A noise assessment should include the characteristics of the existing noise environment.	The characteristics of the existing noise environment are described within Section 14.7.
4.11.3	A noise assessment should include a prediction of how the noise environment will change with the proposed development: • In the shorter term, such as during the construction period • In the longer term, during the operating life of the infrastructure • At particular times of the day, evening and night (and weekends) as appropriate, and at different times of the year	A prediction of how the noise environment will change is included within Section 14.8.
4.11.3	A noise assessment should include an assessment of the effect of predicted changes in the noise environment on any noise-sensitive receptors, including an assessment of any likely impact on health and well-being where appropriate, and noise-sensitive areas.	The effect of any changes in the noise environment is included within Section 14.10.
4.11.3	A noise assessment should include an assessment of the effect of underwater or subterranean noise if the Project is likely to cause disturbance.	This is covered within Section 6.8 of Chapter 6: Aquatic Ecology. Paragraphs 6.8.61 to 6.8.63
4.11.3	A noise assessment should include measures to be employed in mitigating the effects of noise – applicants should consider using best available techniques to reduce noise impacts.	Measures employed to mitigate the effects of noise are included within Sections 14.4 and 14.9.

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
4.11.5	The potential noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered as appropriate.	The potential for an increase in road and river (if used) traffic during the construction of the Project is considered in Section 14.8. The potential for an increase in road traffic during the operation of the Project is scoped out from the assessment. Other modes of transport are not used during the operation of the Project.
4.11.6	For the prediction, assessment and management of construction noise, reference should be made to any relevant British Standards and other guidance which also give examples of mitigation strategies. Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance.	The relevant British Standards and guidance have been used for the prediction, assessment and management of noise. These are described within Section 14.5.
4.11.7	The applicant should consult the relevant authority on the likely scope of the noise impact assessment and mitigation.	The relevant local authorities and other statutory bodies have been consulted with regard to the scope of the assessment process. This is described in Section 14.3.

Paragraph(s)	Requirement for the Applicant	How the Project addressed this
4.11.11	A development must be undertaken in accordance with statutory requirements for noise. Due regard must be given to the relevant sections of the Noise Policy Statement for England, the National Planning Policy Framework, and the government's associated planning practice guidance on noise.	The assessment has been undertaken in accordance with statutory requirements and national policy and guidance for noise. These are described in Section 14.2.

Source: National Policy Statement for Water Resources Infrastructure (Defra, 2023)

National Planning Policy Framework

14.2.8 The National Planning Policy Framework (Ministry of Housing, Communities and Local Government (MHCLG), 2024) states that planning policies and decisions should contribute to and enhance the natural and local environment by, among other things, preventing new and existing development from being put at unacceptable risk or being affected by unacceptable levels of noise pollution.

Noise Policy Statement for England

14.2.9 The government's noise policy is set out in the Noise Policy Statement for England (NPSE) (Defra, 2010). It contains the high-level vision of promoting good health and good quality of life (wellbeing) through the effective management of noise. It is supported by three aims, and together they provide the necessary clarity and direction to enable decisions to be made in any particular situation, both nationally and locally, regarding what is an acceptable noise burden to place on society. These three aims are as follows:

a. Avoid significant adverse impacts on health and quality of life

b. Mitigate and minimise adverse impacts on health and quality of life

c. Where possible, contribute to the improvement of health and quality of life

14.2.10 In defining these aims, the terms 'significant adverse' and 'adverse' are used, for which the NPSE (Defra, 2010) notes the following:

'*There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation (WHO). They are:*

a. *NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

b. *LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.*

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

a. *SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.*'

Planning Practice Guidance – Noise

14.2.11 The Planning Practice Guidance – Noise (MHCLG, 2019), provides guidance on the application of government noise policy. This online document reaffirms the effect levels set out in the NPSE and also adds an additional term of Unacceptable Adverse Effect Level (UAEL), which noise should be prevented from reaching at sensitive receptors.

Regional and local plans and policy

14.2.12 In addition to the national policy set out above, the Project must also have regard to relevant regional and local plans and policy. A summary of legislation and policy for all aspects is provided in Appendix 1.1: National Planning Policy and Legislation, with those specific to noise and vibration summarised below.

The London Plan 2021 (Greater London Authority, 2021)

14.2.13 Policy D13 (Agent of Change) concerns the Agent of Change principle, which places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on proposed new noise-sensitive development. In the case of new noise and nuisance-generating development that is proposed close to noise sensitive receptors, measures should be put in place to mitigate and manage any noise impacts for neighbouring residents and businesses. Development proposals should not be permitted where they do not clearly demonstrate how noise and nuisance will be mitigated and managed.

14.2.14 Policy D14 (Noise) is concerned with noise, which should be reduced, managed and mitigated to improve health and quality of life. Significant adverse noise impacts should be avoided, and existing and potential adverse impacts of noise from new development should be mitigated and minimised.

The London Borough of Hounslow (LBH) Local Plan 2015–2030

14.2.15 The Hounslow Local Plan was adopted in 2015 for the period 2015–2030 (LBH, 2015), and contains Policy EQ5 in relation to noise. A local plan review is currently underway, with the Regulation 19 proposed submission version of the Hounslow Local Plan 2020–2041 retaining the Policy EQ5 (LBH, 2024).

14.2.16 Policy EQ5 (Noise) requires the design of noise generating development to have considered noise impact and mitigation on surrounding noise sensitive receptors. The potential noise impacts of development proposals should be assessed, and existing noise sensitive receptors protected through careful design.

The London Borough of Richmond upon Thames (LBR) Local Plan 2018–2033

14.2.17 The Local Plan 2018–2033 was adopted in 2018 and sets out policies and guidance for the development of the Borough until 2033, or until superseded (LBR, 2018a). It includes strategic objectives to reduce or mitigate environmental impacts and pollution levels, including from noise and vibration.

14.2.18 Policy LP10 (Local Environmental Impacts, Pollution and Land Contamination) and emerging Policy 53 discuss local environmental impacts. LBR seeks to ensure that local environmental impacts, including from noise and vibration, do not cause adverse effects on health and amenity of existing and new users and occupiers of the surrounding area. Good acoustic design is encouraged. The noise assessment of new plant and equipment is required, and mitigation is to be implemented where needed. Policy LP10 also refers to the LBR Development Control for Noise Generating and Noise Sensitive Development Supplementary Planning Document (SPD) (LBR, 2018b), which is summarised below.

The LBR Development Control for Noise Generating and Noise Sensitive Development SPD (September 2018)

14.2.19 The SPD supplements the LBR Local Plan by providing an interpretation of national planning and noise policy. It has been developed in conjunction with LBH. The SPD sets out the main requirements of LBR in relation to planning and noise.

14.2.20 LBR expects an applicant to demonstrate as part of any planning application that noise has been considered, mitigated and reduced to a minimum, and that the principles of good acoustic design have been followed.

14.2.21 Noise generating developments must consider the cumulative noise impacts from their proposals, and the existing acoustic environment, and where appropriate the future cumulative impact of any already permitted noise generating development in the vicinity.

14.2.22 In determining the outcome of a noise assessment, LBR will take account of the impact and effect on the acoustic environment. Development that gives rise to significant adverse effects from noise would not normally be granted.

14.2.23 Part 6 of the document discusses assessment requirements for new noise generating development. The most relevant standard for assessing new industrial and commercial development is BS 4142:2014 +A1:2019 (BSI, 2019), where a low impact is considered to be where the rating level of noise is equal to or less than the background noise level, depending on context. Further advice is given in relation to impacts above the existing background noise level.

14.2.24 Part 9 of the SPD discusses operational vibration, and refers to BS 6472-1:2008 (BSI, 2008). Recommended threshold levels for groundborne noise and vibration are given.

14.2.25 Part 10 discusses construction works and refers to the Control of Pollution Act 1974. A Construction Method Statement, including an acoustic report, should be provided; the required contents of this are listed within the document to include baseline noise surveys and noise predictions, and significance assessment based on the guidance in BS 5228-1:2009 +A1:2014 (BSI, 2014a).

The LBR Construction Code of Practice (January 2022)

14.2.26 The LBR has its own construction code of practice (LBR, 2022) which it attaches to relevant planning approvals. The purpose of its document is to ensure that disturbances due to a range of factors, including noise, are kept to an acceptable level without imposing unnecessary restrictions on contractors.

14.2.27 The LBR construction code of practice provides suggested working hours for noisy activities.

14.2.28 The LBR construction code of practice also includes further measures to manage noise from construction sites.

The Royal Borough of Kingston upon Thames (RBK) Core Strategy 2012

14.2.29 The RBK Core Strategy was adopted in 2012 and is a plan for the Borough of Kingston until 2027 (RBK, 2012). It includes Policies CS1, DM1 and DM10 in relation to noise. A new Local Plan is being created that will set the vision and policies for the future. This is currently in development, and the next steps will be to publish a Regulation 19 Publication version for consultation.

14.2.30 Policy CS1 (Climate Change Mitigation) discusses climate change and aims to ensure that all development will reduce levels of pollution, including from noise.

14.2.31 Policy DM1 (Sustainable Design and Construction Standards) is concerned with sustainable design and construction standards and requires that new development should minimise noise impacts in line with industry best practice.

14.2.32 Policy DM10 (Design Requirements for New Developments) discusses design requirements for new development, and Part K requires the amenity of occupants and neighbours to be considered for various aspects including from noise and disturbance.

14.3 Consultation, engagement and scoping

14.3.1 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 stakeholders such as landowners, residents, businesses, local authorities and other statutory bodies who might be affected by or interested in the Project.

14.3.2 In relation to noise and vibration the responses tended to be general, relaying concerns about potential noise pollution and vibration disturbance during construction from additional traffic and also construction activities. The concerns about an increase in noise were mainly with regard to the proposed

shaft locations at Moormead Recreational Ground and Ham Lands. There were also some concerns about operational noise from the Project, including that from the Mogden Sewage Treatment Works (STW) site.

14.3.3 Responses to the consultation from the three local planning authorities (LPAs) were received, with the only mention of noise being from Hounslow Council, who responded '*Homes opposite the site* [Ivybridge Retail Park] *and along the road used for construction traffic would be impacted by noise and pollution levels this would be detrimental to the residents health – both physical and mental*'.

14.3.4 It should be noted that the previously proposed intermediate shaft locations at Moormead Recreational Ground and at Ivybridge Retail Park are no longer within the current design.

14.3.5 On 16 July 2024, further engagement occurred with representatives from LBR, RBK and LBH via video link. A presentation was given by the Project team which outlined the baseline noise monitoring locations, baseline methodology and proposed assessment methodology. The presentation concluded with an outline of which aspects were proposed to be scoped in and which were proposed to be scoped out. Comments or questions on the presentation were requested but there were none from the representatives of the local authorities present.

14.3.6 On 18 March 2025, a meeting via video link was held with LBH, LBR and RBK to discuss their comments on the EIA Scoping Report (Thames Water, 2024). During this call, Thames Water responded to all the relevant Scoping Report comments, together with the action(s) that are proposed to address each comment. There were no areas of disagreement and no changes to the methodology were made as a result of the call.

14.3.7 Table 14.2 identifies the key feedback received from the Scoping Opinion (Planning Inspectorate (PINS), 2024) together with the responses discussed and agreed with LBH, LBR and RBK. The key points from the discussion (raised by PINS and the LPAs) that are not described within Table 14.2 are:

a. The need for baseline vibration measurements. Thames Water does not consider this to be necessary as the impact from vibration is assessed against an absolute value and not a change. Thames Water suggested that if predictions show that the level of vibration from the Tunnel Boring Machine (TBM) activities could be close to threshold values, then monitoring could be undertaken during the works. The extent of any monitoring would be considered following assessment at Environmental Statement (ES) stage.

b. The need for further baseline noise surveys. Thames Water described the baseline noise surveys that were being undertaken for the PEI Report and asked the LPAs whether they considered further baseline noise surveys were required. The representative from LBH suggested that some surveys could be undertaken towards the northern edge of Mogden STW. However, Thames Water did not consider this necessary as there would be negligible works associated with the Project in this area. No other suggestions for further baseline noise surveys were made.

Table 14.2 Key scoping opinion feedback for noise and vibration

PINS ID reference	Comment	Response
Planning Inspectorate (ID 3.2.1)	The Scoping Report states that there is expected to be limited operational vibration from the pumping stations and outfall structure. Further details are required regarding how this would be appropriately mitigated, and agreement of this approach is required with the relevant consultation bodies. Until these details are provided and agreed, the Inspectorate is unable to scope this matter out.	Details on the likely sources of vibration within the intake and outfall structures at the Burnell Avenue site have been provided within Section 14.8.
Planning Inspectorate (ID 3.2.6)	Effort should be made to agree the study area with the relevant consultation bodies, including consideration of any general guidance that might be of relevance. The ES should describe how the final study area has been defined taking into consideration the predicted operational noise levels against the baseline noise levels.	The study areas for each matter where a quantitative assessment has been undertaken are described within Section 14.6 and are shown in Figure 14.1.

PINS ID reference	Comment	Response
Planning Inspectorate (ID 3.2.9)	The Applicant's attention is drawn to the response provided by London Borough of Richmond upon Thames, in which additional sensitive receptors are identified. These should be considered in the assessment or the ES should otherwise explain why significant effects are not likely to those receptors	The EIA Scoping Report (Thames Water, 2024) lists the receptors that are closest to the various areas of proposed works and is not a definitive list of all sensitive receptors within the study areas. However, these sensitive receptors identified by LBR have been considered within the assessment in Sections 14.8 and 14.10, which list every receptor or group of receptors where significant effects are predicted and provide details of why significant effects are not likely at other receptors.
Planning Inspectorate (ID 3.2.10)	The Applicant's attention is drawn to the response provided by London Borough of Richmond upon Thames and Royal Borough of Kingston upon Thames, in which it is noted that dependent on the technology type selected for the TTP [Tertiary Treatment Plant] large transformers could be required and low frequency noise is possible. The scope of the operational phase noise assessment should include consideration of these matters.	The proposed method of operation of the Tertiary Treatment Plant (TTP) will be taken into account within the assessment. If there are low frequency noise components within the proposed TTP then these have been considered using the assessment methodology described within BS 4142:2014+ A1:2019 (BSI, 2019).

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

Embedded design (primary) mitigation

14.4.1 Thames Water has worked through the design process to avoid or reduce environmental impacts through the use of embedded mitigation. Chapter 3: Consideration of Alternatives details the design alternatives that have been considered, including the environmental factors which have influenced the decision making.

14.4.2 Embedded design (primary) mitigation relevant to this aspect includes:

a. Removal of the need for pumps at the intake and outfall structures

b. Use of a TBM so fewer intermediate shaft sites are required

c. Locating the single intermediate shaft outside of Mogden STW site away from residential areas

d. Removal of a possible shaft at Northweald Lane

Standard good practice (tertiary)

14.4.3 Standard good practice (tertiary) would occur as a matter of course due to legislative requirements or standard sector practices. Standard good practice (tertiary) for this aspect includes:

14.4.4 During construction best practicable means (as defined in section 72 of the Control of Pollution Act 1974) would be adopted on-site in order to reduce construction noise levels (Appendix 4.2: Commitments Register, Provisional Commitment Reference (PCR) 12). Also, the control measures set out in BS 5228-1:2009 +A1:2014 (BSI, 2014a) would be implemented where appropriate and reasonably practicable (PCR 13). These include:

a. Electrical supplies to sites would be provided by mains electrical supply where reasonably practicable, with generators only used for emergencies or where mains power is not reasonably practicable such as during site set up or on remote sites.

b. All plant and equipment would be properly maintained and operated in accordance with manufacturers' recommendations and in such a manner as to avoid causing excessive noise.

c. Stationary equipment, e.g. pumps, compressors and generators, are situated as far as reasonably practical from receptors and where appropriate, acoustic screens are erected around them.

d. Equipment known to emit noise strongly in one direction is, where reasonably practical, orientated so that noise is directed away from noise sensitive areas.

e. Using screening around equipment, positioned at the correct height to provide effective screening, where reasonably practicable and maintaining plant in good operational condition with noise control measures as provided in place.

f. Equipment would be shut down when not in use.

g. Particularly noisy equipment would be fitted with mufflers or silencers of the type recommended by the manufacturers.

h. Care should be taken when loading and unloading vehicles, e.g. minimising drop-heights.

i. The start-up and run-down of vibratory rollers would be carried out at the furthest reasonably practicable area of the site from nearby sensitive receptors.

j. No vehicles would wait or queue on public highways with engines running where reasonably practicable. (PCR 13a)

14.5 Assessment methodology

14.5.1 The assessment methodology adopted has not changed from that previously presented within the EIA Scoping Report (Thames Water, 2024). However, some text and tables have been re-written for improved clarity.

General approach

14.5.2 The approach to the noise and vibration assessment is based on the following guidance documents relevant to noise and vibration:

a. British Standard 4142:2014 +A1:2019, Method for rating and assessing industrial and commercial sound (BSI, 2019)

b. British Standard 5228-1:2009 +A1:2014, Noise and vibration control on construction and open sites – Part 1: Noise (BSI, 2014a)

c. British Standard 5228-2:2009 +A1:2014, Noise and vibration control on construction and open sites – Part 2: Vibration (BSI, 2014b)

d. British Standard 6472-1:2008, Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting (BSI, 2008)

e. British Standard 7385-2:1993, Evaluation and measurement for vibration in buildings – Guide to damage levels from groundborne vibration (BSI, 1993)

f. British Standard 8233:2014, Guidance on sound insulation and noise reduction for buildings (BSI, 2014c)

g. Department of Transport and Welsh Office, Calculation of Road Traffic Noise (CRTN) (1988)

h. Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration Rev 2 (Highways England, 2020)

i. Institute of Environmental Management and Assessment (IEMA), Guidelines for Environmental Noise Impact Assessment (2014)

j. ISO 9613-2:2024, Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors (International Organization for Standardization (ISO), 2024)

k. Acoustics and Noise Consultants, Measurement and Assessment of Groundborne Noise and Vibration (2020)

l. World Health Organization (WHO), Guidelines for Community Noise (1999)

m. WHO, Night Noise Guidelines for Europe (2009)

Baseline data gathering

14.5.3 The proposed method to determine a likely significant adverse effect for the assessment of construction noise is initially based on set noise threshold limit values and not with reference to the baseline noise level. However, baseline noise level is a factor when determining the likely significant effect, and so a

targeted baseline noise survey has been undertaken at two locations. The two locations were selected to be representative of the closest potentially affected noise sensitive receptors to the works within the Mogden STW site. The surveys included day, night, weekday and weekend periods.

14.5.4 No baseline vibration survey is proposed to support the construction vibration assessment, and it is assumed that the vibration baseline will be zero. Given the distances of vibration generating activities and sensitive receptors it is likely that the only possible impacts from construction works would be from tunnelling operations. The undertaking of baseline vibration measurements for tunnelling projects (e.g. Silvertown Tunnel, Lower Thames Crossing) is not standard practice and is considered unnecessary considering the value of the data gathered. A baseline vibration measurement would provide an indication of existing vibration levels, and the source is most likely to be from road traffic, which unless a road is in poor condition, would be close to zero.

14.5.5 The results from the baseline noise survey described above which has been undertaken for the construction noise assessment have been used for the operational noise assessment. The relevant LPA (LBH) were consulted regarding the details of the proposed methodology prior to the surveys being undertaken. No operational noise surveys are planned in the vicinity of the area of the intake/outfall sites as these are gravity fed and will therefore have no pumps that could generate noticeable levels of noise.

Assessing the significance of effects

Assigning sensitivity

14.5.6 Both DMRB LA 111 (Highways England, 2020) and the IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014) note that receptors may have various sensitivities to noise, but do not specifically define a sensitivity scale.

14.5.7 Many of the guidance documents cited earlier present different assessment criteria for different receptor types. The sensitivity of receptors has therefore been considered when selecting the assessment criteria used to describe the magnitude of impact.

14.5.8 Sensitive receptor types for noise and vibration are identified later in this section when the approach for each matter is described.

14.5.9 For the purposes of assigning significance, sensitive receptors for noise and vibration all align with a ‘High’ value as described within Table 4.1 in Chapter 4: Approach to Environmental Assessment.

Assigning magnitude – construction phase

14.5.10 The construction of the Project has been assessed on a monthly basis throughout the construction period. Assessing at a daily level would need a day-by-day construction programme, which is not available at this stage. A month is

considered to be a robust and credible period to provide the basis for assessing construction noise disturbance.

14.5.11 Where the predicted construction level exceeds the relevant SOAEL values then a likely significant adverse effect is reported for each receptor, or groups of receptors, affected.

14.5.12 For residential receptors, likely significant adverse effects have been determined on a community basis where the calculated levels exceed the relevant LOAEL but are less than the relevant SOAEL values by taking into account the following factors:

a. The type of effect being considered (e.g. annoyance)
b. The magnitude of the impact (i.e. the calculated noise or vibration level compared to the relevant LOAEL and SOAEL values and available dose-response information)
c. The existing noise climate in terms of the absolute level and the character of the existing environment
d. The number and grouping of receptors subject to noise effect and noise change
e. Any unique features of the Project or the receiving environment
f. The potential combined impacts of noise and vibration
g. The frequency and duration over which temporary construction impacts may occur
h. The effectiveness of mitigation through design or other means

14.5.13 For non-residential receptors, significant effects are determined on a receptor-by-receptor basis taking into account:

a. The use and sensitivity of the receptor
b. The use of the receptor, including time of day
c. The type of effect being considered
d. The magnitude of the impact
e. The existing ambient noise levels at the receptor affected
f. The potential combined impacts of airborne sound, groundborne sound and vibration
g. Any unique features of the Project's noise or vibration impacts in the area being considered (which may require secondary acoustic indicators/criteria)
h. The frequency and duration over which temporary construction impacts may occur
i. The effectiveness of mitigation through design or other means

Construction airborne noise

14.5.14 The assessment of noise from construction has been undertaken quantitatively based on the guidance and calculation methodology within BS 5228-1:2009

+A1:2014 (BSI, 2014a). Noise predictions from construction have been undertaken using the different activities associated with the construction of the Project. Predictions of construction noise have been based on experience of similar schemes.

14.5.15 The noise level from construction has been calculated at selected locations which are considered to be the closest to the works. These selected locations may be individual sensitive receptors or groups of sensitive receptors. Calculations of construction noise have been undertaken using spreadsheets.

14.5.16 Noise impact thresholds over certain time periods for construction activities at residential premises are defined based on the example thresholds for a potentially significant effect at dwellings presented in Table E.1 of BS 5228-1:2009 +A1:2014 (BSI, 2014a), as indicated in Table 14.3.

14.5.17 For the daytime, recent large infrastructure projects (e.g. High Speed 2 (HS2), Thames Tideway and the A14 Cambridge to Huntington Improvement Scheme) have adopted the highest category within the ABC impact criteria from BS5228-1:2009 +A1:2014 (BSI, 2014a) (i.e. category C) to define the construction noise SOAEL, which is 75dB(A). This was given as a level that noise should not exceed outside the nearest window of an occupied room within the Advisory Leaflet 72 – Noise Control on Building Sites (Department of the Environment, 1976) and is considered to align with the examples of outcomes of the SOAEL provided within Planning Practice Guidance – Noise (MHCLG, 2019):

‘*The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.*’

14.5.18 For night-time, the WHO Night Noise Guidelines (NNG) for Europe (WHO, 2009) introduced an Interim Target of 55dB(A) measured outdoors. This is the noise threshold used for category C of the ABC impact criteria at night and has been taken to be a SOAEL.

14.5.19 For the evening the SOAEL is set 10dB lower than the daytime SOAEL consistent with the ABC criteria and criteria that date back to the Advisory Leaflet 72 – Noise Control on Building Sites (Department of the Environment, 1976).

14.5.20 Category A values have been taken as the LOAEL for each respective time period. The category B values are included within the table in BS5228-1:2009 +A1:2014 (BSI, 2014a) but are not used within this assessment to determine the threshold noise levels. However, they are used when considering the absolute noise level as a factor for situations where the predicted noise level is between the LOAEL and SOAEL.

Table 14.3 Construction airborne noise LOAELs and SOAELs for residential receptors

Time period	$L_{Aeq,T}$ dB Category A LOAEL	$L_{Aeq,T}$ dB Category B	$L_{Aeq,T}$ dB Category C SOAEL
Day (07:00–19:00 weekday and 07:00–13:00 Saturdays)	65	70	75
Night (23:00–07:00)	45	50	55
Evening and weekends (time periods not covered above)	55	60	65

Source: Adapted from EIA Scoping Report (Thames Water, 2024)

Construction groundborne noise

14.5.21 The prediction and assessment of groundborne noise is undertaken with reference to the Acoustic and Noise Consultants publication, Measurement and Assessment of Groundborne Noise and Vibration (Acoustic and Noise Consultants, 2020).

14.5.22 The magnitude criteria for groundborne noise are based upon current industry standard practice, including assessments presented for projects such as Lower Thames Crossing, and are set out in Table 14.4. These are relevant for residential buildings and non-residential sensitive buildings.

Table 14.4 Construction groundborne noise LOAEL and SOAEL

Time periods	LOAEL	SOAEL
All time periods	35dB L_{ASmax}	45dB L_{ASmax}

Source: EIA Scoping Report (Thames Water, 2024)

Construction vibration

14.5.23 Vibration from construction surface works has been assessed using the peak particle velocity (PPV) metric and is predicted at selected receptors within the study area based upon guidance presented by BS 5228-2:2009 +A1:2014 (BSI, 2014b) using spreadsheet calculations.

14.5.24 BS 5228-2:2009 +A1:2014 (BSI, 2014b) has been used to determine the LOAEL and SOAEL values, and the vibration impact criteria for human response is reproduced from BS 5228-2:2009 +A1:2014 in Table 14.5 for the assessment of human response in occupied residential buildings and non-residential sensitive buildings.

Table 14.5 Construction vibration impact criteria (human response)

Vibration level PPV (mm/s)	Effect
10	Vibration is likely to be intolerable for any more than a very brief exposure to this level.
1.0 (SOAEL)	It is likely that vibration of this level in residential environments would cause complaint but can be tolerated if prior warning and explanation has been given to residents.
0.3 (LOAEL)	Vibration might just be perceptible in residential environments.
0.14	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
<0.14	Vibration is below levels of perception.

Source: Adapted from EIA Scoping Report (Thames Water, 2024)

14.5.25 The risk of structural damage due to construction vibration has also been considered by reference to fixed criteria set out in BS 7385-2:1993 (BSI, 1993). Based upon BS 7385-2:1993, BS 5228-2:2009 +A1:2014 (BSI, 2014b) and the professional judgement of the assessment team, the criteria in Table 14.6 have been adopted. All buildings, including any that are unoccupied, within the vibration study area are considered to be potentially sensitive in relation to possible cosmetic damage. BS 7385-2:1993 (BSI, 1993) highlights that the criteria for aged buildings may need to be lower if the buildings are structurally unsound. The standard also notes that criteria should not be set lower simply because a building is important or historic (listed). Buildings have been considered to be structurally sound for this assessment. Transient vibration in relation to building response would relate to vibration from activities such as piling, whereas continuous vibration would relate to activities such as vibrating rollers.

Table 14.6 Construction vibration impact criteria for cosmetic damage to buildings (PPV at building foundations)

Building type	Continuous vibration	Transient vibration
Potentially vulnerable buildings	3mm/s	6mm/s
Structurally sound buildings	6mm/s	12mm/s

Source: EIA Scoping Report (Thames Water, 2024)

14.5.26 The assessment criteria applicable to the assessment of tunnelling works are in terms of the vibration dose value (VDV) for human response. Calculations have been undertaken with reference to BS 6472-1:2008 (BSI, 2008), and informed by precedent set by major infrastructure projects such as HS2. The criteria

given in Table 14.7 are applicable to the consideration of human response to vibration during tunnelling in occupied residential buildings and non-residential sensitive buildings.

Table 14.7 Construction groundborne vibration criteria for tunnelling (human response)

Receptor category	Groundborne vibration effect levels (measured indoors near but not at the centre of floors), VDV $ms^{-1.75}$
Residential LOAEL	16h day: 0.2 8h night: 0.1
Residential SOAEL	16h day: 0.8 8h night: 0.4
Schools/activity centres /places of worship	16h day: 0.4
Hospice/care homes	16h day: 0.2 8h night: 0.1

Source: EIA Scoping Report (Thames Water, 2024)

Road traffic noise during construction

14.5.27 The prediction of noise from construction traffic on local roads is carried out using the BS 5228-1:2009 +A1:2014 (BSI, 2014a) methodology for construction traffic. The magnitude of impact is based on the level of change in road traffic noise as set out in Table 14.8, which reproduces guidance presented in DMRB LA 111 (Highways England, 2020). This scale of magnitude is applicable to residential and non-residential sensitive receptors.

Table 14.8 Magnitude of impact for road traffic noise during construction

Construction road traffic noise magnitude of impact	Increase in basic noise level (BNL) of road used for construction traffic (dB)
Large	Greater than or equal to 5.0
Medium	Greater than or equal to 3.0 and less than 5.0
Small	Greater than or equal to 1.0 and less than 3.0
Negligible	Greater than 0.0 and less than 1.0

Source: EIA Scoping Report (Thames Water, 2024)

14.5.28 A likely significant adverse effect would occur when the magnitude is Medium or Large.

River traffic noise

14.5.29 The prediction of noise from river tugs and barges is undertaken using the BS 5228-1:2009 +A1:2014 methodology for mobile plant. The magnitudes of impact set out in Table 14.9 have been determined based upon guidance presented by

BS 8233:2014 (BSI, 2014c), the WHO Guidelines for Community Noise (GCN) (WHO, 1999) and WHO NNG (WHO, 2009). No source-specific guidance is available for river vessels. This scale of magnitude is applicable to residential sensitive receptors only. Any non-residential sensitive receptors have been considered on a case-by-case basis. A likely significant adverse effect would occur when the magnitude is Medium or Large.

Table 14.9 Magnitude of impact for river traffic noise during construction

Construction noise magnitude of impact	Construction noise level
Large	Above or equal to SOAEL +5dB(A)
Medium	Above or equal to SOAEL and below SOAEL +5dB(A)
Small	Above or equal to LOAEL and below SOAEL
Negligible	Below LOAEL

Source: EIA Scoping Report (Thames Water, 2024)

14.5.30 Table 14.10 provides the values for the LOAEL and SOAEL that are considered appropriate for dwellings. These would be used during the passage of a river vessel to and from a site. When at a works site and either being loaded or unloaded, the noise from the river vessel would form part of the construction activity and the SOAEL for construction would be applicable.

Table 14.10 River traffic noise LOAELs and SOAELs

Time period	LOAEL	SOAEL
Day (07:00–19:00 weekday and 07:00–13:00 Saturdays)	45dB $L_{Aeq,T}$	55dB $L_{Aeq,T}$
Night (23:00–07:00)	40dB $L_{Aeq,T}$	45dB $L_{Aeq,T}$
Evening and weekends	40dB $L_{Aeq,T}$	50dB $L_{Aeq,T}$

Source: EIA Scoping Report (Thames Water, 2024)

Assigning magnitude – operational phase

14.5.31 Operational noise has been predicted using numerical methods to implement the ISO 9613-2:2024 (ISO, 2024) calculation methodology. The magnitude scale to be used in the assessment of operational noise has been developed based upon guidance in BS 4142:2014 +A1:2019 (BSI, 2019). The scale to be used for residential receptors, and those of a similar sensitivity, is presented in Table 14.11. Should other receptor types or unusual local circumstances be identified, reference would be made to other absolute noise criteria such as those presented by BS 8233:2014 (BSI, 2014c) and the WHO GCN (WHO, 1999) and WHO NNG (WHO, 2009).

Table 14.11 Magnitude of impact for operational noise

Operational noise magnitude of impact	Difference between background noise level (L_{A90}) and rating noise level ($L_{Ar,Tr}$) in accordance with BS 4142 (dB)
Large	More than +10
Medium	+5 to +10
Small	0 to +5
Negligible	Below background

Source: EIA Scoping Report (Thames Water, 2024)

14.5.32 A likely significant adverse effect would occur when the magnitude is Medium or Large.

14.5.33 LOAEL and SOAEL values have not been defined for such sources as those generated by the Project, which are classed as industrial noise. A 2014 report undertaken for Defra entitled Possible options for the identification of SOAEL and LOAEL in support of the NPSE (Defra, 2014) states that:

'Given that there is insufficient robust information on people's response to industrial noise it is not possible to derive a LOAEL or SOAEL for industrial sources.'

14.5.34 BS 4142:2014 +A1:2019 (BSI, 2019) emphasises that, along with the difference between a rating level and background noise level, contextual factors should also be considered. These include consideration of the absolute level of sound, the character of the existing noise environment and industrial noise source, and whether the receptor property includes any noise insulation, mechanical ventilation or acoustic screening measures. These contextual factors have been discussed alongside the assessment.

Assumptions and limitations

Construction

14.5.35 The assessment of potential construction noise and vibration effects has been based on the preliminary design, construction programme and methodology. Assumptions regarding the provisional plant and equipment that may be used have been developed using professional judgement, contracting expertise and experience from similar developments and designs. When detailed design is complete and construction methodology confirmed it may be necessary to use different plant and equipment complements. The risk of changes to plant and/or methods resulting in differing predicted noise levels is considered to be small owing to the stage of the design.

14.5.36 The outfall structure for discharging the recycled water would be located either on the bankside or near the bankside in the River Thames. The construction of either option would require similar plant and so these options have not been assessed separately as any noise or vibration from either option would be

similar. Both options would likely require a cofferdam installed to enable a safe working area within the river and so the works associated with the cofferdam construction have been included within the assessment. In addition, the need for a cofferdam during construction has also been assumed for the intake structure.

14.5.37 Not included within the activities assessed is the work associated with any satellite compounds, drop-off areas or activities involving the installation of traffic management. These work areas and activities are considered to generate little in the way of noise or vibration or would be intermittent.

14.5.38 It has been assumed that any utility diversions that might be required during advance works would be carried out during the daytime only, with no need for these to occur during night-time periods.

14.5.39 If contingency temporary dewatering pipework is required from the intermediate shaft to the River Thames, then it is assumed this would be minor works that would generate little noise and vibration and has therefore not been considered within the assessment.

14.5.40 The operation of the TBM at the Mogden STW Western Work Area would require a 24-hour, seven days a week operation. In addition, whichever option is selected for the Tudor Drive connection would require a similar working pattern at the Burnell Avenue site. For these the assessment has therefore assumed night-time working.

14.5.41 During the construction of the TTP it may be necessary to have occasional long duration concrete pours. At this stage, the possible number and duration of these is unknown and so this activity has not been assessed as taking place outside of standard working hours.

14.5.42 The impacts of groundbourne noise and vibration have been assessed using the modelling developed by two other projects which had different input parameters. A site-specific model will be developed for the ES when additional design detail and ground information is available.

14.5.43 Wherever piling is used, the method has been assumed to be percussive (hammer) piling as a worst case.

Operation

14.5.44 The assessment of the TTP in operation assumes that the TTP will make most noise in its normal operation mode, and that it will be in this mode at all times. This is a worst-case assumption.

14.5.45 The assessment of the TTP in operation has been undertaken by assuming a noise level from a recently constructed TTP at Benson STW. It is assumed that the characteristics of the TTP at Mogden STW would be similar to those at Benson STW, and only two blowers would operate at any one time. The current design of the TTP at Mogden STW has the blowers positioned at the base of the existing earth bund at the Mogden Eastern Work Area and this would

provide screening to the closest sensitive receptors. The TTP would be operational all the time and there would be no difference between daytime and night-time operations. This assumption has been based on the emerging design and is considered to represent a reasonable worst case for the purpose of assessment.

14.5.46 Any maintenance of the outfall or intake during operation will not make a noticeable amount of noise, and is not considered in the operational noise assessment.

14.6 Study area

14.6.1 Separate study areas are defined below for each element of the noise and vibration assessment. All sites that form part of the Project have been considered, and thus study areas have been identified within the areas of all three LPAs. Based on the assessment of impacts on receptors within these study areas during the impact assessment stage, consideration has been given to the likelihood of significant effects outside these areas, and the study areas extended where relevant. Potential effects of noise and vibration on aquatic ecology are considered in Chapter 6: Aquatic Ecology.

14.6.2 The study areas are shown within Volume 2 – Figure 14.1: Noise and Vibration Study Area, sensitive receptors and the baseline noise survey locations.

Construction noise and vibration assessment

14.6.3 Following guidance in BS 5228-1:2009 +A1:2014 (BSI, 2014a), the study area for the construction noise assessment is 300m from any construction activity, or the area within which sound levels from the Project are forecast to give rise to potential impacts, whichever is the greater.

14.6.4 The study area for the construction vibration assessment is 100m from any construction activity considered likely to generate vibration (DMRB LA111).

14.6.5 These two study areas are shown on Volume 2 – Figure 14.1: Noise and Vibration Study Area, sensitive receptors and the baseline noise survey locations, which also shows the sensitive receptors that fall within each study area.

Construction road traffic noise and vibration

14.6.6 The construction traffic noise study area is defined as 50m from the carriageway edge of public roads with the potential for an increase in basic noise level (BNL) of 1dB(A) or more. The procedure for calculating a BNL is set out by the CRTN document (Department of Transport and Welsh Office, 1988) and relates to a noise level at a reference location 10m from the carriageway edge.

14.6.7 For construction traffic vibration, the study area is based upon guidance presented by the Transport and Road Research Laboratory (New, 1986), which

indicates that a '*Heavy lorry on a poor road surface*' would result in groundborne vibration levels (PPV) of less than 1mm/s at a distance of approximately 2m and approximately 0.3mm/s at a distance of approximately 4m. The study area is defined as 4m from the carriageway edge of any route used by Heavy Goods Vehicles (HGVs).

14.6.8 A qualitative assessment of potential impacts from construction traffic has been provided for the PEI Report as the required traffic data were not yet available to carry out a quantitative assessment. A study area has therefore not been included in Figure 14.1: Noise and Vibration Study Area, sensitive receptors and the baseline noise survey locations.

Construction river traffic noise

14.6.9 In the absence of any guidance on study areas for the assessment of noise from river freight movements using the River Thames, if this mode of transport is used the study area adopted would be similar to that defined for road traffic, i.e. 50m from the riverbank where it is considered likely that the noise from additional river traffic will be above existing levels.

14.6.10 River freight movements are not considered likely to be sources of potentially significant vibration effects.

Operational noise

14.6.11 There is no current authoritative guidance that limits how far the noise study area should extend from the operational noise sources intended as part of the Project. The assessment of noise from the operation of the TTP considers the closest noise sensitive receptors, and also the existing noise climate in the area.

14.7 Baseline conditions

Baseline noise

14.7.1 To inform this PEI Report, reference has been made to Ordnance Survey mapping and the strategic noise mapping undertaken by Defra (Extrium, 2019). The results from the Defra strategic mapping have been used to provide a high-level description of existing traffic and rail noise levels at receptors in parts of the study areas covered by the strategic noise mapping. In addition, the air noise contours for Heathrow Airport have also been reviewed (Civil Aviation Authority, 2024).

14.7.2 Baseline noise levels in the areas surrounding the proposed work sites are likely to vary, with locations which range from residential streets to those near busy urban roads. The main factors that affect baseline noise levels are expected to be as follows:

a. Higher noise levels would be expected at locations closer to transport infrastructure and existing industrial sources.

b. Diurnal patterns – higher noise levels would be expected at times of peak transport activity and lowest at night.

c. Meteorological conditions – noise levels would be at their lowest in the absence of wind and rain.

14.7.3 Certain receptors with the potential to be affected by the Project may also be affected by noise from sources included in the Defra strategic noise mapping, such as:

a. A310 Twickenham Road / London Road

b. A316 Chertsey Road

c. A307 Richmond Road

d. South Western Railway near Twickenham Station (Waterloo to Reading/Windsor and Hounslow/Kingston Loop)

14.7.4 The Defra strategic noise maps indicate that noise levels at some receptors in the vicinity of these roads and railway could be above 55dB $L_{Aeq,16h}$, and/or above 50dB L_{night}.

14.7.5 As part of the strategic noise mapping, Defra has produced a list of Noise Important Areas (NIAs), identified as areas requiring action to reduce noise levels. Various NIAs have been designated on the road networks local to the Project, with the nearest to the draft Order limits located at A316 The Avenue (NIA ID 616), and at A305 King Street (NIA ID 615). These NIA are shown in Volume 2 – Figure 14.1: Noise and Vibration Study Area, sensitive receptors and the baseline noise survey locations.

14.7.6 The Mogden STW site lies within the 60dB L_{den} noise contour for 2023, indicating that the existing noise environment will be influenced by aircraft noise from Heathrow airport. The remaining sites which form part of the Project are outside of recent aircraft noise contours.

14.7.7 Baseline noise surveys were undertaken from 13 to 24 March 2025 at two locations with the boundary of the Mogden STW site. The noise loggers were unattended during the surveys.

14.7.8 The first survey location (L1) was on the western side of the Mogden STW site and considered to be representative of nearest noise sensitive receptors on Wainwright Grove and Harvesters Close. The noise logger was positioned part way down the embankment in order to provide as much screening as possible from any noise generated by Mogden STW. The dominant noise source at this location was from aircraft and distant road traffic. Noise from within Mogden STW was just audible. A weather monitoring device was also installed at this location, which was positioned at the top of the embankment on the edge of the level bund area.

14.7.9 At the second survey location (L2) the noise logger was positioned on top of the existing embankment in the south-east corner of the Mogden STW site. This location was considered to be representative of the closest sensitive receptors

in Hillary Drive. The dominant noise source at this location was that from aircraft and distant road traffic. Noise from within Mogden STW was just audible.

14.7.10 The full details of the noise measurement surveys are provided in Appendix 14.2: Baseline Noise Survey Results.

14.7.11 The noise survey locations are indicated in Volume 2 – Figure 14.1: Noise and Vibration Study Area, sensitive receptors and the baseline noise survey locations. Table 14.12 summarises the locations and baseline measurement results, excluding periods of unsuitable weather. In addition, the data from Friday 21 March 2025 were excluded due to the power outage at London Heathrow airport that caused there to be no flights that day. The lack of aircraft noise was considered to be non-typical of the usual baseline noise in the area.

Table 14.12 Baseline noise survey summary of measured noise levels

Location	Time period	$L_{Aeq,T}$ dB Daytime (07:00–23:00)	$L_{Aeq,T}$ dB Night-time (23:00–07:00)	$L_{A90,T}$ dB Daytime (07:00–23:00)	$L_{A90,T}$ dB Night-time (23:00–07:00)
L1 – western side of Mogden STW	Weekday	60	53	52	51
L1 – western side of Mogden STW	Weekend	60	53	52	49
L2 – south-east corner of Mogden STW	Weekday	58	55	54	52
L2 – south-east corner of Mogden STW	Weekend	59	55	54	52

14.7.12 The results at the two baseline survey locations show very similar noise levels between the two sites and also between weekday and weekend periods. The higher overall noise levels (i.e. the L_{Aeq}) measured at L1 are likely due to the location being closer to London Heathrow airport. The higher L_{A90} at L2 could be due to the closer proximity to the working areas of Mogden STW.

14.7.13 The project team are exploring the possibility of further baseline monitoring by the Burnell Avenue site and by Ham Street site.

14.7.14 To assist with the operational noise assessment of the TTP, noise levels were gathered from an existing installation at Benson STW in Oxfordshire. This site was visited on 7 March 2025 where source measurements close to the moving bed biofilm reactor (MBBR) were obtained. The results from these measurements are summarised within Appendix 14.2: Baseline Noise Survey Results.

14.7.15 During the visit to Benson STW any acoustic features (e.g. tonality, impulsivity) of the MBBR were identified as these are required for the operational noise assessment.

Baseline vibration

14.7.16 There are no vibration generating sources identified in the vicinity of the Project, and baseline vibration is therefore assumed to be zero.

Future baseline

14.7.17 With the noise climate in the area dominated by road and air traffic, the future noise baseline around the Project is likely to be similar to the existing baseline. Localised noise sources, for example from construction activities, could temporarily alter the noise climate in the area of such activities.

14.7.18 In general, climate change is expected to lead to an increase in temperatures, with a greater frequency of hotter, drier summers and warmer, wetter winters. Although the projections are more uncertain, wind speeds are expected to increase slightly and the number of storms are also expected to increase. Further information on projected changes in climate parameters is provided in Chapter 18: Climate Change. Changes in climate parameters have the potential to interact with effects identified within some environmental topics and exacerbate or diminish their impact. Such combined impacts are termed In-Combination Climate Impacts (ICCI). Future climate change has the potential to alter the noise climate, as rainfall, temperature and wind are factors that can influence the propagation of noise. Consideration of the potential for ICCI associated with these changes is provided in Section 14.8 of this chapter.

14.8 Preliminary assessment of likely significant effects

Construction phase

14.8.1 This section sets out the likely significant effects on noise and vibration during construction. The assessment assumes that embedded design (primary) mitigation and standard good practice (tertiary) measures in the draft Code of Construction Practice are in place, and the results of the assessment then inform the need for any additional (secondary) mitigation requirements during construction. As described in Section 14.5, where the SOAEL is exceeded, there is a likely significant adverse effect. Where the predicted construction noise or vibration level is between the LOAEL and the SOAEL then the significance is determined using professional judgement considering certain factors.

14.8.2 A detailed list of the plant and equipment assumed for the various construction activities is given in Appendix 14.3: Construction Noise and Vibration Calculations. An indicative construction programme can be found in Chapter 2: Project Description.

14.8.3 Unless stated otherwise it is assumed that the construction hours would be as stated in Chapter 2: Project Description.

Construction noise

Mogden STW site – Western Work Area

14.8.4 The predicted construction noise levels during works for the closest residential receptors are summarised in Table 14.13 with any exceedance of the daytime or night-time threshold level highlighted. All activities are daytime unless stated within the table.

14.8.5 For activities carried out at the Western Work Area of the Mogden STW site, partial screening has been assumed between all works and the closest noise sensitive receptors on Harvesters Close and Wainwright Grove provided by the existing bund around the site, with the exception of the taller activities of piling and crane use.

Table 14.13 Predicted construction noise from activities at Mogden STW Western Work Area

Construction activity	**Closest receptor on Wainwright Grove / Harvesters Close L_{Aeq} dB**
Compound – top soil removal	67
Compound – hardstanding	64
Compound – paving	59
Compound – establish buildings, groundworks	60
Compound – establish buildings, lifting in	58
Compound – establish buildings, roofing and cladding	60
Compound – daily operations	62
Drive site – site preparation	59
Drive site – shaft caisson jacking	55
Drive site – shaft excavation	58
Drive site – spray concrete lining	51
Drive site – shaft dewatering (and night-time)	29
Drive site – TBM assembly	58
Drive site – TBM operation daytime	60
Drive site – TBM operation night-time	55
Site restoration	57

14.8.6 The predicted noise level during top soil removal is between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level is less than 3dB above the bottom end of the range of 65–75dB.

b. The duration of this activity to establish the compound is likely to be less than a month.

c. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.7 The predicted noise level during the night-time from TBM operations is lower than that of the daytime due to the spoil not being moved away in lorries during the night-time period. The night-time construction SOAEL of 55dB $L_{Aeq,T}$ is met at the closest residential receptors at Wainwright Grove during TBM operation. This is considered to be a likely significant effect. Noise from works to support the TBM operation would reduce to below the SOAEL of 55dB $L_{Aeq,T}$ at a distance of 95m, which includes residential dwellings west of the shaft on and alongside the site boundary on Wainwright Grove and Harvesters Close.

14.8.8 There are no non-residential receptors within the vicinity of the works where significant adverse effects are likely.

Mogden STW site – Eastern Work Area

14.8.9 The works at the Eastern Work Area at the Mogden STW site would include earthworks at the existing embankment, construction of a small site compound, construction of the tunnel interception shaft, and finally construction of the TTP on top of the existing storm tanks. As the site is constrained, construction works would need to be phased. Material storage and handling for the Eastern Work Area at Mogden STW would be undertaken at the compound at the Western Work Area at the Mogden STW site.

14.8.10 The predicted construction works to establish the compound for the closest residential receptors are summarised in Table 14.14, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level highlighted. All activities would be undertaken during daytime hours.

Table 14.14 Predicted construction noise from activities at Mogden STW Eastern Work Area compound

Construction activity	Closest receptor on Bankside Close L_{Aeq} dB
Top soil removal	67
Hardstanding	66
Establish buildings, groundworks	62
Establish buildings, lifting in	64
Establish buildings, roofing and cladding	62
Daily operations	64
Site restoration	62

14.8.11 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during top soil removal and hardstanding. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level is less than 3dB above the bottom end of the range of 65–75dB.

b. The duration of top soil removal and hardstanding is likely to be of less than a month.

c. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.12 The predicted construction noise levels during works to construct the interception shaft for the closest residential receptors are summarised in Table 14.15, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level, or night-time 55dB $L_{Aeq,T}$ threshold, highlighted. All activities are daytime unless stated within the table. Partial screening due to the embankment has been assumed between works and the closest noise sensitive receptors, with the exception of the activities of piling and crane use that would have a higher noise source height.

Table 14.15 Predicted construction noise from interception shaft at Mogden STW Eastern Work Area

Construction activity	Closest receptor on Bankside Close / Hillary Drive L_{Aeq} dB	Closest receptor on Trevor Close L_{Aeq} dB
Vegetation clearance	67	68
Cutting into embankment	62	63
Embankment piling	79	81
Ground preparation	64	59
Shaft caisson jacking	60	55
Shaft excavation	63	58
Shaft spray concrete lining	57	58
Shaft dewatering (and night-time)	34	35

14.8.13 The daytime construction SOAEL of 75dB $L_{Aeq,T}$ is predicted to be exceeded at the closest residential receptors during embankment piling works. These are considered to be likely significant adverse effects. Noise from piling would reduce to below the SOAEL of 75dB $L_{Aeq,T}$ at a distance of 85m, which includes residential dwellings east and south of the works including on Bankside Close, Hillary Drive, Trevor Close and Beaumont Place. There are no other non-residential receptors where the SOAEL would be exceeded. The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The embankment piling works would include intermittent piling over a period of three and a half months.

14.8.14 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during vegetation clearance. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level of these activities is in the lower half of the range of 65–75dB.

b. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.15 The predicted construction noise levels during works to construct the TTP at the closest residential receptors in Trevor Close are summarised in Table 14.16, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level highlighted. All activities would be undertaken during daytime hours. The closest receptors in Hillary Drive would be a similar distance to the works as are those receptors on Trevor Close. Partial screening has been assumed for construction of ground level works, and no acoustic screening correction for activities where the noise source would be elevated above the height of the embankment.

Table 14.16 Predicted construction noise from construction of TTP at Mogden STW Eastern Work Area

Construction activity	Closest receptor on Trevor Close L_{Aeq} dB
Ground level buildings	62
Foundation piling	77
Platform construction	68
Lifting in of TTP components	69
Concreting	66
Fitting out and testing	67

14.8.16 The daytime construction SOAEL of 75dB $L_{Aeq,T}$ is predicted to be exceeded at the closest residential receptors at Trevor Close during foundation piling. This is considered to be a likely significant adverse effect. Noise from piling would reduce to below the SOAEL of 75dB $L_{Aeq,T}$ at a distance of 80m, which includes residential dwellings east and south of the works including on Bankside Close, Trevor Close and Beaumont Place. There are no other non-residential receptors where the SOAEL would be exceeded. The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The foundation piling works would include intermittent piling over a period of up to six months.

14.8.17 During the works to construct the TTP, construction noise levels are predicted to be between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ for all the remaining activities except the construction of the ground level buildings. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level of these activities is in the lower half of the range of 65–75dB.

b. These activities would not include any activities that would produce sudden high levels of noise that could result in disturbance.

Intermediate shaft site

14.8.18 The intermediate shaft site would be on the Ham Playing Fields site, together with the site compound.

14.8.19 The predicted construction noise levels during works for the closest noise sensitive receptor, Ham House, are summarised in Table 14.17 with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold, or night-time 55dB $L_{Aeq,T}$ threshold level highlighted. All activities are daytime unless stated within the table. No acoustic screening correction between construction works and receptors has been assumed.

Table 14.17 Predicted construction noise from activities at Ham Playing Fields intermediate shaft site

Construction activity	Ham House L_{Aeq} dB
Compound – top soil removal	66
Compound – hardstanding	65
Compound – paving	63
Compound – fencing	58
Compound – establish buildings, groundworks	61
Compound – establish buildings, lifting in	61
Compound – establish buildings, fitting out	61
Compound – daily operations	60
Compound – site restoration	62
Shaft works – ground preparation	54
Shaft works – caisson jacking	50
Shaft works – shaft excavation	53
Shaft works – spray concrete lining	44
Shaft works – dewatering (and night-time)	23
Shaft works – shaft operation	43

14.8.20 During works to construct the intermediate shaft compound, construction noise levels are predicted to be between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during top soil removal and hardstanding creation. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level is less than 3dB above the bottom end of the range of 65–75dB.

b. The duration of top soil removal and hardstanding is likely to be less than a month.

c. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.21 Predicted noise levels are below LOAEL during all shaft activities, including dewatering being below the night-time LOAEL, indicating no likely significant effect during shaft construction or operation.

14.8.22 There are no noise sensitive receptors other than residential dwellings likely to be impacted by construction noise in this area.

14.8.23 The predicted construction noise levels during works to establish temporary parking at Riverside Drive for the closest noise sensitive receptors on Riverside Drive are summarised in Table 14.18, with any exceedance of the 75dB $L_{Aeq,T}$

daytime threshold level highlighted. All activities would be undertaken during daytime hours. No acoustic screening correction between construction works and receptors has been assumed.

Table 14.18 Predicted construction noise from activities at Riverside Drive

Construction activity	Closest receptor on Riverside Drive L_{Aeq} dB
Top soil removal	70
Kerb removal	72
Vacuum excavation	72
Laying of new material	71

14.8.24 During works to construct the temporary Riverside Drive parking area, construction noise levels are predicted to be between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during all activities. It has been determined that this is not a significant effect for the following reasons:

a. The duration of this activity to establish the parking area is likely to be less than a month.

b. The works would be moving along Riverside Drive and so no single receptor would be exposed to these noise levels for the duration of the works.

Burnell Avenue site

14.8.25 There are several construction activities in this area that include the establishment of the compound, reception shaft for the TBM, connection shaft and connection works to the TLT, the intake and outfall, and a structure for control equipment and motor control centres (MCCs). There are two options for the in-river discharge outfall under consideration. In terms of noise and vibration they would be similar therefore only one set of calculations is presented. In addition, there are two options for the connection to the TLT: an adit connection direct to the TLT or the pipejacking of a conveyance pipeline to the Tudor Drive site. These two options are sufficiently different and so two sets of calculations are presented.

14.8.26 The predicted construction noise levels during works for the compound and reception shaft at the closest noise sensitive receptors on Burnell Avenue, Northweald Lane/Chivenor Grove and also across the River Thames at Broom Water West are summarised in Table 14.19, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level, or night-time threshold of 55dB $L_{Aeq,T}$, highlighted. All activities are daytime unless stated within the table. No acoustic screening correction between construction works and receptors has been assumed.

Table 14.19 Predicted construction noise from Burnell Avenue site compound and reception shaft

Construction activity	Closest receptor on Burnell Avenue L_{Aeq} dB	Closest receptor at Broom Water West L_{Aeq} dB	Closest receptor at Northweald Lane/ Chivenor Grove L_{Aeq} dB
Set up – utility diversions	62	58	72
Compound – top soil removal	73	61	72
Compound – hardstanding	71	59	71
Compound – paving	70	58	70
Compound – establish buildings, groundworks	71	55	51
Compound – establish buildings, lifting in	71	56	51
Compound – establish buildings, fitting out	71	56	51
Compound – fencing	64	51	64
Compound – operation	66	54	66
Compound – site restoration	68	56	68
Shaft works – ground preparation	69	56	56
Shaft works – shaft caisson jacking	64	52	52
Shaft works – shaft excavation	67	55	55
Shaft works – spray concrete lining	58	45	45
Shaft works – dewatering (and night-time)	34	24	23
Shaft works – shaft operation and TBM removal	58	45	45

14.8.27 During utility diversions at the Burnell Avenue site construction noise levels are predicted to be between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ at the closest residential receptors at Northweald Lane and Chivenor Grove. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The utility diversion works would move along the route of the utility diversions and will not be at the closest position to a receptor for the

duration of the works. When the works are further away the construction noise level will reduce.

b. The duration of the utility diversion works is likely to be less than a month.

14.8.28 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during several phases at the closest residential receptors at Burnell Avenue and Northweald Lane during compound construction. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The duration of the activities to establish the compound is likely to be less than a month.

b. The noise from compound construction would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.29 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during several phases at the closest residential receptors at Burnell Avenue during the ground preparation and excavation activities at the reception shaft. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The predicted noise level during these activities is in the bottom half of the range of 65–75dB.

b. The noise from compound construction would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.30 The predicted construction noise levels during works for the intake and connection shaft at the closest noise sensitive receptors on Dysart Avenue and also across the River Thames at Broom Water West are summarised in Table 14.20, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level, or night-time threshold of 55dB $L_{Aeq,T}$, highlighted. All activities are daytime unless stated within the table. No acoustic screening correction between construction works and receptors has been assumed.

Table 14.20 Predicted noise during intake and connection shaft works

Construction activity	Closest receptor on Dysart Avenue L_{Aeq} dB	Closest receptor at Broom Water West L_{Aeq} dB
Intake – vegetation clearance	62	64
Intake – embankment earthworks	59	61
Intake – cofferdam construction	73	75
Intake – pipework to TLT connection	66	58
Intake – brickwork to intake	62	64
Intake – removal of cofferdam	48	50
Shaft works – caisson jacking	66	54
Shaft works – shaft excavation	69	57
Shaft works – spray concrete lining	58	53
Shaft works – dewatering (and night-time)	34	29

14.8.31 The daytime construction SOAEL of 75dB $L_{Aeq,T}$ is predicted to be exceeded at the closest residential receptors at Broom Water West during piling to construct the cofferdam. These are considered to be likely significant adverse effects. Noise from piling would reduce to below the SOAEL of 75dB $L_{Aeq,T}$ at a distance of 85m, which includes some of the residential dwellings at Broom Water West. The non-residential receptors of the National Cycle Route 4 and Thames Path National Trail also pass within 85m of cofferdam piling. The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The construction of the cofferdams at Burnell Avenue are likely to be undertaken over a period of five weeks with two weeks of piling within that five week period.

14.8.32 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during cofferdam construction at the closest residential receptors on Dysart Avenue. It has been determined through the use of professional judgement that is a likely significant effect for the following reasons:

a. The absolute noise level is in the upper half of the range of 65–75dB

b. This activity would produce sudden high levels of noise that could result in disturbance.

14.8.33 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during several activities at the closest residential receptors at Dysart Avenue including pipework and caisson jacking and shaft excavation. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level is in the lower half of the range of 65–75dB.

b. These activities would not include any operations that would produce sudden high levels of noise that could result in disturbance.

14.8.34 The predicted construction noise levels during works to construct the structure for control equipment (kiosk) and MCCs are summarised in Table 14.21, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level highlighted. All activities would be undertaken during daytime hours. No acoustic screening correction between construction works and receptors has been assumed for works at this location.

Table 14.21 Predicted construction noise during construction of the structure for control equipment and MCCs

Construction activity	Closest receptor on Dysart Avenue L_{Aeq} dB
Ground clearance	61
Foundations and structure	66

14.8.35 During construction of the structure, construction noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ for the foundations and structure. It has been determined through the use of professional judgement that this is not a significant effect for the following reasons:

a. The absolute noise level is less than 3dB above the bottom end of the range of 65–75dB.

b. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.36 The predicted construction noise levels during construction of the outfall at the closest noise sensitive receptors on both sides of the river are summarised in Table 14.22, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level highlighted. All activities would be undertaken during daytime hours. No acoustic screening correction between construction works and receptors has been assumed. The predicted noise levels would be similar for each outfall option.

Table 14.22 Predicted noise from construction of outfall structure

Construction activity	Closest receptor on Burnell Avenue L_{Aeq} dB	Closest receptor at Broom Water West L_{Aeq} dB
Vegetation clearance	61	59
Embankment earthworks	58	56
Cofferdam construction (piling)	72	70
Pipework to TLT connection	63	53
Brickwork for outfall structure	61	58
Removal of cofferdam	47	44

14.8.37 Predicted noise levels are between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ during cofferdam construction at the closest residential receptors on Burnell Avenue and Broom Water West. It has been determined through the use of professional judgement that is a likely significant effect for the following reasons:

a. The absolute noise level is in the upper half of the range of 65–75dB

b. This activity would produce sudden high levels of noise that could result in disturbance.

14.8.38 The predicted construction noise levels during works to construct the connection to the TLT for the closest residential receptors on Dysart Avenue are summarised in Table 14.23. Any exceedance of the daytime or night-time threshold level has been highlighted. There are two options for this connection, one being via a sprayed concrete lined adit to the TLT of about 70m, and the second by a 500m length pipe-jacked conveyance pipeline connection to the TLT at Tudor Drive. Acoustic screening has been assumed for the plant that will be operating at the base of the shaft for both options.

Table 14.23 Predicted construction noise from construction options for connection to the TLT

Construction option	**Closest receptor on Dysart Avenue** **L_{Aeq} dB**
Construction of adit connection – daytime	65
Construction of adit connection – night-time	55
Pipejacking conveyance pipeline – daytime	65
Pipejacking conveyance pipeline – night-time	57

14.8.39 The works to construct the connection to the TLT are predicted to be between the daytime LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$ at the closest residential receptors on Dysart Avenue for both construction options during the daytime. It has been determined through the use of professional judgement that this is not a likely daytime significant adverse effect for the following reasons:

a. The absolute noise levels are within the bottom half of the range of 65–75dB.

b. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.40 As this connection would be constructed on a continuous basis, the construction thresholds for the night-time periods have also been considered. It has been assumed that heavy vehicles used to remove spoil would not operate outside of daytime working hours, resulting in lower noise levels from the activities during the night. The predicted construction noise levels for both options are above the night-time SOAEL of 55dB $L_{Aeq,T}$. This is a likely significant adverse effect. Noise from this activity would reduce to below the night-time SOAEL of 55dB $L_{Aeq,T}$ at a distance of 50m from adit works and 60m

from conveyance pipeline works, which includes residential dwellings at Dysart Avenue and Biggin Hill Close. There are also the non-residential receptors of the National Cycle Route 4 and Thames Path National Trail within 60m of these works. The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The nighttime adit works would have a construction duration of six and a half months while the conveyance pipeline would have a construction duration of three months.

Tudor Drive site

14.8.41 There are two options for the connection to the TLT at this location. One is for a direct connection from the existing shaft, and the second requires construction of a new TLT connection shaft. The predicted construction noise levels during these works, and the connection to the TLT at Tudor Drive for the closest residential receptors on Tudor Drive are summarised in Table 14.24, with any exceedance of the 75dB $L_{Aeq,T}$ daytime threshold level, or night-time 55dB $L_{Aeq,T}$ threshold highlighted. All construction phases are expected to be carried out during standard daytime hours, with the exception of dewatering, which would need to occur continuously during construction. No acoustic screening correction between construction works and receptors has been assumed for all works, except dewatering where the pumps would be screened by the shaft.

Table 14.24 Predicted construction noise from connection to TLT at Tudor Drive site

Construction activity	Closest receptor on Tudor Drive L_{Aeq} dB
Shaft works – caisson jacking	72
Shaft works – shaft excavation	73
Shaft works – spray concrete lining	66
Shaft works – dewatering (and night-time)	42
TLT connection	64

14.8.42 Three of the activities to construct a TLT connection shaft at Tudor Drive are predicted to be between the daytime construction LOAEL of 65dB $L_{Aeq,T}$ and daytime construction SOAEL of 75dB $L_{Aeq,T}$ at the closest residential receptors at Tudor Drive. It has been determined through the use of professional judgement that this is not a likely significant adverse effect for the following reasons:

a. The existing noise level in the area of Tudor Drive is likely to be high from existing road traffic and so the increase in noise from the works may not be noticeable.

b. This activity would not include any activities that would produce sudden high levels of noise that could result in disturbance.

14.8.43 The works to connect to the TLT at Tudor Drive are predicted to be below daytime construction LOAEL of 65dB $L_{Aeq,T}$. This indicates no likely significant effect.

14.8.44 There are no non-residential receptors within the vicinity of the works where significant adverse effects are likely.

Construction vibration

14.8.45 The assessment of vibration during construction has considered the potential impact during piling at the Mogden STW Eastern Work Area embankment stabilisation and the new platform to support the TTP.

14.8.46 The piling method is assumed to be percussive, using a SL30 hammer rig, or similar, operating within a dense granular soil. This type of vibration would be considered as transient in relation to building response. Results from these calculations are presented in Table 14.25.

Table 14.25 Predicted construction vibration

Works location and activity	Closest sensitive receptors	Predicted PPV mm/s
Mogden STW Eastern Work Area – embankment stabilisation piling	Trevor Close	3.7
Mogden STW Eastern Work Area – TTP platform foundations piling	Trevor Close	2.5

14.8.47 The predicted levels of vibration at all receptors are below the 12mm/s threshold level for potential cosmetic damage for structurally sound buildings. There is therefore no likely significant effect to structures from vibration during piling.

14.8.48 The predicted levels of vibration at receptors are above the 1.0mm/s SOAEL for human response. These are likely significant adverse effects. The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The embankment piling works would include intermittent piling over a period of three and a half months.

14.8.49 At this point the only non-residential receptors within the vicinity of the works, that has been considered to have potential likely significant effects (due to the potential for sensitive equipment or patients), is Medex Health.

14.8.50 Further investigation into the facilities at Medex Health will be undertaken to understand their sensitivity to vibration.

Tunnel Boring Machine

14.8.51 At this preliminary stage of assessment, the impact from the use of the TBM has been considered by examining the predicted impacts from two recent tunnelling projects in or around London. For the assessment that will be presented in the ES, numerical modelling will be used to calculate the groundborne noise and vibration from the operation of the TBM.

14.8.52 The two recent tunnelling projects examined are the Silvertown Tunnel (Transport for London, 2016) and the Lower Thames Crossing (National Highways, 2022). The Silvertown Tunnel project opened to traffic in April 2025 whereas the Lower Thames Crossing has recently been consented.

14.8.53 Table 14.26 presents the tunnel parameters from these two projects. Table 14.27 shows the predicted levels of groundborne noise and vibration obtained from numerical modelling. These have been taken from the ESs of these two example projects. Both of these projects used numerical modelling to predict the groundborne noise and vibration from the TBM and the calculations would have included input parameters such as soil type and TBM power. The input parameters for these two example projects are unknown and so cannot be reported here.

14.8.54 For comparison, the proposed depth of the Project conveyance tunnel will vary between approximately 20m and 40m below ground level in the areas where it passes under buildings, with the proposed tunnel internal diameter being 3.5m. Although the exact alignment of the Project tunnel has yet to be finalised, given the density of buildings in some areas, it can be assumed that at some stage the tunnel will pass directly under buildings and so the depth of the tunnel would be the same as the closest distance to a receptor.

Table 14.26 Tunnel parameters from recent TBM assessments in or around London

Project and receptor details	Depth, m	Distance to receptor, m	Diameter, m
Silvertown Tunnel (closest receptor)	15	170	11.5
Lower Thames Crossing main tunnel (closest receptor)	25	118	16.5
Lower Thames Crossing main tunnel (Thames and Medway Canal)	25.6	25.6	16.5
Lower Thames Crossing grouting tunnel (closest receptor)	7.5	134	5.8
Lower Thames Crossing grouting tunnel (Thames and Medway Canal)	7.5	7.5	5.8
Lower Thames Crossing micro TBM (closest receptor)	3	38	0.75

Table 14.27 Predicted noise and groundborne vibration from recent TBM assessments in or around London

Project and receptor details	Groundborne noise, L_{ASmax} dB	Vibration on structures, PPV mm/s	Human response to vibration, VDV mm/s
Silvertown Tunnel (closest receptor)	32.3	0.0082	<0.01
Lower Thames Crossing main tunnel (closest receptor)	-2	0.003	0.001
Lower Thames Crossing main tunnel (Thames and Medway Canal)	n/a	0.03	n/a
Lower Thames Crossing grouting tunnel (closest receptor)	-8	0.002	0.0007
Lower Thames Crossing grouting tunnel (Thames and Medway Canal)	n/a	0.04	n/a
Lower Thames Crossing micro TBM (closest receptor)	13	0.0006	0.0006

14.8.55 The Silvertown Tunnel and Lower Thames Crossing reports both concluded that these predicted levels of noise and vibration impacts were below the relevant impact criteria and, had a negligible impact and had no significant effects. From the tunnel variables presented in Table 14.26 there is no direct comparison available with those expected for the Project. In terms of TBM diameter, the grouting tunnel for Lower Thames Crossing is the closest in comparison to the Project, and if the predicted level of vibration when above the Thames and Medway Canal (7.5m) is considered (i.e. PPV of 0.04mm/s) then this is a magnitude of 150 times below the impact criteria of 6mm/s where significant effects may occur from continuous vibration in relation damage at a structurally sound building. Given this, it is considered unlikely that the use of the TBM for the Project would result in significant effects.

14.8.56 The numerical modelling that will be undertaken for the ES involves the use of advanced computational methods to calculate the groundborne noise and vibration from the TBM at individual receptors. Finite element methods are one example that is commonly used for these types of calculation. This modelling is usually undertaken using specialist computer software which can process complex calculations efficiently. The model uses input data such as soil

properties, TBM operational parameters, tunnel depth and receptor locations to predict the level of vibration.

Construction traffic

14.8.57 For this assessment it is assumed that all deliveries to and removal of material from the various construction sites will be transported by road. The use of river transport is still an option but at this stage there is insufficient information available to undertake a quantitative assessment of impacts from this transport option. If river transport is used, then impacts from this would be assessed within the ES.

14.8.58 Considering the potential increase in noise from traffic on the road network, the assessment approach examines the increase in noise over the existing situation. This requires knowledge of the expected traffic flow with and without the Project. The expected traffic generated by the Project has been predicted and is presented within Chapter 12: Traffic and Transport. However, at this stage of assessment only the existing flows for the A-roads within the study area are available, and so an assessment can only be undertaken of impacts expected at sensitive receptors alongside these roads. Within Chapter 12: Traffic and Transport, it is reported that during the Project construction the increase in traffic on the A-roads in the study area is less than 1%, which would be an increase in noise of less than 0.1dB. Using the magnitude of impact scale presented in Table 14.8 this would be a Negligible magnitude of impact and is not considered to be a likely significant effect.

14.8.59 Details of the existing traffic flows on the minor roads within the study area are expected to be available for the ES and an assessment will therefore be included at that stage. It is expected that the magnitude of impact on these roads would be Negligible or Small, due to the small, predicted increase in noise associated with construction traffic, which would not be considered a likely significant effect.

Summary of construction impacts

14.8.60 Table 14.28 provides a summary of the identified preliminary likely significant effects from construction. All the effects reported within the table are adverse.

Table 14.28 Preliminary assessment of likely significant effects during construction

Receptor	Impact assessment	Sensitivity of receptor	Magnitude of impact	Likely significance of effect
Residential Wainwright Grove / Harvesters Close	Construction noise Mogden Western Work Area – night-time TBM operation	Sensitive	Above SOAEL	Significant
Residential Bankside Close, Hillary Drive, Trevor Close and Beaumont Place	Construction noise Mogden Eastern Work Area – daytime embankment piling	Sensitive	Above SOAEL	Significant
Residential Bankside Close, Trevor Close and Beaumont Place	Construction noise Mogden STW Eastern Work Area – daytime TTP buildings foundation piling	Sensitive	Above SOAEL	Significant
Residential Broom Water West	Construction noise Intake – daytime cofferdam piling	Sensitive	Above SOAEL	Significant
Residential Dysart Avenue	Construction noise Intake – daytime cofferdam piling	Sensitive	Between LOAEL and SOAEL	Significant
Residential Dysart Avenue and Broom Water West	Construction noise Outfall – daytime cofferdam piling	Sensitive	Between LOAEL and SOAEL	Significant
Residential Dysart Avenue	Construction noise – night-time adit connection	Sensitive	Above SOAEL	Significant
Residential Dysart Avenue and Biggin Hill Close	Construction noise – night-time conveyance pipeline	Sensitive	Above SOAEL	Significant
Residential Trevor Close & Healthcare (Medex Health)	Construction Vibration (human response) Mogden Eastern Work Area Piling of embankment and TTP platform	Sensitive	Above SOAEL	Significant

Operation phase

Mogden STW site

Western Work Area

14.8.61 Once the Project is operational there would be no noise or vibration generated from the drive shaft at this location. Therefore, no assessment of impacts from noise or vibration has been undertaken.

Eastern Work Area

14.8.62 The assessment of operational impacts from the TTP compares the existing background noise level with the predicted noise from the TTP. Any acoustic features (e.g. tonality, impulsivity) are also subjectively taken into consideration within the assessment by adding a correction of up to 9dB(A).

14.8.63 To gain an understanding of the likely noise level from an operational TTP, a visit was made to a recently constructed TTP at the Benson STW in Oxfordshire. The visit was on 7 March 2025 where observations were made and source noise measurements undertaken at various positions around the TTP. It was identified that the primary noise source was from a bank of four blowers, of which two were operating at the time of the measurements. The Project Liaison Engineer from Thames Valley Operations confirmed that having two blowers in operation at any one time was the normal operating procedure for that TTP.

14.8.64 Details of the noise measurements undertaken at Benson STW on 7 March 2025 are contained within Appendix 14.2: Baseline Noise Survey Results.

14.8.65 The background noise level used for the assessment is the mode L_{A90} at night of 52dB(A), as is shown in Table 14.12. Taking the measured noise level of 62dB(A) at 4.5m from the blowers at Benson STW, once corrections have been made for distance and screening, this provides a predicted noise level of 31dB(A) at the closest sensitive receptor 50m away in Hillary Drive. A 3dB(A) acoustic feature correction has been added to account for the readily distinctive sound of the blowers to give a noise rating level at the closest receptor of 34dB $L_{Ar,Tr}$. This predicted noise rating level is 18dB(A) below the background noise level, and in accordance with scale of magnitude provided in Table 14.11, this would be a negligible impact and not a likely significant effect.

Intermediate shaft site

14.8.66 Once the Project is operational there would be no noise or vibration generated from the shaft at this location. Therefore, no assessment of impacts from noise or vibration has been undertaken.

Burnell Avenue site

Intake and outfall structures

14.8.67 Within the EIA Scoping Report (Thames Water, 2024), it was proposed to scope out an operational noise and vibration assessment for these structures. However, within their Scoping Opinion (PINS, 2024), PINS requested further details regarding how this would be appropriately mitigated. Until these details are provided and agreed, PINS were unable to agree to scope this matter out.

14.8.68 At these two locations noise and vibration could be generated by the presence of pumps. However, the design would mean the flow of water at both these structures is by gravity and no noise or vibration generating plant is required. An assessment of noise and vibration at these structures is therefore not considered to be required as there would be no items of plant within the structures that would generate a noticeable level of noise or vibration. This is therefore mitigated through embedded design (primary) as there would be no noise generating items of plant (e.g. pumps) present.

Reception and TLT connection shaft sites

14.8.69 Once the Project is operational there would be no noise or vibration generated from the shaft at this location. Therefore, no assessment of impacts from noise or vibration has been undertaken.

Structure for control equipment and MCCs

14.8.70 This structure, which could take the form of a kiosk, would contain electrical equipment for the operation of the intake and outfall structures. The only item within the structure likely to generate noise would be a transformer. Any noise from a transformer can readily be mitigated through the use of material that would be considered at detailed design. There would be no noticeable level of vibration generated from the structure.

Adit connection and Tudor Drive (TLT connection)

14.8.71 Once the Project is operational there would be no noise or vibration generated from the shaft at this location. Therefore, no assessment of impacts from noise or vibration has been undertaken.

Cumulative effects

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

In-combination effects with climate change

14.8.73 Future climate change has the potential to alter the noise climate, as rainfall, temperature and wind are factors that can influence the propagation of noise. However, none of these factors are used within the NNNPS (Department for Transport, 2014) stated calculation methodologies for the assessment for construction or operational industrial noise.

14.8.74 Weather conditions, or any potential changes in weather conditions, are not considered within the methodologies used in the assessment of potential impacts for this Project.

14.8.75 It has therefore been determined that the potential significant effects identified for noise and vibration are unlikely to be exacerbated further by climate change.

14.9 Additional (secondary) mitigation and enhancement measures

Additional (secondary) mitigation

14.9.1 Mitigation measures are defined in Chapter 4: Approach to Environmental Assessment of this PEI Report. Embedded design (primary) mitigation and standard good practice (tertiary) specific to this aspect are described in Section 14.4.

14.9.2 There are no additional (secondary) mitigation measures identified for construction noise or vibration at this stage. Examples of mitigation measures that could be considered include the provision of screening or an enclosure for the conveyor drive units associated with night-time TBM operation at the Mogden STW Western Work Area. For piling works, noise mitigation could include the selection of quieter piling methods, or the use of a piling shroud or other screening close to the piling hammer to reduce noise. Mitigation during the night-time works associated with the connection works to the TTP at Burnell Avenue site could include the provision of screening around these works. An example of mitigation from vibration from piling would be a different technique to percussive piling. These would be explored and reported in the ES.

Enhancement measures

14.9.3 There is no scope for enhancement with the operation of the works proposed.

14.10 Summary of residual likely significant effects

14.10.1 This section determines the likely significant effects of those receptors identified in Section 14.8. Any additional (secondary) mitigation described in Section 14.9 is taken into consideration, as are the factors listed in Section 14.5.

Construction

Construction noise

Mogden STW site – Western Work Area

14.10.2 The night-time construction SOAEL of 55dB $L_{Aeq,T}$ is met at the closest residential receptors at Wainwright Grove during TBM operation. This is considered to be a significant adverse effect. Noise from works to support the TBM operation would fall below the SOAEL of 55dB $L_{Aeq,T}$ at a distance of 95m. There are residential dwellings west of the shaft on and alongside the site boundary on Wainwright Grove and Harvesters Close that are within 95m of these works. There are no noise sensitive receptors other than residential dwellings likely to be impacted by construction noise in this area.

Mogden STW site – Eastern Work Area

14.10.3 The daytime construction SOAEL of 75dB $L_{Aeq,T}$ is predicted to be exceeded at the closest residential receptors during embankment piling works and TTP foundations piling. These are significant adverse effects. Noise from piling would fall below the SOAEL of 75dB $L_{Aeq,T}$ at a distance of 85m. There are residential dwellings east and south of the works alongside the site boundary on Bankside Close, Hillary Drive, Trevor Close and Beaumont Place that are within 85m of these works.

14.10.4 The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The embankment piling works would include intermittent piling over a period of three and a half months and the foundation works would be require intermittent piling over a six month period.

Ham Playing Fields site

14.10.5 No potentially significant adverse impacts have been identified from works to be undertaken at the Ham Playing Fields site.

Burnell Avenue site

14.10.6 During piling to construct the intake cofferdam, the daytime construction SOAEL of 75dB $L_{Aeq,T}$ is predicted to be exceeded at the closest residential receptors at Broom Water West, and during outfall cofferdam piling to be between the LOAEL of 65dB $L_{Aeq,T}$ and SOAEL of 75dB $L_{Aeq,T}$. This is a significant adverse effect. Noise from piling would reduce to below the SOAEL of 75dB $L_{Aeq,T}$ at a distance of 85m. There are residential dwellings at Broom Water West that are within 85m of these works. The National Cycle Route 4 and Thames Path National Trail also pass within 85m of cofferdam piling. As users would be

impacted by noise only while passing the cofferdam piling, the effect is considered as not significant.

14.10.7 The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The construction of the cofferdams at Burnell Avenue are likely to be undertaken over a period of five weeks with two weeks of piling within that five week period.

Adit (TLT connection)

14.10.8 The works to connect to the TLT by either adit connection or conveyance pipeline are predicted to be above the night-time SOAEL of 55dB $L_{Aeq,T}$ at the closest residential receptors on Dysart Avenue. This is a significant adverse effect. Noise would fall below the night-time SOAEL of 55dB $L_{Aeq,T}$ at a distance of 60m. There are residential dwellings at Dysart Avenue and Biggin Hill Close that are within 60m of these works. The National Cycle Route 4 and Thames Path National Trail also pass within 60m of these works, though users would be impacted by noise only while passing the connection works.

14.10.9 The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The nighttime adit works would have a construction duration of six and a half months while the conveyance pipleine connection would have a construction duration of three months.

Tudor Drive site shaft construction

14.10.10 No potentially significant adverse impacts have been identified from works to be undertaken at the Tudor Drive site.

Construction vibration

14.10.11 The predicted levels of vibration from the piling of the embankment at the Mogden STW Eastern Work Area are above the SOAEL for human response of 1.0mm/s. These are significant adverse effects and would extend to residential dwellings within Hillary Drive (including Medex Health), Bankside Close, Lynton Close, Mann’s Close, Trevor Close and Beaumont Place. Beyond these locations the level of vibration from piling would reduce to below the SOAEL.

14.10.12 The assessment undertaken here is a precautionary worst case for the purpose of this preliminary assessment. The embankment piling works would include intermittent piling over a period of three and a half months.

14.10.13 Table 14.29 presents a summary of the likely significant residual effects with currently no identified mitigation.

Table 14.29 Summary of residual likely significant effects for noise and vibration construction phase

Site	Description of effect	Likely significance of effect	Additional (secondary) mitigation and enhancement measures	Residual effects
Mogden STW Western Work Area	Night-time TBM operation	Significant adverse	None identified at PEI Report stage	Significant adverse
Mogden STW Eastern Work Area	Daytime embankment piling	Significant adverse	None identified at PEI Report stage	Significant adverse
Mogden STW Eastern Work Area	Daytime TTP foundations piling	Significant adverse	None identified at PEI Report stage	Significant adverse
Burnell Avenue	Daytime intake and outfall cofferdam piling	Significant adverse	None identified at PEI Report stage	Significant adverse
Dysart Avenue and Biggen Hill	Night-time construction of connection to TTP	Significant adverse	None identified at PEI Report stage	Significant adverse
Mogden STW Eastern Work Area	Construction vibration (human response) during piling of embankment and platform foundations	Significant adverse	None identified at PEI Report stage	Significant adverse

14.11 Next steps

14.11.1 Prior to the production of the ES the following work is expected to be undertaken:

a. An assessment of the possible groundborne noise and vibration impacts from the TBM would be undertaken using numerical modelling

b. The applicant will explore opportunities to undertake further noise baseline surveys at Burnell Avenue site and Ham Street site

c. If necessary, the construction noise and vibration assessment would be updated to consider any changes to design or likely plant that would be used

d. Greater detail will be developed for the intensity and duration of construction activities to provide a more accurate understanding of likely significant effects (the preliminary assessment provided her provides a reasonable worst case at the time of writing)

e. Measures will be examined to reduce the noise and vibration from those activities where significant adverse effects have been identified. Following the examination of possible mitigation measures, the duration of any remaining significant effects would be provided in the ES

f. Should the river or rail network be used for importing or exporting material or spoil, an assessment would be undertaken of the impact arising from this activity

g. Where additional traffic data are available the assessment of impacts from construction traffic would be updated

h. Further investigation will be undertaken into the sensitivity of Medex Health to temporary construction vibration in order to better understand potential significant effects

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