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anglianwater

Cambridge Waste Water Treatment Plant Relocation Project

Preliminary Environmental Information

February 2022

Noise and vibration

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Summary

This paper has been produced to identify the likely significant effects resulting from noise and vibration impacts related to the Proposed Development following preliminary environmental impact assessment.

Anglian Water recognises that noise and vibration during construction and operation may be a concern to local residents and other stakeholders. This paper uses worst case assumptions to consider on a qualitative basis where adverse impacts and potentially significant adverse effects may arise due to noise and vibration. It sets out the basis on which the preliminary assessment has been made and explains what mitigation is proposed to reduce the effects of noise and vibration where these arise. There is an ongoing commitment to work with the environmental health officers of the local planning authorities, with other stakeholders and delivery partners to avoid significant adverse effects where possible and minimise adverse impacts on local residents and the community. This commitment will remain in place during subsequent planning stages, through construction and into the operation of the Proposed Development.

Construction of major infrastructure inevitably produces noise and vibration. High noise and vibration levels due to construction activities at receptor locations can result in adverse effects. In relation to noise and vibration, an adverse effect depends on a number of factors such as the existing soundscape, the characteristics of the noise and the duration and timing of the noise or vibration. The effects of noise and vibration are therefore variable (as described in Figure 1). Preliminary assessment using worst-case assumptions indicates that for most parts of the study area considered for noise and vibration there are very few impacts that are potentially significant. There are, however, localised areas with sensitive receptors where high noise and vibration levels may arise due to proposed temporary construction activities which would occur nearby.

Significant adverse noise and vibration effects may arise during some of the planned construction activities which would occur for an extended duration (e.g. greater than 10 days in 15 consecutive days or 40 days in a 6 month period) or at times of the day when sensitivity to noise impacts is higher (e.g. the early morning, Saturday afternoon, Sundays and night-time periods)[1].

[1] BS5228 Part 1, Annex E 'Significance of noise effects' presents various methods of determining the significance of noise effects due to construction works. The method detailed in Annex E.3.2 is referred to and sets out appropriate periods (night, evening/ weekends or day). Noise thresholds are specified and differentiated for Saturdays with a specific period between 7:00am and 1:00pm having a different (higher) noise threshold to the period 1:00pm to 11:00pm.

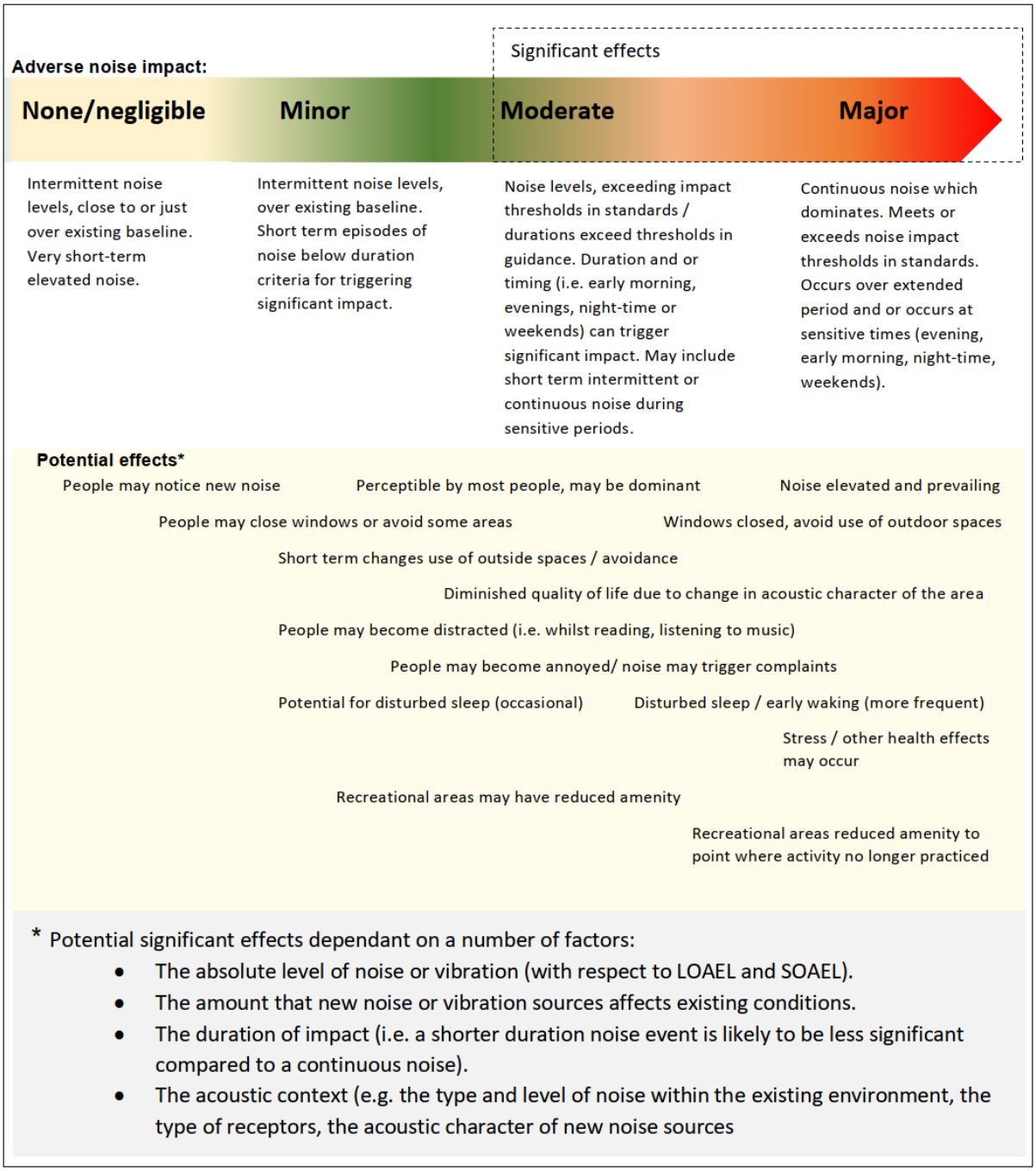
Receptors that are potentially subject to significant adverse effects include those closest to horizontal directional drilling (HDD) works, to excavation and tunnelling works, and to associated construction traffic using minor roads and haul roads. Potential significant adverse noise and vibration effects due to these activities would typically be localised and affect only a small number of receptors close to the proposed works.

Recreational users of Public Rights of Way (PRoW) and the River Cam adjacent to construction working areas may also experience temporary adverse effects during the construction phase. However, these are unlikely to result in significant adverse effects due to the limited exposure users would receive whilst moving past areas where construction is ongoing.

The resulting noise impacts due to construction of the proposed waste water treatment plant (WWTP) itself are expected to be low due to the distance from works to nearest sensitive receptors. Construction within the area of land required for the proposed WWTP is therefore unlikely to result in significant adverse effects, including in respect of the nearest residential receptors at Biggin Abbey and the Gatehouse.

Mitigation during construction will be implemented to reduce potential noise and vibration impacts where possible. Measures are set out within the **Code of Construction Practice (CoCP)** and the **Construction Traffic Management Plan (CTMP)** (outline documents for each of these are included as part of the PEI).

The location of the proposed WWTP is relatively distant (i.e., greater than 500m) from noise sensitive receptors. Once operational, embedded mitigation as part of the design of the proposed WWTP, such as the selection of low noise equipment, acoustic housings and the earthwork bank, would aim to avoid significant adverse effects and to minimise potential noise impacts. Taking into account these design features, preliminary assessment indicates that the noise impact from operation of the proposed WWTP would be low and unlikely to be noticeable when considered against the existing background noise environment.



Source: after IEMA (2014) Guidance for Environmental Noise Assessment, and DCLG (2021) Guidance Noise Exposure Hierarchy Paragraph: 005 Reference ID: 30-005-20190722

Figure 1: Qualitative summary of noise impacts and effects

Document purpose

The **Noise and Vibration** information paper sets out preliminary information in relation to noise and vibration associated with the construction and operation of the relocated Cambridge waste water treatment works. This paper sets out the preliminary findings of the noise and vibration impact assessment, comprising a review of the existing environment and identification of potential noise and vibration impacts. It sets out how we intend to mitigate and manage noise and vibration impacts.

This information paper should be cross-read with the Environmental Information Papers for **Traffic and transport, Historic environment**, **Community** and **Recreation** information papers.

Limitations and assumptions

This paper has been written based on currently available information, including design information (e.g. plant layout and specifications required for operation of the Proposed waste water treatment plant, and construction information including methodology, timings and programme). Preliminary information has been used to estimate the likely noise and vibration levels and potential impacts using reasonable worst-case scenarios where appropriate. This information may be subject to change during the ongoing development of the design which may influence the findings of the environmental impact assessment (EIA) process. The updated design information will be used to complete noise and vibration predictions within the Environmental Statement (ES).

The earliest construction is expected to start is 2024. We have assumed a start date of April 2024 for the purposes of this Preliminary Environmental Information. The proposed WWTP is planned to be fully operational in 2028. The maximum duration of construction works in particular areas are set out in this Paper, where necessary. All dates shown are subject to change and are preliminary.

Baseline noise surveys have been completed at locations surrounding the site that have the potential to be affected by changes in noise due to the Proposed Development. These noise surveys provide an understanding of existing noise conditions at noise sensitive receptors and in the surrounding communities. This survey data has informed the preliminary assessment of noise impacts arising during the construction and operational phases and will be presented in full within the ES.

Noise and Vibration overview

The following provides a summary of relevant legislation, policy and guidance which has informed the preliminary assessment and mitigation design to control and manage noise and vibration during construction and operation of the Proposed Development:

- Sections 60 and 61 of the Control of Pollution Act 1974 concern impacts relating to construction sites and the Environmental Protection Act 1990 places a duty on local authorities to serve abatement notices where noise from premises, vehicles and machinery is judged to constitute a statutory nuisance. Compliance with these controls is required although the requirements fall outside the planning system.
- The Land Compensation Act 1973 Part 1 includes provision for compensation for loss in property value resulting from physical factors, including noise and vibration, resulting from the use of public works.
- The Environmental Noise (England) Regulations implement European legislation requiring noise action plans to be developed on a five-year rolling programme. The action plans seek to manage noise issues and effects including noise reduction, if necessary, based on the results obtained through a national mapping process of major noise sources.
- National planning policy relevant to noise and vibration and pertinent to the proposed WWTP includes the National Planning Policy Framework (NPPF), National Policy Statement (NPS) for Waste Water which addresses both construction and operational noise and which makes reference to the Noise Policy Statement for England (NPSE).

The NPSE policy has three main aims which developers should seek to apply within the context of sustainable development:

- to avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life through effective management and control of environmental, neighbour and neighbourhood noise.

The NPSE also defines the following terms which are relevant in assessment of noise impacts:

- Lowest Observed Adverse Effect Level (LOAEL): this the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL): this is the level above which significant adverse effects on health and quality of life occur.

Noise and vibration LOAEL and SOAEL values and significance criteria have been defined within the CWWTPR Scoping report (Anglian Water, 2021).

National and local planning policy identify the need for a site-specific assessment to consider the impacts of noise and vibration during both construction and operational phases.

In general, the magnitude of noise and vibration impacts and the significance of effects as assessed within EIA are based on several factors. The significance of effect is not solely dependent on the absolute level of noise or vibration at a receptor location. These factors include:

- The absolute level of noise or vibration (with respect to LOAEL and SOAEL).
- The degree that new noise or vibration sources affects existing conditions.
- The duration of impact (i.e. a shorter duration noise event is likely to be less significant compared to a continuous noise).
- The acoustic context (e.g. the type and level of noise within the existing environment, the type of receptors, the acoustic character of new noise sources).

The legislative requirements and policy aims, including the NPS for Waste Water and NPSE, have influenced the design process and proposed mitigation measures as discussed within this preliminary assessment. The design and mitigation measures aim to avoid significant noise and vibration impacts and minimise adverse noise impacts on health and quality of life.

British standards and industry standard guidance provide methodology for the assessment of noise and vibration. These standards include British Standard 5228 for the assessment of construction noise and vibration, and British Standard 4142 for the assessment industrial noise sources, and the Design Manual for Roads and Bridges LA 111 for the assessment of road traffic noise. The principles of these have been applied qualitatively to preliminary assessment and will be fully implemented quantitatively within the Environmental Statement (ES).

Existing noise levels

We have reviewed the Proposed Development against information available for the surrounding area to identify locations that may be affected by changes to noise and vibration as a result of the relocation of the existing Cambridge WWTP. Generally, for all types of development, locations that may be sensitive to changes in noise and vibration include residential dwellings, educational facilities such as schools and nurseries, listed buildings and assets of historic interest, community facilities such as village halls and health centres, as wells as external spaces that provide recreational amenity to the local community (for example parks, and Public Rights of Way (PRoW)).

Please also refer to the **Community Information Papers** and **the Environmental Information Paper: Recreation** which provide additional information on community uses within areas surrounding the Proposed Development.

The closest residential receptors to the Proposed Development include those in surrounding communities within Milton, Horningsea, north Cambridge in Chesterton and Fen Ditton. Residential receptors adjacent to the proposed new pipeline route section from Waterbeach to the proposed WWTP include those within Waterbeach, Clayhithe and Horningsea.

Baseline noise measurements have been completed at locations representative of the closest noise sensitive receptors to construction and operational noise sources[2]. The noise surveys included a combination of unattended measurements (these measure noise conditions continuously over a period of approximately 1 week) supplemented with attended measurements at a number of other locations (completed during the daytime only). Full survey results will be presented within the ES.

The closest noise sensitive receptors to the Proposed Development are mostly located in rural settings. Noise measurements of existing conditions show that noise levels are typically higher at locations closer to main roads including the A14 and A10. Extant noise levels in the area immediately surrounding the proposed WWTP are dominated by road traffic from the A14.

Existing noise levels in areas further from the A14 and A10 are characterised by a combination of other sources including road traffic from minor roads, rail, aircraft, commercial or agricultural activities, and environmental noise sources such as birdsong and wind in trees.

Background noise levels relevant for assessment of impacts from new operational noise sources within the proposed WWTP are measured in terms of the $L_{A90,T}$[3] parameter. Potential noise impacts due to operation of the new plant would be greatest during the night-time period when existing noise levels are lowest. Noise survey data from the closest receptors surrounding the proposed WWTP show that the typical night-time background noise level at those receptors to be between approximately 35-40 dB $L_{A90,T}$.

There are no significant existing sources of vibration surrounding the Proposed Development that are relevant to or affect the assessment of associated construction and operation impacts.

Waterbeach New Town[4] development proposals (S/2075/18/OL[5] and S/0559/17/OL[6]) are proposed in land located to the north of the existing settlement of Waterbeach. These consist of residential development of around 11,000 new homes in total (over both east and west sites), retail and office use, educational facilities (primary, secondary schools and a sixth form centre) and community, recreation, and leisure space.

In relation to the Waterbeach New Town development (S/0791/18/FL[7]) an application has been submitted to relocate Waterbeach Rail Station from its existing site at Station Road to

[2] The selection of these locations was discussed and agreed with the local authority.
[3] BS 4142 is the British Standard used to assess the impact of operational noise and defines the background noise level in terms of the $L_{A90,T}$. The $L_{A90,T}$ is the A-weighted noise level that is exceeded for 90% of a given time interval.
[4] More information on Waterbeach New Town available at: http://www.waterbeach.co.uk/
[5] S/2075/18/OL refers to the planning application reference submitted to the relevant local authorities. The application outcome can be found at: https://scambs.moderngov.co.uk/ieDecisionDetails.aspx?AIId=87494
[6] S/0559/17/OL refers to the planning application reference submitted to the relevant local authorities. The application outcome and be found at: https://scambs.moderngov.co.uk/ieDecisionDetails.aspx?Id=11063
[7] S/0791/18/FL refers to the planning application reference submitted to the relevant local authority. The application outcome can be found at: https://scambs.moderngov.co.uk/ieDecisionDetails.aspx?AIId=74679

a new site east of Bannold Drove. The timing of these proposals is uncertain; however, it is reasonable to expect that some construction activities could coincide within the same time when the Proposed Development is in construction.

In addition to the potential impact of noise and vibration on people and communities, the NPS for Waste Water also requires that the impact of noise on protected species or other wildlife should be considered and that the results of any noise surveys and predictions should be used to inform the ecological assessment. The assessment work on protected species and wildlife will be included in the Biodiversity chapter within the ES.

Figure 2 summarises the nearest receptors, existing condition and noise measurement locations.

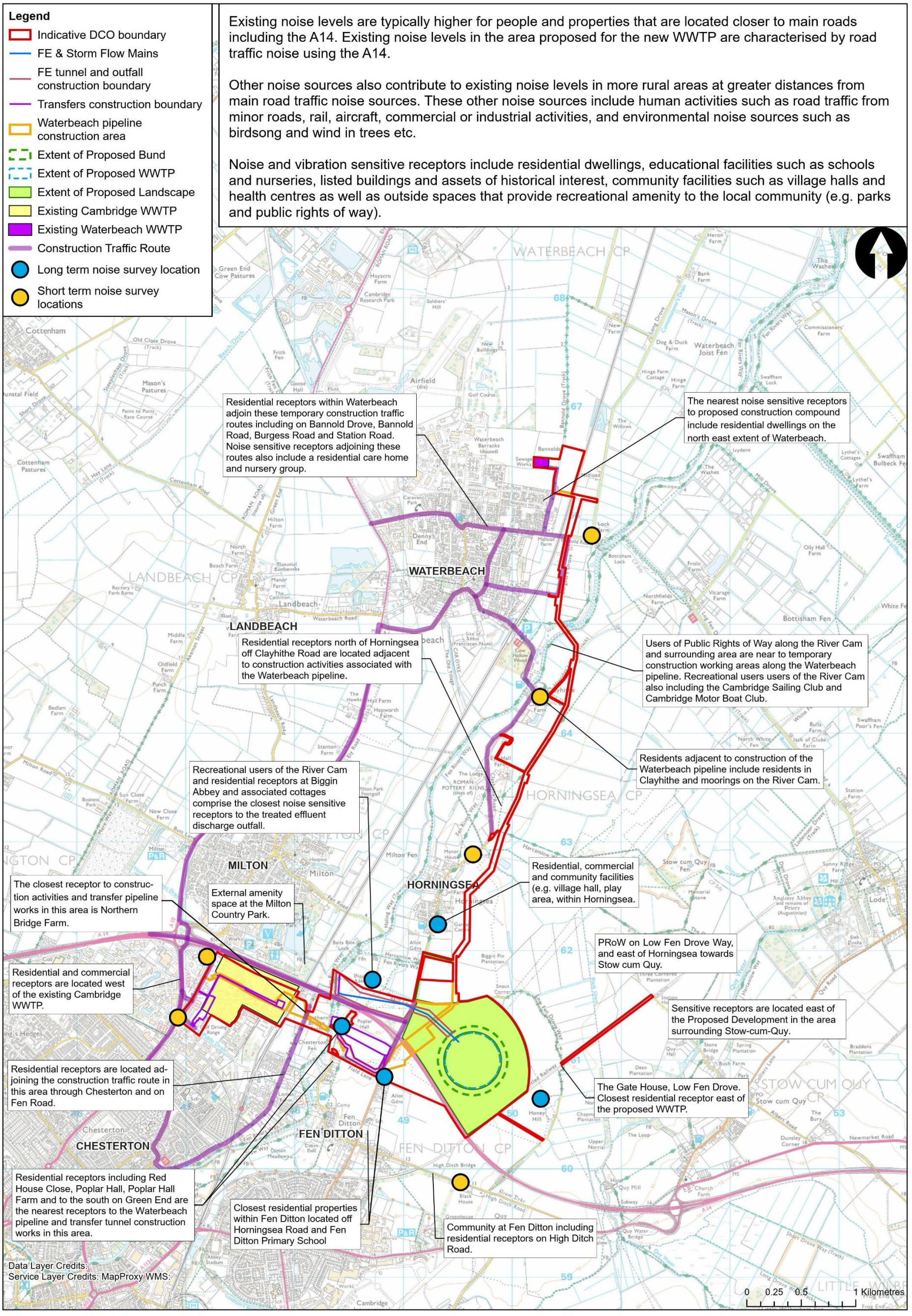


Figure 2: Noise and vibration receptors and existing conditions overview

How would the construction of the proposed relocation of Cambridge Waste Water Treatment Plant change noise and vibration during construction?

The significance of noise and vibration impacts within Environmental Impact Assessment is subject to several factors as set out above. Construction activities that generate high noise or vibration levels at the nearest receptors would result in adverse effects. Significant adverse effects are likely to occur where construction noise and vibration levels exceed significance thresholds informed by British Standards and become dominant over an extended period (e.g. greater than 10 days in 15 consecutive days or 40 days in a 6 month period).

Construction noise overview

During the construction of the Proposed Development the following have to potential to increase noise levels and may result in adverse impacts:

- Enabling and preliminary activities for different areas within the land required for the construction of the Proposed Development. These include vegetation clearance and ground preparation, construction of access and haul roads, installation of fencing and temporary construction offices and welfare areas.
- The use of construction equipment to complete all construction activities including excavations, movement of materials (including loading and unloading), produce and pour concrete, tunnelling, laying pipework, construction of structures and buildings, etc.
- Movement of vehicles to and from construction areas using the road network to deliver materials, equipment and people and to remove items from site such as waste. The greatest noise impacts due to construction traffic would be on minor roads where relative increases in traffic and resultant noise levels would be higher.
- The use of construction compounds to facilitate construction activities. These may include movement of equipment, deliveries and use of fixed noise sources (such as generators, pumps and wheel wash equipment).

Subsequent sections of this paper consider the potential for the adverse impacts to produce significant adverse effects on individual and community receptors.

Construction vibration overview

During the construction of the Proposed Development the following have to potential to result in ground-borne vibration[8] that could result in adverse impacts:

- The completion of specialist construction activities such as piling to install temporary and permanent structures.
- The use of specialist equipment to prepare a tunnel connecting the existing Cambridge WWTP to the proposed WWTP.

[8] Vibration transmitted through the ground.

- The use of HDD equipment to install pipework including sections underneath the River Cam and other watercourses, the railway line and the A14.

Ground borne vibration from specialist construction activities (such as piling or tunnelling) could result in adverse impacts for people within approximately 100m from these sources of vibration. These activities with the potential to result in adverse vibration impacts would however be relatively short term (i.e. a few days at a time). Significant adverse effects from vibration are not expected due to the distance from works for the majority of sensitive receptors. However, significant effects have the potential to occur due to continuous working methods for these activities at vibration sensitive receptors within 50m of sources of vibration from tunnelling and HDD activities. Receptors where the greatest impacts may arise include Red House Close, Poplar Hall, Poplar Hall Farm, Northern Bridge Farm and The Cottage, Burgess Drove. These receptors would be most impacted due to the proximity of underground works at these locations. The likelihood of potential significant effects on the closest people to underground works is dependent on several factors including the rate of tunnelling, location of proposed tunnel route, existing ground conditions and distance to sensitive receptors.

Mitigation will be implemented to prevent significant adverse effects as described in the outline **Code of Construction Practice (CoCP)**. Additional measures such as Building condition surveys would also be undertaken in instances where vibration could potentially result in high levels of vibration at receptors due to construction activities. The results of these surveys would be used to inform any additional protective measures for specific properties and ongoing monitoring requirements.

Construction working hours

The proposed construction working hours are presented within the outline **CoCP** which is include as part of the PEI. These hours reflect the construction and engineering requirements needed to complete construction of the Proposed Development.

Core working hours are divided into summer core and winter core[9]. These working patterns aim to maximise the availability of daylight and enable efficient working through the construction programme. Periods of continuous working and works outside of core hours are also specified in the outline **CoCP**.

Works that would occur within the core working hours but during the early morning, evening or Saturday afternoon periods[10] may result in adverse noise impacts. This is due to the higher sensitivity of receptors to noise from construction works during these periods.

[9] Winter core working hours (October to March) - 7am to 6pm Monday to Friday. 8am to 4pm Saturday. Daily mobilisation activities - plus up to one hour before and after for mobilisation/maintenance activities i.e. 6am to 7pm Monday to Friday and 7am to 5pm Saturday.

[10] Early morning, evening, night-time and weekend periods including Saturday afternoons are considered to be more sensitive in recognition of the fact that in general people are more likely to be in their homes/gardens or undertaking recreational activities in outdoor spaces. The sensitivity of noise from construction activities at different times of day is recognised within British Standard 5228, which sets out guidance for lower thresholds for noise from construction during these periods.

Continuous 24/7 working periods are required for safety critical reasons (e.g. works immediately adjacent to the railway or A14) and for engineering requirements to complete specialist construction activities including underground works such as the tunnelling and HDD. Associated surface level equipment for underground works (such as HDD equipment, spoil removal plant, and dewatering pumps) would generate noise during these continuous working periods. Construction activities which occur on a continuous basis are more likely to result in adverse noise impacts at the nearest noise sensitive receptors due to the increased sensitivity to noise at night-time periods.

Exceptional construction activities (such as large concrete pours, abnormal load deliveries, contract lifts of large plant items) may also result in adverse noise impacts however these would be relatively short term (i.e. typically for 1-2 days at a time). Large concrete pours would be required for construction of the proposed WWTP and would be contained within the earth work bank. Abnormal load deliveries would be managed through the **Construction Traffic Management Plan (CTMP)** to minimise adverse impacts (an outline **CTMP** is included as part of the PEI).

Construction of the proposed WWTP

Construction, testing and commissioning of the proposed WWTP would be completed over several phases within a period of approximately 48 months. Potential noise impacts due to construction would vary over the construction programme according to the phase of works, plant requirements and location of works within the area of land required for the construction of the proposed WWTP. The earth bank will be constructed early within construction programme and will provide acoustic screening to the closest noise sensitive receptors surrounding the main works areas during construction.

The nearest residential receptors to the proposed WWTP include Gate House on Low Fen Drove Way located to the east of the proposed WWTP at approximately 550m. There are also residences approximately 950m to the north in Horningsea, 550m to the west off Horningsea Road, and property approximately 900m south in Fen Ditton off High Ditch Road.

Figure 3 provides preliminary information relating to construction activities (described in grey annotations) and potential noise impacts due to construction of the proposed WWTP.

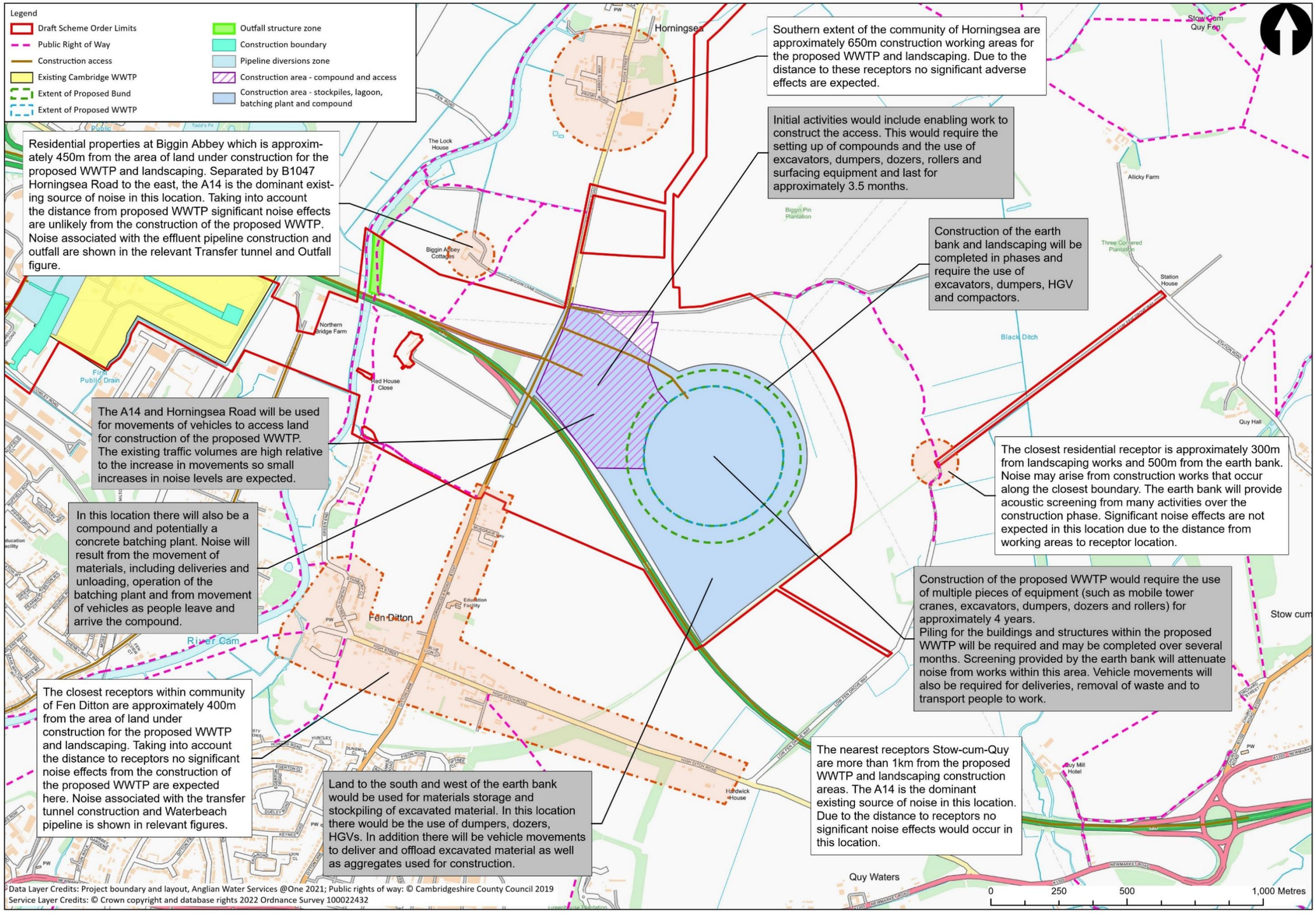


Figure 3: Proposed WWTP construction activities (grey boxes) and potential noise impacts (white boxes)

Table 1 presents preliminary information on the type and quantity of equipment that would be required to complete the construction of the proposed WWTP, the earth bank and the landscaping works. These details represent the duration of the peak of activity within the overall construction duration for this location and represent the worst case in terms of potential for noise generation and resulting noise impacts. Other phases of construction would require overall fewer plant and equipment items and are therefore likely to result in lower noise impacts.

Table 1: Proposed WWTP Preliminary Construction Information

Activity and Description	Outline Plant Requirements	Approximate Duration
Phase 1 enabling works: Establish compound and temporary access road, topsoil strip and excavation to prepare earthwork embankment.	20–25 items of construction plant and machinery including excavators, dumpers, dozers and rollers. Vehicle movements will also include HGV deliveries to the site via access off Horningsea Road.	3.5 months
Phase 2 enabling works: Complete construction of main construction compound, excavations within earthwork embankment, complete site access road and junction alterations on Horningsea Road, early planting, install permanent access road and drainage.	30-35 items of construction plant and machinery including mobile and tower cranes, excavators, dumpers, dozers, rollers and road paver. Vehicle movements will also include HGV deliveries to the site via access off Horningsea Road.	
Water recycling centre, sludge treatment centre, construction: Construction of areas outside the earthwork embankment, construction of WWTP foundations, buildings, process equipment.	5-10 items of construction plant and machinery including cranes, excavators, dumpers, dozers and rollers. Construction compound will include use of generators and concrete batching plant. Vehicle movements will also include HGV deliveries to the site via access off Horningsea Road.	48 months
Water recycling centre, sludge treatment centre, testing and commissioning: Construction of areas within the earthwork embankment	40-45 items of construction plant and machinery including mobile and tower cranes, excavators, dumpers, dozers and rollers. Use of tool compressors and generators. The construction compound would require the use of generators. Vehicle movements will also include HGV deliveries to the site via access off Horningsea Road.	

Overall noise impacts from construction of the proposed WWTP are unlikely to result in significant adverse effects due to the distance to the nearest noise sensitive receptors.

The nearest residential receptors may experience temporary adverse effects during construction phases which utilise plant and equipment close to the site boundaries (e.g., landscaping or earthmoving activities). The location of noise sources would vary over the large working area and the nearest residents would therefore notice variations in noise over

the course of the construction programme. The existing noise environment is dominated by road traffic noise from the A14 at the nearest noise sensitive receptors. Whilst noise during these activities may at times be noticeable against the existing noise environment, the resultant noise impact is unlikely to be of a magnitude that would result in significant adverse effects due to the distance from working areas to the nearest residential receptors.

Recreational users of Public Rights of Way (PRoW) and the River Cam adjacent to construction working areas would experience temporary adverse effects during the construction phase, however, these are unlikely to result in significant adverse effects due to the limited exposure users would receive whilst moving through areas where nearby construction activities are ongoing.

Transfer pipeline corridor (section from Waterbeach to Low Fen Drove Way)

Construction works along the pipeline route would involve either the 'open cut' method of excavating trenches to install the pipeline or a method using HDD. Open cut methods would include use of excavators, vehicles to move spoil material, and pipe installation equipment to lay and join pipes.

The pipeline installation would take up to 12 months to complete between Waterbeach and Low Fen Drove Way. The pipeline installation would move through the area of land required to construct the proposed WWTP and continue to the existing Cambridge WWTP. These excavation and pipe installation works would be undertaken during core working hours (as defined in the outline **CoCP**). Works would move progressively along the pipeline length. It is anticipated on average 40-50 metres of pipeline would be laid per day where open cut methods are used. Noise from construction of the pipeline would at times result in high noise levels at certain receptor locations and the greatest impacts would occur during more sensitive times of the day including early morning, evening and Saturday afternoons. Works may cause a short term temporary disturbance at residential receptors and in external amenity spaces. Whilst noisy works using open techniques may cause adverse impacts, these are unlikely to be significant due to the short term nature of these activities at any one location (i.e. works would pass by a particular location over the course of a few days after which activities would become further away meaning noise levels diminish).

The closest noise sensitive receptors to the transfer pipeline corridor that may be affected by short term noise during construction include homes and businesses in Waterbeach, Clayhithe and the eastern edge of Horningsea.

Users of Public Rights of Way (PRoW) and recreational spaces would also be affected by noise during construction; however, these impacts are unlikely to result in significant adverse effects due to the limited exposure users would receive whilst moving through areas where nearby construction activities are ongoing.

HDD would be used at several crossing points along the pipeline route including to cross the River Cam and several roads. Pipeline installation may also use the HDD method depending on other constraints such ground conditions or ecological requirements. HDD works in each instance would take up to 4 weeks per location to complete. Shorter drill shots may be

undertaken during daytime only in less critical locations and HDD works may take less time in each instance (such as for shorter and shallow crossings) however 4 weeks is considered as a worst case to account for setup, drill completion and demobilisation at key crossing locations. These construction activities would require HDD equipment to be located at either side of the crossing feature and 24 hour working due to requirements of the drilling process. Noise from the HDD activities has the potential to result in adverse impacts due to the 24 hour working requirements and increased sensitivity to noise during night-time periods. The most affected receptors to proposed HDD works include those off Burgess Drove, Bannold Road and Capper Road.

Significant adverse effects have the potential to occur at the closest receptors to proposed HDD works including at The Cottage, Burgess Drove due to the continuous nature of works and relatively close proximity to noise sources.

Mitigation including the use of acoustic barriers around HDD compounds will be implemented to reduce potential noise impacts where possible so that they are not significant. Additional measures including consideration of the timings of works and the application of Best Practicable Means will be reviewed and applied to minimise potential noise impacts, however, residual impacts may still result in adverse effects and temporary disturbance at the closest receptors (e.g. noise impact would be of a level that people would make small changes such as closing windows for short periods or turning up volume on TV or radio during works).

Table 2 presents outline construction plant requirements for the main construction methods for the transfer pipeline corridor construction.

Table 2: Transfer Pipeline Corridor Preliminary Construction Information

Activity and Description	Outline Plant Requirements	Approximate Duration
Open cut excavation and pipe installation: Excavation of trench, pipes are fused together and installed in trench, trench is backfilled.	Excavators, dumper, use of generator for pipe joining equipment. HGV movements will also include pipe and stone deliveries.	12 months
Horizontal directional drilling: Construction of drilling pit, completion of drill shot, demobilisation of equipment and backfilling drilling pit.	Directional drilling rig, generator, slurry cleaning plant, pumps and settlement tank.	

A construction compound would be located at the northern end of the pipeline route to facilitate construction activities. Activities that may generate noise within the construction compound include movement of people and vehicles, storage of construction materials, use of generators and deliveries by HGVs. Noise from the compound operation has the potential to result in adverse impacts for the closest receptors on the north and eastern extent of

Waterbeach (e.g. receptors off Capper Road) however will be controlled through measures as described within the outline **CoCP** to prevent significant adverse effects.

Figure 4 and Figure 5 provide preliminary information relating to construction activities (described in grey annotations) and potential noise impacts due to construction of the Transfer pipeline corridor.

Transfer pipeline corridor (from Low Fen Drove Way to the existing Cambridge WWTP)

This section of pipeline works between Low Fen Drove Way and the existing Cambridge WWTP would be undertaken using the same methods as per route from Waterbeach to Low Fen Drove Way. However, this section would require additional crossing points using HDD under the A14, Horningsea Road, River Cam and railway line. This pipeline route would take approximately 5 months in total to construct. Worst case assumptions consider HDD works in each instance would take up to 4 weeks per location to complete and would involve initial setup of the drilling equipment, completion of the drill and demobilisation[11].

The closest sensitive receptors to HDD pits and pipeline construction along this section of the route include receptors off Horningsea Road, Red House Close, Poplar Hall, receptors in Fen Ditton off Green End and receptors off Fen Road including Northern Bridge Farm. These receptors would be subject to adverse noise impacts during construction activities including during 24 hour works to complete HDD activities.

[11] Shorter drill shots may be undertaken during daytime only in less critical locations and HDD works may take less time in each instance (such as for shorter and shallow crossings) however 4 weeks is considered as a worst case to account for setup, drill completion and demobilisation at key crossing locations.

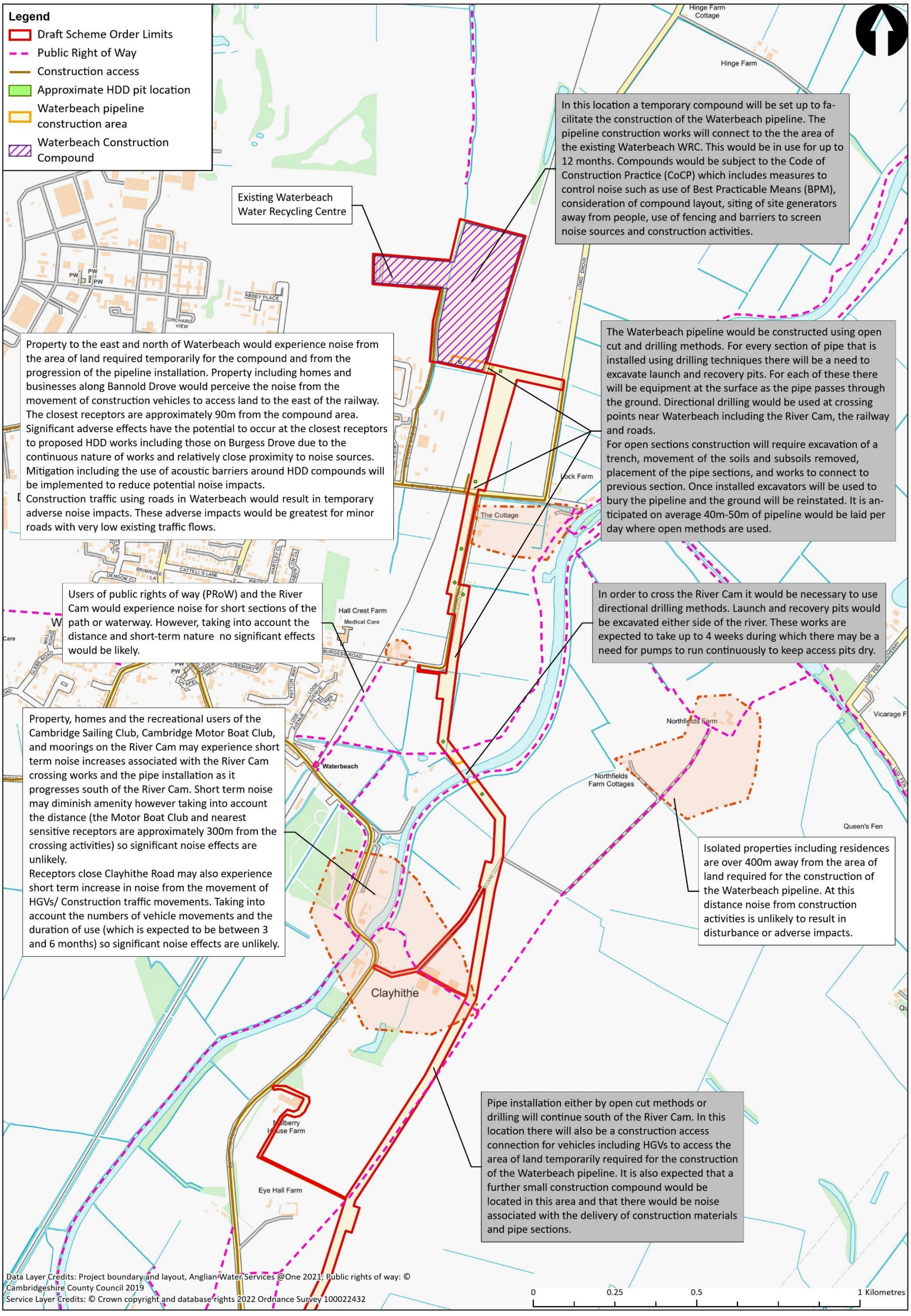


Figure 4: Transfer pipeline – northern section construction activities (grey boxes) and potential noise impacts (white boxes)

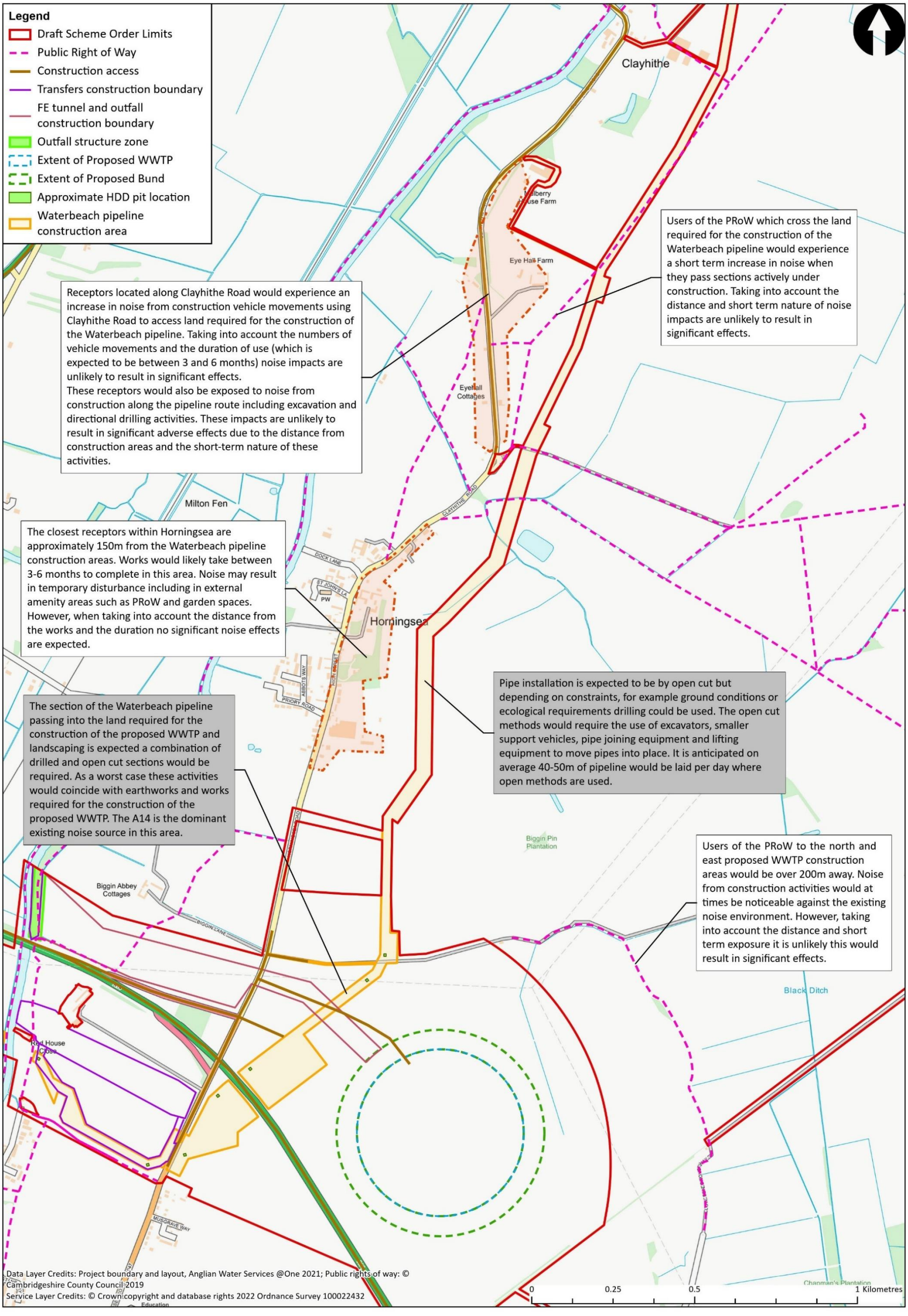


Figure 5: Transfer pipeline -southern section construction activities (grey boxes) and potential noise impacts (white boxes)

Waste water transfer tunnel

Construction of the waste water transfer tunnel between the existing Cambridge WWTP and proposed WWTP will be completed using a micro-tunnel boring machine (MTBM) and pipejacking method. The pipe sections would be lowered into the shaft, inserted within the tunnel behind the MTBM and jacked along the tunnel.

Several shaft locations are proposed which have been considered within preliminary assessment as worst case shaft locations (these are discussed in the **PEI Introductory Paper** within section **Waste water transfer tunnel and shafts** page 13). Proposed shafts would be located between the existing Cambridge WWTP and the proposed WWTP:

- Shaft 3 within the eastern extent of the existing Cambridge WWTP;
- Shaft 4 east of the River Cam near to the Red House Close within Fen Ditton;
- Shaft 5 west of Horningsea Road south of the A14; and
- The terminal pumping station shaft within the proposed WWTP.

The excavation and construction of each shaft would take up to 3 months. During this period there would be the need for a nearby compound for the workforce and to safely store equipment and materials. The compound will include site cabins and welfare facilities.

The shafts would be used to lower construction equipment for subsurface construction, to remove excavated material, and to recover construction equipment once tunnel sections have been completed. Shaft 3 and 5 would be used as 'driving shafts' the point from which the MTBM would be lowered from to commence tunnelling towards the receiving shaft which would require the operation of surface level supporting equipment during tunnelling. Shaft 4 and the Terminal Pumping Station within the relocated proposed WWTP would be 'receiving shafts' and used to recover equipment after tunnel sections have been constructed.

In terms of location, as a worst case for potential noise and vibration impacts, Shaft 4 would be in close proximity to Red House Close and Poplar Hall receptors. Construction of shafts is expected to include the following steps:

- Site set up including moving in equipment (such as excavators, mobile cranes, generators, pipe jack rig and pumps), creation of temporary storage areas, and set up of fencing or barriers around the works area.
- Surface excavation of the shaft using excavators and requiring the movement of HGVs to remove material for re use elsewhere.
- Works to create the concrete structure at the top of the shaft.
- Excavation below ground level as the shaft deepens with material brought to the surface by crane, and sequential placement of precast concrete rings which will form the sides of the shaft. This stage may also require pumping to remove water which would require pumps at the surface. Excavated material brought to the surface would continue to be collected and moved elsewhere by HGVs.
- Completion of the target depth, build base, finishing works and removal of shaft construction equipment.

Some aspects of the above steps would result in adverse noise impacts at the closest receptors. Noise levels during shaft construction will be higher during specific activities such as surface excavation works, concrete works to create the surface structure of the shaft, and the use of generators at the surface. However, these are likely to be intermittent and vary over the overall construction period which is expected to take 3 months. Noise impacts from the excavation of the shaft would reduce during the excavation phase as the excavator operates from within the shaft. The setup and shaft construction would be undertaken during core hours only.

Preliminary assessment indicates significant adverse effects may arise if should some of these higher noise level activities during the shaft construction occur during more noise sensitive times (e.g. early morning, Saturday afternoon, Sundays and night-time periods) at the closest receptors including Red House Close. Although core hours are to be adopted there may be short term activities that need to occur outside of these times. These could include safety critical works (for example work that may need to be completed so as the construction site is safe or concrete pours).

Once constructed, Shaft 4 (used as receiving shaft) would be dormant for the majority of tunnelling operations apart from the use of dewatering pumps if required. This dormant phase could be for a period of up to 9 months and noise impacts would be minimal as only dewatering equipment would be in use. Shaft 4 would become active again for the recovery of the MTBM once the tunnel drive has been completed. Recovery of the MTBM would take approximately 5 days.

Once equipment has been recovered, works at the shaft will be completed to provide a permanent surface ventilation column. In normal operation, the surface ventilation column and transfer from the location of the existing WWTP to the proposed WWTP would not result in operational noise impacts. Please also refer to the **Environmental Information Paper: Landscape and Visual Amenity** and the **Environmental Information Paper: Odour** which provide additional information on the potential impacts associated with operational vent shafts.

Table 3 presents outline construction plant requirements for the main construction methods described for the waste water transfer tunnel construction.

Table 3: Waste Water Transfer Tunnel Preliminary Construction Information

Activity and Description	Outline Plant Requirements	Approximate Duration
Construct temporary access road: Movement of equipment, ground clearance, laying of any temporary surfacing or compaction to create track	Excavator, compactor, telehandler, cement mixer truck. Deliveries by HGV.	2 months
Enabling and site setup: Delivery of equipment, preparation of the construction compound, erect site hoarding/temporary lighting	Excavators, hand tools (e.g. electric hammer drill, saw, nail gun), backhoe, mobile crane. Deliveries by HGV.	
Excavate and construct shaft: Excavate shaft and remove spoil. Delivery of precast structures. Placement of precast sections of the shaft lining. Waste material will be removed from the shaft location by lorry. Dewatering (assumed will be required during shaft construction).	Excavators, mobile crane, telehandler, dewatering pumps, settlement tank, generator. Deliveries and removal of spoil material by HGV.	3 months per shaft
Tunnelling (drive shaft): Underground activities will comprise movement of the MTBM from the drive shaft towards receiving shaft. Above ground support equipment include the pipe-jack equipment within the shaft, spoil removal plant and machinery to lower pipe sections.	Excavators, mobile crane, pipe jack rig, telehandler, dewatering pumps, settlement tank, site generator. Deliveries and removal of spoil material by HGV.	Approximately 5 months subject to tunnel section length and ground conditions
Recover MTBM: The MTBM will be recovered from receiving shaft using a crane.	Mobile crane, excavators, HGV lorry	5 days

The shaft construction and tunnelling activities for driving shafts (Shaft 3 and Shaft 5) are at a greater distance from the nearest receptors (more than 200 m). Noise from these activities would result in adverse noise impacts and be noticeable during periods when existing noise levels are quieter (e.g. early morning, Saturday afternoon, Sundays and night-time periods). Although noise from machinery at these shafts or the movement of vehicles may be heard by people, due to the distance from these shafts to receptors the potential impacts are however unlikely to result in significant adverse effects. Furthermore as part of the CoCP measures would be applied to minimise potential adverse impacts. This would include notification of the nearest receptors when noisier elements of the construction works are planned.

The nearest receptors to Shaft 5 include the community directly to the south to the eastern side of Horningsea Road (including properties off Musgrave Way). These receptors would likely notice and may experience some disturbance due to noise from tunnelling activities especially during works at night-time and more sensitive periods. Adverse impacts may be experienced at these receptors also due to vehicle movements accessing the working area.

Noise levels and resulting impacts from these construction activities are unlikely to be of a magnitude that would result in significant adverse effects.

Figure 6 provides a summary of construction activities (described in grey annotations) and potential noise impacts due to construction of the waste water transfer tunnel and the outfall at the River Cam.

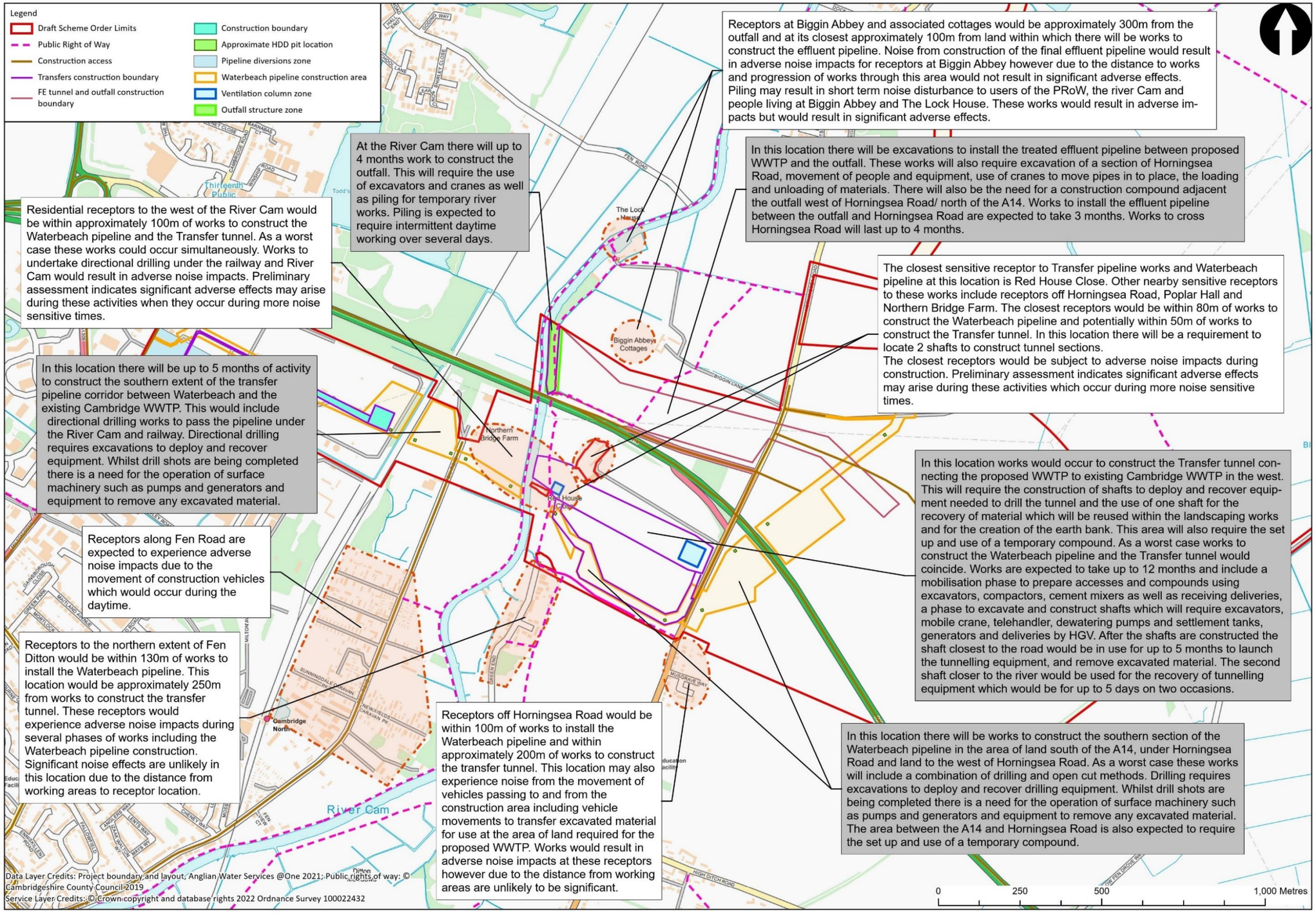


Figure 6: Waste water transfer tunnel, final effluent transfer pipeline and outfall construction activities (grey boxes) and potential noise impacts (white boxes)

Treated effluent transfer pipelines and discharge outfall to the River Cam

The construction of the treated effluent transfer pipeline between the proposed WWTP and River Cam would use an open cut method to excavate trenches to install the transfer pipelines. Activities would include use of excavators, vehicles to move spoil material and pipe installation equipment to lay and join pipes. Overall, the construction of the final effluent pipeline between the proposed WWTP and outfall location is expected to take up to nine months to complete. The pipeline construction from the outfall to Horningsea Road would take approximately 3 months to complete. The pipeline crossing at Horningsea Road would take approximately 4 months to complete subject to the road diversion and excavation methodology.

A temporary haul road would be constructed to provide access to the outfall location. Enabling activities including haul road construction would take approximately 1 month to complete. Construction of the outfall would use sheet piling to form a temporary cofferdam to allow the construction of the outfall in dry conditions. The works compound, cofferdam and outfall construction would take approximately 3 months in total to complete although within this period the duration of piling would be expected to be over two weeks.

The treated effluent transfer pipeline and outfall construction activities would both be undertaken during core working hours as set out in the outline **CoCP**. Table 4 presents outline construction plant requirements for the main construction methods described for the transfer pipeline and final effluent discharge outfall construction.

Table 4: Treated Effluent Pipeline and Final Effluent Discharge Outfall Preliminary Construction Information

Activity and Description	Outline Plant Requirements	Approximate Duration
Construct temporary access Roads: Movement of equipment, construction of temporary access route between Horningsea Road and outfall location	Excavator, compactor, telehandler, cement mixer truck. Deliveries by HGVs.	1 month
Enabling and site setup: Movement of equipment and cabins, prepare construction compound, erect site hoarding/temporary lighting	Excavators, hand tools (e.g. electric hammer drill, saw, nail gun), backhoe, mobile crane. Deliveries by HGVs.	
Excavate outfall trench and pipe installation: Excavation of trench sections, movement of pipe lengths to trench section, fusing of pipe lengths for installation within excavated trench, backfilling of the trench. Reinstatement of surface. Crossing at Horningsea Road would take longer due to road traffic control required for excavations and resurfacing activities.	Excavators, mobile crane, dumper, generator, dewatering pump and settlement tank, roller, Deliveries to site by HGVs.	3 months between outfall and Horningsea Road. Crossing at Horningsea Road would take approximately 4 months.
Construct outfall cofferdam and river bank works:	Excavators, dumper, piling rig and sheet piling	3 months

Activity and Description	Outline Plant Requirements	Approximate Duration
Delivery of equipment, construction of cofferdam using sheet piles, excavation at bank, concrete works and construction of final effluent outfall. Reinstatement and demobilisation.	equipment to form cofferdam, mobile crane, generator, dewatering pump and settlement tank, concrete pump. Deliveries to site by HGVs.	

Biggin Abbey and associated cottages are the closest noise sensitive receptors to the treated effluent transfer pipeline and the outfall to the River Cam that and may be affected by noise during construction. Noise due to enabling works and pipeline excavation to construct the treated effluent pipeline may result in temporary adverse effects at these receptors. The duration of the works to complete the section of the treated effluent transfer pipeline from the outfall to Horningsea Road would be up to 3 months. The nearest noise sensitive receptors are more than 300m from the outfall construction works and noise impacts from construction of the outfall are therefore unlikely to be significant.

Noise from these works may cause temporary disturbance and affect receptors use of external amenity spaces particularly during the pipeline excavation and piling works at the outfall. Mitigation including control of working hours to daytime periods only will be used to reduce potential noise impacts.

Recreational users of Public Rights of Way (PRoW) and the River Cam adjacent to construction working areas may experience temporary adverse effects during the construction phase, however, these are unlikely to result in significant adverse effects due to the limited exposure users would receive whilst moving through areas where nearby construction activities are ongoing.

Figure 7 provides a summary of construction activities (described in grey annotations) and potential noise impacts due to construction of the treated effluent pipeline and outfall at the River Cam.

Construction traffic

The following sections describe noise impacts relating to construction traffic divided into areas around the Proposed Development. Reference may also be made to the **Environmental Information Paper**: **Traffic and transport** which provides more information relating to construction traffic in each of these areas. For the location of the proposed construction access routes refer to Figure *'Construction and Access'* within the **PEI Introductory Paper**.

Horningsea and Fen Ditton

Construction traffic would access the proposed WWTP via junction 34 of the A14 and into the Proposed Development entrance directly off Horningsea Road for a period of approximately 4 years during construction of the proposed WWTP. During the peak construction period which is expected to occur in 2026 the daily construction traffic would

include 250 cars/vans and 242 HGVs. The existing traffic volume on these routes is high and therefore the relative increase due to construction vehicles would be very small. The resultant increase in road traffic noise due to construction traffic to access the area of land required for the construction of the proposed WWTP would be negligible and would not result in significant adverse effects.

Waterbeach and Clayhithe

Construction traffic would access working areas of the Waterbeach transfer pipeline near Clayhithe and east of Waterbeach from the A10 via routes through Waterbeach (e.g. Denny End Road, Bannold Road, Car Dyke Road, Station Road, Clayhithe Road, Burgess Road). These routes would be used for construction traffic during pipeline works in 2024 for approximately 5 months. Daily vehicle movements during the peak construction period on routes through Waterbeach would total 28 cars/vans and 28 HGVs. These peak periods within the Waterbeach and Clayhithe areas would likely occur during the spring and summer of 2024. Noise due to construction traffic using these routes in most cases would result in minor adverse impacts however are not of a magnitude that would result in significant adverse effects.

Minor roads with existing very low traffic flows (e.g. Burgess Road) would experience a larger relative increase in traffic flow with construction traffic during peak periods. Residents located immediately adjoining these routes may experience temporary disturbance due to the addition of construction traffic and HGV movements. These noise impacts have the potential to result in significant adverse effects, however, these peak construction periods would be temporary and daily absolute noise levels due to road traffic at the nearest noise sensitive receptors would remain low due to the overall low traffic flows.

Milton

During construction of the transfer pipeline from Waterbeach to the existing Cambridge WWTP, construction vehicles would make use of the A10, heading north from junction 33 (the Milton Interchange) of the A14. Daily vehicle movements during the peak construction period using the A10 would be 36 cars/vans and 22 HGVs. These peak construction vehicle movements are likely to take place during 2024 for approximately 7 months. Construction traffic using the A10 may result in negligible noise impacts at nearby noise sensitive receptors adjoining the route and would not result in significant adverse effects.

Chesterton

During construction of the waste water transfer tunnel construction vehicles would travel along Cowley Road, Milton Road, Green End Road and sections of Fen Road to reach construction works at the northern end of Fen Road. Daily vehicle movements during the peak construction period on these routes would include 28 cars/vans and 30 HGVs.

Construction vehicles would also travel along Fen Road, Milton Road, Green End Road and Cowley Road to reach construction works near Cowley Road and the existing Cambridge

WWTP. Average daily vehicle movements during the peak construction period on these routes would include up to 78 cars/vans and 94 HGVs.

Construction traffic on these routes would likely occur during 2024 and 2025 for a period of approximately 15 months. Residential receptors immediately adjoining these routes may notice an increase in road traffic noise due to additional HGV movements. Noise impact due to construction traffic using routes through Chesterton may result in minor adverse impacts however are not of a magnitude that would result in significant adverse effects.

Once operational how would the proposed relocation of Cambridge Waste Water Treatment Plant change noise and vibration?

Operational impacts are permanent compared to impacts due to construction activities which occur for a temporary period. The significance of operational noise impacts within EIA are primarily dependent on the level of noise at receptors and the increase in noise level when compared to existing background noise environment (this is the difference between the Rating noise level[12] and existing background noise level). Adverse noise impacts would occur if the Rating noise level from the operation of the proposed WWTP is greater than the existing background noise environment. Significant adverse effects would occur if the Rating noise level from the operation of the proposed WWTP exceeded the extant background noise levels by 10dB or more depending on the context. The context is considered within assessment to account for the type and character of the noise sources, the character of existing noise environment and potential effect that introduction of new noise sources might have at receptor locations.

Proposed WWTP

New noise sources include plant and equipment at fixed locations within the proposed WWTP. New noise sources also include vehicle movements to access the WWTP and mobile plant or machinery for daily operation and maintenance.

As with the existing Cambridge WWTP processes and equipment within the proposed WWTP would generate noise and include the operation of blowers, pumps and compressors, the sludge treatment plant, biogas recovery (and use in Combined Heat and Power equipment or on-site boilers), the operation of air extraction and odour control units and intermittent operation of the flare stack.

The location of the proposed WWTP is relatively distant (i.e. greater than 500m) from existing noise sensitive receptors. The nearest noise sensitive receptors include residential receptors at the Gate House on Low Fen Drove Way located to the east at approximately 550m. Residential receptors are also located to the north in Horningsea at approximately 950m, to the west off Horningsea Road at approximately 550m and south in Fen Ditton off High Ditch Road at approximately 900m.

Preliminary calculations based on the design and plant information indicate noise from during operation would be less than 30 dB $L_{Aeq,T}$ at the nearest noise sensitive receptors. Results from preliminary calculations show that predicted noise during operation of the Proposed Development would therefore be lower than the existing background noise levels at the nearest noise sensitive receptors. This is an indication that noise impact from operation of the proposed WWTP would be low and unlikely to be noticeable when considered against the existing background noise environment.

[12] The rating noise level is defined within BS4142:2014+A1:2019 and used for the assessment of industrial and commercial noise. The Rating noise level is determined at the receptor location and includes character corrections for noise that includes tonal, impulsive or intermittent elements.

Recreational users the proposed external recreational spaces within the Proposed Development boundary and users of Public Right of Way (PRoW) closest to the proposed WWTP (85/14) may notice noise from processes and plant associated with operation. Noise impacts on these users are unlikely to result in significant adverse effects due to the limited and temporary exposure that people would receive whilst moving through areas that adjacent to new operational noise sources.

In normal operation, the transfer pipelines from Waterbeach, the transfer from the location of the existing WWTP to the proposed WWTP and the final effluent pipeline would not result in operational noise impacts.

Operational traffic

Once operational, the Proposed Development would be accessed from junction 34 of the A14 and the permanent access road directly into the proposed WWTP immediately to the south of the Horningsea Road/ Low Fen Drove Way/ Biggin Lane junction.

Approximately 100 cars/vans and 150 heavy goods vehicles (HGV) would access the proposed WWTP on a daily basis once operational. The relative increase in vehicle movements using the via A14 to access the proposed WWTP is very small due to the volume of existing traffic on these routes. Noise impacts due to the increase in traffic with addition of operational traffic at surrounding noise sensitive receptors would therefore be very limited and would not result in significant adverse effects.

The reassignment of traffic away from the existing Cambridge WWTP to the proposed WWTP would likely result in a minor reduction in noise and small beneficial effect for sensitive receptors immediately adjacent to Cowley Road or Milton Road.

Further details relating to operational traffic can be found in the **Environmental Information Paper: Traffic and Transport**.

Operational vibration

Once operational the proposed WWTP would not generate vibration that would be perceptible or cause disturbance at the nearest people and property. This is primarily due to the relatively large distances between proposed WWTP and nearest people and properties.

How will we manage our development activities to avoid, reduce or offset adverse changes noise and vibration?

In developing our mitigation, we have carefully considered the issue of construction and operational noise and vibration. It is recognised that noise can be of particular concern in relation to people that live or work near areas under construction and or close to roads temporarily used for construction access.

The **PEI Introductory Paper** sets out how the Development Consent Order (DCO) would secure mitigation, and this includes the use of a **CoCP** and plans that the appointed contractor(s) would be required to prepare and implement.

An outline of our **CoCP** and an outline **CTMP** are included within the PEI. These provide a consistent approach to the management of construction activities including the management of construction vehicle movements to minimise disruption from vehicle movements.

In accordance with national and local policy including the NPS for Waste Water and the NPSE appropriate mitigation design would aim to avoid significant adverse effects and minimise adverse noise impacts at the nearest noise sensitive receptors.

National and local planning policy aims include the requirement for developers to implement good design principles and mitigate noise and vibration impacts where practicable to avoid significant effects and minimise adverse noise impacts.

Mitigation measures will evolve through a project community liaison officer who will continue to talk to representatives from local highways authorities and people living and working close to the Proposed Development. In this way we intend to maintain open communication lines to provide up to date information about our activities and to discuss specific day-to-day issues around construction management.

Furthermore, our activities would be subject to specific regulations for some activities in construction as well as the Environmental Permits required in operation.

The following sets out how we intend to mitigate our development proposals during construction (including commissioning and decommissioning activities) and once the proposed WWTP is operational.

In construction

The following sets out general details in relation to primary, secondary, and tertiary noise and vibration mitigation in construction.

Primary measures

Siting of the construction compounds away from sensitive receptors wherever possible.

Orientating compounds and setting layouts to minimise disturbance to nearby receptors (for example siting generator within a compound area so it is as far away from people as possible).

Secondary measures (management activities)

Application of industry best practice and Best Practicable Means (BPM) as described in BS5228 when adopted help developers and contractors to meet these requirements and assist to minimise, control and manage noise and vibration impacts from construction.

The **CoCP** describes measures that contractors will be required to adopt and implement to minimise noise and vibration experienced by people during the construction phase. These measures include the application of BPM as described in BS5228, and includes the following general measures to reduce noise levels at source:

- adopting controlled working hours.;
- requirements for equipment to be switched off when not in use and operators expected to avoid unnecessary revving of engines;
- where feasible using one-way traffic systems to minimise the annoyance caused by vehicle reversing alarms;
- use of rubber linings where feasible for example on chutes and dumpers to reduce impact noise;
- minimising the drop height of materials, such as delivery of aggregates;
- where possible using plant with noise control measures e.g. silencers, mufflers and acoustic shrouds;
- regularly maintaining plant and equipment by trained persons;
- use of plant that is CE marked with a sound power level where feasible for example generators, pumps, auger machines, and compressors; and
- shutting down plant or operating plant in a minimum idling condition whenever not required.

The provision of noise insulation at properties or temporary rehousing will be considered where all reasonable measures have been taken to reduce noise but levels are such that significant community disturbance or interference with day to day activities or sleep is likely to occur over an extended duration. We will continue to coordinate with any affected people eligible for these further measures in determining the agreed needs, including elements such as type, timing and duration of the measure(s).

The following general measures will be used to reduce potential adverse vibration impacts:

- careful selection of construction methods to determine if the impact can be reduced through an alternative method of construction;
- use of plant and machinery with a low frequency vibrational output switched to that with a higher frequency output if practical;
- location of equipment as far as possible on non-saturated ground;
- use of equipment with anti-vibration mountings where practical; and
- maintaining haul roads will be kept as smooth as possible and maintained to reduce vibration impacts from heavy plant.

The outline **CoCP** also sets out plans and commitments for community and stakeholder engagement which will include communicating works activities that may be noisy and/or

produce vibration and or carried out at sensitive times (early morning, Saturday afternoon, Sundays and night-time periods). These communications shall include details of when and how long the activity is likely to last.

Tertiary measures (regulation)

Legal requirements upon the developer include compliance with The Control of Pollution Act 1974 and Environmental Protection Act 1990 to avoid noise from construction activities resulting in significant disturbance, interfere with activities or prevent sleep.

Anglian Water currently intend to seek prior consent from the relevant local authority under Section 61 of the Control of Pollution Act (CoPA) for proposed construction activities which have the potential to result in significant adverse effects. This will be reviewed following further assessment and preparation of the ES. The prior consent application would provide a further assessment of construction noise and vibration and set out BPM measures to minimise construction noise and vibration.

In operation

following sets out general details in relation to primary, secondary, and tertiary noise and vibration mitigation in operation.

Primary measures

Siting of the proposed WWTP away from sensitive receptors so that there are very few pathways resulting in noise effects on people.

During operation, measures to reduce noise and vibration will also include:

- selection of low noise generating plant and equipment;
- use of silencers or enclosures to minimise noise levels from the noisiest equipment at source;
- locating and orientation of plant and equipment during design such to maximise distance and acoustic screening effects; and
- inclusion of acoustic barriers or earthwork banks.

Secondary measures (management activities)

Although no specific noise management plans are identified as being required at this stage, there may be operational management plans as part of complying with our environmental permit for the proposed WWTP that include noise and vibration management and monitoring (see below).

Tertiary measures (regulation)

Operation of the proposed WWTP will be in accordance with our Industrial Emissions Directive (IED) permit and any noise conditions that this may contain. The operation of the proposed WWTP would require an Environmental Permit, which will be issued and regulated by the Environment Agency. The permit will require the operator to 'prevent significant pollution and also comply with the requirements to use 'appropriate measures' (Waste Framework Directive 2018/851) or 'best available techniques' (BAT) to prevent or minimise noise pollution'[13].

Figure 7 summarises potential impacts and describes measures that have been identified to reduce potential noise and vibration impacts.

[13] Environment Agency (2022) Guidance Noise and vibration management: environmental permits. Available at: https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits/noise-and-vibration-management-environmental-permits#when-a-noise-assessment-is-needed

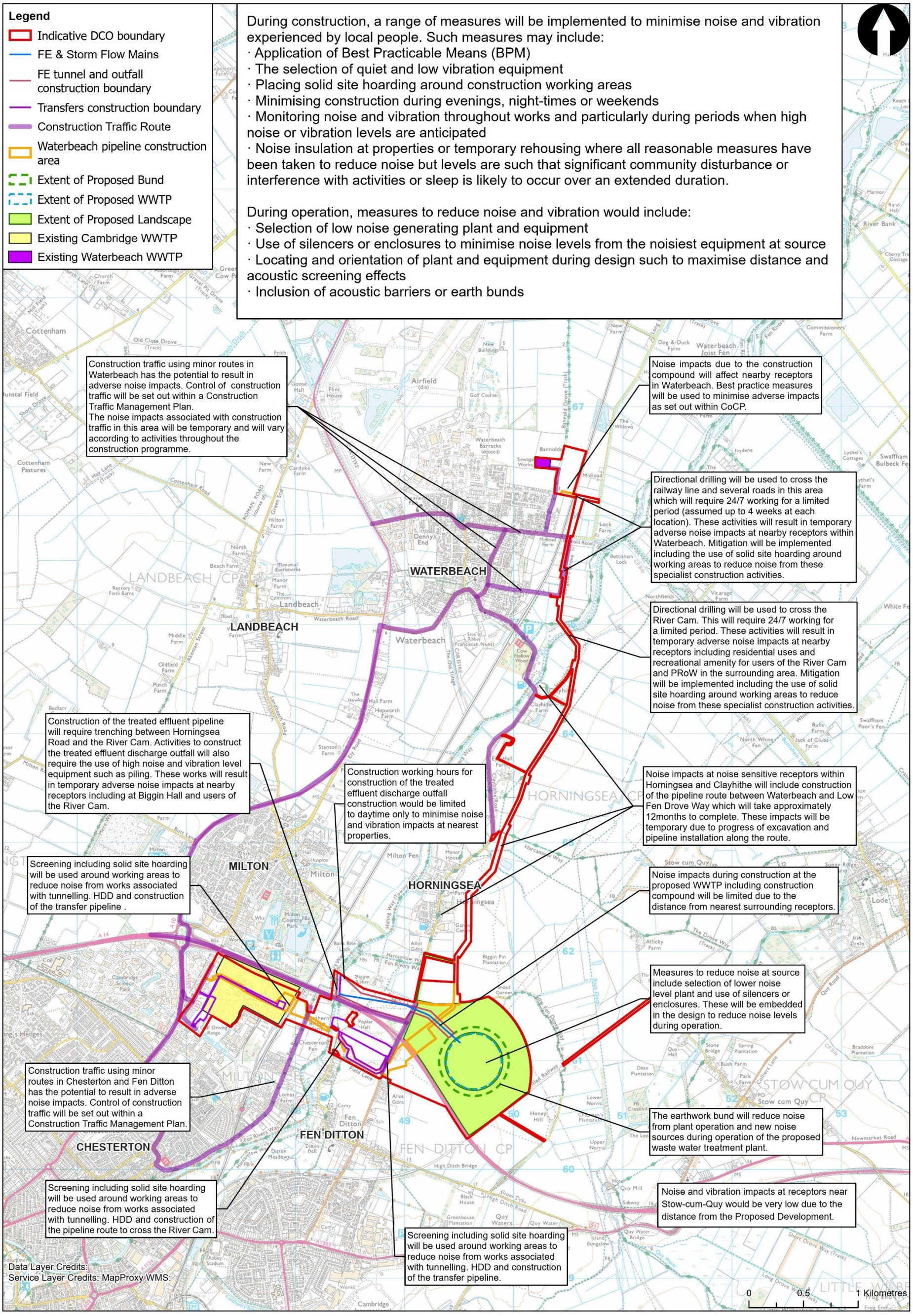


Figure 7: Noise and vibration potential impacts and mitigation overview

What might the likely significant noise and vibration effects be in relation to the proposed relocation of Cambridge Waste Water Treatment Plant?

During construction

Construction activities within the area of land used to construct the proposed WWTP are unlikely to result in significant noise and vibration effects due to the distance from the working areas to nearest residential receptors.

Preliminary assessment using worst-case assumptions indicates high noise and vibration levels have the potential to occur at several sensitive receptors due to proposed construction. High noise and vibration levels at receptor locations and resulting adverse effects due to construction can cause changes in behaviour, attitude or other physiological response of receptors (e.g. avoiding certain activities due to noise intrusion, having to close windows where there is no alternative ventilation, potential for sleep disturbance, diminished quality of life due to change in acoustic character of the area).

Significant adverse noise and vibration effects may arise during some of the planned construction activities where activities would result in high noise or vibration levels, would occur for an extended duration (e.g. greater than 10 days in 15 consecutive days or 40 days in a 6 month period), and at times of the day when sensitivity to noise impacts is higher (e.g. early morning, Saturday afternoon, Sundays and night-time periods). Potential significant adverse noise and vibration effects due to these activities would typically be localised and affect a small number of receptors close to the proposed works. These activities include:

- Significant adverse noise effects have the potential to occur at the closest receptors to proposed tunnelling and HDD works (Red House Close, Northern Bridge Farm, The Cottage Burgess Drove). These activities require 24 hour construction. Significant adverse effects may occur due to the completion of these activities during more sensitive time periods including during the night-time over an extended duration.
- Significant adverse noise effects have the potential to occur during construction of the transfer tunnel pipeline. These activities include enabling works, excavation of shafts and tunnelling. Works to construct each shaft would take approximately 3 months. Significant adverse effects may occur due to the proximity of works to Red House Close and completion of these activities during more sensitive times in the day during Core working hours (e.g. early morning, Saturday afternoon, Sundays and night-time periods).
- Construction traffic using minor roads within Waterbeach have the potential to result in significant adverse noise effects for routes that have existing low traffic flows (e.g. Burgess Road). Further assessment is required within the ES to account for traffic survey data analysis and detailed construction programme.
- Adverse vibration effects due to tunnelling and HDD activities are likely to arise due to 24 hour working requirement for these activities at vibration sensitive receptors within 50m of tunnelling and HDD activities. The closest residential receptor to tunnelling works is Red House Close where the proposed tunnelling route is located approximately 25 m underground linking Shaft 3 and Shaft 4. It is anticipated the

duration of these adverse impacts will be limited to a few days at a time in each instance.

During operation

The proposed WWTP design includes embedded mitigation such as the earthwork bank which aims to avoid significant adverse effects and minimise potential noise impacts during operation. No significant adverse effects are likely due to noise from the normal operation of the Proposed Development.

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