TECHNICAL NOTE

Job Name: Yorkshire Water Environmental Permitting, Knostrop

Job No: 331001762

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Subject: **Knostrop STF – Noise and Vibration Risk Assessment**

1. Introduction

1.1. Stantec (UK) has been commissioned by Yorkshire Water (YW) to undertake a noise and vibration risk assessment to support a permit application for the Knostrop Sludge Treatment Facility (STF).

1.2. YW already holds a permit (issued in 2018) for sludge treatment by anaerobic digestion at Knostrop. However, due to changes in the interpretation of the environmental permitting regulations, it has been agreed by YW and the Environment Agency that a variation is required to add Schedule 5.4 Part A(1)b(i) Anaerobic Digestion treatment activities and associated Section 5.4 A(1) (a)(i) return liquor treatment to the existing permit.

1.3. This technical note summarises the results of our review of the AD treatment activities with regards to statutory guidance relating to noise and vibration.

2. EA Permitting Requirements - Noise

2.1. When applying for a permit, the Environment Agency may require a noise management plan to be submitted if:

- They consider there may be a risk of noise and vibration pollution beyond the site boundary; or
- A noise impact assessment has been prepared as part of a risk assessment.

2.2. The findings of any noise impact assessment should be considered as part of the wider environmental risk assessment.

2.3. The noise and vibration management plan should be prepared, if required, following the guidance in Environmental Permitting: H3 part 2 Noise Assessment and Control[1].

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[1] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/298126/LIT_8291_337647.pdf

Guidance on Risk Assessments

2.4. Risk assessments for permitting purposes should be undertaken in accordance with the Guidance on the preparation of risk assessments[2] which details a procedure for undertaking a risk assessment of a site.

Horizontal Guidance Note for Noise Part 2 – Noise Assessment and Control

2.5. This guidance provides supplementary information to assist Applicants in preventing and minimising emissions of noise and vibration.

2.6. The assessment methodology is based primarily on the requirements detailed in BS4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas. This standard has been superseded by BS4142:2014+A1:2019, but the principles of the assessment methodology remain broadly similar.

2.7. The guidance document also provides an overview of the application of Best Available Techniques (BAT) to sites and processes.

Requirements for Quantitative Noise Impact Assessments

2.8. The information requirements of the EA with regards to what must be submitted if an assessment uses computer modelling or spreadsheet calculations are detailed in guidance 'Noise impact assessments involving calculations or modelling'[3]. This requirement is not applicable in this instance as a qualitative review methodology has been selected.

3. Best Applicable Techniques (BAT)

3.1. In addition to the BAT detailed in the Horizontal Guidance Note for Noise Part 2, further information on BAT is detailed in the 'Commission Implementing Decision (EU) 2018/1147 of 10 August 2018'[4]. With respect to noise, section 1.4 states:

> ***BAT 17****. In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to set up, implement and regularly review a noise and vibration management plan, as part of the environmental management system (see BAT 1), that includes all of the following elements:*
>
> *1. A protocol containing appropriate actions and timelines;*
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> *2. A protocol for conducting noise and vibration monitoring;*
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> *3. A protocol for response to identified noise and vibration events, e.g. complaints;*
>
> *4. A noise and vibration reduction programme designed to identify the source(s), to measure/estimate noise and vibration exposure, to characterise the contributions of the sources and to implement prevention and/or reduction measures.*
>
> *Applicability*
>
> *The applicability is restricted to cases where a noise or vibration nuisance at sensitive receptors is expected and/or has been substantiated*

[2] https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit

[3] https://www.gov.uk/guidance/noise-impact-assessments-involving-calculations-or-modelling

[4] https://www.legislation.gov.uk/eudn/2018/1147

BAT 18. *In order to prevent or, where that is not practicable, to reduce noise and vibration emissions, BAT is to use one or a combination of the techniques given below.*

	Technique	Description	Applicability
a.	*Appropriate location of equipment and buildings*	*Noise levels can be reduced by increasing the distance between the emitter and the receiver, by using buildings as noise screens and by relocating building exits or entrances.*	*For existing plans, the relocation of equipment and building exits or entrances may be restricted by a lack of space or excessive costs.*
b.	*Operational measures*	*This includes techniques such as:* *(i) inspection and maintenance of equipment;* *(ii) closing of doors and windows of enclosed areas, if possible;* *(iii) equipment operation by experienced staff;* *(iv) avoidance of noisy activities at night, if possible;* *(v) provisions for noise control during maintenance, traffic, handling and treatment activities.*	*Generally applicable.*
c.	*Low-noise equipment*	*This may include direct drive motors, compressors, pumps and flares.*	
d.	*Noise and vibration control equipment*	*This includes techniques such as:* *(i) noise reducers;* *(ii) acoustic and vibrational insulation of equipment;* *(iii) enclosure of noisy equipment;* *(iv) soundproofing of buildings.*	*Applicability may be restricted by a lack of space (for existing plants).*
e.	*Noise attenuation*	*Noise propagation can be reduced by inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).*	*Applicable only to existing plants, as the design of new plants should make this technique unnecessary. For existing plans, the insertion of obstacles may be restricted by a lack of space.* *For mechanical treatment in shredders of metal wastes, it is applicable within the constraints associated with the risk of deflagration in shredders.*

4. Project Proposals

4.1. Reference should be made to Section II of the full permit application for a technical description of the site activities covered by the permit variation application.

5. Noise and Vibration Risk Assessment

5.1. A preliminary noise risk assessment has been undertaken based on information provided by YW.

5.2. In considering the risks associated with the operations covered by the permit application, the following site-specific factors have been considered:

- The proximity and sensitivity of nearby receptors
- The existing environmental sound climate at the receptors

- The operational characteristics of the source
- The history of noise complaints arising in respect of the operations carried out under the scope of the permit variation.

Noise and Vibration Sensitive Receptors

5.3. The sensitivity of a particular receptor depends on a variety of factors, but the following table provides examples of the types of receptors likely to be considered either high, medium or low sensitivity.

Table 1: Summary of Receptor Sensitivity

Sensitivity to Noise and Vibration	Description	Example Receptor
High	Receptors where people or operations are particularly sensitive to noise or vibration	Residential, including private gardens Quiet outdoor areas used for recreation Theatres/Auditoria/Studios Schools and Nurseries during the daytime Hospitals/residential care homes Places of worship
Medium	Receptors where noise or vibration may cause some distraction or disturbance	Offices Retail areas and other commercial developments Bars/Cafes/Restaurants where external noise may be intrusive Sports ground where quiet conditions are necessary (e.g. tennis, golf, bowls)
Low	Receptors where distraction or disturbance from noise and vibration is minimal	Industrial areas Sports ground with no specific requirement for quiet conditions Night clubs

5.4. For the purposes of this assessment, noise and vibration sensitive receptors are considered to be any existing occupied premises within 1.5 km of the site which may be adversely affected by noise or vibration and has a high sensitivity.

5.5. In this instance the following receptors have been identified. Where appropriate, receptors have been grouped where they are within the same area.

Table 2: Noise and Vibration Sensitive Receptors

Receptor Reference	Receptor Description	Receptor Type	Distance from Site Boundary (m)
A	Levens Garth / Cartmel Drive	Residential	860
B	Temple Avenue	Residential	1500
C	Halton Moor Avenue	Residential	980
D	Thwaite House	Residential / Museum	930
E	Lock Fall House	Residential	1450
F	Local Nature Reserver	Ecological	850

5.6. Due to the nature of the sources present on site, the distance between the identified receptors and the site boundary, vibration from the operations at the site is unlikely to have an impact and is considered to be low risk. Vibration is therefore not considered further.

Existing Environmental Sound Climate

5.7. The site lies close to a number of sources of noise including:

- the M1 motorway and A63 dual carriageway.
- the Cross Green Industrial estate.
- a single local wind turbine.
- the Logic distribution park.

5.8. A number of environmental sound surveys have been undertaken on the site and in the surrounding area as part of the permit application. The results of the surveys are presented in the Knostrop WwTW Operational Noise Assessment dated 22 May 2018 (ref. 191894-BVLZ0-00-RP-V-00041 – P02).

5.9. The environmental sound surveys undertaken to support the permitting application are relatively short in duration but indicate that sound levels at the nearby noise sensitive receptors are generally in the region of 43-53 dB $L_{Aeq,T}$ (42-52 dB $L_{A90,T}$) during the night-time.

Complaint History

5.10. In October 2020 an investigation was undertaken by Mike Hewitt, an independent acoustic consultant, into a series of noise complaints regarding a low frequency droning sound which the complainants attributed to the Knostrop WwTW. The complaints are relatively recent having started in August 2020.

5.11. As part of the investigation, a series of sound surveys were undertaken of both the equipment at the WwTW and the environmental sound climate at the location of the complainants.

5.12. The results of the assessment are presented in a report prepared by Mike Hewitt titled 'Investigation of Noise Complaint' and dated October 2020. The conclusions of the assessment are that:

- On the night of the survey, the impact of the sound coming from the general Pontefract Road industrial area on the residential areas around the complaint locations was low.
- The most audible component of that sound, the 1 kHz tone, could not be traced to a source within the Knostrop sludge treatment plant. A more minor part of the sound, a 400 Hz tone, is potentially associated with the odour control plant at the STF.
- As the calculated and measured level of that sound was significantly below the threshold for a low impact, it is concluded that no reduction in odour control noise level is necessary.

5.13. It is understood that the EA has recently visited the site to undertake their own assessment. Their investigations also concluded that sources within the wider WwTW were responsible, and found no attributable noise source within the STF. This is being investigated by YW outside of the EPR.

Operational Characteristics

5.14. The sources of noise associated with the permit include:

- The movement of vehicles on the site associated with the transportation of sludge and sludge cake.
- The operation of plant items including the CHP engines, conveyors, pumps, odour control unit, sludge screens, compressors and waste gas burner.

5.15. All of the activities described within the permit variation application are existing and will continue to operate in the same manner as their established use (e.g. hours of operation and load). There are no changes to activities or additional plant or equipment included as part of the permit variation.

Risk Matrix

5.16. Based on the above, Table 3 details a review of the information detailed in the Preliminary Noise Risk Assessment.

5.17. The combined assessment of the proposals in noise and vibration terms is that the probability of exposure and consequence are both low, with the overall risk level being low.

5.18. Whilst complaints have been received with regards to the adjacent YW facility, an investigation undertaken by Mike Hewitt, MIOA, suggests that these complaints are unsubstantiated as far as they relate to noise from the STF. As there are no significant changes proposed to the existing installation, BAT 17 as defined in 'Commission Implementing Decision (EU) 2018/1147 of 10 August 2018' is not considered to be applicable.

5.19. On the basis of the qualitative risk assessment carried out above and reported in Table 3, and in light of the operating history of the plant (i.e. there being no substantiated complaints in respect of operations at the STF), no further controls are considered necessary in respect of the permitted operations. Site management practices included within YW's Environmental Management Systems (EMS), which include provisions for noise control and plant maintenance, will continue to be applied; no specific permit Noise Management Plan is considered necessary at this time. The history of complaints, although considered not to be related to permitted activities, does indicate that certain local residential receptors are sensitive to noise and this does therefore increase the risk of receiving further complaints. As such, in the event of material changes to the local noise environment, or location or sensitivity of nearby receptors, or should substantiated complaints arise in respect of STF operations, this position should be reviewed as part of normal site management reviews and controls. It should also be noted that legislative controls, outside of EPR, remain in force and provide controls to ensure the continued compliance in respect of noise emissions from the wider WwTW (outside of the permitted installation).

Table 3: Risk Matrix

Hazard	Receptor	Pathway	Risk Management Techniques	Probability of Exposure	Consequence	Overall Risk
Noise: CHP	Residential/ Ecological	Airborne	The equipment is containerised in a high performance acoustically treated enclosure and designed for external applications. Plant is located a significant distance from receptors. Good maintenance of plant to ensure that excessive noise levels are not generated, under Operations & Maintenance contract Regular checks of noise mitigation measures fitted to items of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low
Noise: CHP Exhaust	Residential/ Ecological	Airborne	Enclosure mounted high performance exhaust silencer with elevated stack vent point. Plant is located a significant distance from receptors. Regular checks of noise mitigation measures fitted to items of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low
Noise: Boiler Gas Booster / Boosted Pipe	Residential/ Ecological	Airborne	Plant is located a significant distance from receptors. Good maintenance of plant to ensure that excessive noise levels are not generated, under Operations & Maintenance contract Regular checks of noise mitigation measures fitted to items of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low
Noise: Digester, Pumps and Compressors	Residential/ Ecological	Airborne	Plant is located a significant distance from receptors. Good maintenance of plant to ensure that excessive noise levels are not generated, under Operations & Maintenance contract Regular checks of noise mitigation measures fitted to items of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low
Noise: Odour Control Plant	Residential/ Ecological	Airborne	Plant is located a significant distance from receptors. Good maintenance of plant to ensure that excessive noise levels are not generated, under Operations & Maintenance contract Regular checks of noise mitigation measures fitted to items of plant. Where repair or replacement is required, the plant will, where possible, be taken out of service until repair or replacement of parts has been undertaken.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low

Hazard	Receptor	Pathway	Risk Management Techniques	Probability of Exposure	Consequence	Overall Risk
Noise: CHP Dry Air Coolers	Residential/ Ecological	Airborne	Fans of a low noise specification and subject to regular checks and maintenance. Plant is located a significant distance from receptors. Good maintenance of plant to ensure that excessive noise levels are not generated from equipment breakdown or wear and tear (e.g. fan motor bearing failure), under Operations & Maintenance contract.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low
Noise: Waste Gas Burner	Residential/ Ecological	Airborne	Waste gas burner operates only when CHPs are unavailable. Plant is located a significant distance from receptors. Good maintenance of plant to ensure that excessive noise levels are not generated from equipment breakdown or wear and tear (e.g. fan motor bearing failure), under Operations & Maintenance contract.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low
Noise: Vehicular movements around site	Residential/ Ecological	Airborne	The site is located a significant distance from receptors. Background sound levels in this area are already likely to be relatively high (due to road traffic) and are unlikely to be significantly affected by vehicle movements on the site.	Low - The risk management actions will prevent significant impact at nearest receptors	Low – Minor nuisance impacts	Low