

7 Noise & Vibration

7.1.1 This Chapter provides an assessment for the noise and vibration immissions¹ from the construction and operation of:

- The K3 Proposed Development;
- The practical effect of the K3 Proposed Development;
- The WKN Proposed Development.

7.1.2 For details of the description of the development and the DCO permission sought please refer to Chapter 2.

7.2 Regulatory and Policy Framework

Planning Policies

National Policy Statements

Overarching National Policy Statement for Energy (EN-1), Section 5.11:

7.2.1 The overarching National Policy Statement (NPS) for Energy (EN-1) [Ref 7.1] is part of a suite of NPSs issued by the Secretary of State for Energy and Climate Change. It sets out the Government's policy for the delivery of major energy infrastructure.

7.2.2 In reference to noise and vibration assessment, paragraph 5.11.1 explains that the Government's policy on noise is set out in the Noise Policy Statement for England (NPSE). With regard to an 'Applicant's Assessment', paragraph 5.11.4 states that:

"Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:

- *a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;*
- *identification of noise sensitive premises and noise sensitive areas that may be affected;*
- *the characteristics of the existing noise environment;*
- *a prediction of how the noise environment will change with the proposed development;*
- *in the shorter term such as during the construction period;*
- *in the longer term during the operating life of the infrastructure;*
- *at particular times of the day, evening and night as appropriate;*

¹ 'Immission' is the correlative of 'emission'. Immission describes the sound received by a noise sensitive receptor whilst emission describes the sound leaving or being emitted by a source.

- *an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and*
- *measures to be employed in mitigating noise.*

The nature and extent of the noise assessment should be proportionate to the likely noise impact."

7.2.3 Paragraph 5.11.5 states that:

"The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered."

7.2.4 Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance.

National Policy Statement for Renewable Energy Infrastructure (EN-3):

7.2.5 With regards to noise and Waste-to-Energy (WtE) facilities, the National Policy Statement (NPS) for Renewable Energy Infrastructure (EN-3) [Ref 7.2] provides the following instruction:

"Generic noise and vibration impacts are covered in detail in Section 5.11 of EN-1. In addition, there are specific considerations which apply to biomass and EfW generating stations as set out below. Sources of noise and vibration may include:

- *delivery and movement of fuel and materials;*
- *processing waste for fuel at EfW generating stations;*
- *the gas and steam turbines that operate continuously during normal operation; and*
- *external noise sources such as externally-sited air-cooled condensers that operate continuously during normal operation.*

Applicant's assessment

- *The ES should include a noise assessment of the impacts on amenity in case of excessive noise from the project as described in Section 5.11 in EN-1."*

7.2.6 Whilst providing some specific guidance, this directs the noise assessment back to the requirements of EN-1.

Noise Policy Statement for England

7.2.7 The Noise Policy Statement for England (NPSE) [Ref 7.3], published in March 2010 by Defra, aims to provide clarity regarding current policies and practices to enable

noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion.

7.2.8 Paragraph 1.6 of the NPSE sets out the long-term vision and aims of Government noise policy:

"Noise Policy Vision

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."

"Noise Policy Aims

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *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."*

7.2.9 The aims require that all reasonable steps should be taken to avoid, mitigate and minimise adverse effects on health and quality of life whilst also taking into account the guiding principles of sustainable development, which include social, economic, environmental and health considerations.

7.2.10 With regard to the terms 'significant adverse' and 'adverse' included in the 'Noise Policy Aims', these are explained further in the 'Explanatory Note' as relating to established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation which are:

"NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on human health and quality of life due to noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected."

Defra has then extended these concepts for the purpose of the NPSE to introduce the concept of:

"SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur."

7.2.11 The accompanying explanation states:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

7.2.12 With regard to 'further evidence', Defra has commissioned research to try and identify the levels at which the above effects occur, but this is not yet in the public domain. However, early indications are that this research has been largely inconclusive. On this basis, and until further guidance becomes available, and given that there is no specific guidance in the NPPF on noise, as demonstrated below, there is no justification to vary assessment methods and criteria from those previously adopted from British Standards etc.

National Planning Policy Framework (NPPF)

7.2.13 The National Planning Policy Framework (NPPF) [Ref 7.4] sets out the Government's planning policies for England and how these are expected to be applied. The emphasis of the Framework is to allow development to proceed where it can be demonstrated to be sustainable. In relation to noise, Paragraph 180 of the Framework states:

"Planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impact resulting from noise from the development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

7.2.14 The point 'a)' refers to 'significant adverse impacts' which relates to the 'significant observed adverse effect level' (SOAEL) in the NPSE. Although the term 'effect' is used instead of the term 'impact' these have been deemed to be interchangeable in this context. Therefore, given the comments above on the NPSE with regard to

assessment methods and criteria, the current content of the NPPF does not require any change in previously adopted approaches.

Planning Practice Guidance - Noise (PPGN)

- 7.2.15 The Government has published Planning Practice Guidance on a range of subjects including noise [Ref 7.5]. The guidance forms part of the NPPF and provides advice on how to deliver its policies. The PPGN reiterates general guidance on noise policy and assessment methods provided in the NPPF, NPSE and British Standards (BSs) and contains examples of acoustic environments commensurate with various effect levels. Paragraph 006 of the PPGN explains that:

"The subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation."

- 7.2.16 According to the PPGN, factors that can influence whether noise could be of concern include:

- the source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- for a new noise making source, how the noise from it relates to the existing sound environment;
- for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features), and;
- the local arrangement of buildings, surfaces and green infrastructure, and the extent to which it reflects or absorbs noise.

- 7.2.17 More specific factors to consider when relevant include:

- the cumulative impacts of more than one source of noise;
- whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations.

- In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.
- Noise Action Plans (where these exist), and, in particular the Important Areas identified through the process associated with the Environmental Noise Directive and corresponding regulations should be taken into account. Defra's website has information on Noise Action Plans and Important Areas. Local authority environmental health departments will also be able to provide information about Important Areas.
- the effect of noise on wildlife. Noise can adversely affect wildlife and ecosystems. Particular consideration needs to be given to the potential effects of noisy development on international, national and locally designated sites of importance for biodiversity;
- where external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.
- some commercial developments including restaurants, hot food takeaways, night clubs and public houses can have particular impacts, not least because activities are often at their peak in the evening and late at night. Local planning authorities will wish to bear in mind not only the noise that is generated within the premises but also the noise that may be made by customers in the vicinity.

7.2.18 The PPGN provides a relationship between various perceptions of noise, effect level and required action in accordance with the NPPF. This is reproduced in Table 7.1 below.

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Table 7.1: Summary of the Noise Exposure Hierarchy from PPGN.

7.2.19 The PPGN describes sound that is not noticeable to be at levels below the NOEL. It describes exposures that are noticeable, but not to the extent that there is a perceived change in quality of life, as below the LOAEL; and these exposures need no mitigation. With reference to the definition of noise in the NPSE, such immissions are 'sound' and not 'noise'. On this basis, the audibility of sound from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.

7.2.20 The PPGN suggests that noise exposures above the LOAEL cause small changes in behaviour. Examples of these small changes in behaviour are provided in the PPGN and include: having to turn up the volume on the television; needing to speak more loudly to be heard; where there is no alternative ventilation, closing windows for some of the time because of the noise; or, a potential for some reported sleep disturbance. In line with the NPPF and NPSE, the PPGN states that consideration needs to be given to mitigating and minimising effects above the LOAEL but taking account of the economic and social benefits being derived from the activity causing the noise.

- 7.2.21 The PPGN suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of material changes in behaviour are provided in the PPGN and include: where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present; and/or there is a potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. In line with the NPPF and NPSE, the PPGN states that effects above the SOAEL should be avoided and that whilst the economic and social benefits being derived from the activity causing the noise must be taken into account, such exposures are undesirable.
- 7.2.22 The PPGN suggests that a noise impact may be partially offset if the residents of affected dwellings have access to a relatively quiet part of their dwelling, private external amenity area and/or external public or private amenity space nearby.
- 7.2.23 The principles of the PPGN can also be applied to non-residential noise sensitive receptors. For example, for users of a public right of way (PRoW), a noise which was audible but doesn't result in any change of behaviour would be below the LOAEL. If the noise was intrusive and resulted in some behavioural change (such as not stopping as one passes through the noisy area), then the impact would be judged to be below the SOAEL. If the noise resulted potential users to avoid the area or risk psychological stress or physiological effect, impacts would be above the SOAEL.

Swale Borough Council's Development Plan

- 7.2.24 The Swale Borough Council (SBC) Development Plan, "Bearing Fruits 2031" [Ref 7.6], adopted 2017, commits to "Conserving and enhancing the natural environment". In its policy relating to pollution, land contamination and unstable land, it instructs that, in context of the NPPF:

"Noise and vibration

Assessing developments for noise and vibration - both from noise generated from new developments affecting existing development and new development close to existing noise sources - can be complex. The relevant British Standards and guidance, including BS4142, BS8233 and BS7445 need to be considered. The Council's Environmental Protection Team has published a guidance document, Noise and Vibration: Planning Guidance Document, 2013. Developers should refer to this guidance, as well as the latest revised British Standards, in their planning applications."

7.3 Methodology

Scoping and Consultation

- 7.3.1 The formal scoping exercise is summarised in Chapter 3. Following the scoping request submitted in August 2018 The Planning Inspectorate (PINS) provided their scoping opinion in September 2018. The formal scoping exercise is set out in Chapter 3 with a summary of consultation responses set out in Appendix 3.2-3.

- 7.3.2 A consultation response was received from Swale Borough Council (SBC), requesting a noise assessment in respect of construction activities and operation of the K4 development (the subject of a separate nearby DCO application).
- 7.3.3 The Environmental Health Officer at SBC was consulted on Wednesday 17th January 2018 with regards to the nearby K4 Proposed Development assessment methodology, it was confirmed, by telephone, that the assessment for operational noise should follow the assessment methodology contained within BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' [Ref 7.7] (since superseded by BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' [Ref 7.8]) with a rating difference appropriate to the situation and for construction noise, the assessment could follow the examples within BS 5228-1:2009+A1:2014, with appropriate adjustment if required. The noise surveys along the residential fringe towards the Paper Mill were discussed, with their locations considered broadly appropriate.
- 7.3.4 Whilst this consultation was in respect of a separate application and assessment, the response was not project specific, rather outlining the general expectations and recommendations of SBC, when undertaking a noise assessment such as this. As such, the response from SBC has been considered appropriate for this assessment and K3 Proposed Development and WKN Proposed Development as it follows best practice utilising the most relevant standards.
- 7.3.5 The potential sources or phases of the K3 Proposed Development that could result in significant effects are considered to be:
- noise and/or vibration generated by construction plant and activities;
 - noise arising from off-site traffic generated by the K3 Proposed Development during construction, operation, and decommissioning
 - noise arising from the operation of the K3 Proposed Development, including noise from fixed and mobile plant and from HGV movements within the site boundary; and
 - vibration generated by the operational plant.
- 7.3.6 It should be noted that the above four aspects have been considered previously as part of the noise assessment undertaken to inform the planning process of K3 as consented (under the Town and Country planning permission).
- 7.3.7 The potential sources or phases relevant to the practical effect K3 Proposed Development that could result in significant effects are considered to be:
- noise arising from off-site traffic generated;
 - noise arising from increased on-site traffic; and
 - noise and vibration generated by the operational plant.
- 7.3.8 No additional maintenance or decommissioning would be necessary pursuant to the practical effect K3 Proposed Development above that of K3 as consented. The

decommissioning (demolition) of both K3 and WKN are considered below. There would be a requirement in the DCO for a Decommissioning Environmental Management Plan to be produced prior to demolition at a future date.

7.3.9 The potential sources or phases of the WKN Proposed Development that could result in significant effects are considered to be:

- noise and/or vibration generated by construction plant and activities;
- noise arising from off-site traffic generated by the WKN Proposed Development during construction, operation, and decommissioning;
- noise arising from the operation of the WKN Proposed Development, including noise from fixed and mobile plant and from HGV movements within the site boundary; and
- vibration generated by the operational plant.

Establishing Baseline Conditions

7.3.10 Baseline noise conditions have been determined by surveying with due regard to Chapter 10 of IEMA's Guidelines for Environmental Noise Impact Assessment [Ref 7.9] and British Standard 7445 'Description and measurement of environmental noise' - Parts 1 to 3, 2003 [Ref 7.10], 1991 [Ref 7.11] and 1991 [Ref 7.12]. The survey details and results are provided in Appendix 7.1.

Study Area

7.3.11 A study area of approximately 1 km from the site boundary has been considered for assessment for noise and vibration sensitive receptors (NVSRs). Representative receptors within that area have been assessed for potential effect. Beyond this distance, noise predictions become unreliable and any adverse effects will have been identified within the 1 km area.

Significance Criteria

7.3.12 This section sets out how the magnitude of impacts relating to noise and vibration have been identified with regards to the K3 Proposed Development; the practical effect of K3 Proposed Development and the construction and operation of the WKN Proposed Development.

Construction Noise

7.3.13 The magnitude of construction noise impacts has been determined in accordance with Annex E of BS 5228-1:2009+A1:2014 [Ref 7.13]. The significance criteria for assessing noise impact from construction works have been based on Example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014, as referred to above. This indicates that:

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds

the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq period, from site noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect."

- 7.3.14 For the majority of noise sensitive receptors (NVSRs), pre-construction ambient noise levels are relatively low, resulting in the criteria set within the lower cut-off levels given in Table 7.2 below applying, the most stringent limits. As such, the lower cut-off levels are used throughout the construction assessment. The assessment also applies the duration criteria in BS 5228-1:2009+A1:2014 of works taking place for one month or more.

Assessment category and threshold value period (LAeq)	Threshold value, in decibels (dB)			
	No/Negligible	Minor	Moderate	Major
Night-time (23.00 to 07.00 hours)	<40	40 - 45	45 - 55	>55
Evenings (19.00 to 23.00 hours weekdays). Weekends (13.00 to 23.00 hours Saturdays and 07.00 to 23.00 hours Sundays)	<50	50 - 55	55 - 65	>65
Daytime (07.00 to 19.00 hours) weekdays and Saturdays (07.00 to 13.00 hours)	<60	60 - 65	65 - 75	>75

Table 7.2: Ambient Noise Threshold Levels.

Construction Traffic

- 7.3.15 For noise change associated with non-permanent sources and construction road traffic, a change of 3 dB is the minimum perceptible noise under normal conditions, and a change of 10 dB corresponds roughly to halving or doubling of subjective loudness. BS 5228-1:2009+A1:2014 states:

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more subject to lower cut-off values of 65 dB, 55 dB and 45 dB LAeq,T from site noise alone, for the daytime, evening and night-time periods, respectively and a duration of one month or more, unless works of a shorter duration are likely to result in significant effect."

- 7.3.16 In the absence of specific construction traffic noise guidance, it is considered appropriate for this criterion to be applied to off-site construction traffic, as marking the onset of a potentially significant noise change, where added, construction traffic becomes a sufficient proportion of the existing road traffic to result in such a noise impact.
- 7.3.17 Taking an increase of 5 dB in traffic noise as a significant impact would correspond to a moderate adverse effect for a medium-sensitivity residential receptor. This is consistent with the thresholds given in paragraph 7.3.14, to allow semantic descriptors associated with noise change bands to be generated. The approach is based on the premise that subjective response to noise from a new source is proportional to the change in overall noise level. Hence, the semantic scale

provided in Table 7.3 has been adopted to describe noise change (given that only increases are likely, there are no decrease bands).

Predicted Change in $L_{Aeq,T}$ or $L_{A10,T}$	Significant Yes/No?	Semantic Scale Rating
Increase of less than 3 dB	No	Negligible / No significant change
Increase of 3 - 5 dB	No	Minor Increase
Increase of 5 - 10 dB	Yes	Moderate Increase
Increase of more than 10 dB	Yes	Major Increase

Table 7.3: Semantic Scale to Describe Changes in Noise.

Construction Vibration

7.3.18 Criteria for assessing the significance of construction vibration are provided in BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration' [Ref 7.15].

7.3.19 Table 7.4 below details potential vibration levels measured in terms of Peak Particle Velocity (PPV) based on the guidance in BS 5228-2:2009+A1:2014 and provides a semantic scale for construction vibration effects on human receptors. Criteria are applied equally to daytime and night-time periods.

Peak Particle Velocity	Description	Magnitude of Impact
>0.14 mm/s	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
>0.3 mm/s	Vibration might just be perceptible in residential environments.	Minor
>1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Moderate
>10 mm/s	Vibration is likely to be intolerable for any more than a brief exposure to this level.	Major

Table 7.4: Potential Vibration Levels Measured in Terms of Peak Particle Velocity (PPV)

Operational Noise

7.3.20 Noise effects associated with the operation of the K3 Proposed Development; the practical noise effect of the Proposed K3 Development and noise effects from the WKN Proposed Development have been determined based upon the methodology contained within BS 4142:2014+A1:2019. This requires the following:

- Determination and characterisation of the baseline sound environment to derive a representative background sound level for the periods of interest;
- Development of a noise model that includes the significant sound generating items of plant and activities; this model predicts noise levels at the NVSRs included within the model – this provides the specific sound level at each NVSR (a SoundPLAN noise model has been developed which utilises prediction methodology contained within International Standard (ISO) 9613-2:1996 'Acoustics: Attenuation of sound during propagation outdoors. Part 2: General method of calculation' [Ref 7.14]);

- Specification of any character corrections as required and described in Section 9 of BS 4142:2014+A1:2019 including those for tonality, impulsivity, other sound characteristics and intermittency – when any corrections are made to the Specific Sound Level, this then becomes the Rating Level, $L_{Ar,Tr}$ (if no corrections are made, the level is still termed the Rating Level); and then
- Determination of the difference at each NVSR between the $L_{Ar,Tr}$ and the background sound level. The difference determines the impact which can be described in accordance with Section 11 of BS 4142:2014+A1:2019 but this also requires consideration of the context.

7.3.21 From the above and following the guidance in BS 4142:2014+A1:2019, Table 7.5 can be used to define the magnitude of impact.

7.3.22 In general, criteria are applied equally to daytime and night-time periods. However, the night-time background sound levels are generally lower than for the daytime, resulting in more stringent criteria during the night-time period.

7.3.23 BS 4142+A1:2019 instructs that the context should also be considered in determining impact. It may be appropriate to vary the impact criteria for individual cases by giving weight to the absolute noise levels using the levels within the ‘World Health Organisation’ (WHO) published document ‘Guidelines for Community Noise’ [Ref 7.16].

7.3.24 The GCN document provides guidance on the desirable levels of environmental noise. With regard to daytime noise levels the GCN states that

"To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces, and outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq} . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development."

7.3.25 With regard to night-time noise the GCN states:

"Indoor guideline values for bedrooms are 30 dB L_{Aeq} ... outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB L_{Aeq} ... assuming that the noise reduction from outside to inside with the window open is 15 dB"

7.3.26 On the basis of the above guidance in BS 4142:2014+A1:2019 and the GCN, Table 7.5 can be used to define the magnitude of impact.

Difference between Rating Level and Background Sound Level	BS 4142 Semantic Description	Magnitude of Impact
> 10 dB	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.	Major depending on the context

Difference between Rating Level and Background Sound Level	BS 4142 Semantic Description	Magnitude of Impact
5 to 10 dB	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.	Moderate depending on the context
0 to 5 dB	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.	Minor depending on the context
-10 to 0 dB		Negligible depending on the context
< -10 dB	-	No change

Table 7.5: Semantic Description and Magnitude of Impact Between Rating and Background Level.

Operational Traffic

- 7.3.27 Operational traffic has the potential to result in a permanent change to the noise arising from the surrounding road network (compared to construction traffic, which is temporary). It is generally accepted that an increase of 3 dB(A) or more is the threshold at which a permanent noise effect becomes significant (Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 HD 213/11 para 3.37 [Ref 7.18]).
- 7.3.28 Noise change criteria are applied equally to the daytime and night-time periods. It is also standard practice to categorise the degree of effect according to the extent of the predicted noise change. This is frequently implemented by the use of semantic descriptors associated with noise change bands. This approach has been used in the UK over the last 10 years in the assessment of road traffic schemes, expanding upon the criteria within DMRB and reflecting the likely duration of construction for this particular project.
- 7.3.29 The criteria are based on the premise that the subjective response to noise from a new source is proportional to the change in overall noise level. Hence, the semantic scale provided in Table 7.6 has been adopted to describe noise change (given that only increases are likely, there are no decrease bands).

Predicted Change in $L_{Aeq,T}$ or $L_{A10,T}$	Significant Yes/No?	Semantic Scale Rating / Magnitude of Impact
0 dB	No	No significant change
0.1 – 0.9 dB	No	Negligible Increase
1 – 2.9 dB	No	Minor Increase
3 – 4.9 dB	Yes	Moderate Increase
5+ dB	Yes	Major Increase

Table 7.6: Semantic Scale Describing Change in Noise.

- 7.3.30 These changes reflect the short-term response to increased traffic noise. Over the longer term, the associated impacts decrease, and the DMRB provides the following criteria for the classification of magnitude of noise impacts in the long term in Table 7.7 below.

Predicted Change in $L_{Aeq,T}$ or $L_{A10,T}$	Significant Yes/No?	Semantic Scale Rating / Magnitude of Impact
0 dB	No	No significant change
0.1 – 2.9 dB	No	Negligible Increase
3 – 4.9 dB	No	Minor Increase

Predicted Change in $L_{Aeq,T}$ or $L_{A10,T}$	Significant Yes/No?	Semantic Scale Rating / Magnitude of Impact
5 – 9.9 dB	Yes	Moderate Increase
10+ dB	Yes	Major Increase

Table 7.7: DMRB Classification of Long Term for Noise Change.

Operational Vibration

7.3.31 Due to the large separation distance between potential vibration sources and vibration sensitive receptors, vibration levels at receptors are considered likely to be very low. On this basis vibration from operational plant will be assessed qualitatively.

Assessment of Effects

7.3.32 The assessment of the effect with regards to noise and vibration is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed, with regard to IEMA’s Guidelines, is presented in Table 7.8. Where a range of significance of effect is presented, the final assessment for each effect is based upon expert judgement. Specific NVSRs have been identified and included within the assessment for the Environmental Statement and are shown on Figure 7.1.

7.3.33 For the purposes of this assessment, any effects identified as being moderate or greater are considered significant adverse effects. Adverse effects of slight or below are noteworthy but not considered significant in context of the EIA Regulations.

		Magnitude of impact				
		No change	Negligible	Minor	Moderate	Major
Sensitivity of receptor	Negligible	Negligible	Negligible	Negligible or slight	Negligible or slight	Slight
	Low	Negligible	Negligible or slight	Negligible or slight	Slight	Slight or moderate
	Medium	Negligible	Negligible or slight	Slight	Moderate	Moderate or substantial
	High	Negligible	Slight	Slight or moderate	Moderate or substantial	Substantial or very substantial

Table 7.8: Scale for Determining Significance of Effects

Limitations and Assumptions

7.3.34 In all assessments, it is good practice to consider uncertainty, which can arise from a number of different aspects of an assessment. There is a degree of uncertainty associated with: the sound monitoring instrumentation, the use of instrumentation, i.e. the measurements, the source data used for modelling, the sound propagation model and the subjective response of residents to the sound sources.

7.3.35 Uncertainty due to instrumentation error has been significantly reduced with the introduction of modern instrumentation and is reduced further by ensuring that all instrumentation is calibrated before and after each measurement period and is within accepted calibration intervals.

- 7.3.36 Every effort has been made to reduce the uncertainty of the baseline sound level measurements. Uncertainty in the baseline data has been reduced significantly by carrying out the baseline sound level survey over a period of seven days, allowing analysis of how representative the baseline data is given the naturally varying noise level at the site.
- 7.3.37 A quantitative assessment has been undertaken based on likely source levels provided by the developer and relevant British Standards. This approach minimises uncertainty associated with the source data inputs to the sound propagation model.
- 7.3.38 With regard to subjective response, the acoustics standards and guidance adopted for the assessment are based on the subjective response of the majority of the population. This is considered to be the best that can be achieved in a population of varying subjective responses, which are dependent upon a wide range of factors.
- 7.3.39 On the basis of the above, whilst the magnitude of any uncertainty has not been quantitatively defined, measures have been taken to minimise this aspect in accordance with best practice.
- 7.3.40 The exact location of buildings, and therefore the exact location of noise generating plant/building facades of the WKN Proposed Development has not been finalised. As noted in Chapter 2 and on the parameter plan (Figure 2.8) there is up to a 5 m buffer in any direction for final building locations. Whilst the final building location would have a slight effect on resultant noise immission at NVSRs, given the relatively large separating distance between the site and NVSRs (approx. 700 m) this effect is considered to be negligible.

7.4 Baseline Conditions

- 7.4.1 The K3 and the WKN Proposed Development are located on land at Kemsley Paper Mill, Sittingbourne, Kent. The Sites comprise the existing K3 Consented Development facility and an adjacent area to the north on which the WKN Proposed Development would operate. Both are bounded to the west by the paper mill, to the east by The Swale and to the north and south by Kemsley Marshes. A temporary laydown area is also proposed for the construction of the WKN Proposed Development.
- 7.4.2 The nearest residential receptors are approximately 700 m to the west. This is the residential area called Kemsley. There are potential noise sensitive ecological receptors bordering the north, east and south of the proposal site. The Saxon Shore Way PRoW, which follows the bank of the Swale, passes close to the eastern extent of the Sites.
- 7.4.3 The A249 is located approximately 2 km to the north and west of the Sites and is accessed via Swale Way. The A249 connects with both the A2 west of Sittingbourne and the M2 at Junction 5 approximately 8 km south of the Sites. To the north, the A249 provides access to the Isle of Sheppey.

Sensitive Receptors

- 7.4.4 The classes of sensitive receptors, listed in Table 7.9 below, have the potential to be affected by effects arising from the K3 Proposed Development and WKN Proposed Development. The assessment in this Chapter has considered the effects listed in the table upon the identified sensitive receptors. Receptors are shown on Figure 7.1 and are the same for both the K3 Proposed Development and the WKN Proposed Development.
- 7.4.5 Residential receptors are considered to be of medium sensitivity. This allows for other receptors of particular sensitivity to be allocated high sensitivity where appropriate.
- 7.4.6 One school, Kemsley Primary School, has been identified within the 1 km study area, approximately 1 km from the Site. The school is considered to be of medium sensitivity. No high-sensitivity receptors (e.g. such as hospitals, recording studios etc.) have been identified within the study area.
- 7.4.7 PRoWs are considered as sensitive to noise, but of low vulnerability/sensitivity. The Saxon Shore Way footpath follows both sides of the Swale, passing within approximately 100 m of the Site.

Receptor	Importance/sensitivity/vulnerability to change
Residential dwellings	Medium
School, Kemsley Primary	Medium
Public Rights of Way	Low
Other noise sensitive receptors	n/a - None identified

Table 7.9: Identified Receptors and Their Sensitivity to Noise.

- 7.4.8 The ecological receptors are identified and assessed within Chapter 10 Ecology.

Existing Sound Environment

- 7.4.9 Baseline sound level survey data gathered in 2016 has been used to determine representative baseline sound levels across the K3 and WKN Sites and wider area.
- 7.4.10 The local acoustic environment within the residential areas is determined by sound arising from traffic movements. The Transport consultants advised that traffic growth of around 3.6% is anticipated between 2016 and 2019. This would equate to a sound level increase of approximately 0.2 dB, indicating that the 2016 data remains valid without modification for assessment in 2019 and beyond.
- 7.4.11 Baseline sound level measurements were carried out between Tuesday 7th June and Tuesday 14th June 2016 at 41 Reams Way and 97 Walsby Drive. It is considered that these locations are representative of the neighbouring residential areas. These locations are shown in Figure 7.2.
- 7.4.12 It is noted that these surveys do not contain any contribution from K3 as consented and were undertaken before the construction of the K3 began.
- 7.4.13 Consideration was given to undertaking additional surveys to update the survey data. However, the current construction activities associated with K3 as consented would likely have compromised the survey data. The data from 2016 have been

used, therefore, given the expected relatively small anticipated growth in traffic noise (0.2 dB from paragraph 7.4.9).

7.4.14 Table 7.10 below provides a summary of the representative baseline sound levels determined by survey. The representative levels have been determined by consideration of the survey data to provide levels indicative of the quieter times during the survey period. This is considered to be a robust approach.

NVSR	Survey Location	Period	Representative Background Sound Level $L_{A90,T}$ (dB)	Range of Background Sound Levels $L_{A90,T}$ (dB)	Range of Residual Sound Level $L_{Aeq,T}$ (dB)
Reams Way	LT1	07:00 - 23:00	49	40 - 62	60 - 64
		23:00 - 07:00	43	38 - 56	54 - 59
Walsby Drive	LT2	07:00 - 23:00	39	32 - 49	47 - 51
		23:00 - 07:00	35	30 - 48	45 - 51

Table 7.10: Summary of Representative Baseline Sound Levels Determined From 2016 Survey.

7.4.15 Within this assessment, the minimum representative daytime and night-time levels are used; i.e. for the background sound levels: 39 dB $L_{A90,day}$ and 35 dB $L_{A90,night}$; and for the ambient sound levels: 47 dB $L_{Aeq,day}$ and 45 dB $L_{Aeq,night}$.

7.4.16 No significant vibration is transmitted beyond the footprint of the neighbouring industrial buildings, so existing vibration levels across the site and wider area are considered to be negligible. Assessment of vibration effects are compared against the absolute thresholds provided in Table 7.4, rather than vibration level change. Therefore, no measurement of baseline vibration is required.

7.5 Future baseline

7.5.1 Based on the assumed traffic growth for the area, and traffic flow data for the existing measured baseline (2016) and assessment baseline year (2021) scenarios, predictions indicate that sound levels are likely to increase by less than 0.5 dB due to the natural increase in traffic flows on the local road network. This is not considered to be a significant change with regards to the assessment procedure or representative baseline sound levels outlined in Table 7.10.

7.6 K3 Proposed Development Predicted Effects

Construction Effects

7.6.1 An assessment of the K3 Consented Development construction noise and vibration effects was included within the 2010 ES, pursuant to its Town and Country permission, and no likely significant effects were identified.

7.6.2 The 2010 ES (as amended) has been submitted with the application as Document 3.3 with the construction noise and vibration results summarised below.

Construction Vibration

- 7.6.3 An assessment was undertaken to consider potential vibration effects associated with the construction of the K3 as consented, primarily considering vibration effects during impact driven piling. The assessment concluded that there would be no significant construction vibration effects, with the ES stating:

"12.6.13 With regards to the assessment of effects to structures, impact driven piling is a 'transient' vibration source. With reference to Appendix 12.3, the results of the assessment indicate that the vibration levels in the foundations of a building 60 m from the piling rig would be expected to be 5 mm/s, or less, which is a tenth of the level at which BS 5228-2 suggests is commensurate with the level above which cosmetic damage may occur in industrial buildings. On this basis, vibration effects are considered to be not significant."

Construction Noise (construction activity)

- 7.6.4 An assessment was undertaken of noise effects from construction activities for the K3 as consented. This considered noise associated with:

- site preparation and ground excavations;
- pre-cast concrete driven piling;
- night-time concrete pour of foundations; and
- general building construction.

- 7.6.5 The assessment concluded that there would be no significant construction activity noise effects, with the ES stating:

"12.6.3 The results of the assessment indicate that the noise emission levels from daytime construction activities are not expected to exceed 65 dB $L_{Aeq, 12h}$ at NVSRs during the construction of the proposed SEP. The results of the assessment indicate that the noise emission levels from night-time concrete pouring activities are not expected to exceed 45 dB $L_{Aeq, 8h}$ at NVSRs and, on this basis, significant adverse noise effects are not predicted to occur at NVSRs. On this basis, noise effects during the construction or the SEP are considered to be not significant."

Construction Noise (construction traffic)

- 7.6.6 An assessment was undertaken to consider potential construction traffic noise effects associated with the construction of the K3 as consented. The number of K3 construction vehicles would vary during the construction period between approximately 15 cars and 30 HGVs per day to approximately 60 cars and 240 HGVs per day. The assessment, undertaken on a 'worst-case' basis, concluded that there would be no significant construction traffic noise effects, with the ES stating:

"12.6.10 The results of the assessment indicate that the noise change would be less than 1 dB and, on this basis, noise effects associated with delivery HGVs attending the site during the construction of the SEP are considered to be not significant."

Completed Development Effects

- 7.6.7 An assessment of operational noise effects associated with K3 as consented was undertaken as part of the 2010 ES pursuant to its Town and Country permission. The 2010 ES (as amended) forms an appendix to this ES (Appendix 2.1). No likely significant operational noise effects were identified.
- 7.6.8 The K3 Proposed Development introduces no additional noisy fixed plant above K3 as consented, i.e. noise emissions from fixed plant of K3 Proposed Development are equal to the K3 as consented.
- 7.6.9 Since the 2010 ES was completed the design and construction of K3 as consented has been modified from that which was originally assessed, primarily involving the relocation of proposed buildings, such as the boiler house etc.
- 7.6.10 As such a revised prediction of operational noise from the K3 Consented Development (and necessarily the K3 Proposed Development) has been undertaken.
- 7.6.11 Predictions of K3 Proposed Development operational noise have been made based upon the revised site layout using the same noise source data and SoundPLAN v8.1 noise modelling software.
- 7.6.12 In addition, the revised predicted K3 Proposed Development noise levels have been assessed against baseline data obtained in 2016, as provided in Table 7.10 above, rather than baseline data from 2010.
- 7.6.13 Noise during operation would arise from mobile and fixed plant. Plant items within buildings would contribute to an internal reverberant noise level which would be attenuated by the building structure before radiating into the environment. External plant items would radiate noise straight into the environment, as would the exhaust stacks and air intakes.
- 7.6.14 Predictions are made for nine residential NVSRs within a 1 km buffer of the K3 Site that are considered to be representative of the wider area. NVSRs are shown in Figure 7.1. The lowest measured baseline noise levels of the two sound monitoring surveys have been used for the assessment. This provides a worst-case assessment.
- 7.6.15 With reference to paragraph 7.3.19 character corrections can be added to predicted specific sound levels at NVSRs to account for any tonal, impulsive features etc, that may be audible at NVSRs. In this instance it is not considered appropriate to apply any character correction on the basis that predicted specific sound levels are sufficiently below the lowest daytime and night-time residual sound levels (by at least 11 dB) that any tonal or impulsive characteristics etc. would not be audible above the residual level.
- 7.6.16 Furthermore, no impulsive activities are proposed, and that proposed plant items and activities have typically broadband noise emissions. Therefore the likelihood that noise sources would contain such features would be low. On this basis predicted specific sound levels are equal to the rating sound level for each NVSR.

7.6.17 Details of the predicted sound levels, and the assessment against representative background sound levels and anticipated change in ambient sound levels is given in Table 7.11. Contours showing predicted sound levels during normal operation are provided in Figure 7.3.

NVSR	Period	Baseline Ambient Sound Level, $L_{Aeq, 16\text{-hours}}$ (dB)	Baseline Background Sound Level, L_{A90} (dB)	Specific Sound Level, $L_{Aeq, 1\text{-hour}}$ (dB)	Rating Level, $L_{Ar, Tr}$ (dB)	Rating / Background Difference (dB)	Change in Ambient Sound Level (dB)
Marsh Rise	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
Off Reams Way	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
Reams Way	Day	47	39	36	36	-3	0
	Night	45	35	34	34	-1	0
Reams Way N	Day	47	39	36	36	-3	0
	Night	45	35	34	34	-1	0
Reams Way S	Day	47	39	36	36	-3	0
	Night	45	35	34	34	-1	0
Recreation Way N	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
Recreation Way S	Day	47	39	33	33	-6	0
	Night	45	35	32	32	-3	0
Walsby Drive N	Day	47	39	33	33	-6	0
	Night	45	35	32	32	-3	0
Walsby Drive S	Day	47	39	33	33	-6	0
	Night	45	35	32	32	-3	0

Table 7.11: K3 Proposed Development Operation Noise Assessment.

7.6.18 The receptors above are identified as residential. The sensitivity of the receptors is therefore, considered to be medium.

7.6.19 During normal operation of K3 Proposed Development, the highest difference between the rating level and representative background sound level is -1 dB and would occur during the night-time at NSRs on Reams Way.

7.6.20 This would be an indication of a minor or negligible adverse impact following the criteria adopted, depending on the context. In this instance, consideration of the context is considered to further reduce the likely impact, as outlined below.

7.6.21 For the daytime period, resultant ambient sound levels are below the guideline level for the onset of annoyance as detailed in the GCN (50 dB L_{Aeq}). Furthermore, specific sound from the K3 Proposed Development, would not increase the ambient sound level.

- 7.6.22 For the night-time period, baseline residual sound levels are at the level for the onset of sleep disturbance, as detailed in the GCN (45 dB L_{Aeq}). However, specific sound levels at NVSRs associated with the K3 Proposed Development are at least 9 dB below the baseline residual sound level and therefore do not contribute significantly to the resultant ambient sound level, i.e. by less than 1 dB.
- 7.6.23 On the basis of the above, it is considered that overall noise impacts are of no greater than minor adverse magnitude.
- 7.6.24 With reference to Table 7.8, minor adverse impacts affecting residential properties, of medium sensitivity, is considered to be of slight adverse effect, and not significant.
- 7.6.25 Whilst impacts associated with operation of the K3 Proposed Development would be long-term, any noise generated by the facility would cease after decommissioning. In this regard, the impacts would be temporary rather than permanent.

Off-Site HGV Movements

- 7.6.26 The operation of the K3 Proposed Development would result in approximately 387 HGVs and 49 car movements during the period of 06:00 to 00:00 hours. There are potential noise increases from road traffic on the existing road network that would affect the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.
- 7.6.27 A summary of the traffic flows from Chapter 4 are provided in Table 7.12 below. The increase in noise arising from each link as a result of the additional operational traffic is provided in the last column, calculated using the methodology outlined within the Calculation of Road Traffic Noise (CRTN) [Ref 7.17].

Road Link		Base		Base + K3		dB Increase
		Total	HGVs	Total	HGVs	
		1	Swale Way East of B2005 Grovehurst Roundabout	21653	14%	
2	Barge Way North of Swale Roundabout	7003	32%	7433	36%	0.6
3	Barge Way, East of Fleet End Roundabout	3390	29%	3826	36%	1.2
4	A249 South of Swale Way Junction	39726	13%	40151	13%	0.1
5	A249 between the A2 and M2	55448	12%	55880	12%	0.1
6	M2 West	73889	11%	74102	11%	0.0
7	M2 East	67095	10%	67144	11%	0.0
8	Swale Way north of Reams Way Junction	15195	8%	15212	8%	0.0
9	Swale Way south of Reams Way Junction	15240	8%	15256	8%	0.0

Road Link						dB Increase
		Base		Base + K3		
		Total	HGVs	Total	HGVs	
10	Swale Way south of Ridham Avenue Roundabout	13904	7%	13920	7%	0.0
11	A249, North of Swale Way Junction	36047	8%	36063	8%	0.0

Table 7.12: K3 Proposed Development Operational Traffic Assessment.

- 7.6.28 With reference to Table 7.12 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from K3 operational traffic on the existing road network is 1.2 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)
- 7.6.29 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of minor and negligible adverse magnitude in the short and long term periods respectively.
- 7.6.30 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be no change in noise level and therefore in the both the short and long term periods the impact would be negligible.
- 7.6.31 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

On-site vehicle movements

- 7.6.32 On-site vehicle movements are included within the Completed Development Effects section above.

Operational Vibration

- 7.6.33 The plant would be designed and installed as to minimise vibration transmission from any plant items which might generate vibration. This control of vibration at source is necessary to maximise life of the plant, minimise maintenance and prevent interference with other processes within the facility and wider K3 Site. Typically, placing vibration isolation mounts into concrete pads would ensure that groundborne vibration is not perceptible beyond the immediate area of the plant.
- 7.6.34 The nearest residential properties are over 700 m from the main operational area of the K3 Site. As discussed in BS 5228-2:2009+A1:2014, vibration levels decrease rapidly over distance. Given the separation distance between the K3 site and the nearest residential receptors, vibration from operational activities would be significantly below the negligible significance criteria.
- 7.6.35 As such, vibration is considered to have no or negligible impact magnitude and would have no significant adverse effect.

Decommissioning

- 7.6.36 In the future, the facility may be decommissioned and potentially demolished. For the decommissioning (demolition) of K3 Proposed Development there would be a requirement in the DCO for a Decommissioning Environmental Management Plan to be produced prior to demolition.
- 7.6.37 The effects in relation to noise and vibration would be no worse than but are likely to be similar to or less than, those that would occur during the construction phase. This is based on the assumption that similar plant items would be used for decommissioning works as for construction works. Works would take place over a comparable timeframe.
- 7.6.38 As identified within Chapter 4 Traffic and Transport, the traffic flows associated with decommissioning are lower than those during the construction of K3. Consequently, any traffic impacts would also be no greater than those experienced during construction.
- 7.6.39 A construction noise assessment was undertaken as part of the original planning application for K3 as consented, which concluded:
- "The results of the assessment indicate that the noise emission levels from daytime construction activities are not expected to exceed 65 dB $L_{Aeq,12h}$ at NVSRs during the construction of the proposed facility. The results of the assessment indicate that the noise emission levels from night-time concrete pouring activities are not expected to exceed 45 dB $L_{Aeq,8h}$ at NVSRs and, on this basis, significant adverse noise effects are not predicted to occur at NVSRs. On this basis, noise effects during the construction or the SEP are considered to be not significant."*
- 7.6.40 On the basis of the above, decommissioning noise and vibration effects of the K3 Development at NVSRs would result in a slight adverse effect (noise levels are up to a magnitude of moderate impact and NVSRs are of medium sensitivity), which is not considered to be significant.
- 7.6.41 A summary of the noise and vibration effects associated with the operation of the K3 Development, prior to mitigation is provided in Table 7.13 below.

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Effects					
Construction Noise on residential NVSRs	Medium	No Impact or Negligible	Adverse	Short term	Negligible
Construction Vibration on residential NVSRs	Medium	No Impact or Negligible	Adverse	Short term	Negligible
Construction effects on non-residential NVSRs	Medium / Low	No Impact or Negligible	Adverse	Short term	Negligible
Completed Development Effects					
Operational noise on residential NVSRs	Medium	Minor	Adverse	Long-term	Slight
Operational vibration on residential NVSRs	Medium	No Impact or Negligible	Adverse	Long-term	Negligible

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Decommissioning Noise on residential NVSRs	Medium	No Impact or Negligible	Adverse	Short term	Negligible

Table 7.13: Summary of K3 Proposed Development Noise Impacts Prior to Mitigation.

7.7 Mitigation

7.7.1 On the basis of the above no mitigation is required for the K3 Proposed Development.

7.8 Residual Effects

7.8.1 Residual effects are those that are predicted to remain after implementation of the secondary mitigation measures described above. There are no predicted residual effects from the K3 Development.

7.9 The practical effect of the K3 Proposed Development

Construction Effects

7.9.1 No additional construction activity is associated with the practical effect of K3 Proposed Development beyond that necessary for K3 as consented. Construction of K3 as consented is due to be completed with the facility operational by late 2019.

Completed Development Effects

7.9.1 The practical effect of the K3 Proposed Development does not introduce additional noisy fixed plant to K3 as consented. The assessment for the K3 Development above has been based on the maximum operational noise and so reflects the maximum noise that would result from the operational plant from the K3 Proposed Development. The practical effect of the K3 Proposed Development will not increase operational noise beyond that generated by K3 as consented. Any noise generated by K3 Proposed Development would cease after decommissioning.

7.9.2 The practical effect of the K3 Proposed Development will increase the waste throughput of K3 as consented and therefore result in an additional 68 HGV movements per day.

7.9.3 The Transport Assessment indicates no additional HGV movements at night, and no additional non-HGV movements.

7.9.4 The noise contribution from these additional vehicles has been considered both with regard to their movement around site and to this additional traffic on the existing road network surrounding the K3 Site.

On-Site HGV Movements

- 7.9.5 The additional vehicles on the K3 Site would have minimal effect at the surrounding residential and school NVSRs, with a contribution from the HGVs below 5 dB L_{Aeq} during the daytime, and no contribution during the night-time above K3 as consented. This would be of no impact or a negligible magnitude of impact. A plan of the noise contours associated with the additional HGVs is provided in Figure 7.4.
- 7.9.6 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct short-term and temporary.

Off-Site HGV Movements

- 7.9.7 From Chapter 4 Traffic and Transport, the K3 Proposed Development would result in up to a maximum of around 68 additional HGV movements per day above those pursuant to K3 as consented. There are potential noise increases from road traffic on the existing road network that would affect the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.
- 7.9.8 A summary of the traffic flows from Chapter 4 are provided in Table 7.14 below. The increase in noise arising from each link as a result of the additional traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Base (inc. existing K3)				Base + Proposed K3		dB Increase
		Total		HGVs		Total	HGVs	
		Total	HGVs	Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	22082	16%			0.1
2	Barge Way North of Swale Roundabout	7364	35%	7433	36%			0.1
3	Barge Way, East of Fleet End Roundabout	3757	35%	3826	36%			0.2
4	A249 South of Swale Way Junction	40084	13%	40151	13%			0.0
5	A249 between the A2 and M2	55811	12%	55880	12%			0.0
6	M2 West	74058	11%	74102	11%			0.0
7	M2 East	67129	11%	67144	11%			0.0
8	Swale Way north of Reams Way Junction	15200	8%	15212	8%			0.0
9	Swale Way south of Reams Way Junction	15244	8%	15256	8%			0.0
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	13920	7%			0.0
11	A249, North of Swale Way Junction	36051	8%	36063	8%			0.0

Table 7.14: K3 Proposed Development Operational Traffic Assessment

- 7.9.9 With reference to Table 7.14 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from the practical effect of the K3 Proposed Development on the existing road network is 0.2 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)
- 7.9.10 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short and long term periods respectively.
- 7.9.11 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be no change in noise level and therefore in the both the short and long term periods the impact would be negligible.
- 7.9.12 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Operational Vibration

- 7.9.13 No new plant is required by way of consequence of the practical effect of the K3 Proposed Development and there remains unchanged from that of K3 as consented.
- 7.9.14 As such, vibration is considered to result in no impact or a negligible magnitude of impact. For all NVSRs, this would result in no effect or a negligible effect and would not be significant. Any negligible effect would be adverse, direct, long-term and temporary.
- 7.9.15 **Decommissioning**
- 7.9.16 Decommissioning of K3 Proposed Development is described above in paragraph 7.6.30, with no significant noise effects predicted.
- 7.9.17 The summary of effects prior to mitigation is provided in Table 7.15 below.

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Completed Development Effects					
Operational noise and vibration	Medium	No Impact or negligible	Adverse, direct	long-term and temporary	No effect or negligible

Table 7.15: Summary of K3 Proposed Development Noise and Vibration Effects Prior to Mitigation.

7.10 Mitigation

- 7.10.1 On the basis of the above no mitigation is required above that currently in place for the K3 as consented.

7.11 Residual Effects

7.11.1 Residual effects are those that are predicted to remain after implementation of the secondary mitigation measures described above. There are no predicted residual effects.

7.12 WKN Proposed Development Predicted Effects

7.12.1 Effects of the WKN Proposed Development may arise during its construction, operation, and eventual decommissioning. The effects of noise are likely to be limited to the area immediately surrounding the development site, and so receptors representative of the immediate surrounding areas within the study area have been assessed.

7.12.2 The WKN Proposed Development would be constructed and operated after the K3 Proposed Development is operational. However, for the purposes of this assessment, the baseline sound levels summarised in Table 7.10 have been used, i.e. levels without the K3 Proposed Development in operation.

7.12.3 It is not possible to predict the impact of the K3 Proposed Development on existing background sound levels without introducing significant uncertainty. Nevertheless, the levels detailed in Table 7.10 are considered to provide the basis for a robust assessment, as operation of K3 Proposed Development would likely result in higher baseline levels.

Construction Effects

7.12.4 The impacts of the construction of the WKN Proposed Development have been considered with regards to noise and vibration. No demolition would be required for the construction of WKN.

7.12.5 Construction effects would be temporary and relatively short-term (less than 5 years). Construction noise and vibration would be intermittent, depending on the nature of the construction phase and day-to-day programme, but with more intense activity at the start and consequentially higher noise levels during site clearance and foundation construction. Once construction works cease, construction noise and vibration would also immediately cease.

7.12.6 Construction activity would occur within standard working hours except where a deviation from daytime only is required, i.e. during prolonged concrete pours for example, in which prior written approval from Swale Borough Council is needed.

7.12.7 This assessment has included consideration of all associated works (Works No. 2-7) as set out in Chapter 2 i.e. use of the construction compound etc.

Construction Noise

7.12.8 The nearest residential properties are over 700 m from the main construction area of the WKN Site. Given the separation between the WKN Site and the nearest residential receptors, construction activities are unlikely to result in significant adverse effect due to noise.

- 7.12.9 The majority of activities associated with the construction of the WKN Proposed Development would occur during the daytime. The construction of the WKN Proposed Development may require a concrete pour associated with the construction of the foundations that may require 24-hour working.
- 7.12.10 Four periods during the construction phase that are representative of the periods for which there is the greatest potential for significant noise effects to occur have been assessed quantitatively:
- site preparation and ground excavations;
 - driving pre-cast concrete piles;
 - 24-hour concrete pours for foundations (including night-time works); and
 - general building construction.
- 7.12.11 At this stage of assessment, detailed construction programme and methodology is not available. The noise sources and source data assumed within the construction models are provided in Appendix 7.2, with typical noise source levels being taken from BS 5228-1:2009+A1:2014. The results of the construction assessments are provided in Appendix 7.3.
- 7.12.12 Noise levels from piling at the NVSRs identified have been calculated using 3D sound modelling software 'SoundPlan v8.0', with input acoustic data based that provided by the client and taken from BS 5228-1:2009+A1:2014.
- 7.12.13 From the results in Appendix 7.3 it can be seen that piling activity is predicted to result in the greatest construction noise levels at surrounding NVSRs.
- at residential NVSRs, of medium sensitivity, a maximum construction noise level of 32 dB L_{Aeq} is predicted (Reams Way S);
 - at the PRoW running along the Swale, of low sensitivity, a maximum construction noise level of 44 dB L_{Aeq} is predicted; and
 - at Kemsley Primary School, of medium sensitivity, a maximum construction noise level of 30 dB L_{Aeq} is predicted.
- 7.12.14 With reference to Appendix 7.3 construction noise levels during general excavation and concreting would be lower than for piling.
- 7.12.15 With reference to Table 7.2, construction noise levels of these magnitudes result in no greater than negligible adverse impacts and therefore, with reference to Table 7.8, no greater than slight adverse effects, which are not considered as significant in EIA terms.
- 7.12.16 Any construction noise effect would be adverse, direct, short-term and temporary.
- 7.12.17 It is considered, therefore, that construction works on site would not result in any significant effects within the surrounding residential area or other noise-sensitive receptors. Notwithstanding this, best practicable means to reduce construction

noise impacts (including minimising night-time works where practicable) should be implemented to minimise any potential for disturbance to the surrounding area.

7.12.18 Construction of the WKN Proposed Development would also necessitate a significant number of construction vehicles accessing the Site, with a high proportion being HGVs. Construction traffic would consist of a mix of light and heavy commercial vehicles to transport materials and equipment to and from and within the WKN Site.

7.12.19 From Chapter 4 Traffic and Transport, construction work would result in up to a maximum of around 405 two-way vehicle movements per day, including 50 HGVs. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.12.20 A summary of the traffic flows from Chapter 4 for the annual average weekday traffic (AAWT) 18hr period are provided in Table 7.16 below, the AAWT metric being appropriate for prediction of acoustic effects. The predicted increase in noise arising from each link as a result of the additional construction traffic is provided in the last column, calculated using the methodology within the CRTN.

Road Link		Base				dB Increase	
		Base		Base + WKN		dB Increase	
		Total	HGVs	Total	HGVs		
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	22920	15%	0.1	
2	Barge Way North of Swale Roundabout	7364	35%	8270	32%	0.2	
3	Barge Way, East of Fleet End Roundabout	3757	35%	4662	30%	0.5	
4	A249 South of Swale Way Junction	40084	13%	40955	13%	0.1	
5	A249 between the A2 and M2	55811	12%	56646	12%	0.1	
6	M2 West	74058	11%	74339	11%	0.0	
7	M2 East	67129	11%	67246	11%	0.0	
8	Swale Way north of Reams Way Junction	15200	8%	15200	8%	0.0	
9	Swale Way south of Reams Way Junction	15244	8%	15244	8%	0.0	
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	13908	7%	0.0	
11	A249, North of Swale Way Junction	36051	8%	36051	8%	0.0	

Table 7.16: WKN Proposed Development Construction Traffic Assessment.

7.12.21 With reference to Table 7.16 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from WKN construction traffic

on the existing road network is 0.5 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)

7.12.22 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short and long term periods respectively.

7.12.23 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be no change in noise level and therefore in the both the short and long term periods the impact would be negligible.

7.12.24 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Construction Vibration

7.12.25 Surface plant, such as cranes, compressors and generators, are not recognised as sources of high levels of environmental vibration. Even at a distance of 10 m, PPVs significantly less than 5 mm/s are generated by such plant. For example, from BS 5228-2:2009+A1:2014, a tracked excavator may generate a PPV of approximately 0.6 mm/s and a heavy lorry on poor road surface a PPV of less than 0.1 mm/s at 10 m distance. These values are well below limits at which even cosmetic building damage becomes likely. Similarly, whilst vibration from impact piling might result in higher vibration levels at source, vibration level would be insignificant beyond the immediate development area.

7.12.26 The nearest residential properties are over 700 m from the main construction area on the WKN Site and the construction laydown area. With reference to BS 5228-2:2009+A1:2014, vibration levels decrease rapidly with increasing distance and is also attenuated by energy absorption in the soil and by obstacles and discontinuities.

7.12.27 Given the separation between the WKN Site and the nearest residential receptors, vibration from construction activities would be significantly below the minor significance criteria. As such, vibration is considered to result in no impact or a negligible impact magnitude and would have no significant adverse effect.

7.12.28 Any effects on other non-residential NVSRs would also be negligible; from the PRow vibration would be unlikely to be noticeable and would fall below any threshold of significance.

Completed Development Effects

Operational Noise

7.12.29 Noise during operation would arise from mobile and fixed plant. Noise from plant items within buildings would be attenuated by the building structure before radiating into the environment. External plant items would radiate noise straight

into the environment, as would the exhaust stacks and air intakes. The approximate locations of these plant items are shown in Figure 2.8 in Chapter 2.

7.12.30 The noise sources and source data assumed within the operational noise models are provided in Appendix 7.4. Noise source data has been provided by the scheme engineers. The results of the operational noise assessments are provided in Appendix 7.5.

7.12.31 Operational noise from the WKN Proposed Development has been predicted for normal operation. Predictions of operational noise have been made using the noise source data and SoundPLAN 8.1 noise modelling software. Predictions have been made a nine residential NVSRs within a 1 km buffer of the WKN Site, considered representative of the wider area and noise contours have also been calculated. NVSRs are shown in Figure 7.1. The lowest baseline noise levels from the two monitoring locations has been used for the assessment. This provides a worst-case assessment.

7.12.32 With reference to paragraph 7.3.19 character corrections can be added to predicted specific sound levels at NVSRs to account for any tonal, impulsive features etc, that may be audible at NVSRs. In this instance it is not considered appropriate to apply any character correction on the basis that predicted specific sound levels are sufficiently below the lowest daytime and night-time residual sound levels (by at least 11 dB) that any tonal or impulsive characteristics etc. would not be audible above the residual sound level.

7.12.33 Furthermore, no impulsive activities are proposed, and that proposed plant items and activities have typically broadband noise emissions. Therefore, it is unlikely that noise sources would contain such features. On this basis predicted specific sound levels are equal to the rating sound level for each NVSR.

7.12.34 Details of the predicted sound levels, and the assessment against representative background sound levels and anticipated change in ambient sound levels is given in Table 7.17. Contours showing predicted sound levels during normal operation are provided in Figure 7.6.

NVSR	Period	Baseline Ambient Sound Level, $L_{Aeq, 16\text{-hours}}$ (dB)	Baseline Background Sound Level, L_{A90} (dB)	Specific Sound Level, $L_{Aeq, 1\text{-hour}}$ (dB)	Rating Level, $L_{Ar,Tr}$ (dB)	Rating / Background Difference (dB)	Change in Ambient Sound Levels (dB)
Marsh Rise	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
Off Reams Way	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
Reams Way	Day	47	39	36	36	-3	0
	Night	45	35	34	34	-1	0
Reams Way N	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
	Day	47	39	35	35	-4	0

NVSR	Period	Baseline Ambient Sound Level, $L_{Aeq, 16\text{-hours}}$ (dB)	Baseline Background Sound Level, L_{A90} (dB)	Specific Sound Level, $L_{Aeq, 1\text{-hour}}$ (dB)	Rating Level, $L_{Ar,Tr}$ (dB)	Rating / Background Difference (dB)	Change in Ambient Sound Levels (dB)
Reams Way S	Night	45	35	34	34	-1	0
Recreation Way N	Day	47	39	35	35	-4	0
	Night	45	35	34	34	-1	0
Recreation Way S	Day	47	39	34	34	-5	0
	Night	45	35	33	33	-2	0
Walsby Drive N	Day	47	39	33	33	-6	0
	Night	45	35	32	32	-3	0
Walsby Drive S	Day	47	39	33	33	-6	0
	Night	45	35	32	32	-3	0

Table 7.17: WKN Proposed Development Operational Noise Assessment.

- 7.12.35 The receptors above are identified as residential. The sensitivity of the receptors is therefore medium.
- 7.12.36 During normal operation of the WKN Proposed Development, the highest difference between the rating level and representative background sound level of -1 dB is predicted during the night-time at NVSRs on Reams Way.
- 7.12.37 This would be an indication of a minor adverse impact, depending on the context, following the criteria adopted. In this instance, consideration of the context is considered to further reduce the likely impact, as outlined below.
- 7.12.38 For the daytime period, resultant ambient sound levels are below the level for the onset of annoyance as detailed in the GCN (50 dB L_{Aeq}). Furthermore, the WKN Proposed Development would not increase the ambient sound level
- 7.12.39 For the night-time period, baseline residual sound levels are at the level for the onset of sleep disturbance, as detailed in the GCN (45 dB L_{Aeq}). However, specific sound levels at NVSRs associated with the K3 Proposed Development are at least 9 dB below the baseline residual sound level and therefore do not contribute significantly to the resultant ambient sound level, i.e. by no more than 1 dB.
- 7.12.40 On the basis of the above, it is considered that overall noise impacts are of no greater than minor adverse magnitude.
- 7.12.41 With reference to Table 7.8, minor adverse impacts affecting residential properties, of medium sensitivity, is considered to be of slight adverse effect, and not significant.
- 7.12.42 Whilst impacts associated with operation of the WKN Proposed Development would be long-term, any noise generated by the facility would cease after decommissioning. In this regard, the impacts would be temporary rather than permanent.

Off-Site HGV Movements

7.12.43 The operation of the WKN Proposed Development would result in approximately 252 HGVs and 71 car movements per day. There is the potential for this increase in road traffic to result in an increase the level of road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.12.44 A summary of the traffic flows from Chapter 4 are provided in Table 7.18 below. The increase in noise arising from each link as a result of the additional operational traffic is provided in the last column, calculated using the methodology within the CRTN.

Road Link						dB Increase
		Base		Base + WKN		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	22334	16%	0.1
2	Barge Way North of Swale Roundabout	7364	35%	7687	37%	0.3
3	Barge Way, East of Fleet End Roundabout	3757	35%	4080	38%	0.5
4	A249 South of Swale Way Junction	40084	13%	40398	14%	0.1
5	A249 between the A2 and M2	55811	12%	56128	12%	0.1
6	M2 West	74058	11%	74205	11%	0.0
7	M2 East	67129	11%	67163	11%	0.0
8	Swale Way north of Reams Way Junction	15200	8%	15212	8%	0.0
9	Swale Way south of Reams Way Junction	15244	8%	15256	8%	0.0
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	13920	7%	0.0
11	A249, North of Swale Way Junction	36051	8%	36065	8%	0.0

Table 7.18: WKN Proposed Development Operational Traffic Assessment.

7.12.45 With reference to Table 7.18 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from operational WKN traffic on the existing road network is 0.5 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)

7.12.46 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short and long term periods respectively.

7.12.47 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be no change in noise level and therefore in the both the short and long term periods the impact would be negligible.

7.12.48 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Operational Vibration

7.12.49 The plant would be designed and installed as to minimise vibration transmission from any plant items which might generate vibration. This control of vibration at source is necessary to maximise life of the plant, minimise maintenance and prevent interference with other processes within the facility and wider WKN Site. Typically, the use of placing vibration isolation mounts into concrete pads would ensure that groundborne vibration is not perceptible beyond the immediate area of the plant.

7.12.50 The nearest residential properties are over 700 m from the main operational area of the WKN Site. As discussed in paragraph 7.6.31, vibration levels decrease rapidly with separation. Given the separation between the WKN site and the nearest residential receptors, vibration from operational activities would

7.12.51 be significantly below the negligible significance criteria. As such, vibration is considered to result in no impact or a negligible impact magnitude and would result in no effect or a negligible effect i.e. not significant.

Decommissioning

7.12.52 In the future, the facility may be decommissioned and potentially demolished. For the decommissioning (demolition) of both the K3 Proposed Development and WKN, there would be a requirement in the DCO for a Decommissioning Environmental Management Plan to be produced prior to demolition.

7.12.53 The effects in relation to noise and vibration would be no worse than but are likely to be similar to or less than those that occurred during the construction phase. This is based on the assumption that similar plant items would be used for decommissioning works as for construction works. Works would take place over a comparable timeframe.

7.12.54 As identified within Chapter 4 Traffic and Transport, the traffic flows associated with decommissioning would be lower than those during its construction. Consequently, any traffic impacts would also be no greater than those experienced during construction.

7.12.55 A summary of the effects prior to mitigation is provided in Table 7.19 below.

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Effects					

Effect Identified	Receptor Sensitivity	Impact Magnitude	Nature	Duration	Degree of Effect
Construction Noise on residential NVSRs	Medium	No Impact or Negligible	Adverse	Short term	Negligible
Construction Vibration on residential NVSRs	Medium	No Impact or Negligible	Adverse	Short term	Negligible
Construction effects on non-residential NVSRs	Medium / Low	No Impact or Negligible	Adverse	Short term	Negligible
Completed Development Effects					
Operational noise on residential NVSRs	Medium	Minor	Adverse	Long-term	Slight
Operational vibration on residential NVSRs	Medium	No Impact or Negligible	Adverse	Long-term	Negligible
Decommissioning Noise on residential NVSRs	Medium	No Impact or Negligible	Adverse	Short term	Negligible

Table 7.19: Summary of WKN Noise Impacts Prior to Mitigation.

7.13 Mitigation

7.13.1 Specific measures necessary to mitigate adverse noise or vibration effects are identified in this section. In addition to these required mitigation measures, best practicable means should be adopted to minimise noise emissions as far as is reasonably practicable.

Mitigation for Construction Effects

7.13.2 No specific mitigation is identified as being required to reduce construction noise or vibration adverse effects.

7.13.3 Notwithstanding this, best practicable means should be adopted to minimise noise emissions as far as is reasonably practicable. This should include adherence to a Construction Environmental Management Plan (CEMP) or similar which would demonstrate how the construction works would meet best practicable means. The CEMP would include a monitoring of community response to construction noise to ensure that impacts are controlled and no worse than predicted. As draft CEMP is provided as Appendix 2.1 of the ES.

7.13.4 The Project would be constructed during standard working hours except by prior written agreement of SBC.

Mitigation for Completed Development Effects

7.13.5 Secured through the detailed design process, any plant noise specification would either require that noise emissions as experienced within neighbouring residential areas are relatively free from distinct tones or impulsive character or specified to a lower acoustic emission such that the BS 4142:2014+A1:2019 rating level remains as stated in Table 7.19.

7.13.6 Notwithstanding this, best practicable means should be adopted to minimise noise emissions and remove tonal components as far as is reasonably practicable.

- 7.13.7 Any plant noise associated with non-standard operation is excluded from this assessment and emergency plant would operate only under exceptional circumstances. Notwithstanding this, and where reasonably practicable, silencers or other screening would be installed such as to control noise from emergency steam release valves.
- 7.13.8 Noise level monitoring undertaken as part of completion tests would be compared against the predicted noise and effect levels, to ensure that the noise emissions committed to within this ES are achieved.

Mitigation for Demolition Effects

- 7.13.9 No specific mitigation is identified as being required to reduce construction noise or vibration adverse effects.
- 7.13.10 Notwithstanding this, best practicable means should be adopted to minimise noise emissions as far as is reasonably practicable. This should include adherence to a Decommissioning Environmental Management Plan (DEMP) or similar which would demonstrate how the works would meet best practicable means. The stipulation for a DEMP is to form a Requirement of the DCO.

7.14 Residual Effects

- 7.14.1 Residual effects are those that are predicted to remain after implementation of the secondary mitigation measures described above. With regards to EIA criteria, only effects of moderate or above are significant.
- 7.14.2 With the mitigation identified above, no significant adverse residual effects would result from the construction, operation or decommissioning of the WKN Proposed Development.

7.15 Cumulative Effects

- 7.15.1 All large-scale developments within 3 km of the K3 and WKN Sites, and all large energy, industrial and mixed-use schemes within 10 km of the K3 and WKN Sites have been considered as part of the cumulative scenarios. Forty-six schemes have been identified as shown in Figures 3.1 & 2 in Chapter 3 'Methodology'.
- 7.15.2 As outlined in Chapter 3 'Methodology', the following cumulative scenarios have been considered:
- Baseline + K3 Proposed Development + other relevant cumulative developments within the zone of influence of the K3 Proposed Development;
 - Baseline (K3 as consented) + the 'practical effect' of K3 Proposed Development + other relevant cumulative developments within the zone of influence of the K3 Proposed Development;
 - Baseline (K3 as consented) + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the WKN Proposed Development; and

- K3 as consented + the practical effect of the K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the WKN Proposed Developments.
- K3 Proposed Development + WKN Proposed Development + other relevant cumulative developments within the zone of influence of the K3 and WKN Proposed Developments.

7.15.3 A review of the 46 identified schemes has been undertaken; this review has concluded that:

- there would be no significant residual adverse cumulative noise or vibration effects associated with the 46 identified schemes;
- only one identified scheme (Scheme 16) would have the potential to result in cumulative operational adverse effects above those outlined above for the K3 Proposed Development or the WKN Proposed Developments; and
- save for a country park, included within an identified scheme (Scheme 3), none of the identified schemes introduce new or potential NVSRs to the assessment area.

K3 Proposed Development plus other relevant developments

Construction Site Noise

7.15.4 The precise timescale for construction of the other 46 projects is unknown. However, due to the variable nature of construction noise, the cumulative effects of construction are generally no greater than those that arise for individual projects. The duration for which construction noise occurs, however, may be extended if different projects are constructed non-concurrently. However, if each development follows the guidance contained within BS 5228-1:2009+A1:2014 and given localised nature of noise impacts associated with the construction of each development, it is unlikely that cumulative construction noise effects would occur.

7.15.5 Consequently, cumulative effects due to construction works overlapping with other projects would be unlikely to be greater than for the project alone, i.e. not significant.

Cumulative Traffic during Operation of K3 Proposed Development

7.15.6 The operation of the K3 Proposed Development and the construction/operation of the 46 identified schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase existing road traffic noise levels experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.15.7 A summary of the traffic flows from Chapter 4 are provided in Table 7.20 below. The increases in noise levels arising from each link as a result of the additional cumulative traffic from the 46 identified schemes is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Base		Cumulative Traffic during Operation of K3 Proposed Development		dB Increase
		Total	HGVs	Total	HGVs	
		1	Swale Way East of B2005 Grovehurst Roundabout	21653	14%	
2	Barge Way North of Swale Roundabout	7003	32%	7513	36%	0.7
3	Barge Way, East of Fleet End Roundabout	3390	29%	3906	37%	1.4
4	A249 South of Swale Way Junction	39726	13%	40587	13%	0.2
5	A249 between the A2 and M2	55448	12%	56299	12%	0.2
6	M2 West	73889	11%	74255	11%	0.1
7	M2 East	67095	10%	67202	11%	0.0
8	Swale Way north of Reams Way Junction	15195	8%	15586	8%	0.1
9	Swale Way south of Reams Way Junction	15240	8%	15630	8%	0.1
10	Swale Way south of Ridham Avenue Roundabout	13904	7%	13956	7%	0.0
11	A249, North of Swale Way Junction	36047	8%	36066	8%	0.0

Table 7.20: K3 Proposed Development Cumulative Operational Traffic Assessment.

7.15.8 With reference to Table 7.20 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from the K3 Proposed Development and cumulative traffic on the existing road network is 1.4 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)

7.15.9 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of minor and negligible adverse magnitude in the short and long term periods respectively.

7.15.10 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a 0.1 dB change in noise level and therefore in the both the short and long term periods there would be a negligible adverse impact.

7.15.11 For all NVSRs, there would be no effect or a negligible effect, which would not be significant in EIA terms. Any negligible effect would be adverse, direct long-term and temporary.

Operational effects during Operation of K3 Proposed Development

7.15.12 As stated above, only one identified scheme would have the potential to result in cumulative operational effects. Scheme 16 (Chapter 3) is for the decommissioning of the existing K1 'combined heat and power plant' (CHP) on the site and the build, commission and operation of a new CHP plant K4 at the adjacent Kemsley Paper Mill.

7.15.13 With reference to the noise assessment included as part of the DCO application for Scheme 16, the rating levels at NVSRs associated with the normal 'scenario 2' operation of Scheme 16 are presented below in Table 7.21. Also shown are the rating levels associated with the operation of the K3 Proposed Development (as outlined in Table 7.11 above), the combined rating level of the K3 'Proposed Development' and Scheme 16 and the difference between the combined rating and background sound level.

NVSR	Period	Baseline Ambient Level, $L_{Aeq, 16\text{-hours}}$ (dB)	Baseline Background Level, L_{A90} (dB)	Scheme 16. Rating Level, $L_{A,Tr}$ (dB)	K3 'as a whole' Rating Level, $L_{A,Tr}$ (dB)	Combined Rating Level, $L_{A,Tr}$ (dB)	Rating / Background Difference (dB)	Change in Ambient Sound Level (dB)
Marsh Rise	Day	47	39	38	35	40	+1	+1
	Night	45	35	38	34	39	+4	+1
Off Reams Way	Day	47	39	36	35	39	0	+1
	Night	45	35	36	34	38	+3	+1
Reams Way	Day	47	39	34	36	38	-1	+1
	Night	45	35	34	34	37	+2	+1
Reams Way N	Day	47	39	35	36	39	0	+1
	Night	45	35	35	34	38	+3	+1
Reams Way S	Day	47	39	36	36	39	0	+1
	Night	45	35	36	34	38	+3	+1
Recreation Way N	Day	47	39	38	35	40	+1	+1
	Night	45	35	38	34	39	+4	+1
Recreation Way S	Day	47	39	35	33	37	-2	0
	Night	45	35	35	32	37	2	+1
Walsby Drive N	Day	47	39	37	33	38	-1	+1
	Night	45	35	37	32	38	+3	+1
Walsby Drive S	Day	47	39	39	33	40	+1	+1
	Night	45	35	39	32	40	5	+1

Table 7.21: K3 Proposed Development 'as a whole' Proposed Development Cumulative Operational Noise Assessment.

- 7.15.14 The receptors above are identified as residential. The sensitivity of the receptors is therefore medium.
- 7.15.15 During the normal operation of Scheme 16 and the K3 Proposed Development, a highest difference between the rating level and representative background level of +5 dB is predicted during the night-time at one NVSR.
- 7.15.16 This would be an indication of a moderate adverse impact, depending on the context, following the criteria adopted. In this instance, consideration of the context is considered to reduce the likely impact, as outlined below.
- 7.15.17 For the daytime period, resultant ambient sound levels at this and all NVSRs are below the level for the onset of annoyance as detailed in the GCN (50 dB L_{Aeq}). Furthermore, the cumulative contribution of sound from Scheme 16 and the K3 Proposed Development 'as a whole' would not contribute significantly to the ambient sound level, i.e. no more than 1 dB.
- 7.15.18 For the night-time period, baseline residual sound levels are at the level for the onset of sleep disturbance as detailed in the GCN (45 dB L_{Aeq}). However, cumulative specific sound levels at NVSRs associated with the Scheme 16 and the K3 Proposed Development 'as a whole' are at least 5 dB below the baseline residual sound level and therefore do not contribute significantly to the resultant ambient sound level, i.e. by no more than 1 dB.
- 7.15.19 In addition, the above cumulative assessment is based on both sites operating at maximum capacity concurrently, i.e. a 'worst-case' scenario. It is considered likely that site activities would vary to some extent, with all plant not operating at full capacity concurrently and during those periods noise emissions would be appropriately lower.
- 7.15.20 Furthermore, the Scheme 16 noise levels used in this assessment have been based on the higher range of normal operational conditions as outlined in the Scheme 16 DCO application (scenario #2 with dump condensers in use).
- 7.15.21 For scenario #1 (without dump condensers), rating sound levels from Scheme 16 at NVSRs are up to 6 dB lower and at Walsby Drive S the Scheme 16 rating level would be 33 dB $L_{Ar,Tr}$. As such, the cumulative rating level would be 36 dB $L_{Ar,Tr}$, which is only 1 dB above the night-time background sound level. This is an indication of a minor adverse impact depending on the context.
- 7.15.22 On the basis of the above, it is considered that the overall Scheme 16 and the K3 Proposed Development 'as a whole' noise impacts are of no greater than minor adverse magnitude, and with reference to Table 7.8 would result in slight adverse noise effects, which are not considered to be significant in EIA terms.

Decommissioning

- 7.15.23 As outlined in the decommissioning sections for the K3 Proposed Development, during decommissioning noise and vibration immissions are likely to be similar to or less than, those that occurred during the construction phase. This is based on similar plant items being used for decommissioning works as for construction works and would take place over a comparable timeframe.

7.15.24 Where decommissioning occurs concurrently with other development, appropriate mitigation would be included to ensure that decommissioning does not result in new or additional significant impact.

The 'practical effect' of K3 Proposed Development plus other relevant cumulative developments against a baseline of K3 as consented

Construction Site Noise

7.15.1 On the basis there would be no construction associated with the 'practical effect' of K3 Proposed Development, only the WKN Proposed Development, there would be no cumulative construction site or construction traffic noise effects.

Cumulative Traffic during operation of the K3 Proposed Developments

7.15.2 The introduction of the operational 'practical effect' of K3 Proposed Development and the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.15.3 A summary of the traffic flows from Chapter 4 are provided in Table 7.22 below. The increase in noise arising from each link as a result of the additional cumulative traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Operation				dB Increase
		Base		Cumulative Traffic during operation of the 'practical effect' of K3 Proposed Developments		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	22534	16%	0.2
2	Barge Way North of Swale Roundabout	7364	35%	7513	36%	0.2
3	Barge Way, East of Fleet End Roundabout	3757	35%	3906	37%	0.4
4	A249 South of Swale Way Junction	40084	13%	40587	13%	0.1
5	A249 between the A2 and M2	55811	12%	56299	12%	0.1
6	M2 West	74058	11%	74255	11%	0.0
7	M2 East	67129	11%	67202	11%	0.0
8	Swale Way north of Reams Way Junction	15200	8%	15586	8%	0.1
9	Swale Way south of Reams Way Junction	15244	8%	15630	8%	0.1

Road Link		Operation				
		Base		Cumulative Traffic during operation of the 'practical effect' of K3 Proposed Developments		dB Increase
		Total	HGVs	Total	HGVs	
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	13956	7%	0.0
11	A249, North of Swale Way Junction	36051	8%	36066	8%	0.0

Table 7.22: the 'practical effect' of K3 Proposed Development Cumulative Construction Traffic Assessment (baseline K3 Consented Development in operation).

- 7.15.4 With reference to Table 7.22 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from the 'practical effect' of K3 Proposed Development and cumulative traffic on the existing road network is 0.4 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)
- 7.15.5 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short and long term periods.
- 7.15.6 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a negligible 0.1 dB increase in noise level and therefore in the both the short and long term periods there would be a negligible impact.
- 7.15.7 For all NVSRs, there would be no effect or a negligible effect, which would not be significant in EIA terms. Any negligible effect would be adverse, direct long-term and temporary.

Operational Noise

- 7.15.8 On the basis that operation of the 'practical effect' of K3 Proposed Development would not result in any increase in plant noise emissions above the K3 Consented Development, and that operation of the K3 Proposed Development and cumulative development would not result in significant effects (as detailed below), the operation of the 'practical effect' of K3 Proposed Development plus Other Relevant Developments would necessarily not result in significant effects.

Operational Vibration

- 7.15.9 Due to the short distances over which any vibration levels attenuate to baseline, there would be no cumulative vibration effects.

Decommissioning

- 7.15.10 As outlined in the decommissioning sections for the K3 Proposed Development and the WKN Proposed Development, during the decommissioning of each proposed development noise and vibration immissions are likely to be similar to or less than, those that occurred during the construction phase. This is based similar plant items being used for decommissioning works as for construction works and would take place over a comparable timeframe.
- 7.15.11 Hypothetically, should the 'practical effect' of K3 Proposed Development and the WKN Proposed Development be decommissioned concurrently, the cumulative increase in decommissioned noise is limited to a maximum of 3 dB. Whilst this could affect a determination of impact, 3 dB is of the order of other uncertainties associated with decommissioning noise prediction.
- 7.15.12 With reference to paragraph 7.9.14 noise levels associated with the construction of the WKN Proposed Development are of no to negligible impact. On the basis that noise levels during decommissioning of an individual project would be no worse than during construction of an individual project, and that during cumulative decommissioning there is the potential that noise levels would have an impact magnitude of up to one level higher, i.e. of minor adverse impact. Noise effects during the cumulative decommissioning may be up to slight adverse effect, which is not considered significant

WKN Proposed Development plus other relevant cumulative developments against a baseline of K3 as consented

Construction Site Noise

- 7.15.1 The precise timescale for construction of the other 46 projects is generally unknown. However, due to the variable nature of construction noise, the cumulative effects of construction are generally no greater than arise for individual projects. The duration for which construction noise occurs, however, may be extended if different projects are constructed non-concurrently. However, if each development follows the guidance contained within BS 5228 1:2009+A1:2014 and given localised nature of noise impacts associated with the construction of each development, it is unlikely that cumulative construction noise effects would occur.
- 7.15.2 Consequently, the cumulative effects due to construction works overlapping with other projects would be unlikely to be greater than for the project alone.

Cumulative Traffic during construction of the WKN Proposed Development

- 7.15.3 The construction of the WKN Proposed Development and the construction/operation of the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.
- 7.15.4 A summary of the traffic flows from Chapter 4 are provided in Table 7.23 below. The increase in noise arising from each link as a result of the additional cumulative traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Cumulative Traffic during construction of the WKN Proposed Development				dB Increase
		Base		Cumulative Traffic during construction of the WKN Proposed Development		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	23372	15%	0.2
2	Barge Way North of Swale Roundabout	7364	35%	8350	33%	0.3
3	Barge Way, East of Fleet End Roundabout	3757	35%	4742	31%	0.7
4	A249 South of Swale Way Junction	40084	13%	41391	13%	0.1
5	A249 between the A2 and M2	55811	12%	57065	12%	0.1
6	M2 West	74058	11%	74492	11%	0.0
7	M2 East	67129	11%	67303	11%	0.0
8	Swale Way north of Reams Way Junction	15200	8%	15574	8%	0.1
9	Swale Way south of Reams Way Junction	15244	8%	15618	8%	0.1
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	13944	7%	0.0
11	A249, North of Swale Way Junction	36051	8%	36054	8%	0.0

Table 7.23: WKN Proposed Development Cumulative Construction Traffic Assessment (baseline K3 Consented Development in operation).

- 7.15.5 With reference to Table 7.23 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from K3 + WKN construction and cumulative traffic on the existing road network is 0.7 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)
- 7.15.6 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short- and long-term periods.
- 7.15.7 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a 0.1 dB increase in noise level and therefore in the both the short and long term periods there would be a negligible impact.
- 7.15.8 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Cumulative Traffic during operation of the WKN Proposed Development

7.15.9 The introduction of the operational WKN Proposed Development and the construction/operation of the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.15.10 A summary of the traffic flows from Chapter 4 are provided in Table 7.24 below. The increase in noise arising from each link as a result of the additional cumulative traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Cumulative Traffic during operation of the WKN Proposed Development				dB Increase
		Base		Cumulative Traffic during operation of the WKN Proposed Development		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	22430	16%	0.2
2	Barge Way North of Swale Roundabout	7364	35%	7687	37%	0.4
3	Barge Way, East of Fleet End Roundabout	3757	35%	4080	38%	0.7
4	A249 South of Swale Way Junction	40084	13%	41992	13%	0.2
5	A249 between the A2 and M2	55811	12%	59155	12%	0.2
6	M2 West	74058	11%	74992	11%	0.1
7	M2 East	67129	11%	67394	11%	0.0
8	Swale Way north of Reams Way Junction	15200	8%	15308	8%	0.1
9	Swale Way south of Reams Way Junction	15244	8%	15353	8%	0.1
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	14017	7%	0.1

Road Link		Base				Cumulative Traffic during operation of the WKN Proposed Development		dB Increase
		Total		HGVs		Total	HGVs	
11	A249, North of Swale Way Junction	36051	8%	36599	8%		0.1	

Table 7.24: WKN Proposed Development Cumulative Operation Traffic Assessment.

- 7.15.11 With reference to Table 7.24 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from WKN operational and cumulative traffic on the existing road network is 0.7 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)
- 7.15.12 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short- and long-term periods.
- 7.15.13 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a 0.1 dB increase in noise level and therefore in the both the short and long term periods there would be a negligible adverse impact.
- 7.15.14 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Cumulative effects during operation of WKN Proposed Development

- 7.15.15 On the basis that operation of the K3 Proposed Development and the WKN Proposed Development, and cumulative development would not result in significant effects (as detailed below), the operation of the WKN Proposed Development alone plus cumulative would necessarily not result in significant effects.

Decommissioning

- 7.15.16 As outlined in the decommissioning sections for the WKN Proposed Development, during the decommissioning of the WKN Proposed Development, noise and vibration immisions are likely to be similar to or less than, those that occurred during the construction phase. This is based similar plant items being used for decommissioning works as for construction works and would take place over a comparable timeframe.

The 'practical effect' of K3 Proposed Development plus the WKN Proposed Development plus other relevant cumulative development against a baseline of K3 as consented

Construction Site Noise

7.15.1 On the basis there would be no construction associated with the 'practical effect' of K3 Proposed Development, only the WKN Proposed Development, cumulative construction site noise effects is covered in the WKN Proposed Development plus Other Relevant Developments section above.

Cumulative Traffic during construction of the WKN Proposed Development and operation of the proposed K3 development

7.15.2 The introduction of the operational 'practical effect' of K3 Proposed Development and the construction of the WKN Proposed Development, and the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.15.3 A summary of the traffic flows from chapter 4 are provided in Table 7.25 below. The increase in noise arising from each link as a result of the additional cumulative traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Cumulative Traffic during construction of the WKN Proposed Development and operation of the 'practical effect' of K3 proposed development				dB Increase
		Base		Cumulative Traffic during construction of the WKN Proposed Development and operation of the 'practical effect' of K3 proposed development		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	23440	16%	0.3
2	Barge Way North of Swale Roundabout	7364	35%	8418	33%	0.4
3	Barge Way, East of Fleet End Roundabout	3757	35%	4811	32%	0.8
4	A249 South of Swale Way Junction	40084	13%	41458	13%	0.2
5	A249 between the A2 and M2	55811	12%	57134	12%	0.1
6	M2 West	74058	11%	74535	11%	0.0
7	M2 East	67129	11%	67319	11%	0.0
8	Swale Way north of Reams Way Junction	15200	8%	15586	8%	0.1
9	Swale Way south of Reams Way Junction	15244	8%	15630	8%	0.1

Road Link		Cumulative Traffic during construction of the WKN Proposed Development and operation of the 'practical effect' of K3 proposed development				dB Increase
		Base		Cumulative Traffic during construction of the WKN Proposed Development and operation of the 'practical effect' of K3 proposed development		
		Total	HGVs	Total	HGVs	
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	13956	7%	0.0
11	A249, North of Swale Way Junction	36051	8%	36066	8%	0.0

Table 7.25: 'practical effect' of K3 + WKN Proposed Development Cumulative Operation Traffic (baseline K3 Consented Development in operation).

- 7.15.4 With reference to Table 7.25 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from 'practical effect' of K3 + WKN operational and cumulative traffic on the existing road network is 0.8 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)
- 7.15.5 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short and long term periods.
- 7.15.6 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a negligible 0.1 dB increase in noise level and therefore in the both the short and long term periods there would be a negligible impact.
- 7.15.7 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Cumulative Traffic during operation of the 'practical effect' of K3 and WKN Proposed Developments

- 7.15.8 The introduction of the operational 'practical effect' of K3 Proposed Development and the WKN Proposed Development and the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.
- 7.15.9 A summary of the traffic flows from Chapter 4 are provided in Table 7.26 below. The increase in noise arising from each link as a result of the additional cumulative

traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Cumulative Traffic during operation of the 'practical effect' of K3 and WKN Proposed Developments				dB Increase
		Base		Total		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	22014	15%	22498	17%	0.3
2	Barge Way North of Swale Roundabout	7364	35%	7756	37%	0.5
3	Barge Way, East of Fleet End Roundabout	3757	35%	4149	39%	0.8
4	A249 South of Swale Way Junction	40084	13%	42059	13%	0.2
5	A249 between the A2 and M2	55811	12%	59223	12%	0.3
6	M2 West	74058	11%	75035	11%	0.1
7	M2 East	67129	11%	67410	11%	0.0
8	Swale Way north of Reams Way Junction	15200	8%	15320	8%	0.1
9	Swale Way south of Reams Way Junction	15244	8%	15365	9%	0.1
10	Swale Way south of Ridham Avenue Roundabout	13908	7%	14029	7%	0.1
11	A249, North of Swale Way Junction	36051	8%	36611	8%	0.1

Table 7.26: 'practical effect' of K3 + WKN Proposed Development Cumulative Operation Traffic Assessment (baseline K3 Consented Development in operation).

7.15.10 With reference to Table 7.67 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from K3 + WKN operational and cumulative traffic on the existing road network is 0.8 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)

7.15.11 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of negligible adverse magnitude in the short and long term periods.

7.15.12 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a 0.1 dB increase in noise level and therefore in the both the short and long term periods there would be a negligible adverse impact.

- 7.15.13 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Operational Noise

- 7.15.14 On the basis that operation of the 'practical effect' of K3 Proposed Development would not result in any increase in plant noise emissions above the K3 Consented Development, and that operation of the WKN Proposed Development and cumulative development would not result in significant effects (as detailed above), the operation of the 'practical effect' of K3 Proposed Development plus the WKN Proposed Development plus Other Relevant Developments would necessarily not result in significant effects.

Operational Vibration

- 7.15.15 Due to the short distances over which any vibration levels attenuate to baseline, there would be no cumulative vibration effects.

Decommissioning

- 7.15.16 As outlined in the decommissioning sections for the K3 Proposed Development and the WKN Proposed Development, during the decommissioning of each proposed development noise and vibration immissions are likely to be similar to or less than, those that occurred during the construction phase. This is based similar plant items being used for decommissioning works as for construction works and would take place over a comparable timeframe.
- 7.15.17 Hypothetically, should the 'practical effect' of K3 Proposed Development and the WKN Proposed Development be decommissioned concurrently, the cumulative increase in decommissioned noise is limited to a maximum of 3 dB. Whilst this could affect a determination of impact, 3 dB is of the order of other uncertainties associated with decommissioning noise prediction.
- 7.15.18 With reference to paragraph 7.9.14 noise levels associated with the construction of the WKN Proposed Development are of no to negligible impact. On the basis that noise levels during decommissioning of an individual project would be no worse than during construction of an individual project, and that during cumulative decommissioning there is the potential that noise levels would have an impact magnitude of up to one level higher, i.e. of minor adverse impact. Noise effects during the cumulative decommissioning may be up to slight adverse effect, which is not considered significant.

K3 Proposed Development plus WKN Proposed Development plus Other Relevant Developments

Construction Site Noise

- 7.15.19 The precise timescale for construction of the other 46 projects is unknown. However, due to the variable nature of construction noise, the cumulative effects of construction are generally no greater than arise for individual projects. The duration for which construction noise occurs may be extended if different projects are constructed non-concurrently. However, if each development follows the

guidance contained within BS 5228-1:2009+A1:2014 and due to the localised nature of noise impacts associated with the construction of each development, it is unlikely that cumulative construction noise effects would occur.

7.15.20 Consequently, the cumulative effects due to construction works overlapping with other projects would be unlikely to be greater than for the project alone.

Cumulative Traffic during construction of the K3 Proposed Development plus the WKN Proposed Development

7.15.21 The construction of the K3 Proposed Development plus WKN Proposed Development and the construction/operation of the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.15.22 A summary of the traffic flows from Chapter 4 are provided in Table 7.27 below. The increase in noise arising from each link as a result of the additional cumulative traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Construction				dB Increase
		Base		Cumulative Traffic during construction of the K3 Proposed Development 'as a whole' plus the WKN Proposed Development		
		Total	HGVs	Total	HGVs	
1	Swale Way East of B2005 Grovehurst Roundabout	21653	14%	23440	16%	0.6
2	Barge Way North of Swale Roundabout	7003	32%	8418	33%	0.9
3	Barge Way, East of Fleet End Roundabout	3390	29%	4811	32%	1.8
4	A249 South of Swale Way Junction	39726	13%	41458	13%	0.3
5	A249 between the A2 and M2	55448	12%	57134	12%	0.2
6	M2 West	73889	11%	74535	11%	0.1
7	M2 East	67095	10%	67319	11%	0.0
8	Swale Way north of Reams Way Junction	15195	8%	15586	8%	0.1
9	Swale Way south of Reams Way Junction	15240	8%	15630	8%	0.1
10	Swale Way south of Ridham Avenue Roundabout	13904	7%	13956	7%	0.0

Road Link		Construction				dB Increase
		Base		Cumulative Traffic during construction of the K3 Proposed Development 'as a whole' plus the WKN Proposed Development		
		Total	HGVs	Total	HGVs	
11	A249, North of Swale Way Junction	36047	8%	36066	8%	0.0

Table 7.27: K3 + WKN Proposed Development Cumulative Construction Traffic Assessment

7.15.23 With reference to Table 7.27 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from K3 + WKN construction and cumulative traffic on the existing road network is 1.8 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)

7.15.24 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of minor and negligible adverse magnitude in the short and long term periods respectively.

7.15.25 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there would be a negligible 0.1 dB change in noise level and therefore in the both the short and long term periods there would be a negligible impact.

7.15.26 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

7.15.27 Any negligible effect would be adverse, direct long-term and temporary.

Cumulative Traffic during operation of the K3 Proposed Development plus the WKN Proposed Development

7.15.28 The introduction of the operational K3 Proposed Development and the WKN Proposed Development and the construction/operation of the 46 identified cumulative schemes would result in increased traffic generation. With these vehicles using the existing road network, there is the potential to increase the existing road traffic noise experienced by the residents of surrounding properties. Road links are described in Chapter 4 Traffic and Transport.

7.15.29 A summary of the traffic flows from Chapter 4 are provided in Table 7.28 below. The increase in noise arising from each link as a result of the additional cumulative traffic is provided in the last column, calculated using the methodology outlined within the CRTN.

Road Link		Operation					dB Increase
		Base		Cumulative Traffic during operation of the K3 Proposed Development plus the WKN Proposed Development			
		Total	HGVs	Total	HGVs		
1	Swale Way East of B2005 Grovehurst Roundabout	21653	14%	22498	17%	0.5	
2	Barge Way North of Swale Roundabout	7003	32%	7756	37%	1.0	
3	Barge Way, East of Fleet End Roundabout	3390	29%	4149	39%	1.8	
4	A249 South of Swale Way Junction	39726	13%	42059	13%	0.4	
5	A249 between the A2 and M2	55448	12%	59223	12%	0.4	
6	M2 West	73889	11%	75035	11%	0.1	
7	M2 East	67095	10%	67410	11%	0.0	
8	Swale Way north of Reams Way Junction	15195	8%	15320	8%	0.1	
9	Swale Way south of Reams Way Junction	15240	8%	15365	9%	0.1	
10	Swale Way south of Ridham Avenue Roundabout	13904	7%	14029	7%	0.1	
11	A249, North of Swale Way Junction	36047	8%	36611	8%	0.1	

Table 7.28: K3 'as a whole' + WKN Proposed Development Cumulative Operation Traffic Assessment

7.15.30 With reference to Table 7.28 above and the criteria in Tables 7.6 and 7.7, it can be seen that the greatest increase in noise arising from K3 + WKN operational and cumulative traffic on the existing road network is 1.8 dB (on link #3 'Barge Way', which is the access road to the site, approximate 450 north-west of the nearest NVSRs)

7.15.31 As link #3 is significantly distant from the nearest NVSRs and that NVSRs are close to other road links (#8, #9 and #10) which will dominate road traffic noise levels

at these locations, any noise change for link #3 would not result in adverse impact. Nevertheless, the noise impact for this link is of minor and negligible adverse magnitude in the short and long term periods respectively.

7.15.32 For the nearest NVSRs, located close to Swale Way (links #8, #9 and #10), approximately 450 m south-west of Barge Way, there is a 0.1 dB increase in noise level and therefore in the both the short and long term periods there would be a negligible adverse impact.

7.15.33 For all NVSRs, there would be no effect or a negligible effect, which would not be significant. Any negligible effect would be adverse, direct long-term and temporary.

Cumulative effects during operation of K3 Proposed Development and the WKN Proposed Development

7.15.34 As stated above, only one identified scheme would have the potential to result in cumulative operational effects. Scheme 16 (Chapter 3) is for the decommissioning of the existing K1 'combined heat and power plant' (CHP) on the site and build, commission and operation of a new CHP plant K4 at the adjacent Kemsley Paper Mill.

7.15.35 With reference to the noise assessment included as part of the DCO application for Scheme 16, rating levels at NVSRs associated with the normal 'scenario 2' operation of Scheme 16 are presented below in Table 7.29. Also shown are the rating sound levels associated with the operation of K3 Proposed (as outlined in table 7.11 above) and the WKN Proposed Development (as outlined in table 7.17 above), the combined rating level (obtained by combining the rating levels for the three schemes) and the combined difference between the rating and background sound levels.

NVSR	Period	Baseline Ambient Level, $L_{Aeq, 16\text{-hours}}$ (dB)	Baseline Background Level, L_{A90} (dB)	Scheme 16. Rating Level, $L_{Ar,Tr}$ (dB)	K3 'as a whole' Rating Level, $L_{Ar,Tr}$ (dB)	WKN Rating Level, $L_{Ar,Tr}$ (dB)	Combined Rating Level, $L_{Ar,Tr}$ (dB)	Rating / Background Difference (dB)	Change in Ambient Sound Level (dB)
Marsh Rise	Day	47	39	38	35	35	41	+2	+1
	Night	45	35	38	34	34	41	+6	+1
Off Reams Way	Day	47	39	36	35	35	40	+1	+1
	Night	45	35	36	34	34	40	+5	+1
Reams Way	Day	47	39	34	36	36	40	+1	+1
	Night	45	35	34	34	34	39	+4	+1
Reams Way N	Day	47	39	35	36	35	40	+1	+1
	Night	45	35	35	34	34	39	+4	+1
Reams Way S	Day	47	39	36	36	35	40	+1	+1
	Night	45	35	36	34	34	40	+5	+1
Recreation Way N	Day	47	39	38	35	35	41	+2	+1

NVSR	Period	Baseline Ambient Level, $L_{Aeq, 16\text{-hours}}$ (dB)	Baseline Background Level, L_{A90} (dB)	Scheme 16. Rating Level, $L_{A,Tr}$ (dB)	K3 'as a whole' Rating Level, $L_{A,Tr}$ (dB)	WKN Rating Level, $L_{A,Tr}$ (dB)	Combined Rating Level, $L_{A,Tr}$ (dB)	Rating / Background Difference (dB)	Change in Ambient Sound Level (dB)
	Night	45	35	38	34	34	41	+6	+1
Recreation Way S	Day	47	39	35	33	34	39	0	+1
	Night	45	35	35	32	33	38	+3	+1
Walsby Drive N	Day	47	39	37	33	33	40	+1	+1
	Night	45	35	37	32	32	39	+4	+1
Walsby Drive S	Day	47	39	39	33	33	41	+2	+1
	Night	45	35	39	30	30	40	+5	+1

Table 7.29: K3 Proposed Development + WKN Proposed Development Cumulative Operational Noise Assessment

7.15.36 The receptors above are identified as residential. The sensitivity of the receptors is therefore medium.

7.15.37 During the normal operation of Scheme 16, the K3 Proposed Development and the WKN Proposed Development, a highest difference between the rating level and representative background level of +6 dB is predicted during the night-time at one NVSR.

7.15.38 This would be an indication of a moderate adverse impact, depending on the context, following the criteria adopted. In this instance, consideration of the context is considered to reduce the likely impact, as outlined below.

7.15.39 For the daytime period, resultant ambient sound levels at these five, and all other NVSRs, are below the level for the onset of annoyance as detailed in the GCN (50 dB L_{Aeq}). Furthermore, the cumulative contribution of sound from the Scheme 16, K3 Proposed Development 'as a whole' and the WKN Proposed Development would not contribute significantly to this level, i.e. by no more than 1 dB.

7.15.40 For the night-time period, baseline residual sound levels are at the level for the onset of sleep disturbance, as detailed in the GCN (45 dB L_{Aeq}). However, cumulative specific sound levels at NVSRs associated with the Scheme 16, K3 Proposed Development 'as a whole' and the WKN Proposed Development are at least 4 dB below the baseline residual sound level and therefore do not contribute significantly to the resultant ambient sound level, i.e. by no more than 1 dB.

7.15.41 In addition, the above cumulative assessment is based on all three sites operating at maximum capacity concurrently, i.e. a 'worst-case' scenario. It is considered likely that site activities would vary to some extent, with all plant not operating at full capacity concurrently and during those periods noise emissions would be appropriately lower.

- 7.15.42 Furthermore, the Scheme 16 noise levels used in this assessment have been based on the higher range of normal operational conditions as outlined in the Scheme 16 DCO application (scenario #2 with dump condensers in use).
- 7.15.43 For scenario #1 (without dump condensers), rating sound levels from Scheme 16 at NVSRs are up to 6 dB lower and at Walsby Drive S the Scheme 16 rating level would be 33 dB $L_{Ar,Tr}$. As such, the cumulative rating level would be 36 dB $L_{Ar,Tr}$, which is only 1 dB above the night-time background sound level. This is an indication of a minor adverse impact depending on the context.
- 7.15.44 On the basis of the above, it is considered that the overall Scheme 16, K3 Proposed Development 'as a whole' and the WKN Proposed Development operational noise impacts are of no greater than minor adverse magnitude, and with reference to Table 7.8 would result in slight adverse noise effects, which are not considered to be significant.

Decommissioning

- 7.15.45 As outlined in the decommissioning sections for the WKN Proposed Development, during the decommissioning of the WKN Proposed Development 'as a whole', noise and vibration immissions are likely to be similar to or less than, those that occurred during the construction phase. This is based similar plant items being used for decommissioning works as for construction works and would take place over a comparable timeframe.

7.16 Summary

- 7.16.1 A detailed noise and vibration assessment has been undertaken predicting the potential noise and vibration effects of associated with the construction and operation of the
1. the currently consented (under the Town and Country planning permission) 0 to 49.9 MW K3 facility, capable of processing 550,000 tonnes of waste per annum (K3 Consented Development);
 2. the practical effect of K3 Proposed Development that would increase capacity of the K3 facility up to 75 MW (capable of processing a total of 657,000 tonnes of waste per annum); and
 3. the WKN Proposed Development waste-to-energy facility capable of processing 390,000 tonnes of waste per annum, with a generating capacity of up to 42 MW.
- 7.16.2 Cumulative noise and vibration effects of associated with the construction and operation of the WKN and K3 Proposed Development along with 46 other developments has also been undertaken.
- 7.16.3 Overall noise and vibration effects of the K3 and WKN Proposed Developments, both separately and cumulatively, are not considered to be significant.

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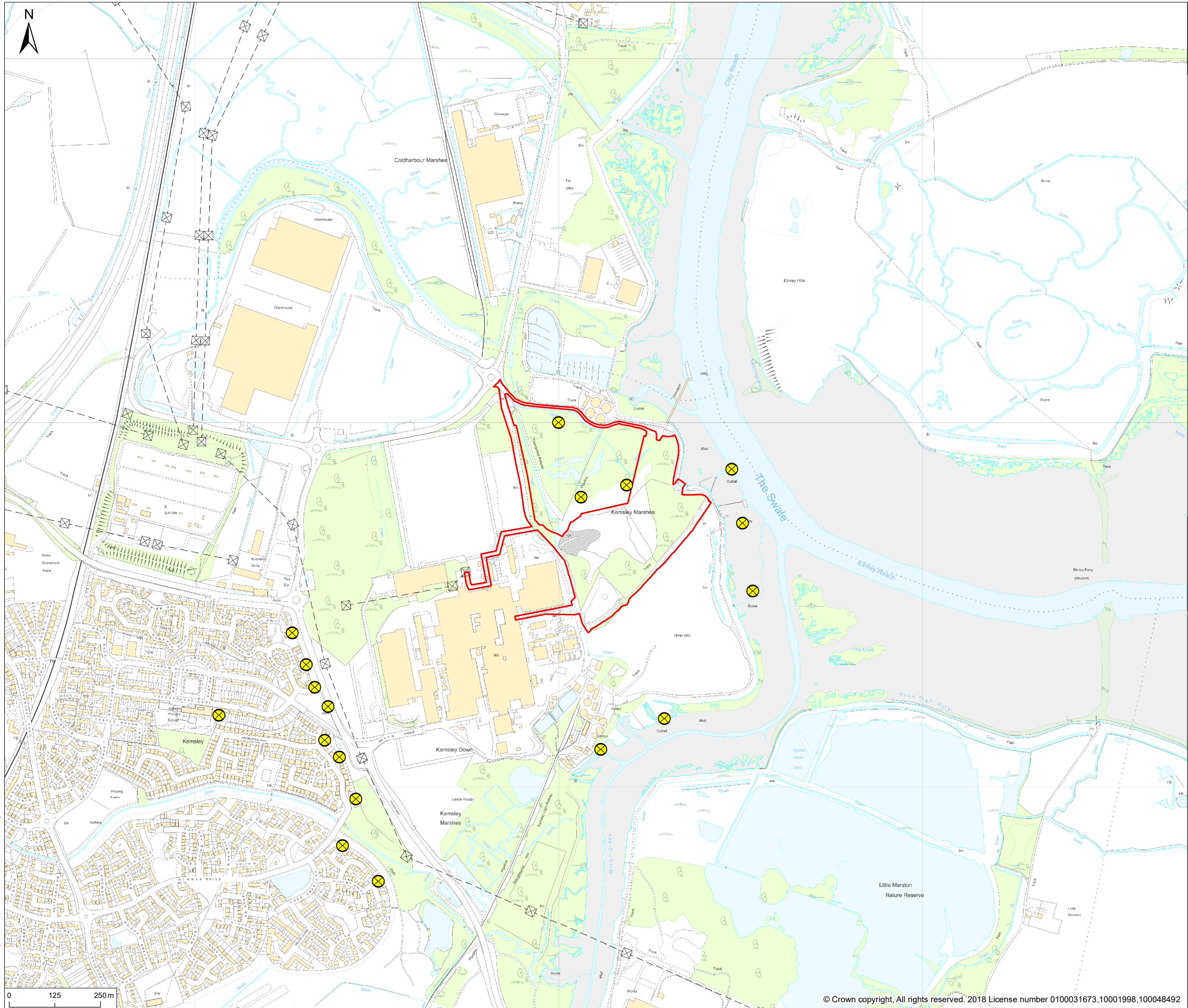
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Wheelabrator Technologies Inc

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7.17 Department of Transport. Calculation of Road Traffic Noise. HMSO. 1988.



ENVIRONMENTAL STATEMENT

Legend

- DCO Boundary
- ✕ Noise Assessment Locations

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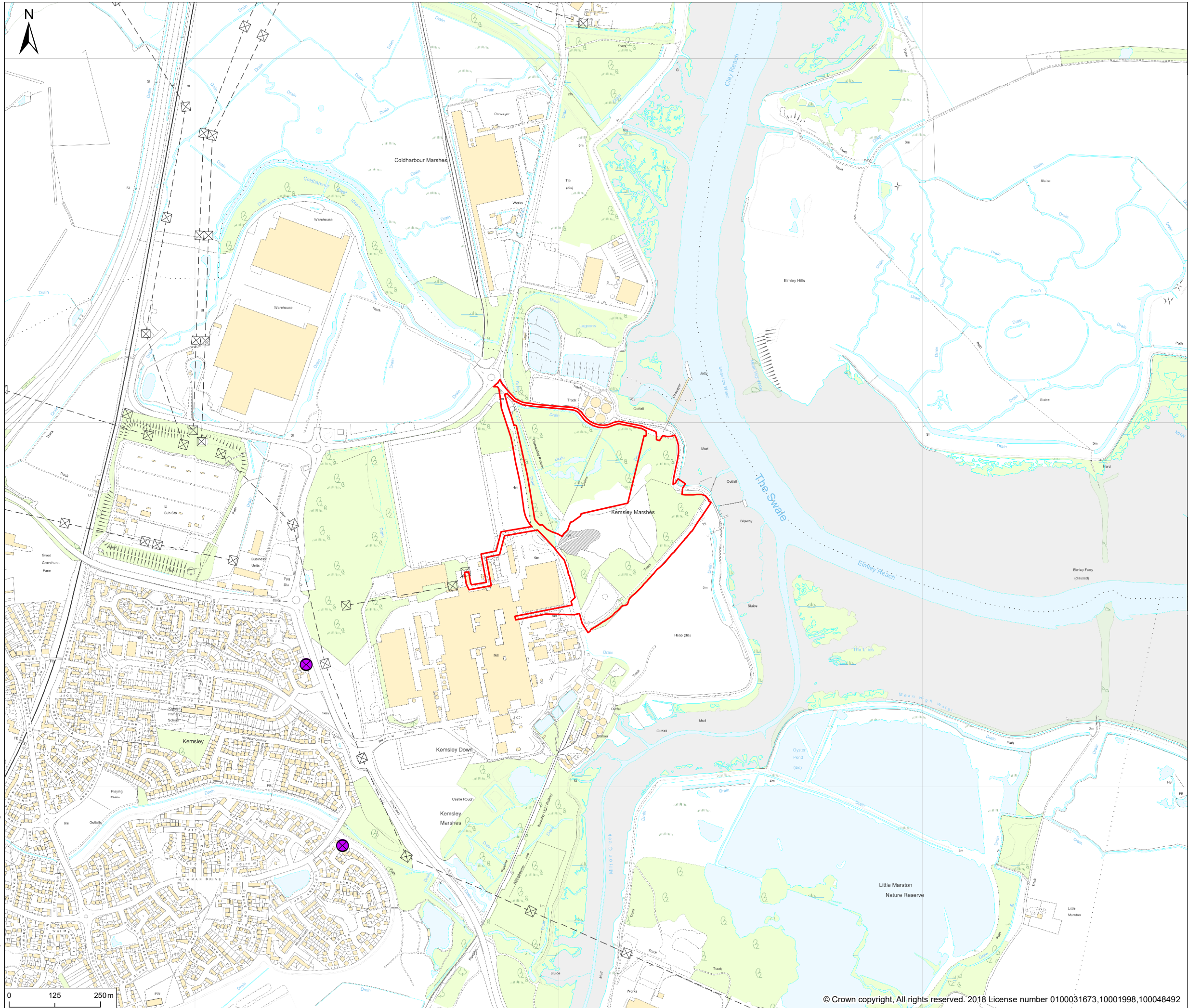
Project **K3 and WKN DCO**

Title **Noise Assessment Locations**

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Job Ref **OXF9812** Scale @ A3: **1:10,000** Date Created: **JUL 2019**

Figure Number **7.1**



ENVIRONMENTAL STATEMENT

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- DCO Boundary
- ✕ Baseline Noise Survey Locations

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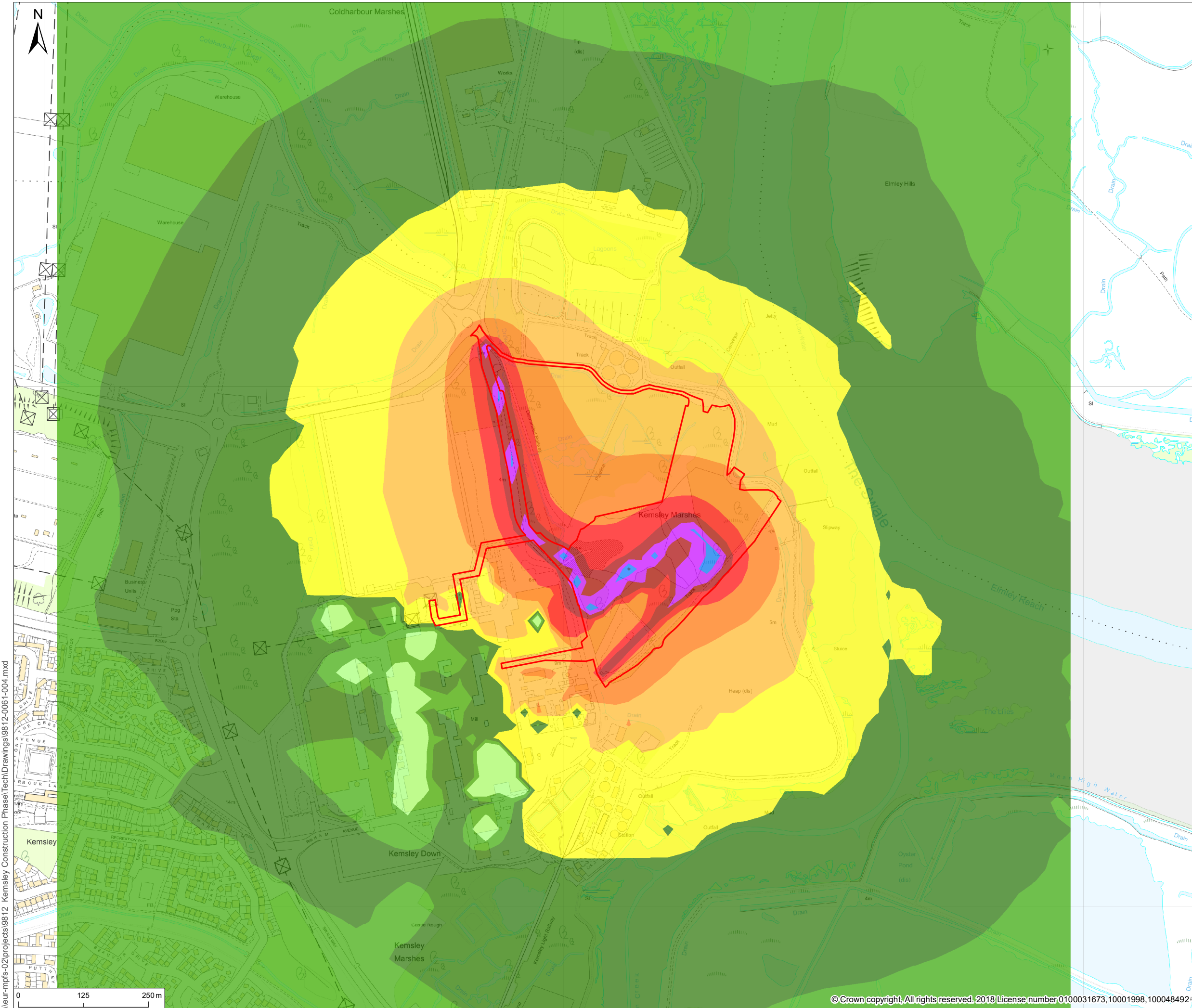
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Figure Number
7.2



Legend

DCO Boundary

**Specific Sound Level
L_{Aeq,Tr} (dB)**

< 30
30 <= < 35
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 70
70 <= < 75
75 <=

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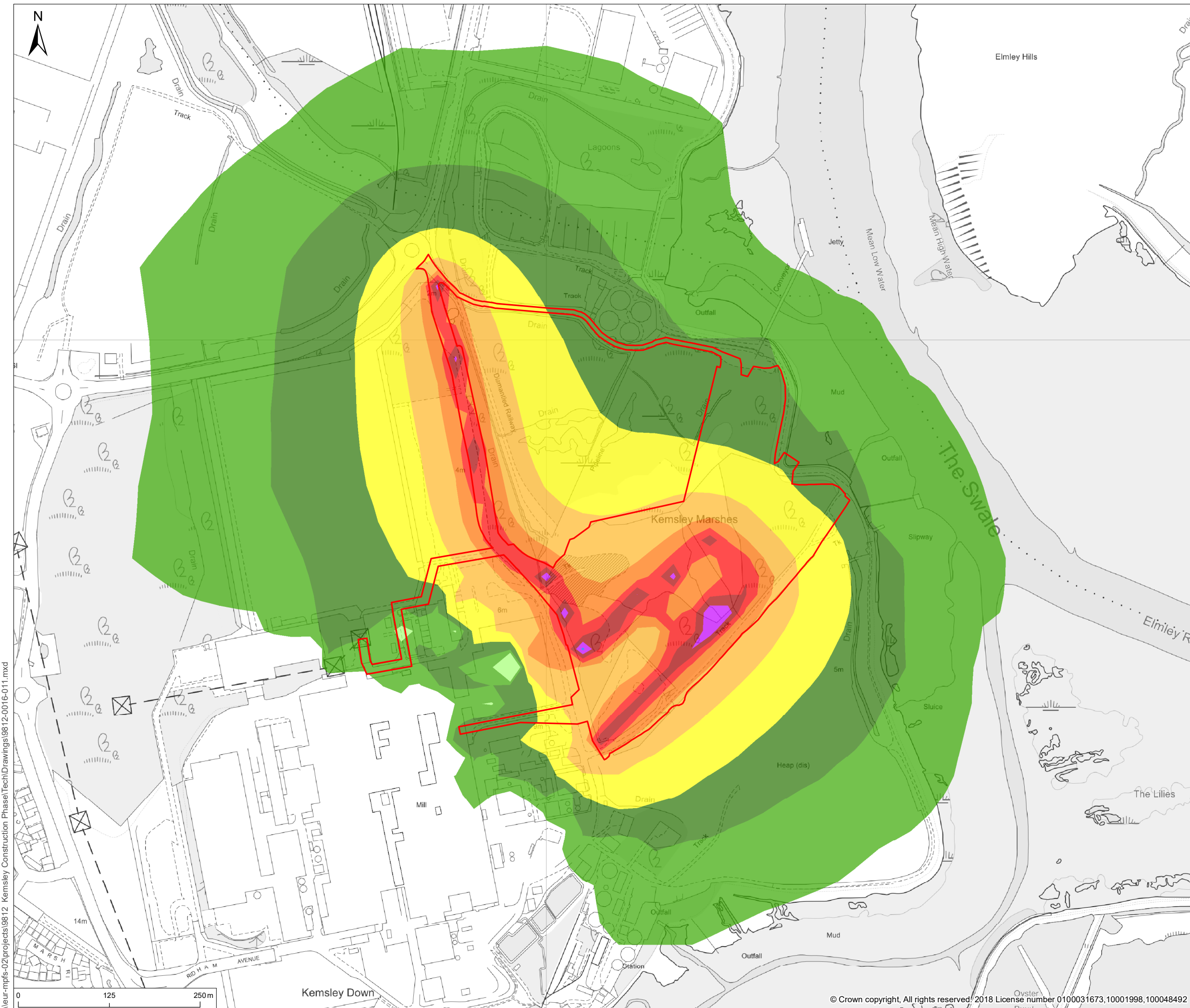
Title **K3 Proposed Development
Operational noise - Normal operation**

Status **SUBMISSION** Drawn By: **CR** PM/Checked By: **SS**

Job Ref **OXF9812** Scale @ A3: **1:7,000** Date Created: **SEPT 2019**

Figure Number
7.3

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Legend

DCO Boundary

Specific Sound Level
L_{Aeq,Tr} (dB)

< 30	Light Green
30 <=	Green
35 <=	Dark Green
40 <=	Yellow-Green
45 <=	Yellow
50 <=	Orange
55 <=	Red-Orange
60 <=	Red
65 <=	Dark Red
70 <=	Purple
75 <=	Blue

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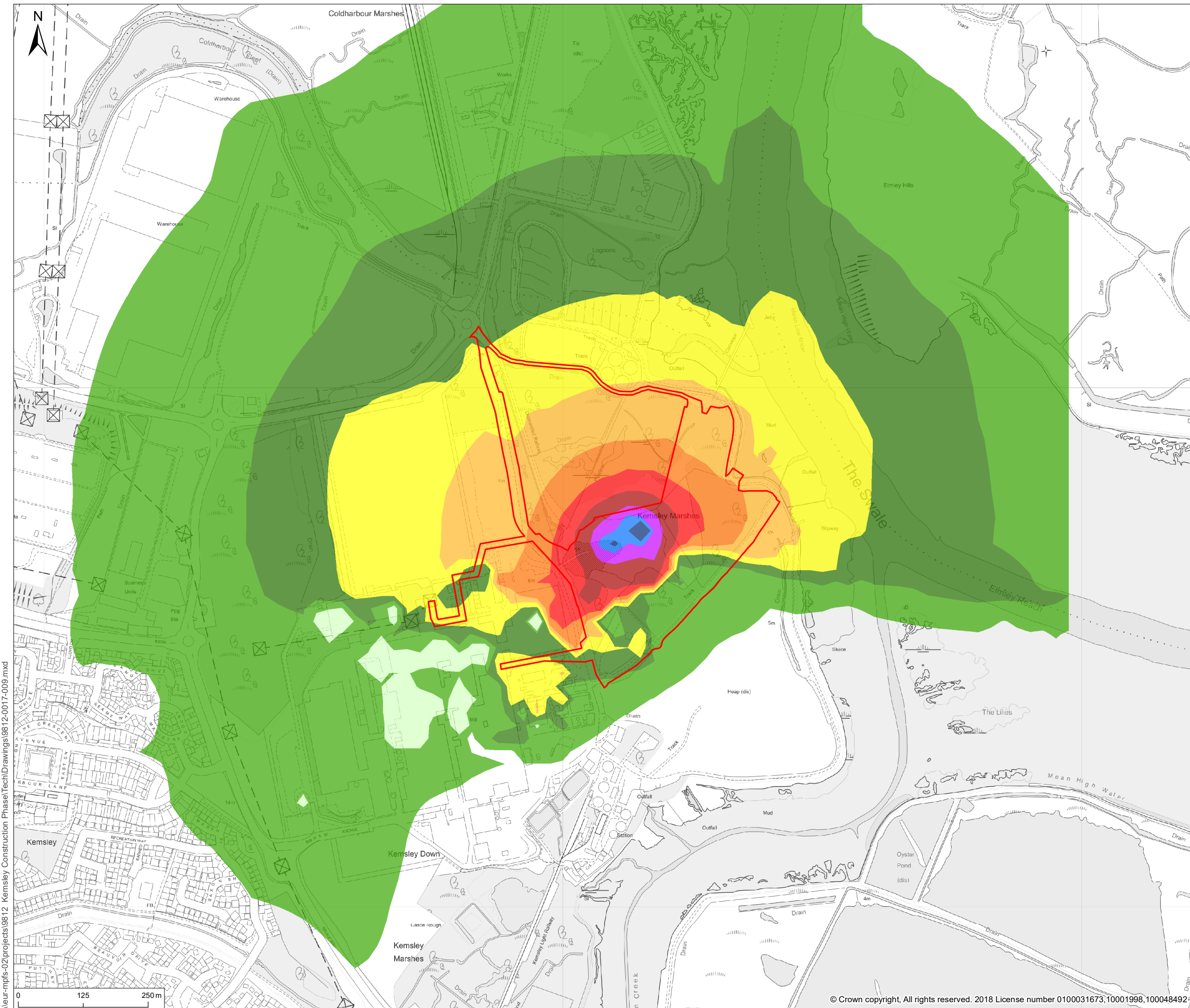
Project **K3 and WKN DCO**

Title **Practical Effect of K3 Operational Noise – Additional HGVs**

Status **SUBMISSION** Drawn By: **CR** PM/Checked By: **SS**

Job Ref **OXF9812** Scale @ A3: **1:5,000** Date Created: **SEPT 2019**

Figure Number
7.4



Legend

DCO Boundary

Specific Sound Level
L_{Aeq,Tr} (dB)

< 30
30 <= < 35
35 <= < 40
40 <= < 45
45 <= < 50
50 <= < 55
55 <= < 60
60 <= < 65
65 <= < 70
70 <= < 75

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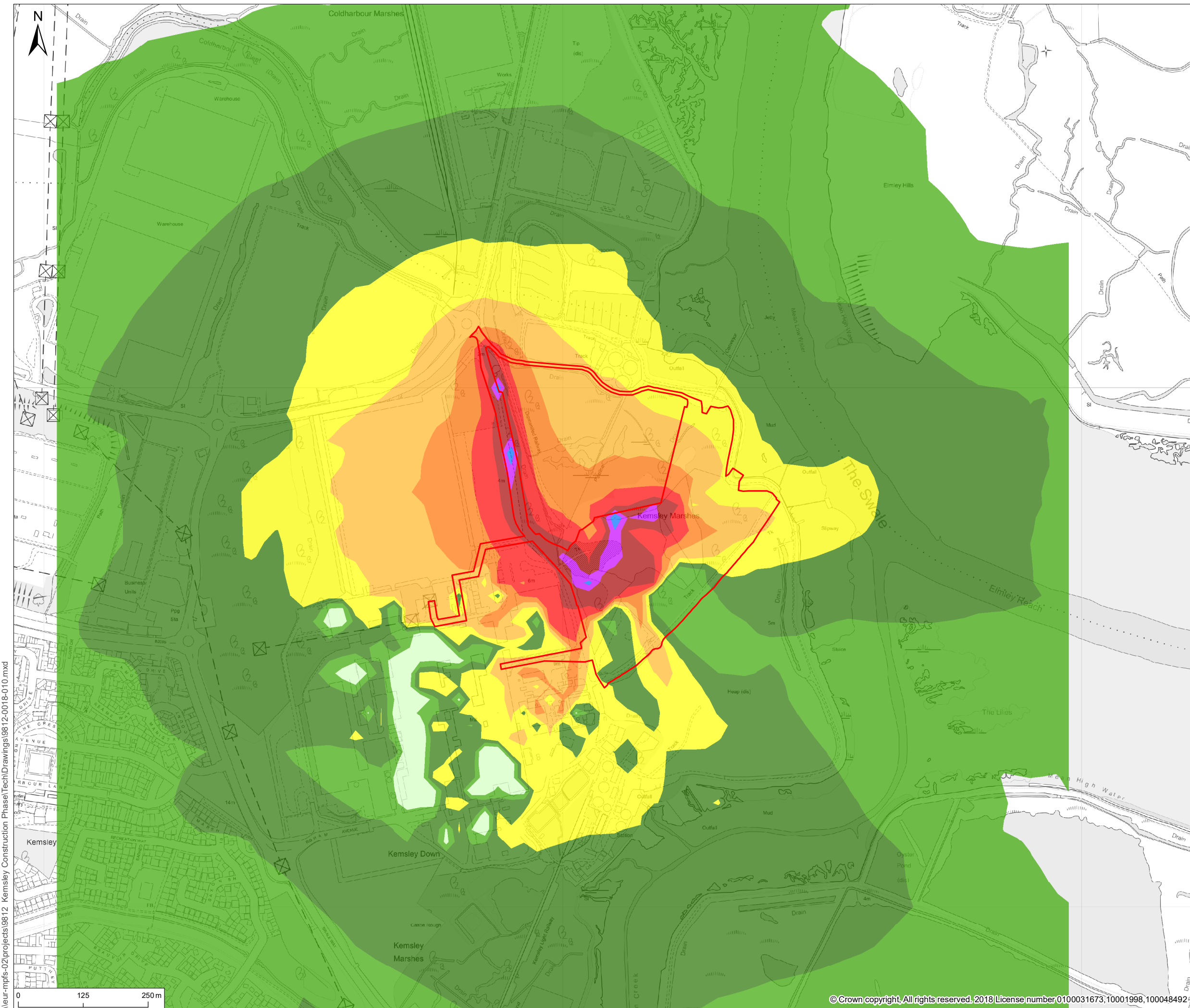
Title **WKN Construction noise - Piling**

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Figure Number
7.5

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Legend

□ DCO Boundary

**Specific Sound Level
L_{Aeq,Tr} (dB)**

<	30
30 <=	< 35
35 <=	< 40
40 <=	< 45
45 <=	< 50
50 <=	< 55
55 <=	< 60
60 <=	< 65
65 <=	< 70
70 <=	< 75
75 <=	< 75

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Project **K3 and WKN DCO**

Title **WKN Operational noise - Normal operation**

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Figure Number **7.6**

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