Chapter Ten
NOISE AND VIBRATION

INTRODUCTION

10.1 This chapter of the ES assesses the potential noise effects that may arise within the study area as a result of implementing the proposed development. Within the scope of this development, it is proposed to construct and operate a waste recycling and energy recovery facility on site with the generated power offsetting the power requirements of an associated adjacent commercial operation.

10.2 Broadly, the assessment of noise undertaken has involved the following:

- Identification of appropriate standards and guidance for use in the assessment of noise impacts;
- Collection of daytime and night-time background and ambient noise level data in order to determine the existing baseline noise climate at potentially sensitive properties in the vicinity of the site;
- Qualitative assessment of noise levels at potentially sensitive local receptors during the construction phase of the development;
- Quantitative/qualitative prediction and assessment of operational noise levels at a selection of residential receivers, which have the potential to be affected by a change in noise level in future years as a result of the development;
- Quantitative/qualitative prediction and assessment of road traffic noise on the wider road network as a result of the proposed development;
- Determination of the significance of the impacts associated with the operation of the development;
- Provision of proposals for mitigation measures, where appropriate, in order to minimise any potential negative impacts arising from the development.
- Prediction of the magnitude of any residual effects that may remain following the implementation of any recommended mitigation measures.

10.3 Elements of the proposed facility will operate on a continuous 24 hours a day, seven days a week basis. However, HGV and vehicle movements will only occur between the hours of 08:00 to 18:00 Monday to Friday.

10.4 Within the scope of the application, it is proposed to operate a 'high energy use' within a structure located on the north western part of the site as detailed on the master plan. At the time of writing, the final occupant of this is unconfirmed, therefore the details of any potential future uses have not yet been concluded.

10.5 However, any future operator has the potential to generate cumulative effects with the proposed waste recycling and energy recovery operation through noise from static and mobile plant and by on-site and off site traffic noise.

10.6 As details are unconfirmed this limits the extent to which the cumulative effects can be assessed. The cumulative effects of noise have been assessed within this chapter in relation to:

- On-site static plant sources – Qualitative/Quantitative assessment based upon assumptions regarding the generated internal noise levels:

- On and off site traffic movements – Quantitative as the TA for the proposals includes aspects relating to the high energy use.

LEGISLATION AND PLANNING CONTEXT

10.7 A detailed review of the development plan documents and planning context in relation to the development proposals is provided in Chapter 5. This section summarises those policies that are directly relevant to noise issues.

The Control of Pollution Act 1974 (CoPA)[1]/Environmental Protection Act 1974 (EPA)[2]

10.8 There are various standards and legislation applicable to construction activities associated with a development of this type and these are outlined below.

- Section 60, Part III of Chapter 40 of the CoPA – Control of noise on construction sites. This provides legislation by which Local Authorities (LAs) can control noise from construction sites to prevent disturbance occurring.

- Section 61, Part III of Chapter 40 of the CoPA – Prior consent for work on construction sites. This provides a method by which a contractor can seek consent to undertake construction works in advance of their commencement. If consent is given, and the stated method and hours of work complied with, then the LA cannot take action under Section 60.

- Section 79, Part III of Chapter 43 of the EPA – Statutory nuisances and inspections thereof. This defines statutory nuisances with regard to noise and other aspects and determines that LAs are under a duty to inspect their areas to detect such nuisances. This section also considers and defines the concept of 'Best Practicable Means' (BPM) which originates from Section 72, Part III of Chapter 40 of CoPA where BPM is defined as 'reasonably practical having regard, among other things, to local

conditions and circumstances, to the current state of technical knowledge and to the financial implications'.

- Section 80, Part III of Chapter 43 of the EPA – Summary proceedings for statutory nuisances. This provides LAs with powers to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

Planning Guidance (Wales): Technical Advice Note (TAN) 11 [3]

10.9 TAN 11 is Wales' primary, overarching, noise guidance document. It provides guidance to local authorities in Wales on the use of their planning powers to minimise the adverse impact of noise. Within the scope of the document TAN 11:

- outlines the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities which will generate noise;

- introduces the concept of noise exposure categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and

- advises on the use of conditions to minimise the impact of noise.

10.10 Within Annex B of TAN 11, 'THE ASSESSMENT OF NOISE FROM DIFFERENT SOURCES' guidance is given within paragraph B17 with regard to 'Noise from industrial and commercial developments', as detailed below:

'B17. The likelihood of complaints about noise from industrial development can be assessed, where the standard is appropriate, using guidance in BS 4142, 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that "a difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance." Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week……'

10.11 With regard to construction noise, paragraph B20 of Annex B states:

'B20. Detailed guidance on assessing noise from construction sites can be found in BS 5228, parts 1-4. In particular, Part 1: 1984, "Code of practice for basic information and procedures for noise control" will be useful because as well as giving general advice it describes a method of predicting noise from construction sites'.

10.12 BS5228, Part 1, 1984 has been superseded by the 1997 version but the same principles apply.

10.13 Within BS5228, Annex 4 provides 'EXAMPLES OF PLANNING CONDITIONS' with Annex 5 providing guidance on 'SPECIFYING NOISE LIMITS', BS5228 further advises that consideration should be given to the type of limit, the noise index, monitoring points and meteorological conditions to ensure that limits are set sensibly in accordance with appropriate guidance and best practice for monitoring.

METHODOLOGY

Relevant Guidance

10.14 As a matter of best practice, this assessment has been undertaken based on the relevant guidance on noise and vibration. This includes:

- BS4142 'Method for Rating Industrial Noise affecting Mixed Residential and Industrial Areas', 1997.[11]
- Calculation of Road Traffic Noise (CRTN), Department of Transport (Welsh Office), 1988.[14]
- BS5228: Noise and Vibration Control on Construction and Open Sites (Part 1: 1997).[4]
- BS7445:Description and Measurement of Environmental Noise, 1991.[17]
- BS6472: Pt1:Guide to Evaluation of human exposure to vibration in buildings: Vibration sources other than blasting, 2008 [8]
- BS7385:Evaluation and measurement for Vibration in Buildings Part 1: 1990 and Part 2:1992[9,10]
- BS5228: Noise and Vibration Control on Construction and Open Sites (Part 4: 1992).[6]

10.15 These guidance and methodology documents are discussed in the following sections in relation to construction and operational phases.

Construction
BS5228 [4,5,6]

10.16 TAN 11 cites the use of British Standard 5228 to assess noise and vibration from construction sites. BS5228: *Noise and vibration control on construction and open sites*, Parts 1,2 and 4 provide guidance on the control of noise from construction and open sites. Part 4

of the standard deals specifically with noise and vibration generated by piling operations. This Standard, in its various parts, has been adopted under s. 71 of CoPA (Control of Pollution Act 1974).

10.17 Part 1, Code of practice for basic information and procedures for noise and vibration control, gives recommendations for basic methods of noise and vibration control relating to construction and open sites where work activities/operations generate significant noise and/or vibration levels. It includes sections on: legislative background; community relations; training; occupational noise effects; neighbourhood nuisance; project supervision; and control of noise and vibration. Annexes include: a list of EC and UK legislation; noise sources, remedies and their effectiveness (mitigation options); guide to sound level data on site equipment and site activities (source terms that are used for modelling); estimating noise from sites (calculation procedures which form the basis of the modelling packages); and noise monitoring.

10.18 Part 2, Guide to noise and vibration control legislation for construction and demolition including road construction and maintenance, provides further detail on the legislation applicable to construction and related aspects.

10.19 Part 4, Code of practice for noise and vibration control applicable to piling operations, provides specific advice and information on legislation, source terms, prediction, monitoring etc of noise and vibration from piling operations. Also included is guidance on human response to vibration and the response of structures.

BS6472 [8]

10.20 BS6472: Pt1:Guide to Evaluation of human exposure to vibration in buildings: Vibration sources other than blasting provides guidance on human response to vibration experienced in buildings. The Standard includes weighting curves related to human response to groundborne vibration.

BS7385 – Parts 1 and 2 [9,10]

10.21 BS7385: Parts 1 and 2 provide guidance on the evaluation and measurement for vibration in buildings. Part 1, Guide for measurement of vibrations and evaluation of their effects on buildings, provides advice on measurement, measurement instrumentation, location and fixing of transducers, and data evaluation. Annexes also provide advice on classifying buildings with regard to their likely sensitivity; estimating peak stress from peak particle velocity and random data.

10.22 Part 2, Guide to damage levels from ground-borne vibration, provides guidance on the levels of vibration above which building structures could be damaged. It identifies the factors that influence the vibration response of buildings, and describes the basic procedure for carrying out measurements. It also states that there is a major difference between the sensitivity of people feeling vibration and the levels of vibration, which have the potential to damage structures.

10.23 The Standard further states that levels of vibration at which adverse comment from people is likely are considerably below the levels of vibration at which buildings and structures may be damaged, except for vibration at lower frequencies.

Operation
BS4142 [11]

10.24 In addition to the above, TAN 11 cites the use of British Standard (BS)4142 to assess noise from industrial and commercial premises.

10.25 The method is based upon a comparison between the rating level of the noise from the specific source being considered and the background noise level (measured as an L_{A90}), in the absence of the specific source. The noise level from the specific source is increased by 5dB(A) if the source has any distinctive characteristics (tones or impulses such as whines, hums or bangs), or if it is irregular enough to attract attention and becomes known as the rating level.

10.26 As stated above, the Standard states that, if the rating level of the noise exceeds the background noise by around 10dB(A) or more, complaints are 'likely'. An increase of 5dB(A) is deemed to be of 'marginal significance' whilst a difference of minus 10dB(A) or more indicates that 'complaints are unlikely'. These descriptions are summarised in Table 10.1 below:

Table 10.1: BS4142 Significance Criteria

BS4142 Assessment Level, dB(A) (Rating Level relative to Background Level)	BS4142 Semantic (as described in the Standard)
< -10	'If the rating level is more than 10dB below the measured background level then this is a positive indication that complaints are unlikely'
-10 to +5	No BS description but the more negative the difference, the less the likelihood of complaints
+5	'A difference of around +5dB is of marginal significance'
+5 to +10	No BS description but the more positive the difference, the greater the likelihood of complaints
> +10	'A difference of around 10dB or more indicates that complaints are likely'

10.27 In situations where the L_{A90} background noise level at night is 'low' (less than 30dB(A)) and the Rating Level is low (less than 35dB(A)), the standard states that the rating method of BS4142 is not applicable. In these circumstances, it is standard practice to assess the noise effect by considering sleep disturbance criteria and other aspects such as noise change.

BS8233 [12]

10.28 BS8233 defines a range of ambient noise levels for a number of design criteria for good or reasonable conditions in certain habitable rooms. Table 10.2 shows a summary of the levels recommended in BS8233 for rooms used for resting and sleeping.

Table 10.2: Indoor Ambient Noise Levels as Recommended in BS8233

Criterion	Typical Situation	Designed Range, $L_{Aeq,T}$ (dB)	
		Good	Reasonable
Reasonable resting/ sleeping conditions	Living Rooms	30	40
	Bedrooms	30	35

World Health Organisation (WHO) [13]

10.29 A report was submitted to the WHO in 1995 for consideration as a revision to the 1980 WHO document and revised community guidelines were issued in 2000. These were published on behalf of the WHO but the authors alone were responsible for the views expressed. In the 2000 guidelines, it is considered that the sleep disturbance criteria should be taken as internal noise levels of 30dB L_{Aeq} and 45dB L_{Amax} or external levels of 45dB L_{Aeq} and 60dB L_{Amax}, with windows open.

10.30 For daytime levels, the 2000 WHO document 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 55dB 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 50dB L_{Aeq}. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.'

10.31 However, the National Noise Incidence Study 2000 found the following:

'The National Noise Incidence Study 2000 has found that 55±3% of the population of England and Wales live in dwellings exposed to day-time noise levels above the WHO level of 55 dB LAeq,day. In 1990 we now estimate that 60±3% of the population were exposed above the level of 55 dB LAeq,day. This change represents a statistically significant decrease in the proportion of the population exposed above this level in 2000 when compared to the results of the 1990 study.

The National Noise Incidence Study 2000 has found that 68±3% of the population of England and Wales live in dwellings exposed to night-time noise levels above the WHO level of 45 dB LAeq,night. In 1990 we now estimate that 66±3% of the population were exposed above the level of 45 dB LAeq,night. This change represents a statistically non-significant increase in the proportion of the population exposed above this level in 2000 when compared to the results of the 1990 study. It should be noted that this is the only (one) of the established guideline values where we have detected an increase in population exposure in 2000 when compared to the 1990 study.'

10.32 Furthermore, in a review of health effects based noise assessment methods undertaken for the Department Environment Transport and the Regions (DETR) just before the issue of the 2000 WHO guidelines, it is noted that:

'Perhaps the main weakness of both WHO-inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values.'

10.33 The report goes on to say:

'The percentages exposed above the WHO guideline values could not be significantly reduced without drastic action to virtually eliminate road traffic noise and other forms of transportation noise (including public transport) from the vicinity of houses. The social and economic consequences of such action would be likely to be far greater than any environmental advantages of reducing the proportion of the population annoyed by noise. In addition, there is no evidence that anything other than a small minority of the population exposed at such noise levels find them to be particularly onerous in the context of their daily lives.'.

Calculation of Road Traffic Noise (CRTN) - Road Traffic Noise

10.34 The main method of calculating road noise is defined in Calculation of Road Traffic Noise (CRTN) [14]. This method of predicting noise at a reception point from a road scheme, a formal procedure originally issued in accordance with the requirements of the Noise Insulation Regulations 1975, consists of five main parts:

- Divide the road scheme into one or more segments such that the variation of noise within the segment is small;
- Calculate the basic noise level at a reference distance of 10m away from the nearside carriageway edge for each segment;
- Assess for each segment the noise level at the reception point taking into account distance attenuation and screening of the source line;
- Correct the noise level at the reception point to take into account site layout feature including reflections from buildings and façades, and the size of the source segment;
- Combine the contributions from all segments to give the predicted noise level at the reception point for the whole road scheme.

Summary of Prediction and Assessment Methods

10.35 The noise and vibration effects associated with the construction and operation of the proposed facility have been assessed using standard methods and criteria. For assessment purposes, the project has been divided into distinct elements, as follows:

- construction of the new facility;
- operation of the facility under normal circumstances; and

- traffic movements associated with operational activities.

10.36 The assessment methods used are summarised below.

Construction

10.37 Within the scope of the construction noise assessment undertaken as part of this chapter, no direct, specific prediction of noise from construction operations has been undertaken. The assessment has been undertaken on a qualitative basis with recommendations being made for mitigation and control measures as appropriate.

Operational (inc off site traffic noise)

10.38 Noise from the operation of the facility has been predicted based upon the information supplied and has been assessed in line with the following methodologies and standards:

- Operational Activities – ISO9613 [7], BS5228, BS4142, BS8233 and noise change
- Operational Traffic – CRTN

10.39 From the traffic assessment (Chapter 8), it can be seen that all operational traffic will enter the site from the purpose built access off Ninth Avenue. Therefore the assessment of off site vehicle related noise will be undertaken to cover this and other industrial estate roads together with other public roads in the vicinity of the site as covered within the scope of the Traffic Assessment.

10.40 All predictions with regard to noise were undertaken utilising the commercially available Braunstein + Berndt GmbH computer noise mapping software SoundPLAN 6.4 implementing the above relevant standards and prediction methodologies.

Assessment Criteria
Noise from Construction of the facility

10.41 It is proposed that, upon the conclusion of an exact construction methodology, scheme details regarding specific controls and measures to be adopted to control noise within the construction will be contained within a Section 61 agreement.

10.42 Generalised evaluative criteria for on-site construction noise have been derived for use on other construction projects drawing upon the guidance in BS5228. However, it is noted that the guidance of BS5228 Part 1 does not extend to provide an absolute noise criteria but merely identifies key factors to consider, these include:

a) Site location
b) Existing ambient noise levels
c) Duration of site operations
d) Hours of work
e) Attitude of the site operator

f) Noise and vibration characteristics
g) Effect of vibration on buildings and humans

10.43 It is generally recognised that, for operational noise, the likelihood of complaints is related to the difference between the industrial noise and the existing background noise level. However, BS5228 recognises that this relationship between responses and noise level differences may well be different for construction noise activities, and a greater difference may be tolerated when it is known that the activities are of a relatively short duration.

10.44 It is considered that under normal circumstances, in order for a property to be significantly affected by construction noise, a daytime level of 75dB L_{Aeq} or above must be experienced for a period of 12 weeks or more.

10.45 Where existing free field ambient noise levels are already elevated above or close to the proposed construction noise limit of 75dB $L_{Aeq,12hours}$ due to existing ambient noise sources, the threshold level of 75dB $L_{Aeq,12hours}$ can be increased by a further 5dB(A)

10.46 It is common practice to attempt to minimise construction noise impacts through environmental controls defined in a S61 Agreement, an Environmental Management Plan or a Code of Construction Practice.

Vibration from construction of the facility

10.47 Within the scope of any construction operations associated with such a development, the only operation that would be considered likely to generate sufficient vibration levels, such to have a potential effect outside of the site boundary, is the undertaking of certain ground stabilisation techniques (Dynamic compaction) or the installation of any supporting piles below the foundations and floor slabs.

10.48 No confirmation has been supplied to RPS regarding any requirement for any ground stabilisation or piling to be undertaken within the scope of the development proposals.

10.49 Once this requirement for this aspect of the construction works has been concluded, a detailed assessment of potential resulting vibration levels associated at the closest sensitive receptor locations would require to be undertaken. The predicted vibration levels would require to be assessed against the standards below to conclude the suitability of the system and any requirements for alternative methodologies should vibration levels be unacceptable.

10.50 The significance of vibration levels affecting building occupants arising from construction activity can be determined from the criteria defined in BS6472:Pt1; these are presented in Table 10.3. Impact would be considered significant if the predicted/measured levels are likely to be at or above those defined as ‘Adverse Comment Possible’.

Table 10.3: Construction Vibration - Threshold of Significant Impacts on Building Occupants

Receptor	Low Probability of Adverse Comment VDV ms-1.75	Adverse Comment Possible –VDV ms-1.75	Adverse Comment Probable –VDV ms-1.75
Residential Buildings 16 hour day	0.2-0.4	0.4 -0.8	0.8 -1.6

10.51 The potential for significant impact upon structures would be deemed to occur if the conservative limits derived from BS7385-2, which are presented in Table 10.4, are exceeded.

Table 10.4: Construction Vibration – Threshold of Potential Cosmetic Damage

Category of Building	Threshold of Potential Cosmetic Damage (Peak Particle Velocity)
Industrial or heavy commercial buildings	50mm/s
Standard residential buildings	15mm/s

10.52 The above presented vibration limits are for transient vibration, for continuous vibration the levels presented should be reduced by up to 50%. However, BS6472 defines vibration as continuous when 'it is uninterrupted for the assessment period. This can be either a daytime period of 16h e.g. 07h00 to 23h00 or a night time period of 8h, e.g. 23h00 to 07h00'. Piling operations would not fulfil this criterion and as such are not considered as continuous vibration.

10.53 Vibration from piling activities also has the potential to damage underground structures such as water pipelines running within or close to the site boundary. BS5228 Part 4 section 8.5.3 provides guidance on the assessment of vulnerability of underground services. The guidance levels provided are as follows:

Table 10.5: Construction Vibration – Threshold of Potential Damage to Underground Services

Vibration Duration	Maximum Peak Particle Velocity
Intermittent or transient vibrations	30mm/s
Continuous Vibrations	15mm/s

10.54 The values presented within Table 10.5 are generally applied to the crown (top) of the pipe unless the lateral extent of the service is considered to be large in relation to the separation distance between said service and the closest pile location.

10.55 BS5228 Part 4 goes on to say:

'It should be noted that even a p.p.v of 30 mm/s gives rise to a dynamic stress which is equivalent to approximately 5% only of the allowable working stress in typical concrete and even less in iron or steel.'

'In the event of encountering elderly and dilapidated brickwork sewers the base data should be reduced by 20% to 50%. For most metal and reinforced concrete service pipes, however, the values [Table 8.6] should be quite tolerable.'

Noise from operation of the facility

10.56 TAN 11 cites the use of BS4142 where assessing noise from proposed industrial and commercial premises that has the potential to adversely affect residential properties.

10.57 At night, the resultant noise levels inside properties are considered to be of more significance in order to assess any potential for sleep disturbance. TAN 11 also makes reference (para B17) to BS8233 which provides general guidance on acceptable noise levels within buildings. In sleeping areas, the recommended maximum indoor ambient noise levels range from 30dB L_{Aeq} (good conditions) to 35dB L_{Aeq} (reasonable conditions). These correspond to external noise levels of 40 to 45dB(A) L_{Aeq} with windows open.

10.58 Similar advice is provided within the WHO guidelines for community noise. This states that to avoid the negative effects on sleep, the L_{Aeq} sound pressure level during the sleeping period should not exceed 30dB(A) for continuous noise and the recommended night-time noise levels outside of dwellings should not exceed 45dB(A) to enable residents to sleep with bedroom windows open.

10.59 The Department of Transport document 'Design Manual for Roads and Bridges' (DMRB) [15] provides a method for the assessment of road traffic effects by predicting the change in the $L_{A10, 18hr}$. A similar approach was set out in its precursor, the 'Manual of Environmental Appraisal for Trunk Road Assessments' (MEA) [16].

10.60 The approach has been used in the UK over the last ten years in the assessment of road traffic schemes and is based upon the premise that subjective response to noise from a new source is proportional to the change in overall noise level.

10.61 In the case of road traffic noise, the DMRB rates impacts through consideration of the change in 18-hour L_{A10} measurement by noise change bands. These are similar to the original noise change bands presented in the MEA, with an additional band being included for an increase of 1- 3, however, it does not indicate whether this change is significant. Noise change bands comparable with those recommended in the MEA are therefore used for the rating of noise impact. The limits of the bands have also been altered slightly to avoid the ambiguity in the MEA bands at the 5 and 10dB noise change levels, which overlap.

10.62 It is often considered useful to categorise the degree of impact according to the extent of the predicted noise change. This is frequently implemented by the use of descriptors associated with noise change bands. A commonly adopted scale is shown in Table 10.6 below.

Table 10.6: Scale for Describing Noise Change – Thresholds of Significance (Permanent Sources and Operational Traffic)

Impact Magnitude	Noise Level Change
Severe	Increase of more than 15dB (A)
Substantial	Increase of 11 – 15dB (A)
Moderate	Increase of 6 – 10dB (A)
Slight	Increase of 3 - 5dB (A)
No significant change	Increase of less than 3dB (A)

10.63 In order to determine the significance of an impact, not only must the magnitude of the impact be determined but the sensitivity of the receptors to the impact must also be defined. This has been scaled within Table 10.7 below based upon professional judgement, taking into account the nature of the receptor:

Table 10.7: Receptor Sensitivity

Receptor Sensitivity	Type of Receptor
High	Dwellings/residential properties including houses, flats, old peoples' homes, hospitals, schools, churches, caravans and open spaces/conservation areas where the existing noise level is low.
Moderate	Commercial premises including retail and offices etc.
Low	Industrial premises, warehousing and distribution etc.

10.64 Based upon the assessment of impact magnitude and the sensitivity of individual receptors, the following matrix has been developed in order to provide an indication of the possible significance of each predicted operational noise impact.

Table 10.8: Significance Matrix

Impact Magnitude	Receptor Sensitivity		
	High	Moderate	Low
Severe	Major	Major/Moderate	Moderate/Minor
Substantial	Major/Moderate	Moderate	Minor
Moderate	Moderate	Moderate/Minor	Minor/Neutral
Slight	Minor	Minor/Neutral	Neutral
No Significant Change	Neutral	Neutral	Neutral

Summary of Assessment Criteria - Construction Noise and Vibration from Construction

10.65 Noise within the construction phase of the development would be controlled within a Section 61 agreement with the Local Authority.

Summary of Assessment Criteria - Operational Noise from the Operation

10.66 A significant noise impact will be deemed to occur if:

- The Rating Level should exceed the Background Level by more than 5dB(A) at any sensitive residential receptor
- Noise Level inside residential properties of more than 30dB L_{Aeq} at night with windows open

Ground-borne Vibration from Operation

10.67 No ground-borne vibration impacts are expected to occur outside of the site boundary as a result of the operation of the proposed development.

Operational Traffic

10.68 A significant noise impact will be deemed to occur if:

- The traffic noise level increases by 3dB or more $L_{A10(18\ hour)}$ at any sensitive residential receptor.

Cumulative Impacts

Assessment has been undertaken on a qualitative/quantitative basis of the cumulative impacts associated with the 'high energy use' on the north western area of the development site.

CONSULTATIONS

10.69 As detailed in Chapter 6, a formal scoping exercise has been undertaken to inform the scope of the Environmental Assessment.

10.70 In addition to the formal scoping exercise, discussions with Mr Christopher Morgan, Head of Planning Services at Brecon Beacons National Park Authority and Mr Christopher Jones, Development Control Manager at Rhondda Cynon Taf County Borough Council during July 2008 have informed the noise assessment. The key element of the consultations was the agreement of suitable monitoring locations, durations and assessment methodologies.

10.71 The detail of the agreements made with BBNPA and RCT within the above consultations is presented within the Baseline Conditions below.

10.72 A site visit was undertaken by the Northern Acoustics Group of RPS Planning & Development on 15th August 2008 in order to carry out a qualitative and quantitative assessment of the prevailing noise conditions on and in the vicinity of the proposed development site.

10.73 It was considered that the key source of noise audible on site during the daytime period was vehicle movements on the surrounding road network coupled with overhead aircraft movements, natural noises and general human activity. During the night-time period, the noise climate was again governed by distant road traffic noise coupled with natural noises.

Potentially Sensitive Receptors

10.74 Identification of the key potentially sensitive receptors closest to the development site boundary was concluded in conjunction with both the BBNPA and RCT. This issue of sensitive receptors was concluded based upon the assessment of detailed OS topographical data and the findings of the site visit.

10.75 The following properties have been selected for assessment purposes:

1) Ty Newydd (Hotel) – to the east of the development site.

2) Residential Dwelling (Reservoir House) adjacent to the Penderyn Reservoir – to the north of the development site - .

3) Tai-cwplau – to the west of the development site.

4) Tre-banog-uchaf – to the north of the development site.

10.76 The monitoring locations as detailed above are presented highlighted within the mapping information shown on Figure 10.1 at the end of this chapter.

Baseline Noise Monitoring

10.77 Noise monitoring surveys were undertaken in order to define baseline noise level conditions in the vicinity of the proposed development site.

10.78 The scope of the monitoring surveys was discussed and agreed with Mr Christopher Jones of RCT prior to the undertaking of the monitoring exercise. Representation was also made to BBNPA regarding the proposed noise assessment scheme although no response was received.

10.79 Daytime and night-time ambient noise monitoring surveys were undertaken on 15th August 2008. The surveys comprised monitoring at 4 locations in total as presented in Table 10.9 below, and identified on Figure 10.1.

Table 10.9: Noise Monitoring Locations

Loc. No.	Address and Description	Potential Receptors	Existing Key Noise Sources
1	Ty Newydd (Hotel) The Sound Level Meter (SLM) was positioned on the landscaped area adjacent to the entrance. Approx. Grid Ref – 294622, 206930	Hotel accommodation and adjacent residential property.	Distant road traffic noise and activities in and around the hotel complex.
2	Reservoir House The SLM was positioned adjacent to the access road to the east of the dwelling. Approx. Grid Ref – 294135, 207270	Residential properties.	Road traffic noise and natural noises, coupled with periodic human activity noise.
3	Tai-cwplau The SLM was positioned within the boundary of the farm complex adjacent to the residential dwelling. Approx. Grid Ref – 293518, 207033	Working Farm and residential dwelling.	Natural and agricultural noises coupled with distant road traffic and human activity noise
4	Tre-banog-uchaf The SLM was positioned outside the church and next to residential properties on Old Kent Road. Approx. Grid Ref – 294059, 207402	Residential dwelling.	Distant road traffic and machinery noise coupled with natural and human noises.

Survey Measurement Timings

10.80 Table 10.10 below provides details of the timings and durations of the noise surveys undertaken.

Table 10.10: Noise Monitoring timings and locations

Monitoring Location	Daytime and Night-time	
	Date	Time
1	15th August 2008	09:00 – 11:00 00:00 – 01:00
2	15th August 2008	11:10 – 13:10 01:14 – 02:14
3	15th August 2008	15:50 – 17:50 03:39 – 04:39
4	15th August 2008	13:25 – 15:25 02:20 – 03:20

Monitoring Protocol

10.81 The daytime noise monitoring surveys comprised at minimum 120 minutes of noise measurements monitored in 15-minute sub-periods. During the night-time survey, a minimum of 60 minutes of noise level data was measured at each location divided into separate 5-minute periods.

10.82 The instrumentation used during the noise surveys was 1No. Norsonic 118 (Serial No. 31314) with all-weather kit. The instrumentation was calibrated before and after each survey using a Bruel & Kjaer Electronic calibrator (Type 4231, Serial No. 2393954). No significant deviations were noted. Instrumentation calibration documentation can be supplied upon request.

10.83 The instrument was configured with a 'fast' time constant and a dynamic range of 20-120dB. The microphones were mounted on tripods and the Sound Level Meter (SLM) was set to measure L_{Aeq}, L_{A90}, L_{A10} and L_{Amax}.

10.84 Weather conditions were periodically noted during the survey periods to be as detailed below:

Friday 15th August 2008

10.85 The weather conditions during the night-time (early hours) of 15th August 2008 were noted to be mild, clear (0% cloud cover) and dry (7°C). The wind speed was measured to be of less than 5ms^{-1}.

10.86 The weather during the daytime period of 15th August 2008 was noted to be fine and dry (17°C) with periodic sunny spells. The wind speed was measured to be of less than 5ms^{-1}. Cloud cover was noted to be approximately 70%. The weather conditions remained relatively constant throughout the daytime survey period although the cloud cover increased to approximately 95% by the early afternoon.

10.87 During all of the periods of monitoring (daytime and night-time) undertaken, the road surfaces within the area were noted to be dry.

Measured Noise Level Data

10.88 A summary of the daytime and night-time survey results is presented within Table 10.11 and Table 10.12 below, with the entire data set being presented within Noise Appendix 10.5.

Table 10.11: Summary of Measured Daytime Noise Levels

Location	Time	Measured Statistical Parameters in (dB)			
		LAeq	LA90	LA10	LAmax
1	09:00 – 10:00	46.1	40.2	47.0	82.1
	10:00 – 11:00	44.6	40.4	46.5	65.3
2	11:10 – 12:10	46.1	41.7	46.3	71.2
	12:10 – 13:10	46.6	42.9	46.5	79.6
3	15:50 – 16:50	50.1	40.9	48.7	75.6
	19:50 – 17:50	48.3	43.0	49.9	70.5
4	13:25 – 14:25	49.0	45.9	50.9	66.0
	14:25 – 15:25	48.7	44.5	50.6	79.2

Table 10.12: Summary of Measured Night-time Noise Levels

Location	Time	Measured Statistical Parameters in (dB)			
		LAeq	LA90	LA10	LAmax
1	00:00 – 01:00	40.8	34.5	42.2	67.1
2	01:14 – 02:14	39.0	37.7	40.2	61.7
3	03:39 – 04:39	54.6	31.6	38.9	81.1
4	02:20 – 03:20	37.7	35.7	39.2	60.7

Limitations

10.89 The baseline survey was undertaken by way of snapshot noise monitoring undertaken during a typical working week day and overnight period. However, the acceptability of this approach was agreed with RCT. The scheme was also presented to BBNPA, and whilst given sufficient time, BBNPA did not advise of any adverse comment to proposals put forward.

10.90 The data supplied to RPS for inclusion within the noise modelling was as discussed an agreed with Mr Don Ridley of Ennertec on 2nd October 2008 based upon the current knowledge regarding the technology to be implemented on site. Following any planning approval, once more detailed information is available relating to the exact specifics of the technology to be installed on site, further noise modelling works would be required to be undertaken to verify the results of this assessment.

10.91 No information is currently available relating to the noise issues associated with the high energy use located on the site except for an estimation of the expected vehicle flow numbers which is contained within the scope of the traffic assessment. Therefore, the impact of this aspect of the development site cannot be categorically quantified at this time. Once a future user and a design of the operational plan confirmed, further acoustic assessment works could be undertaken for the following aspects:

- Noise associated with fixed air conditioning/refrigeration or extraction plant to be assessed in order to ensure that the noise received at the closest sensitive receptor locations would not breach an acceptable limit to the local council;
- Noise associated with other operations on and around the site would not breach an acceptable limit to the local council;
- Off site vehicle movements would not significantly affect noise sensitive receptors around the local road network.

INCORPORATED ENHANCEMENT AND MITIGATION

Construction Activities

10.92 All issues relating to mitigation measures required to reduce noise impact associated with the construction operations will be contained within the scope of a Section 61 agreement.

10.93 Furthermore, within the construction phase of the development, it has been assumed that, as a minimum, the principal contractor will be required to submit a detailed method statement giving construction plant schedules, working hours, proposals to minimise noise emissions and a programme of sample monitoring. Furthermore, the principal contractor will be required to:

- Reduce noise to a minimum, as defined in section 72 of the Control of Pollution Act, 1974 using the best practical means at all times and in agreement with the Local Planning Authorities.
- Maintain/replace exhaust silencers to ensure they are effective.
- Use well silenced compressors in noise-sensitive areas.
- Maintain plant regularly and ensure that noise abatement measures (e.g. covers) are fully operational and used correctly.
- Confine construction activity to within a time period agreed with the Local Authority.
- Keep local residents and Local Authority informed of the proposed working schedule, where appropriate, including the times and duration of any abnormally noisy activity that may cause concern.
- Provide a helpline/contact number for any complaints or concerns from members of the public.
- Employ a manager to ensure that all works are being carried out in accordance with BPM.

Operational Activities

10.94 The following mitigation measures, integral to the design of the proposed facilities, have been introduced to mitigate the potential noise emissions during the operational phase. The noise model and the results presented within the scope of this report assume that all of the below specified mitigation measures are implemented:

Waste Recycling and Energy Recovery Facility

- Buildings will be fully enclosed and will be insulated as specified with appropriate wall and roof systems providing attenuation of –25dB(A) (R_W) or greater;

- As and where specified on Figure 10.2 within the design of the site certain wall/roof sections of the Fuel Preparation Building (Building 3) and the Pyrolisis Building (Building 7) would require an increased specification of cladding providing attenuation of –42dB(A) (Rw) or greater

- All vehicle access and exit doors within the facility including rapid closing doors will require to provide attenuation of between -12 to -17dB(A) (Rw) or greater when closed as detailed on Figure 10.2. When not in use, these doors require to be closed at all times;

- All personnel doors, maintenance doors (including infrequently used access points for cleaning/maintenance purposes) will require to provide acoustic attenuation equivalent to or bettering than the wall cladding specified around it. Doors would require to be appropriately fitted to maintain a constant barrier and would require to remain closed other than when in use.

- All main plant, equipment and operations associated with Fuel Preparation, Biomax operations, Pyrolisis and power generation will be located, operated and undertaken within the confines of the proposed building environments;

High Energy Use

- Any air conditioning/refrigeration/extraction plant associated with the high energy use should be such designed and mitigated as necessary to achieve a noise limit agreed by the local planning authority.

- Within the model it has been assumed that all operations within the high energy building would require to be mitigated to produce noise levels within the limits of the Noise at Work Regulations. It has therefore been assumed within the model that the internal noise generated by any operator of this building would be 85dB(A).

- Further acoustic assessment works would be required to be undertaken following conclusion of a use, design and specification of this aspect of the development site to ensure that no adverse impact occurs.

10.95 These mitigation measures have been incorporated within the base scenario of the modelling exercise and assessment undertaken as presented within Noise Appendices 10.1 and 10.2.

IDENTIFICATION AND EVALUATION OF KEY IMPACTS

10.96 The proposed facility has the potential to impact upon existing local receptors. Impacts are possible in both the long and short-term, during operational and construction phases respectively. The magnitude and significance of the impacts will be evaluated further in this section.

Construction Phase

10.97 Within the scope of the construction operations required for the development of the facility, the following operations have the potential to cause short-term disturbance to the amenity nearby receptors.

- Site establishment activities (inc. ground works) – this is typically the activity which employs the greatest amount of large earth moving equipment;
- Building construction – typically undertaken with less large-scale equipment than the ground works phases;
- Construction traffic – the road traffic movements associated with the construction operations have the potential to generate short-term increases in traffic movements on the surrounding highways.

10.98 It has not been concluded as to whether there is any requirement for piling/ground stabilisation operations. If it is a requirement then some form of assessment of noise and vibration levels associated would require to be undertaken. This assessment, if necessary, could be covered within the works leading to the s.61 agreement.

Operational Phase

10.99 The key elements of the operational phase of the development which could potentially generate long-term disturbance to the amenity of adjacent receptors are as detailed below:

- Operation of the facility equipment both within and exterior to the building structures during the daytime period;
- Operation of the appropriate elements of the facility during the overnight period;
- Operation of the high energy usage facility.
- Daytime HGV movements on the site roads;

- Increases in daytime road traffic volumes on the surrounding highways as a result of development generated traffic movements.

PREDICTION OF IMPACT MAGNITUDE

BS4142 Assessment of Residential Receptors

10.100 A BS4142 assessment has been undertaken to the closest residential receptor locations to the proposed development based upon measured background noise level data and predicted operational noise levels from the entire facility.

10.101 Within a BS4142 assessment, there is a requirement to impose a 5dB character correction to a predicted noise level where tonal or impulsive aspects are envisaged or do occur. It is considered within the scope of this assessment that as a result of all plant, equipment and operations on site being housed within the confines of bespoke designed buildings this correction would not be required as the acoustic attenuation of the building cladding would adequately remove these elements of the noise.

10.102 The plant and equipment utilised within the modelling exercise undertaken is included within Appendix 10.6. Details regarding locations and noise levels for each of the items of plant included within the model were concluded within discussions on the 2nd October 2008 with the Ennertec design engineer Mr Don Ridley.

10.102 Account has been taken of HGV vehicle movements within the service yard areas of the high energy use building as well as assumed noise levels associated with the internal building operations based upon the upper limits of the Noise at Work Regulations.

10.103 Only the incorporated mitigation measures as discussed within paragraph 10.98 of this Chapter have been included within the assessment presented below.

10.104 The output of the noise model constructed is presented within the grid noise map plots contained within Appendices 10.1 and 10.2.

10.105 Table 10.13 below shows the results of the daytime and night-time BS4142 assessment at each of the residential properties assessed. Within the assessment, the averaged one-hour 'background' noise level measured during the daytime and the averaged 5-minute data during the night-time have been used. The assessment has been undertaken in whole decibels as required by BS4142.

Table 10.13: BS4142 Noise Assessment

Parameter	Receptor 1		Receptor 2		Receptor 3		Receptor 4	
	Day	Night	Day	Night	Day	Night	Day	Night
Specific Noise Level of Proposed Facility (dB L_{Aeq})	38	37	40	39	38	37	40	39
Rating Level (dB L_{Ar}) No penalty included as discussed in para 10.105.	38	37	40	39	38	37	40	39
Measured Background Level (dB L_{A90})	40	35	42	38	42	32	45	36
Assessment Level (dB L_{Ar} – dB L_{A90})	-2	+2	-2	+1	-4	+5	-5	+3

10.106 BS4142 states that the lower the assessment level, the less the likelihood there is that complaints will arise. The Standard states that an assessment level of -10 would provide a positive indication that complaints are unlikely, whilst increases of 5dB(A) above background are deemed by the Standard to be of marginal significance.

10.107 The daytime BS4142 assessment for the proposed development shows that, based upon the measured noise level data and predictions undertaken, the rating levels are shown to be between -5dB(A) and -2dB(A) below the measured backgrounds. In accordance with the guidance of BS4142 this is considered to be of less than marginal significance with the more negative the difference the less the probability that complaints regarding the operational facility would occur.

10.108 The overnight assessment undertaken concludes that the predicted rating level is shown to be between +1dB(A) and +5dB(A) above the measured background. This is concluded within the BS4142 assessment methodology to be of marginal significance or less with the potential for resulting complaints being considered to be low.

BS8233 Internal Noise Assessment

10.109 During the overnight period, it is considered that external noise levels are not appropriate for quantifying impact associated with a new noise generating development. This conclusion is drawn as a result of the fact that during this time period people are inside buildings either asleep or trying to get to sleep and it is very rare that an external garden would be occupied during this period. It is therefore considered prudent to present an

assessment of the potential resulting internal noise levels from the overnight operation of the facility.

10.110 It is stated within BS4142 that the method is not appropriate for assessing noise inside buildings; therefore, in order to adequately assess internal noise levels the guidance of BS8233 is referenced. BS8233 states that a 'Good' design criteria for resting and sleeping conditions within bedrooms during the overnight period is 30dB(A), 'Reasonable' conditions are defined within the standard as 35dB(A).

10.111 Given the varied nature of the constructions of the surrounding residential dwellings and in order to present an absolute worst-case assessment, a conservative -13dB(A) attenuation has been assumed to be provided by the façade. This equates to the level presented within PPG24 (paragraph 4, Annex 6) for a façade construction of any detail with a window partially open for ventilation.

10.112 Comparison of the presented predicted external noise levels from the facility during the overnight period (37 to 39 dB(A)), inclusive of this –13dB(A) attenuation, with the criteria presented within BS8233 as stated above, concludes that the internal noise levels attributable to the facility would be expected to be between 24 to 26 dB(A), wholly within the 'Good' design range criteria (30dB(A)).

Vehicular traffic off-site

10.113 The TA has assessed and evaluated the impact of the development-generated flows on identified junctions on the existing local road network from the proposed development. The Junctions which have been assessed are termed A to E.

10.114 When undertaking road traffic noise assessments, it is common practice to assess the potential increase in the LA10 noise level over an 18-hour period between 0600 - 0000hrs using annual average weekday traffic (AAWT) flow data. The predicted noise levels in columns 4 and 5 are for indicative purposes only, normalised to 20m from the carriageway edge. However, the difference in noise level (Column 6) will be experienced at any given distance from the carriageway edge where road noise from the given link is the dominant source.

10.115 The results of the traffic noise assessment are presented within Table 10.14 below.

Table 10.14: CRTN traffic noise calculation results

Junction Name	Route link	Assessment Methodology	Baseline	With Development	Difference
2010 – Opening Year					
A	5th Ave. - Industrial Estate road	CRTN (low flow corrected)	49.2	52.9	+3.7
	Estate Rd - Industrial Estate road	No development flows using this link – no change in noise			
	Main Ave. - Industrial Estate road	No development flows using this link – no change in noise			
	5th Ave. to A4061- Industrial Estate road	CRTN (low flow corrected)	53.2	55.3	+2.1
B	5th Ave. - Industrial Estate road	CRTN (low flow corrected)	52.7	54.9	+2.2
	A4061 (E)	CRTN	59.4	60.0	+0.6
	A4061 (S)	No development flows using this link – no change in noise			
	Rhigos Rd	CRTN	54.6	54.6	0.0
C	A4061	CRTN	60.9	61.3	+0.4
	A465 (Neath)	CRTN	66.8	66.8	0.0
	A4059 (Penywaun)	CRTN	60.7	60.7	0.0
	A465 (Merthyr)	CRTN	67.3	67.5	+0.2
2025 – Design (Operational) Year					
A	5th Ave. - Industrial Estate road	CRTN (low flow corrected)	49.9	53.3	+3.4
	Estate Rd - Industrial Estate road	No development flows using this link – no change in noise			
	Main Ave. - Industrial Estate road	No development flows using this link – no change in noise			
	5th Ave. to A4061- Industrial Estate road	CRTN (low flow corrected)	53.8	55.7	+1.9
B	5th Ave. - Industrial Estate road	CRTN (low flow corrected)	53.2	55.3	+2.1
	A4061 (E)	CRTN	59.9	60.4	+0.5
	A4061 (S)	No development flows using this link – no change in noise			
	Rhigos Rd	CRTN	55.1	55.1	0.0
C	A4061	CRTN	61.4	61.8	+0.4
	A465 (Neath)	CRTN	67.2	67.3	+0.1
	A4059 (Penywaun)	CRTN	61.2	61.2	0.0
	A465 (Merthyr)	CRTN	67.8	68.0	+0.2

Note – Rows highlighted in light grey depict Industrial estate roads with no adjacent residential receptor locations.

10.116 Assessment of the traffic flow turning count drawings (Transport Appendix 2) concludes that the proposed development imparts no impact on the flow patterns of Junctions D and E. Therefore, there will be no resulting changes in the level of traffic generated noise resulting from the proposed development at these junctions.

10.117 It is noted that there are no residential properties in the vicinity of Junction A, which is an internal industrial estate junction. The closest residential dwellings along the road network are adjacent to Junction B off the A4061 (E) toward the A465 (Junction C). The maximum noise increase at residential property due to road traffic flow changes resulting from the proposed development is therefore predicted to be in the region of +0.6dB(A) and +0.5dB(A) during 2010 and 2015 respectively.

10.118 The noted larger increases in road traffic noise around Junction A and link 1 into Junction B (IE road leading to 5th Avenue) are within the industrial estate and do not affect any sensitive residential receptors.

10.119 The impact of the increased traffic associated with the proposed development is rated within Table 10.15 below.

ASSESSMENT OF IMPACT SIGNIFICANCE

10.120 Table 10.15, presented below, references the predicted and measured noise levels to the impact assessment schemes presented and discussed within this Chapter, to conclude the significance of any potential impact.

10.121 Only the BS4142 assessment methodology requires the inclusion of any character correction penalties. As such, the following impact significance assessment is based upon the predicted specific noise levels as presented within Table 10.13.

Table 10.15: Predicted Significance of Impacts (Noise)

Potential Impact Identified	*Receptors Considered*	*Impact Magnitude (as predicted above)*	*Sensitivity of Receptor*	*Overall Impact Significance*
Daytime - All Operational Plant, and on site vehicle movements	1) Ty Newydd (Hotel) and adjacent properties	No significant Change	High	Neutral
	2) Reservoir House and adjacent properties	No significant Change		Neutral
	3) Tai-cwplau and adjacent properties	No significant Change		Neutral
	4) Tre-banog-uchaf and adjacent properties	No significant Change		Neutral

Potential Impact Identified	Receptors Considered	Impact Magnitude (as predicted above)	Sensitivity of Receptor	Overall Impact Significance
Off site 18hr daytime vehicle movements	Residential and Sensitive receptors adjacent to the surrounding road network	No significant Change	High	Neutral
Night-time – operation (no on site vehicle movements)	1) Ty Newydd (Hotel) and adjacent properties	No significant Change	High	Neutral
	2) Reservoir House and adjacent properties	No significant Change		Neutral
	3) Tai-cwplau and adjacent properties	Slight		Minor
	4) Tre-banog-uchaf and adjacent properties	No significant Change		Neutral

During Construction

10.122 The key activities, which arise as a result of the construction phase of the proposed development, would fall broadly into the following categories:

1) Site Works, including site establishment, site clearance, installing access roads and landscaping;

2) Construction of Site Buildings;

3) Traffic associated with the Construction Phase.

10.123 Construction activities associated with developments of this type have the potential to result in significant noise impacts dependent upon the proximity of existing sensitive properties and the need for significant earth moving and use of 'heavy' plant and machinery.

10.124 Increased noise may also result on the local road network due to an increased volume of HGVs travelling to and from the site during the construction programme. The potential effects of these construction noise sources on local receptors will be most significant within close proximity to specific works sites, which may change as the construction phases proceed.

10.125 Given that exact details regarding construction techniques and types of plant likely to be used are not available at present, it is difficult to predict accurately the potential impacts of construction noise on local receptors. Nevertheless, it is considered useful to present potential worst-case noise levels from a selection of typical construction plant, which may be used within a development of this type, and to calculate noise levels back to different distances, which may reflect noise levels at local receptors. The noise levels calculated at distance from each item of plant do not take into account any attenuation due to screening and have been based upon hard reflective ground between source and receiver as a worst-

case scenario. The figures presented are also based upon a 100% on-time, which is unlikely to occur in practice.

10.126 Table 10.16 below presents details for assumed plant, which could reasonably be used during the construction programme, with corresponding worst-case sound power levels for each item of plant as taken from BS5228.

Table 10.16: Potential noise levels of typical construction plant

Plant	Sound Pressure Level in dB(A) at 10m	Sound pressure level at given distance (dB LAeq)						
		20m	50m	100m	200m	300m	600m	1km
Vibratory Sheet Piling rig	88	82	74	68	62	58	52	48
44tn Tracked 360° Excavator	85	79	71	65	59	55	49	45
Articulated Dump Truck	80	74	66	60	54	50	44	40
14tn Tracked 360° Excavator	83	77	69	63	57	53	47	43
Wheeled 360° Excavator	68	62	54	48	42	38	32	28
Telescopic Handlers	71	65	57	51	45	41	35	31
Vibratory Roller	79	73	65	59	53	49	43	39
Water Pump	62	56	48	42	36	32	26	22
Concrete Pump	78	72	64	58	52	48	42	38
Generators	57	51	43	37	31	27	21	17
Cement Mixers	75	69	61	55	49	45	39	35
Crane	78	72	64	58	52	48	42	38
Road lorry (Drive by)	80*	74*	66*	60*	54*	50*	44*	40*
Tracked Excavator with hydraulic breaker	96	90	82	76	70	66	60	56
Wheeled Loader	80	74	66	60	54	50	44	40
Tracked Loader	90	84	76	70	64	60	54	50
Mechanical Crusher	84	78	70	64	58	54	48	44
Tracked Crane	88	82	74	68	62	58	52	48
Hydraulic Pecker	94	88	80	74	68	64	58	54
Pneumatic Chipper	89	83	75	69	63	59	53	49

*Drive by maximum sound pressure level, LpA (max), at speed in km/h as shown

10.127 It is considered that potentially the most affected properties from construction noise would be those located as detailed below.

North of the site – Reservoir House, Tre-banog-uchaf and any other adjacent residential dwellings;

East of the site – Ty Newydd (Hotel) and any adjacent residential dwellings;

West of the site – Tai-cwplau working farm.

10.128 To the south of the proposed development site is located the Hirwaun Industrial Estate. As such the uses within the industrial estate land are not considered to be noise sensitive.

10.129 The following table details a qualitative assessment of the impact of the construction noise associated with the development:

Table 10.17: Potential Noise Levels of Typical Construction Plant

Assessment Location	Approximate worst case closest approach Separation Distance	Average LAeq of Locality*	Qualitative Assessment		
			Impact Magnitude	Receptor Sensitivity	Impact Assessment
North of the site	360	46.4	No significant Change to Substantial	High	Neutral To Major
East of the site	580	45.4	No significant Change to Substantial		Neutral To Major
West of the site	200	49.3	No significant Change to Substantial		Neutral To Major

*Measured LAeq of locality if available.

10.130 It is noted that the assessment results presented are entirely dependant upon the activities that are being undertaken at the time and the associated plant utilised, the less noise generating plant utilised the lesser the impact would be.

Construction Traffic Assessment

10.131 Increased noise may also result on the local road network due to an increased volume of HGVs travelling to and from the site during the construction programme.

10.132 Details regarding the expected numbers of vehicles (HGVs) associated with the construction phase of the development were supplied by Environmental Visage. The assessment of construction generated vehicle movements is based upon either 18hr supplied data where the flows are sufficiently high to allow the use of CRTN or peak hour traffic levels where BS5228 has been required to be used (where flows are too low for the methodology of CRTN). All data used is from the base year of 2008.

10.133 With regard to the 2008 18hr 5th Avenue link data into Junction A the flows are outwith the criteria of CRTN (too low). Therefore assessment along this route has been undertaken based upon the peak hour haul road calculation methodology of BS5228. The calculations are based upon an SPL of 80dB(A) at 7.5m and 74dB(A) at 7.5m for HGV and car movements respectively as taken from EC Directive 92/97/EC (limits for vehicles under acceleration).

10.134 The table below details the increases in percentage HGV movements due to the construction operations along the given links. Furthermore, the percentage increase has been calculated into a noise level increase that would be associated.

Table 10.18: Assessment of Construction Generated HGV Traffic – 2008 Base year

Junction Name	Route link	Baseline 18hr traffic flows	Construction generated flows per day	Percentage increase	Estimated Difference in dB(A)
A	5th Ave. - Industrial Estate road	71 car 13 HGV	50 car 5 HGV	70% Car 38% HGV	+1.9 dB(A)
	Estate Rd - Industrial Estate road	*No Construction flows using this link – no change in noise*			
	Main Ave. - Industrial Estate road	*No Construction flows using this link – no change in noise*			
	5th Ave. to A4061- Industrial Estate road	1400 car 265 HGV	90 car 58 HGV	6.4% Car 21.9% HGV	+0.8 dB(A)
B	5th Ave. - Industrial Estate road	1318 car 231 HGV	90 car 58 HGV	6.8% Car 25.1% HGV	+0.9 dB(A)
	A4061 (E)	6502 Car 878 HGV	90 car 58 HGV	1.4% Car 6.6% HGV	+0.2 dB(A)
	A4061 (S)	*No Construction flows using this link – no change in noise*			
	Rhigos Rd	*No Construction flows using this link – no change in noise*			
C	A4061	7029 Car 1440 HGV	90 car 58 HGV	1.3% Car 4.0% HGV	+0.1 dB(A)
	A465 (Neath)	16719 Car 1696 HGV	45 Car 29 HGV	0.3% Car 1.7% HGV	0.0 dB(A)
	A4059 (Penywaun)	*No Construction flows using this link – no change in noise*			
	A465 (Merthyr)	19903 Car 1809 HGV	45 Car 29 HGV	0.2% Car 1.6% HGV	0.0 dB(A)

Note – the calculations associated with 5th Ave – Industrial Estate road on Junction A were undertaken based upon peak hour flows in line with the methodology of BS5228 due to the flow data being too low for CRTN. All other data was calculated in line with CRTN.

Note 2 – Rows highlighted in light grey depict Industrial estate roads with no adjacent residential dwellings.

10.135 The impacts of the construction phase traffic, based upon the impact assessment scheme presented within this Chapter, are concluded to be of a **Neutral** nature based upon High receptor sensitivities.

Vibration Assessment from Piling Operations

10.136 As previously detailed, it has not been confirmed whether any level of ground improvement work would be required within the scope of the construction works.

10.137 Once any requirement for ground improvement works has been concluded assessment would be required to be undertaken of the suitability of the system proposed both in view of noise and groundborne vibration issues. These assessment works, if required, would be undertaken as part of the S.61 justification works.

Operational Phase

10.138 Based upon the site layout, plant compliment and noise levels, as well as the incorporated mitigation measures as detailed, it is apparent that during normal daytime operation of the proposed development, impacts of **Neutral** adverse significance might be anticipated at receptors in close proximity to the development site.

10.139 During the normal overnight period when all site operations are assumed to be occurring, with the exception of vehicle movements impacts of **Neutral** adverse significance are predicted to occur at locations 1,2 and 4. However due to the influence of the High Energy Building the impact at location 3 is predicted to be of a **Slight** adverse nature. However, notwithstanding the above all predicted internal noise levels associated with the overnight operations at the closest residential properties are comfortably within the 'Good' design range criteria of BS8233.

10.140 Therefore with regard to the sensitive receptor locations 1, 2 and 4 it is not considered necessary that further detailed mitigation measures would be required above those specified within the incorporated mitigation section. However, with regard to assessment location 3, an isolated farm complex, it is considered prudent that additional control measures may require to be implemented within the design of the high energy building.

10.141 At the current time the use of the high energy building has not been concluded and therefore the associated noise characteristics of the operations involved are also unknown. Within the scope of this model it has been assumed that as a worst case the use would generate internal noise levels in line with the limits of the Noise at Work Regulations (85dB(A)). Within the Table below is shown the predicted noise levels at each of the assessment locations resulting from the increase of the facade attenuation of the high energy building to a 42dB(A) enhanced acoustic system (Figure 10.3). All other modelling

assumptions remain the same. This mitigation strategy will also have positive effects on the predicted noise levels at the other assessment locations.

10.142 The results of the mitigated assessment are presented within Table 10.19 below, with the daytime and nighttime grid noise map model outputs of this operational scenario presented within Noise Appendices 10.3 and 10.4.

Table 10.19: Mitigated BS4142 Noise Assessment

Parameter	Receptor 1		Receptor 2		Receptor 3		Receptor 4	
	Day	Night	Day	Night	Day	Night	Day	Night
Specific Noise Level of Proposed Facility (dB L_{Aeq})	37	35	38	36	35	33	38	37
Rating Level (dB L_{Ar}) No penalty included as discussed in para 10.105.	37	35	38	36	35	33	38	37
Measured Background Level (dB L_{A90})	40	35	42	38	42	32	45	36
Assessment Level (dB L_{Ar} – dB L_{A90})	-3	0	-4	-2	-7	+1	-7	+1

10.143 The result of the remedial actions to the assumed high energy building results in the noise impact of the entire facility being reduced to **Neutral** during the daytime and nighttime at all assessment locations.

10.144 However, it is noted that the noise associated with the high energy building has been based upon assumptions due to the lack of detailed information available at the time of this assessment. The remedial mitigation is presented purely to demonstrate that by increasing the specification of the building suitable impacts at adjacent residential receptor locations can be achieved. Following the conclusion of the use of this aspect of the development, further more detailed acoustic modelling and prediction would require to be undertaken to ensure that resulting impacts of this aspect of the development remain acceptable to the local planning authority.

MITIGATION

10.145 Furthermore with regard to both the waste recycling and energy recovery aspect of the development and the high energy user, in the interests of good operational practice, the following issues may be investigated in order to further reduce any impact:

- Provision of specific measures relating to delivery traffic associated with the development, including, for example, reduced speed limits on-site, no waiting or queuing of delivery vehicles with engines running and no unnecessary idling of vehicles.

Construction

10.146 Impacts to specific identified receptors during the construction phase of the development are expected to be relatively short-term. During the construction period, impacts of **Major to Neutral** significance might be anticipated at local receptors dependant upon the activities occurring at the time as well as the area of the site in which the work is being undertaken.

10.147 It is recommended that 'Best Practicable Means' be employed where possible to minimise construction impacts, including, for example:-

Plant and Equipment

- modern, silenced and well-maintained plant should be used at all times, conforming to standards set out in EU Directives;
- equipment including vehicles should be shut down when not in use;
- engine compartments should be closed when equipment is in use and the resonance of body panels and cover plates should be reduced by the addition of suitable dampening materials. Any rattling noise should be addressed by the tightening of loose parts or the addition of resilient materials;
- semi-static equipment is to be sited and orientated as far as is reasonably practicable away from noise-sensitive receptors and to have localised screening if deemed necessary;
- generators and water pumps required for 24-hour operation should be super-silenced or screened as appropriate;
- crane spindles, pulley wheels, telescopic sections and moving parts of working platforms should be adequately lubricated in order to prevent undue screeching and squealing;
- where possible, mains electricity should be used rather than generators.

Methods of Working

- where practical and ground conditions permit, first preference should be given to reaction piling methods ('silent piling'). Otherwise vibratory piling methods, together with pre-augering, should be used. Percussive piling should only be considered where ground condition precludes the use of other methods and prior agreement should be sought from the Local Authority;

- where practicable, pile caps should be cut and then broken with hydraulic rams to minimise the use of heavy air-powered breakers;

- burning equipment should be used in preference to cold cutting where possible;

- large concrete pours (for which an extension of working hours may be necessary) should commence as early as possible within normal working hours so that the activities can be completed within normal working hours as far as possible.

Management of Works Programme

- wherever practicable, noisy works, which are audible at the site boundary, should be undertaken during normal daytime hours, e.g. between 0800 and 1800 Monday to Friday and between 0800 and 1300 on Saturdays;

- routes and programming for the transportation of construction materials, fill, personnel etc. are to be carefully considered in order to minimise the overall noise impact generated by these movements;

- personnel should be instructed on BPM measures to reduce noise and vibration as part of their site induction training;

- shouting and raised voices should be kept to a minimum e.g. in cases where warnings of danger must be given;

- use of radios should be prohibited except where two-way radios are required for reasons of safety and communication.

10.148 A Site Management Plan is proposed for the site preparation and construction stage which will ensure that full consideration is given to potential creation of noise. A copy of the Draft Site Management Plan can be found in ES volume 2.

RESIDUAL EFFECTS

Construction Operations

10.149 The short-term effects of the construction operations could result in an impact significance of **Major to Neutral** dependant upon the works being undertaken at the time and the area in which they occur. With the investigation and implementation of the proposed temporary mitigation measures and careful consideration when planning the construction programme, operational methodologies and plant complement the resulting impact significance could be further reduced.

10.150 Furthermore, it is noted that noise from the construction operations required within the scope of the development could be entirely controlled to within acceptable limits as agreed between Rhondda Cynon Taf CBC and the construction contractor within a 'Prior consent for work on construction sites' agreement under s.61 of the Control of Pollution Act (CoPA) 1974.

Normal Site Operations

10.151 The development of the site at Hirwaun Industrial Estate will result in changes in road traffic flow patterns and volumes in the vicinity of the site. Overall, these traffic flow changes are predicted to result in noise level increases within the vicinity of these major routes of a maximum of 0.6dB(A). The assessment has demonstrated that the increase in noise associated the proposed scheme based upon the traffic flow information supplied will have **Neutral** impact significance on the existing traffic noise levels of the area.

10.152 The impact of operational noise from the proposed development with the implementation of the incorporated enhancement and mitigation measures as detailed within this chapter is predicted to be of **Neutral/slight** significance. Therefore, it is not deemed to have an adverse effect on the noise environment in the vicinity of the proposed facility either during the daytime or the night-time periods.

10.153 However as demonstrated within Table 10.19 and Appendices 10.3 and 10.4 it is shown that, based upon the assumed noise characteristics of the high energy use, increasing the specification of the building façade to an enhanced acoustic system (RW = 42dB(A)) would result in all impacts at the assessment locations being **Neutral** in nature.

10.154 Residual impacts, their magnitude and significance are summarised in the table overleaf.

Table 10.20: Summary of Residual Impacts

Resource	Phase	Residual Effect	Sensitivity of Receptor	Magnitude of Impact	Duration	Nature	Significance	Geographical Level of Importance of Issue				
								I	N	R	D	L
Noise & Vibration	Construction	Construction Noise and Vehicle Movements	High	Slight to Moderate	Short term	Adverse	Minor to Moderate					✓
	Operation	Road Traffic Noise	High	No Significant Change	Permanent	Slight Adverse	Neutral					✓
		Daytime Operational Noise										✓
		Night-time Operational Noise										✓

Key: I: International N: National R: Regional D: District L: Local

Conclusions

10.155 Considering that the long-term impacts are predicted to be **Neutral** at the identified receptors during the operational phase of the development, it is considered that normal operation of the proposed development will not result in significant effects on the surrounding community.

10.156 The short-term effects of the construction operations will be controlled by the agreement of a 'Prior consent for work on construction sites' under s.61 of the Control of Pollution Act (CoPA) 1974. This will ensure that any noise impacts during this phase are suitably controlled.

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