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15 NOISE

15.1 Introduction

The construction and operation of the proposed Resource Recovery Park (RRP) and its component parts would contain sources of noise that would radiate into the surroundings. This section of the Environmental Statement considers the effect of the CCC application and the DBERR application, both separately and combined, on the prevailing noise climate.

In order to establish the suitability of the proposed development for the site, an assessment has been undertaken of this noise impact upon existing residential areas nearby. This assessment identifies, establishes and quantifies the highest likely noise emissions associated with the construction of the complex and its operation.

The assessment is based upon the results of baseline noise monitoring at the site and predictive calculations of the noise impact. Noise mapping software has been used to illustrate changes to the noise climate.

Reference is made to planning guidelines issued by the Local Authority as well as to International and British Standards and Codes of Practice, as and when they may assist with the assessment.

15.2 Relevant Standards and Guidance

In determining an appropriate assessment methodology for noise impact assessments, a procedure is used which is due to be formalised in the forthcoming British Standard – BS 9142 "Guidelines for Environmental Noise Management", which involves a case specific differential assessment based on best practice selection of available comparative and absolute metrics.

The following standards and guidance documents can be referred to in order to assess the significance of noise impacts, depending upon the nature of the noise source.

15.2.1 PPG 24

Planning Policy Guidance PPG 24:1994 Planning & Noise provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. In the case of noise from industrial or commercial developments, it cites BS 4142:1997: '*Method for rating industrial noise affecting mixed residential and industrial areas*' as the recommended standard for guidance.

PPG 24 states, in its explanation of the decibel (dB) on page 7, that *"a change of 3 dB(A) is the minimum perceptible under normal conditions"*

The document also states in paragraph 10 that *"much of the development which is necessary for the creation of jobs and the construction and improvement of essential infrastructure will generate noise. The planning system should not place unjustifiable obstacles in the way of such development."*

PPG 24 itself should not be used as a means of assessing the noise impact of a new noise source on existing residential dwellings. Its purpose is to determine the suitability of land for residential development with respect to the ambient noise climate.

15.2.2 BS 4142:1997

BS 4142:1997: '*Method for rating industrial noise affecting mixed residential and industrial areas'* describes a method to determine the likelihood of complaints from residents about industrial or fixed plant noise. The basis for this method is a measurement of the difference between noise specifically due to industrial sources and the underlying background noise experienced at the residential premises.

Assessment of noise impact during daytime periods (07:00h-23:00h) covers a full hour, whereas a night-time (23:00h-07:00h) assessment is over a five minute period. This is how BS 4142 takes account of the different nature of noise impact on residential dwellings over the two periods; a considerably shorter period of noise exposure is sufficient to produce an adverse reaction at night.

The BS 4142 Assessment method describes the difference between the measured background noise and the rating level. A difference of around +10 dB or more indicates that complaints are likely. A difference of around + 5 dB is of marginal significance. If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.

BS 4142 also specifies a method of assessing tonal or impulsive noises (such as a whine, screech hiss or hum) or distinct impulsive noises (such as bangs, clicks, clatters or thumps). A +5dB correction is to be added to the specific noise source if it is considered to be tonal, impulsive, or considered irregular enough to attract attention.

In the scope of BS4142, it is stated that *"For the purposes of this standard, background noise levels below about 30 dB and rating levels below about 35 dB are considered to be very low"*[1]

15.2.3 World Health Organisation: Guidelines for Community Noise

The WHO published *"Environmental Health Criteria 12: NOISE"* in 1980, identifying community noise targets based on the onset of annoyance and health effects. The document provides absolute noise target levels which are useful in noise impact assessments and have formed the basis of other guidance and standards.

For noise in the community at night, an external noise level target of 45dB(A) L_{eq} is cited, which corresponds to the definition of category 'A' in PPG24 and a *'good'* standard of internal noise environment as recommended in BS 8233:1999 *'Sound insulation and noise reduction for buildings-Code of practice'* when assessed with windows open.

For daytime noise levels, the WHO guidance recommends external levels below 55 dB(A) L_{eq} to prevent any significant community annoyance.

It should be noted, however, that these absolute levels represent aspirational targets. The current prevailing background noise conditions in the study area already exceed these levels for much of the time across a wide area, such that comparative assessments are more appropriate. Indeed, more recent WHO related work has attempted to identify thresholds for the onset of adverse reaction to noise and suggests lower still aspirational targets.

The National Noise Incidence Study 2000 has found that over half the population of England and Wales live in dwellings exposed to day-time noise levels above the WHO

[1] BS4142:1997 Page 1 Section 1.

level of 55 dB $L_{Aeq,16hr}$. Equally, two thirds of the population of England and Wales live in dwellings exposed to night-time noise levels above the WHO criterion of 45 dB $L_{Aeq,8hr}$ external to buildings.

Furthermore, in a review of health effects based noise assessment methods undertaken for the 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."

This 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."* [2]

15.2.4 Calculation Of Road Traffic Noise (CRTN) 1998

CRTN guidelines describe the procedures for calculating noise from road traffic. These procedures are primarily intended to enable entitlement under the Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning.

15.2.5 BS 5228

BS 5228, part 1: '*Noise and Vibration Control on Construction and Open Sites*', is an approved code of practice under the Control of Pollution Act 1974. Whilst this standard does not provide detailed guidance for determining whether or not noise from a site would constitute a problem in a particular location, it does reference a number of factors that are likely to affect considerations of the acceptability of site noise.

Although it is generally recognised that, for industrial noise, the likelihood of complaints is related to the difference between the industrial noise and the existing background noise level, this standard recognises that this relationship between response and noise level difference may well be different for construction noise activities and a greater difference may be tolerated when it is known that the operations are of relatively short duration.

15.2.6 Cheshire Planning Noise Guidelines

Cheshire County Council has issued its own Planning Noise Guidelines. Part 1, the only part published, is entitled Mineral Extraction and Waste Disposal, which is broadly applicable to this assessment.

Although the document specifically addresses operations such as mineral extraction, incinerators and waste landfill sites, it does give the following relevant guidelines:

[2] Defra Noise and Nuisance Policy: Health Effect Based Noise Assessment Methods: A review and Feasibility Study: September 1998: Section 5.3 paragraphs 4 to 6.

On site preparation: *"It will usually be necessary to allow a higher noise limit for this work. Normally the maximum noise level produced by these activities shall not exceed 70 dB LAeq,1hour as measured 1m from the site facing façade of noise sensitive properties. This higher level will be permitted for not more than 8 weeks in any period of 12 months…where, in exceptional circumstances, it is proposed to carry out such activities outside the above time limitations it may be appropriate to impose lower maximum permissible noise levels"*

On Incinerators: *"BS4142 will be used to determine the potential operational noise impact of this type of development… for daytime operations a maximum limit of $L_{Aeq,1hr}$ 5dB above the existing measured background level will be considered to be the maximum allowable level as such an increase is accepted as being of marginal significance and unlikely to give rise to complaints. If the noise contains a distinguishable, discrete, continuous note …or there are distinct impulses in the noise… then the allowable limit would be reduced by 5dB.*

During the night time a lower limit will be applied. To protect residents from risk of sleep disturbance and $L_{Aeq, 1hr}$ level 10dB lower than the existing background noise level will normally be required"

15.2.7 Ellesmere Port and Neston Local Plan GEN4

Local policy plan GEN4 (Noise) details the following:

"Development proposals with the potential to produce noise must conform with the following criteria:

i) Where noise-sensitive uses (e.g. housing, hospitals and schools) are present or are allocated in this Local Plan or any other Development Plan, the ambient noise levels experienced at these noise-sensitive sites should not be raised unacceptably

ii) Where noise-sensitive uses are not present or are unlikely to be affected by additional noise, the noise generated by the proposed development should not detrimentally increase the background noise over a wider area.

iii) In rural areas noise generated should not affect the quiet enjoyment of the countryside, and in particular should not cause an unacceptable degree of disturbance.

15.2.8 Determining the Significance of Impacts

In previous revisions of this section of the ES, a table was detailed to aid in categorising the significance of changes in noise levels. The table was compiled in order to cover the overall noise level changes due to industrial, traffic and other noise sources.

In this revised assessment, the contributions from operational noise, traffic noise and other sources have been assessed separately in order for the effects of each source to be assessed and presented in a clear way which may be more familiar to readers and decision makers.

In 2002 a draft consultation paper of the Guidelines on Noise Impact Assessment was released jointly by the Institute of Acoustics (IOA) and the Institute of Environmental Management and Assessment (IEMA). The draft paper provided an example of categorising the significance of the basic noise change as detailed in Table 15.2.8.1 below.

Table 15.2.8.1: IEMA Criteria for Determining Significance of Impact – Example

Noise Change (dB)	Category
0	No Impact
0.1 – 2.9	Slight Impact
3.0 – 4.9	Moderate Impact
5.0 – 9.9	Substantial Impact
10.0 and more	Severe Impact

It is proposed to adopt similar significance criteria in the assessment of operation noise from the proposed development.

It was stated in the paper (paragraph 7.67) that the table is *“merely an example of how the significance of a range of basic noise changes might be categorised… there is no formulaic approach for relating noise change to a verbal description”*

The Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 part 7 details guidance on assessing noise nuisance from traffic noise. The DMRB advises that the impact arising from a change in noise level depends upon whether it occurs as a result of a gradual or sudden change in road traffic flow. Generally, it is found that a sudden change gives rise to a greater impact than a gradual change.

DMRB defines the impact of a sudden change in road traffic noise levels in terms of the percentage of people bothered very much or quite a lot by noise.

From the graphs in DMRB, the following levels of significance have been interpreted. These significance criterion are consistent with those published by IEMA in Table 15.2.8.1 above and will be used throughout this assessment

Table 15.2.8.2: Criteria for Determining Significance of Impact

Increase in Noise level[1]	% People Bothered Very Much or Quite a Lot by noise[2]	Interpreted Significance[3]
< 1 dB	0% - 20%	No Impact
1 – 3 dB	20% - 30%	Slight Impact
3 – 5 dB	30% - 35%	Moderate Impact
5 – 10 dB	35% - 45%	Substantial Impact
10 – 15 dB	45% - 52%	High Impact
> 15 dB	> 52%	Severe Impact

[1] On opening of the scheme
[2]From DMRB Volume 11, Section 3, Part 7, Figure 3
[3]General description of impact significance (indicatively)

15.3 Baseline Conditions

The baseline noise levels against which predicted noise levels can be compared were collected during a recent environmental noise survey validation excercise.

This updated survey is used for comparison with and validation of previous background surveys between 2003 and 2005.

The 2003 survey data formed part of Sound Research Laboratories Report Number C/03/6W/9780/R02/PAR/jlt dated 26/11/2003. This was from a survey undertaken as part of a Quinn Glass noise impact assessment.

In 2004, Alan Saunders Associates undertook an environmental noise survey in the vicinity of Holme Farm as part of an initial canal berth noise impact assessment.

In 2005 Alan Saunders Associates undertook a further expanded survey for the entire 2006 environmental impact submission.

This updated assessment is based on noise data collected during the recent survey undertaken in November 2007, with the supporting background of all the previous survey data.

15.3.1 Environmental Noise Survey

2007 Survey

An environmental noise survey was undertaken at relevant areas around the proposed development site in order to establish the current noise climate.

The survey was undertaken between 14:00h on Thursday 1st and 14.00h on Friday 2nd November 2007. The survey consisted of continuous automated noise monitoring at two fixed locations, supported by synchronised manual measurements at satellite positions around the site. Additional 24-hour noise monitoring data from the 2005 survey at Spring Farm on Helsby marsh has also been included, as this was not repeated during the 2007 survey.

The noise monitoring equipment was programmed to take measurements of the L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} parameters over consecutive 15-minute periods throughout the duration of the survey.

In order to establish the variation in noise across the site locations, sample manual measurements were carried out at satellite locations 1-16 as indicated on the site plan at various times during the survey. The 24-hour monitors were located at positions marked A, B and C (see Figure 15.1 for an indicative map of measurement locations).

The following equipment was used for the surveys:

- Rion Sound Level Meter type NA 28
- 2 no. Norsonic Sound Level Meter type 116
- Rion Sound Level Calibrator type NC74
- Norsonic Sound Level Calibrator type 1251

The equipment was calibrated before and after use. No calibration drift was observed.

Weather conditions during the survey were dry, together with moderate temperatures and light to no wind.

The results of the monitoring surveys are shown as time histories in Figures 15.2 to 15.4. A summary of these results, and also the manual satellite measurements, are detailed in the table below. Refer to Figure 15.l for a site plan detailing measurement locations.

Table 15.3.1.1: Summary of Ambient Noise Levels

Position	Description	Day			Night		
Refer to Fig 15.1	1/11/2007 - 2/11/2007	L_{Aeq} dB(A)	L_{A10} dB(A)	L_{A90} dB(A)	L_{Aeq} dB(A)	L_{A10} dB(A)	L_{A90} dB(A)
A	Holme Farm*	58	52	43*	47	43	40*
B	Station Road, Ince. North of the Kemira road	54	55	45	47	46	43
C	Spring Farm, Helsby Marsh (2005)	66	66	64	62	63	57
1	Duke of Wellington, Ince	46	48	43	41	42	40
2	Barebrick House, Ince.	57	59	44	52	48	40
3	Ince Orchards	51	49	43	47	48	45
4	Orchard Park Road	55	53	45	44	45	43
5	Redwoods Drive, Elton	57	56	51	43	43	40
6	Parklands Drive, Elton	57	57	51	44	46	41
7	Meadow Lane, Elton	53	56	51	50	51	49
8	A5117/Poole Lane Junction	64	65	59	60	58	50
9	Industrial Area Helsby	63	66	58	47	49	45
10	Lower Rake Lane, Helsby	67	68	66	61	63	57
11	Old Chester Road, Helsby	60	64	53	51	53	48
12	Bottom of Bank House Lane, Helsby	64	65	63	53	56	50
13	Bottom of Smithy Lane, Helsby	65	66	64	56	58	53
14	Ince Banks Pos 1	44	46	40	-	-	-
15	Ince Banks Pos 2	48	50	40	-	-	-
16	Ince Banks Pos 3	48	51	40	-	-	-

*N.B. Previous noise surveys at Holme Farm have indicated noise levels approximately 10dB higher during both day and night. This illustrates the variability of the noise climate at Holme Farm over days/weeks/months due to local activity levels and nearby industry/agriculture. The lowest (most recent) measured background levels have been used in this robust assessment.

Ambient noise levels at Helsby, to the south of the proposed site, are dominated by road noise from the M56 and other local roads, industrial noise from the Kemira plant and agricultural activities in the local area.

Ambient noise levels in Ince Village, to the west of the proposed site, are dominated by local traffic, with contributions from the Stanlow Shell oil refinery to the west, road traffic noise from the M56 and industrial noise from the Kemira and Quinn Glass plant.

Ambient noise levels in Elton Village, to the south-west of the proposed site, are dominated by local traffic including the local trains, industrial noise from the Kemira plant, the Stanlow Shell oil refinery to the west and road traffic noise from the M56.

15.3.2 Existing Ambient Noise Climate

The populations considered in the noise mapping and assessment of the potential noise emissions are those in Ince, Elton, Helsby and Holme Farm.

The most dominant noise source in the area is the M56 motorway between Junctions 12 and 14. The motorway is raised up above the surrounding ground level of the marshes and runs just to the north of Helsby. There is little in the way of noise mitigation on this stretch of the motorway, such as barrier fencing or embankments, which leads to the noise from the motorway propagating quite freely over Ince Marshes and the local populations.

The noise from the motorway affects the Helsby population the most. The town is on a hillside and overlooks the motorway. Rocky cliffs that lie behind the town reflect incident noise from the north to some extent, which adds slightly to the overall sound level. It is understood that the Kemira plant can, according to Helsby residents, be heard during venting events, which are sparse and transient in nature. Noise from the Kemira plant could not be subjectively perceived over the M56 noise during any of the survey visits.

The village of Ince is the furthest from the motorway, and the dominant background noise is due to the Stanlow oil refinery, local traffic and HGV traffic noise from the Kemira road which serves the Kemira plant.

The Quinn Glass factory adjacent to Ince and Elton has recently become operational. The operational noise is therefore included in the background noise measurements. Operational noise from Quinn Glass was subjectively considered to not be significantly audible during the survey and was not a prominent source in the ambient noise climate.

The noise climate at Holme Farm is largely dominated from local farm activity, such as livestock, farm equipment and vehicle movements. The underlying background levels are determined by the Stanlow oil refinery, Kemira plant, M56 and by activity levels on the farm itself.

15.3.3 Illustration of Ambient Noise Climate

The existing noise climate was previously mapped as an illustrative exercise, so that a noise contour plot of the potential noise emission levels could be generally compared to and considered in the context of the existing climate.

The map was based on prominent sources such as the M56 and approximations of noise from the Kemira and Stanlow Plants. It is not feasible to produce an exact ambient noise map with an accurate description of every local noise source to directly compare the predicted levels from the development, due to the complexity and time variance of such sources.

The ambient noise map has not been included in this updated assessment as it implies a degree of precision which cannot be provided and can be misleading if interpreted literally. Reliance is made on direct comparisons with the measured baseline noise levels at specific locations.

15.4 Calculation of Predicted Noise Levels

15.4.1 Construction Noise Calculation

15.4.1.1 Construction Noise

Information has been provided detailing the activities and the phasing during the construction of the site. Assumptions have been made of the necessary equipment which would typically be used during each phase and, based on the guidance contained within BS 5228 (and the latest update to the noise database published by DEFRA), the likely predicted noise impact has been assessed.

The following equipment has been assumed for the various construction stages.

Table 15.4.1.1: Assumed Construction Equipment

Activity	Equipment (assumed %on-time.)	Indicative Duration
1. Creation of ecological mitigation areas	Dozersx2 (50%); Tracked excavator x2 (50%); Wheeled backhoe loader (50%)	3-4 Months
2. Removal of existing services	Breaker on backhoe x2 (10%); Pulverizer on excavator x2 (50%); Tracked crusher (50%); Dozer (50%)	Phased over 60 months
3. Topsoil stripping and groundworks	Dozers x 2 (50%); Tracked excavator x2 (50%), Wheeled backhoe loader x2 (50%)	Phased over 60 months
4. Site infrastructure (Roads etc)	Tracked excavator x2 (50%); Dozer x2 (50%); Articulated dump truck (50%);; Road roller (50%);	Phased over 60 months
5. Building construction	Hydraulic hammer rig (concrete piling) (100%); Articulated dump truck (50%); Concrete mixer truck (50%); Concrete pump (50%); Wheeled loader (50%)	Phased over 60 months
6. Canal Berth Construction	Piling (50%); Concrete mixer truck (50%); Concrete pump(50%)	12-14 months

DEFRA published, in 2004, an up-to-date database of noise emissions from equipment used on construction and open sites. The highest noise level for a piling activity detailed in the database is for pre-cast concrete piling with a hydraulic hammer (89dB$L_{Aeq, cycle}$ at 10 metres).

Where appropriate, or where a range of values exists in the up-to-date database, approximate median values have been taken for equipment. For piling activity, the worst case value (pre-cast concrete piling with a hydraulic hammer) has been assumed for building construction.

15.4.1.2 Construction Noise Emissions

The worst case piling events are considered to be those that would be nearest the residential receivers, i.e. the canal berth and buildings near to the western site boundary and the WEEE Facility buildings.

Initial works during the creation of the ecological mitigation areas would be the closest works to Holme Farm. Noise levels from this activity are likely to be around 57dB(A), although this would be only for a relatively short period of three to four months.

The closest possible piling to Holme Farm is some 550m distant. At this point, the worst case piling noise is likely to be around 55dB(A) (see Table 15.4.1.2). Most piling activity would be around 10-15dB below these levels, accounting for different piling techniques and increased distances from the nearest receivers.

The typical highest construction noise levels are detailed below, for each phase of the entire site development (based on the preliminary phasing strategies), given the typical distance from the receivers associated with each phase.

Table 15.4.1.2: Highest Predicted Construction Noise levels at Residences

Activity (references from Table 15.4.1.1)		Holme Farm	Ince/ Elton village
Ecological Mitigation Area works (1)		57dB	42dB
Worst Case Construction (piling), $L_{Aeq,cycle}$		55dB	54dB
Typical Construction (including piling) L_{Aeq} Based on preliminary phasing strategies	Phase 1 (2,3,4,5,6)	56dB	51dB
	Phase 2 (2,3,4,5)	50dB	52dB
	Phase 3 (2,3,5)	51dB	49dB
	Phase 4 (2,3,5)	55dB	55dB
	Phase 5 (2,3,5)	57dB	55dB
Typical Daytime Ambient L_{Aeq}		**58dB**	**55dB**

In the absence of piling, typical construction noise levels are expected to be lower than the prevailing ambient noise climate.

Worst case piling activities are closer to the existing noise climate but it should be noted that these worst case situations would apply only for limited time periods whilst site works are active at these closest points.

15.4.1.3 Construction Traffic

The traffic assessment has detailed predicted construction traffic levels during five phases of the development. Some parts of the CCC and DBERR applications would become operational whilst construction continues on other areas, therefore the predicted combined construction and operational traffic flows have been estimated for each phase of development.

From the data supplied from the Traffic Assessment, the 18-hour daily flows have been calculated along the same roads considered in the Traffic Noise Assessment (Section 15.4.3).

There is no predicted night-time construction traffic, therefore a night-time construction traffic noise assessment has not been considered.

The worst case scenario (where the combination of construction traffic and operational traffic is at the estimated highest) is between year 2015 and 2017 during Phase 5. The following table details the 18-hour daytime traffic flows, plus the percentage heavy goods vehicles for each critical road.

Table 15.4.1.3.1: Worst Case Construction Traffic Flow

Road		2015-2017 (Phase 5)		
		Base (2017)	Construction	Base + Construction + Operational
Kemira Road	Total Vehs	1501	544	5157
	%HGV	28%	26%	24%
Pool Lane (South of Kemira Road Rbt)	Total Vehs	2961	544	6542
	%HGV	23%	26%	23%
Pool Lane (North of A5117 junction)	Total Vehs	8122	544	11704
	%HGV	14%	26%	16%
F.A5117 (East of Poole Lane junction)	Total Vehs	16481	381	18323
	%HGV	9%	26%	11%
H. A5117 (West of Poole Lane junction)	Total Vehs	19121	163	20539
	%HGV	6%	26%	7%

The methodology for calculating construction traffic noise impact follows the method detailed in Section 15.4.3.

The predicted road traffic noise levels due to the worst case phasing scenario with combined construction and operational traffic are detailed in the table below.

Table 15.4.1.3.2: Worst Case Construction Traffic Noise Levels

Position	Description	Traffic Noise Level $L_{A10,18hr}$ dB(A)	
		Base (2017)	2017 Construction + Operational
B	Station Road, Ince. North of Kemira road	54.1	57.3
2	Barebrick House, Ince.	51.2	53.2
7	Meadow Lane, Elton	51.7	53.5
8	A5117/Poole Lane Junction	68.8	69.5

15.4.1.4 Construction Vibration

Vibration impact is commonly assessed against sensitivity and damage criteria to residential houses. Typically, peak particle velocities (p.p.v.) of 15 - 20 mm/s are necessary to cause any damage in residential buildings.

The processes generating the highest levels of ground-borne vibration are predicted to be compacting and/or piling works. This work would be concentrated to the areas of the site to be occupied by the buildings and canal berth.

BS5228 part 4 provides data on a range of piling activities and the associated measured vibration levels. This data has been used to calculate some of the highest likely vibration levels at the nearest residential property due to piling at the nearest possible pile (approximately 550m). A simple cylindrical decay of vibration waves has been assumed in the calculations to apply a worst case propagation scenario.

The highest predicted levels would be around 0.4mm/s p.p.v during the nearest piling events. This would equate to an r.m.s. acceleration of 0.014m/s² *(ref Table 8 BS6472:1992)*

BS6472:1992 '*Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)*' states that these levels of vibration would correspond to a low probability of adverse comment. *(ref Table 6 BS6472:1992)*

The geometric attenuation of vibration to other receptors at greater distances (i.e. Ince, Elton, and Helsby and the majority of Ince Banks) is large enough such that perception of vibration due to piling operations would be unlikely.

15.4.2 Operational Noise Calculation

This section of the assessment considers sources associated with the operation of the proposed developments, excluding construction and external traffic flows. Traffic movements on internal service roads, however, have been included in the assessment as part of the "operational" noise emissions.

At this early design stage, exact plant selection and internal process design has not yet been finalised. In order to evaluate the likely noise levels from the development, data has been obtained of the loudest processes that would likely to be used in each plot.

The following robust calculations and assessment utilise supplied and availiable equipment noise levels to estimate the highest likely noise levels due to all elements of the development running constantly and concurrently.

15.4.2.1 Operational Noise Data

The likely noise levels from the proposed developments have been calculated using the available knowledge of processes associated with each proposed section and the typical associated noise levels. In order to aid the cumulative propagation calculations from each section, a computational noise modelling suite, Cadna/A, has been utilised, which has been verified in-house and against selected hand calculations on this project.

The input data was based the processes occurring within each element of the development, whether they are located indoors or outdoors and typical noise level data for each particular process.

The overall sound power levels of individual processes were supplied. Calculations were made to estimate the total sound pressure level inside each section building, for internal processes. This data was then used to calculate the resultant sound power level radiated by each of the buildings. The calculations have been undertaken such that they would always over-estimate the noise emissions from each building. In addition, the buildings have been assumed to be constructed out of lightweight metal cladding, with no additional acoustic treatment. In reality the buildings are likely to be more robust in construction and design and thus the actual noise emissions are likely to be much lower.

Data was obtained for the main elements of the RRP for use in the model, most of which was supplied as an overall dB(A) value. Some of the process frequency spectra have been estimated using generalised spectral distributions for standard industrial processes. Some specific process frequency spectra – for example timber shredding and rock crushing – have been applied from field measurements of this type of process elsewhere.

The elements of the development modelled were the RDF Facility and associated MRF and MBT plants, Bioethanol Plant, Timber Plant, WEEE Facility, Block Making Facility, Plastics Facility, Cargo Berth and the Soil Treatment Plant.

Noisy procedures, such as wood chipping, crushing and shredding, would be located inside the respective buildings and not in the open environment.

15.4.2.2 Soil Treatment Plant

It is understood that the following main plant items would be associated with the soil treatment plant. Overall sound power data has been supplied for each process and frequency spectra have been applied, typical of the nature of the process.

Table 15.4.2.2.1: Soil Treatment Processes and Sound Power Levels

Soil Treatment	32	63	125	250	500	1000	2000	4000	8000	dBA
Crushers	104.8	112.0	121.8	104.5	102.4	102.1	98.3	94.7	90.9	109
Screeners	99.5	105.0	108.0	107.0	105.0	103.0	102.0	100.0	95.2	109
Bioremediation	98.5	104.0	107.0	106.0	104.0	102.0	101.0	99.0	94.2	108
Sand washing plant	99.0	99.0	100.0	100.0	100.0	100.0	99.0	98.0	98.0	106

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

The resultant calculated worst case sound power level of the building external facades is as follows:

Table 15.4.2.2.2: Soil Treatment Building Sound Power Level

	32	63	125	250	500	1000	2000	4000	8000	dBA
Soil Treatment	111.8	113.0	116.6	98.6	92.7	86.1	80.5	82.3	64.1	102

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

In addition to the building noise, two wheeled-loading shovels have been modelled as operating constantly outside the soils facility.

The sound power level supplied for a wheeled loading shovel (CAT980) is 108dB(A). The following generic spectrum has been applied

Table 15.4.2.2.3: Wheeled Loading Shovel Sound Power Level

	32	63	125	250	500	1000	2000	4000	8000	dBA
Wheeled Loading Shovel	99	100	101	102	103	103	101	99	98	108

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

15.4.2.3 Block Making Facility

The processes and associated sound power levels inside the block making facility are as follows. The overall sound power levels were supplied and the frequency spectra estimated.

Table 15.4.2.3.1: Block Making Processes and Sound Power Levels

Block Making	32	63	125	250	500	1000	2000	4000	8000	dBA
Feed Conveyor	80.0	85.0	86.0	87.0	88.0	89.0	89.0	87.0	86.0	95
Wheeled Loading Shovel	99.0	100.0	101.0	102.0	103.0	103.0	101.0	99.0	98.0	108
Feed to hoppers	80.0	85.0	86.0	86.0	87.0	86.0	85.0	84.0	83.0	92
Diesel Forklift truck	98.0	99.0	100.0	98.0	96.0	94.0	92.0	91.0	90.0	100
Conveyor transfer point	93.0	94.0	95.0	93.0	91.0	89.0	87.0	86.0	85.0	95
Delivery Road Tanker	99.0	100.0	101.0	102.0	103.0	103.0	101.0	99.0	98.0	108
Bucket Elevator	97.0	98.0	99.0	97.0	95.0	93.0	91.0	90.0	89.0	99
Mixers in tower	100.0	101.0	102.0	100.0	98.0	96.0	94.0	93.0	92.0	102
Block Making machine in enclosure	79.0	84.0	85.0	86.0	87.0	88.0	88.0	86.0	85.0	94
Palleter	89.0	94.0	95.0	95.0	96.0	95.0	94.0	93.0	92.0	101
Depalleter	89.0	94.0	95.0	95.0	96.0	95.0	94.0	93.0	92.0	101
2 Cubers	86.0	91.0	92.0	92.0	93.0	92.0	91.0	90.0	89.0	98
2 Strappers	83.0	88.0	89.0	89.0	90.0	89.0	88.0	87.0	86.0	95
1 Stacking Machine	80.0	85.0	86.0	86.0	87.0	86.0	85.0	84.0	83.0	92
Forklift	98.0	99.0	100.0	98.0	96.0	94.0	92.0	91.0	90.0	100

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

The resultant calculated worst case sound power level of the building external facades is as follows:

Table 15.4.2.3.2: Block Making Building Sound Power Level

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
Block Making	119.0	115.4	111.4	103.8	99.8	92.6	86.8	88.0	71.1	102

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

In addition to the building noise, an idling delivery road tanker, a forklift and a wheeled loading shovel have been modelled adjacent to the building. The source level data is as follows. These have been assumed to be running constantly throughout the day, furthering a worst case scenario.

Table 15.4.2.3.3: Block Making Vehicular Sound Power Levels

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
Wheeled Loading Shovel	99.0	100.0	101.0	102.0	103.0	103.0	101.0	99.0	98.0	108
Delivery Tanker	99.0	100.0	101.0	102.0	103.0	103.0	101.0	99.0	98.0	108
Forklift Truck	98.0	99.0	100.0	98.0	96.0	94.0	92.0	91.0	90.0	100

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

15.4.2.4 Timber Facility

The processes and associated sound power levels inside the timber facility are as follows. The overall sound power levels were supplied and the frequency spectra estimated from measurements on similar items of plant.

Table 15.4.2.4.1: Timber Facility Processes and Sound Power Levels

Timber Facility	32	63	125	250	500	1000	2000	4000	8000	dBA
Wood Chipper	99.5	99.5	108.0	104.8	110.1	109.4	103.8	95.2	95.2	113
Wood shredder	107.5	107.5	116.0	112.8	118.1	117.4	111.8	103.2	103.2	121
Gast Regenerative Plower	86.0	87.0	87.0	87.0	88.0	89.0	90.0	89.0	88.0	96
Bagging machine	82.0	83.0	83.0	83.0	84.0	85.0	86.0	85.0	84.0	92
Sand washing plant	99.0	99.0	100.0	100.0	100.0	100.0	99.0	98.0	98.0	106
Band Magnet	83.0	83.0	84.0	84.0	84.0	84.0	83.0	82.0	82.0	90
Screener	86.9	86.9	95.4	92.2	97.5	96.8	91.2	82.6	82.6	100

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

The resultant calculated worst case sound power level of the building external facades is as follows:

Table 15.4.2.4.2: Timber Facility Building Sound Power Level

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
Timber Facility	113.4	108.5	111.5	101.4	102.6	96.6	87.2	83.3	68.1	103

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

In addition to the building noise, an external forklift truck was modelled (as previous) outside the building. This has been assumed to be running constantly throughout the day, furthering a worst case scenario.

15.4.2.5 Plastics Facility

The processes and associated sound power levels inside the plastics facility are as follows. The overall sound power levels were supplied and the frequency spectra estimated from measurements on similar items of plant.

All processes were assumed to be present in all three of the plastics village buildings, to present a worst case scenario.

Table 15.4.2.5.1: Plastics Facility Processes and Sound Power Levels

Plastics Facility	32	63	125	250	500	1000	2000	4000	8000	dBA
Plastic Shredder	91.9	91.9	100.4	97.2	102.5	101.8	96.2	87.6	87.6	105
Bagging machine	82.0	82.0	82.0	83.0	85.0	86.0	85.0	85.0	84.0	92
Mechanical Chipper	110.0	110.0	110.0	111.0	113.0	114.0	113.0	113.0	112.0	120
Sand Washing Plant	102.0	102.0	101.0	100.0	100.0	99.0	99.0	99.0	99.0	106
Gast Regenerative Plower	86.0	87.0	87.0	87.0	88.0	89.0	90.0	89.0	88.0	96

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

The resultant calculated worst case sound power level of the building external facades is as follows:

Table 15.4.2.5.2: Plastics Facility Building Sound Power Level

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
Plastics Facility	117.0	112.0	107.2	100.8	98.9	94.6	89.5	93.2	77.2	101.4

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

In addition to the building noise, an external forklift truck was modelled (as previous) outside the building. This has been assumed to be running constantly throughout the day, furthering a worst case scenario.

15.4.2.6 WEEE Facility

The processes and associated sound power levels inside the WEEE facility are as follows. The overall sound power levels were supplied and the frequency spectra estimated from measurements on similar items of plant.

Table 15.4.2.6.1: WEEE Facility Processes and Sound Power Levels

WEEE Facility	32	63	125	250	500	1000	2000	4000	8000	dBA
Air eddy separators	92.0	95.0	96.0	95.0	95.0	92.0	91.0	90.0	90.0	99
Conveyor Belts	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	95
Metal Shredders	95.9	95.9	104.4	101.2	106.5	105.8	100.2	91.6	91.6	109
Plastic Shredders	91.9	91.9	100.4	97.2	102.5	101.8	96.2	87.6	87.6	105
Band Magnet	83.0	83.0	84.0	84.0	84.0	84.0	83.0	82.0	82.0	90
Gast Regenerative Plower	86.0	87.0	87.0	87.0	88.0	89.0	90.0	89.0	88.0	96
Fragmentiser	107.5	107.5	116.0	112.8	118.1	117.4	111.8	103.2	103.2	121

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

The resultant calculated worst case sound power level of the building external facades is as follows:

Table 15.4.2.6.2: WEEE Facility Building Sound Power Level

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
WEEE Facility	113.5	108.6	111.8	101.7	103.0	96.9	87.4	82.9	67.6	103.3

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

In addition to the building noise, an external forklift truck was modelled (as previous) outside the building. This has been assumed to be running constantly throughout the day, furthering a worst case scenario.

15.4.2.7 MRF & MBT Facility

A worst case has been assumed that two shredders and other plant would be operating in each of the buildings. The assumed sound power levels are as follows.

Table 15.4.2.7.1: MRF & MBT Facility Processes and Sound Power Levels

MRF&MBT Facility	32	63	125	250	500	1000	2000	4000	8000	dBA
Fans	78.0	79.0	80.0	81.0	81.0	81.0	81.0	81.0	81.0	88
Conveyor Belts	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	95
Shredders	100.5	100.5	99.5	98.5	98.5	97.5	97.5	97.5	97.5	105
Shredders	100.5	100.5	99.5	98.5	98.5	97.5	97.5	97.5	97.5	105

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

Table 15.4.2.7.2: MRF & MBT Facility Building and Sound Power Levels

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
MRF&MBT Facility	107.6	102.6	96.7	88.7	84.7	78.6	74.6	78.5	63.3	88

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

In addition to the building noise, an external forklift truck was modelled (as previous) outside the building. This has been assumed to be running constantly throughout the day, furthering a worst case scenario.

15.4.2.8 Bulk Cargo Facility

The following data was recorded at Berth 36, Port of Tilbury quayside while packs of bulk cargo were being unloaded from a large ship by three cranes.

It should be noted that the noise data was, by necessity, recorded with the ships engines running.

Table 15.4.2.8.1: Measured Bulk Cargo Discharge Noise Levels

Sound Pressure Level	$L_{Aeq(2min)}$	L_{Amax}
Bulk cargo discharge cycle (2 tonnes per pack)	74dB @ 30m	88dB @ 30m

These measurements have been used to derive a point source power level for loading/offloading operations (with ship engines running) for incorporation into the complete model. The measurement derived power level is as follows.

Table 15.4.2.8.2: Bulk Cargo Loading/Unloading Sound Power Level

Sound Power Level	32	63	125	250	500	1000	2000	4000	8000	dBA
Bulk Cargo Offload	120.0	120.0	114.0	110.0	109.0	110.0	104.0	100.0	89.0	113

SWL re 10^{-12} W vs. Octave Band Centre Frequency Hz

The source has been assumed to be running continuously throughout the day - to account for increased cargo activity and further a worst case scenario. In addition to the above, four forklift trucks have been assumed to be operating around the cargo berth area and rail freight unloading area.

15.4.2.9 Ethanol Plant

Specific plant noise data was unavailable for the ethanol plant. The only particularly noisy plant items would be conveyor belts and some small pumps and compressors. All these items would be located inside the buildings.

A worst case sound pressure level of 65dB(A) at 1m from the facades of the buildings has been assumed with a frequency spectrum as follows.

Table 15.4.2.9.1: Ethanol Plant Building Sound Pressure Levels

Sound Pressure Level @ 1m from facade	32	63	125	250	500	1000	2000	4000	8000	dBA
Ethanol Plant	55.0	56.0	59.0	60.0	61.0	59.0	58.0	56.0	55.0	65

SPL re2x 10^{-5} Pa vs. Octave Band Centre Frequency Hz

15.4.2.10 RDF Facility

Noise source data for the RDF plant has been sourced primarily from a previous noise assessment for a similar energy from waste (EfW) plant extension at Eastcroft Power Station (report reference R05.1250/1/DRK dated 31st May 2007).

The buildings and items of plant which have significant source noise levels have been used in this assessment. The main building, cooling tower and ID fan sound pressure levels at 1m are as follows. Frequency spectra have been estimated.

Table 15.4.2.9.1: RDF Facility Source Pressure Levels

RDF Sound Pressure @ 1m	32	63	125	250	500	1000	2000	4000	8000	dBA
Boiler House	55.0	58.0	60.0	60.0	61.0	62.0	55.0	50.0	45.0	65
Turbine Hall	58.0	61.0	63.0	63.0	64.0	65.0	66.0	67.0	68.0	73
FGT plant	53.0	54.0	58.0	63.0	64.0	68.0	70.0	68.0	68.0	75
Compressor Room	58.0	61.0	63.0	63.0	64.0	65.0	58.0	53.0	48.0	68
ID Fans	90.0	89.0	88.0	84.0	83.0	83.0	84.0	79.0	75.0	89
Evaporative Cooling Tower	85.0	84.0	83.0	82.0	80.0	80.0	80.0	81.0	80.0	87

SPL re2x 10^{-5} Pa vs. Octave Band Centre Frequency Hz

The Eastcroft assessment report describes this source data as either noise measurements recorded at a similar facility or empirical data from other industrial sites.

The report also details noise levels due to the predicted operation of the facility and measured safety valve tests at different receptors of varying distances from the site. These are summarised as follows.

Table 15.4.2.9.2: Eastcroft Expansion Noise Levels (far field)

Receptor Distance (m)	Predicted Operational Noise L_{Aeq} dB	Saftey Valve Tests L_{Aeq} dB
500	31	64
350	33	59
300	33	-
250	39	63
270	37	-
380	35	-
215	39	-
650	30	-
920	27	-

15.4.2.11 Resource Recovery Village

The precise operating nature of the Resource Recovery Village units is not known at the present time. A worst case assumption of a sound pressure level of 60dB(A) at 1m from the façade of the buildings has been assumed, considering typical light industrial business work in the units. Numerous common external sources, such as lorries idling and unloading, reversing lorry alarms and forklift trucks were assumed to be distributed across the site.

15.4.2.12 Time of Operation

The only processes to be operating during night-time would be the RDF Facility, the Bioethanol Plant, the Cargo Berth and the Rail Sidings.

15.4.2.13 Topographical Information

Detailed topographical data was used to validate the more basic relief data on which the model was constructed. Significant deviations from the marshland plain were Helsby Hill, Ince and the Kemira road cutting for the road traffic noise calculations.

15.4.3 Road Traffic Noise Calculation

15.4.3.1 Road Traffic Source Data

The 18hr daytime traffic levels for the roads utilised by the proposed developments have been derived from the figures supplied in the transport assessment.

The data used in the assessment are those which show an increase in traffic flow of >25% in any future scenario. This is in line with guidance in the DMRB, and eliminates roads subject to a <1dB increase in road noise level from the assessment.

Table 15.4.3.1: Daytime AAWT Traffic Levels – Base + DBERR Application

Road	2007 Veh / 18hr (%HGV)	2022 Veh / 18hr (%HGV)	2022 + DBERR Veh / 18hr (%HGV)	% Increase
Kemira Road	1362 (28%)	1562 (28%)	1770 (31%)	13%
Pool Lane (South of Kemira Road roundabout)	5025 (29%)	3079 (23%)	3285 (25%)	7%
Poole Lane (North of Cryers Lane junction)	8408 (22%)	8447 (14%)	8653 (15%)	2%
A5117 (West of Poole Lane)	13140 (4%)	19886 (6%)	19961 (6%)	0%
A5117 (East of Poole Lane)	14735 (10%)	17140 (9%)	17258 (9%)	1%

Table 15.4.3.2: Daytime AAWT Traffic Levels – Base + CCC Application

Road	2007 Veh / 18hr (%HGV)	2022 Veh / 18hr (%HGV)	2022 + CCC Veh / 18hr (%HGV)	% Increase
Kemira Road	1362 (28%)	1562 (28%)	5481 (21%)	251%
Pool Lane (South of Kemira Road roundabout)	5025 (29%)	3079 (23%)	6901 (21%)	124%
Poole Lane (North of Cryers Lane junction)	8408 (22%)	8447 (14%)	12269 (15%)	45%
A5117 (West of Poole Lane)	13140 (4%)	19886 (6%)	21483 (7%)	8%
A5117 (East of Poole Lane)	14735 (10%)	17140 (9%)	18943 (11%)	11%

Table 15.4.3.3: Daytime AAWT Traffic Levels – Base + Entire Site

Road	2007 Veh / 18hr (%HGV)	2022 Veh / 18hr (%HGV)	2022 + Entire Site / 18hr (%HGV)	% Increase
Kemira Road	1362 (28%)	1562 (28%)	5689 (22%)	264%
Pool Lane (South of Kemira Road roundabout)	5025 (29%)	3079 (23%)	7107 (22%)	131%
Poole Lane (North of Cryers Lane junction)	8408 (22%)	8447 (14%)	12475 (16%)	48%
A5117 (West of Poole Lane)	13140 (4%)	19886 (6%)	21559 (7%)	8%
A5117 (East of Poole Lane)	14735 (10%)	17140 (9%)	19060 (11%)	11%

In additional to the above, to address concerns raised over night-time road traffic noise levels, the following figures have also been used in a night time traffic noise assessment.

Table 15.4.3.4: Night-time AAWT Traffic Levels – Base + DBERR Application

Road	2007 Veh / 6hr (%HGV)	2022 Veh / 6hr (%HGV)	2022 + DBERR Veh / 6hr (%HGV)	% Increase
Kemira Road	52 (15%)	59 (15%)	115 (61%)	51%
Pool Lane (South of Kemira Road roundabout)	245 (76%)	150 (61%)	188 (56%)	25%
Poole Lane (North of Cryers Lane junction)	410 (58%)	411 (36%)	449 (36%)	9%
A5117 (West of Poole Lane)	405 (11%)	613 (15%)	627 (15%)	2%
A5117 (East of Poole Lane)	454 (25%)	528 (22%)	548 (23%)	4%

Table 15.4.3.5: Night-time AAWT Traffic Levels – Base + CCC Application

Road	2007 Veh / 6hr (%HGV)	2022 Veh / 6hr (%HGV)	2022 + CCC Veh / 6hr (%HGV)	% Increase
Kemira Road	52 (15%)	59 (15%)	286 (52%)	276%
Pool Lane (South of Kemira Road roundabout)	245 (76%)	150 (61%)	357 (51%)	138%
Poole Lane (North of Cryers Lane junction)	410 (58%)	411 (36%)	618 (39%)	50%
A5117 (West of Poole Lane)	405 (11%)	613 (15%)	691 (17%)	13%
A5117 (East of Poole Lane)	454 (25%)	528 (22%)	641(28%)	21%

Table 15.4.3.6: Night-time AAWT Traffic Levels – Base + Entire Site

Road	2007 Veh / 6hr (%HGV)	2022 Veh / 6hr (%HGV)	2022 + Entire Site Veh / 6hr (%HGV)	% Increase
Kemira Road	52 (15%)	59 (15%)	325 (50%)	327%
Pool Lane (South of Kemira Road roundabout)	245 (76%)	150 (61%)	394 (50%)	163%
Poole Lane (North of Cryers Lane junction)	410 (58%)	411 (36%)	656 (39%)	59%
A5117 (West of Poole Lane)	405 (11%)	613 (15%)	706 (18%)	15%
A5117 (East of Poole Lane)	454 (25%)	528 (22%)	661 (29%)	25%

15.4.3.2 Road Traffic Noise Calculations

With the aid of road noise mapping software, the following road noise levels at the relevant receivers have been calculated using CRTN calculation methodologies.

Although no specific methodology for calculating night time noise levels is detailed in CRTN, the 6-hour average night time $L_{A10,6hr}$ noise level have been calculated using the same assumptions in order to evaluate the potential night time noise impact from increases in traffic flows.

Assumed traffic noise levels for Station Road have also been used in the base and development calculations. These have been verified against noise survey measurement data on Station Road.

Table 15.4.3.7: Daytime Traffic Noise Levels

Position	Description	Predicted Traffic Noise Level $L_{A10,18hr}$ dB(A)				
		2007 Base	2022 Base	2022+DBERR	2022+CCC	2022+Entire Site
B	Station Road, Ince. North of Kemira road	55.0	54.9	55.3	57.7	58.0
2	Barebrick House, Ince.	51.3	51.4	51.6	53.3	53.4
7	Meadow Lane, Elton	52.6	51.9	52.1	53.5	53.7
8	A5117/Poole Lane Junction	68.3	68.9	69.0	69.7	69.7

Table 15.4.3.8: Night-time Traffic Noise Levels

Position	Description	Predicted Traffic Noise Level $L_{A10,6hr}$ dB(A)				
		2007 Base	2022 Base	2022+DBERR	2022+CCC	2022+Entire Site
B	Station Road, Ince. North of Kemira road	48.3	48.2	48.9	51.8	52.1
2	Barebrick House, Ince.	43.7	43.7	44.2	46.6	46.9
7	Meadow Lane, Elton	46.5	45.1	45.5	47.3	47.6
8	A5117/Poole Lane Junction	60	60.3	60.6	61.7	62

15.4.4 Shipping Traffic Noise Calculation

The number of commercial vessel movements passing through the Ince section of the Manchester Ship Canal from January to December 2007 was approximately 607 in total or a 1,214 two-way flow .(excluding smaller craft such as tugs and pleasure vessels but including barges). This would equate to approximately 3 commercial ships per day. The speed limit for vessels on the canal is a restriction to 6kts.

During the 2007 survey, noise measurements were taken in the near-field of Tug and Cargo Ships at cruising speed on the canal. The A-weighted data obtained is as follows (corrected to 15m).

Table 15.4.4.1: Measured Shipping Noise

$L_{eq, pass}$ dB(A)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
Ship pass at 15m	23.0	49.0	50.0	51.0	54.0	53.0	51.0	48.0	42.0	60
Tug pass at 15m	23.0	44.0	54.0	55.0	54.0	56.0	52.0	46.0	32.0	62

Holme Farm is approximately 220m from the nearest approach to the canal. The worst case $L_{Aeq,1hour}$ calculation (assuming no screening or ground attenuation effects) of noise levels from tug and ship passes, which already form part of the existing noise climate, are shown below:

Table 15.4.4.2: Calculated Shipping Noise

At Holme Farm	Predicted $L_{Aeq, 1hour}$	Ambient Day L_{A90} / L_{Aeq}	AmbientNight L_{A90} / L_{Aeq}
Ship pass	29dB	43-56	40-47
Tug pass	31dB		

15.4.5 Rail Traffic Noise Calculation

Based on the anticipated one freight train per day serving the RDF facility and another ten per month serving the rest of the RRP, it is unlikely for there to be more than three trains per day serving the development. There would only ever be one train serving the development at any one time.

It is also understood that the existing rail traffic on the line consists of four two-carriage passenger trains per day. The freight movements, therefore, are considered as a new noise source added to the pre-existing noise climate.

Once the freight trains have left the Ince development and the Kemira sidings, they would travel east past Helsby.

The receivers most susceptible from noise from the rail line are those on the North West side of Helsby. The residences adjacent to the track are typically 20m away from the track.

The average hourly L_{Aeq} level of a passing freight train has been calculated by using guidance in CRN[3], (assuming 10 freightliners pulled by a diesel locomotive travelling at 100km/hr) at 20m from the track assuming no screening losses (worst case).

By comparison, the average hourly L_{Aeq} of a passenger train pass-by has been calculated (assumed to be a two-carriage electric locomotive passenger train, also travelling at 100km/hr).

Table 15.4.5.1: Calculated Rail Noise

20m from rail line	$L_{Aeq,1hour}$	Typical Ambient L_{Aeq} Day / Night	Resultant $L_{Aeq,1hour}$
Freight Train	60.1 dB	65 / 65	66.2
Passenger Train	53.4 dB	65 / 65	65.3

This would indicate that in the two periods per day when a freight train passes Helsby, the typical hourly L_{Aeq} level would be increased by approximately 1.2dB.

In comparison with the existing situation, when a two carriage passenger train passes Helsby, the typical hourly L_{Aeq} increase would be 0.3dB.

[3] *Calculation of Railway Noise 1995*. The Department of Transport

15.5 Assessment of Impacts

The nearest settlements to the proposed site are Ince (approx 900m west from site boundary) and Elton (approx 600m south west from site boundary), with the closest residential property, Holme Farm, some 400m west of the site boundary.

The main noise impact on Holme Farm would be from the cargo berth and the general process and activity on the operational site. The main impact on the villages of Ince and Elton however, would be from the increase in traffic noise along Kemira road and Poole Lane, which would be the main route for vehicles into the site.

15.5.1 Construction Noise Impact Assessment

15.5.1.1 Construction Noise

The worst and typical cases of likely construction noise have been calculated for the kind of activities which might be expected on the development site with an approximate account taken of the location of each phase.

The construction noise levels are predicted to be approximately equal to the prevailing noise level. This would increase the existing noise level by up to around 3dB at Holme Farm, which is considered to be only a slight to moderate impact. At Ince and Elton, the rise in noise level would be below 3dB, which could be considered to be a slight impact.

For construction of a major facility such as this, considerably higher impacts are accepted as a matter of course. High levels of specific mitigation, such as the use of Auger piling, are not deemed necessary.

Due to the period of construction lasting for a number of years, it is probable that parts of the development would be brought on line whilst construction works continue. The operation of the site is, however, predicted to give rise to considerably lower noise levels than its construction. During periods where operation and construction occur simultaneously, the resultant site noise level would be dominated by construction.

15.5.1.2 Construction Vibration

The impact from vibration due to piling, which is likely to be the highest cause of vibration, has been calculated and shown to be below a perceptible level at the nearest sensitive receivers. There would therefore be no impact from construction vibration.

15.5.1.3 Construction Traffic

Construction traffic levels have been calculated based on the worst case phasing prediction in the traffic assessment, which also includes a proportion of operational traffic. The following increase in road traffic noise levels are detailed as follows.

Table 15.5.1.3: Calculated Construction Traffic Noise Impact

Position	Description	Traffic Noise Level $L_{A10,18hr}$ dB(A)	
		Base (2017))	2017 Construction + Operational
B	Station Road, Ince. North of Kemira road	54.1	+3.2
2	Barebrick House, Ince.	51.2	+2.0

7	Meadow Lane, Elton	51.7	+1.8
8	A5117/Poole Lane Junction	68.8	+0.7

The highest predicted rise in road traffic noise levels is 3.2dB at residences on Station Road, north of Kemira Road. Although a 3dB rise in noise levels is usually the minimum perceptible change in noise level, this impact could be described as slight to moderate when compared against the significance criteria in Table 15.2.8.2. Road noise mitigation on Kemira Road would be required in order to reduce this impact.

Traffic noise level changes at residences on Meadow Lane, although defined as a slight impact according to Table 15.2.8.2, would be unlikely to be perceived as a noticeable change in traffic noise levels.

Traffic noise level increase at position 8 would be less than 1dB; this is assessed as having no impact.

15.5.2 Operational Noise Impact Assessment

In terms of absolute noise levels in outdoor living areas, the WHO guidelines advise that, in order to avoid annoyance, daytime noise levels would have to be maintained at 55 dB $L_{Aeq,16h}$ or less. The 16-hour L_{Aeq} is the average level between 07:00h and 23:00h.

The baseline survey data (Table 15.3.1.1) shows that these aspirational levels are already exceeded at most receptor locations. This is the case in the vast majority of urban, suburban and semi-rural locations.

The extent to which these existing noise levels would be further increased by the proposed development provides an indication of the relative severity of the impact rather than a comparison with this notional threshold relating to the onset of noise effects.

15.5.2.1 Operational Noise – DBERR Application

A separate assessment of the DBERR application has been provided to allow this application to be decided on its own merits. A noise contour plot of the predicted operational noise emission levels is shown in Figure 15.5.

The tabulated predicted noise levels below show the noise level contribution produced from the RDF processes alone, with an additional column showing the total noise level due to the whole DBERR application (including internal road activity and operation of the cargo berth). The change in ambient L_{Aeq} noise level is also shown.

Table 15.5.2.1: DBERR Application – Predicted Operational Noise Levels

Position	Description	Existing Ambient				Predicted Day/Night		Change in L_{Aeq} dB Whole DBERR	
		Day		Night		RDF Process Only	Whole DBERR		
		L_{Aeq} dB	L_{A90} dB	L_{Aeq} dB	L_{A90} dB	$L_{Aeq,T}$ dB	$L_{Aeq,T}$ dB	Day	Night
A	Holme Farm	58	43	47	40	33	40	0.1	0.8
B	Station Road, Ince. North of Kemira road	54	45	47	43	31	33	0	0.2
C	Spring Farm, Helsby Marsh	66	64	62	57	28	28	0	0
1	Duke of Wellington, Ince	46	43	41	40	31	34	0.2	0.7
2	Barebrick House, Ince.	57	44	52	40	28	30	0	0
3	Ince Orchards	51	43	47	45	32	32	0.1	0.1
4	Orchard Park Road	55	45	44	43	32	32	0	0.3
5	Redwoods Drive, Elton	57	51	43	40	33	33	0	0.4
6	Parklands Drive, Elton	57	51	44	41	30	31	0	0.2
7	Meadow Lane, Elton	53	51	50	49	28	29	0	0
9	Industrial Area Helsby	63	58	47	45	23	24	0	0
10	Lower Rake Lane, Helsby	67	66	61	57	24	25	0	0
11	Old Chester Road, Helsby	60	53	51	48	24	25	0	0
12	Bottom of Bank House Lane, Helsby	64	63	53	50	23	24	0	0
13	Bottom of Smithy Lane,	65	64	56	53	23	24	0	0

Position	Description	Existing Ambient				Predicted Day/Night		Change in L_{Aeq} dB Whole DBERR	
		Day		Night		RDF Process Only	Whole DBERR		
		L_{Aeq} dB	L_{A90} dB	L_{Aeq} dB	L_{A90} dB	$L_{Aeq,T}$ dB	$L_{Aeq,T}$ dB	Day	Night
	Helsby								
[14]	Ince Banks Pos 1*	44	40	-	-	36	38	0.9	
[15]	Ince Banks Pos 2*	48	40	-	-	38	63	14.7	
[16]	Ince Banks Pos 3*	48	40	-	-	33	41	0.8	

*The impact on Ince Banks is discussed in Section 15.5.6

Compared with the levels predicted in the far field for the Eastcroft EfW assessment (see Table 15.4.2.9.2), the RDF facility prediction is approximately 6dB higher for any given distance. This demonstrates the robust assessment methodology employed based on the available data. (Holme Farm, the nearest receptor, would be approximately 1100m from the RDF facility).

Daytime

At all receivers, the rating level from the RDF facility alone, without activity at the cargo berth and internal roads is significantly below the 5dB above background L_{A90} criterion stated in the Cheshire Planning Noise Guidelines on Incinerators (Section 15.2.6).

When the whole DBERR application (RDF facility and other activities such as the cargo berth and internal vehicle movements) is assessed against the current ambient L_{Aeq} noise level, the maximum change in noise level is 0.2dB. Referring to the significance criteria in Table 15.2.8.2, this can be assessed as having no impact.

These levels are also in line with EPNBC local policy GEN4 as they would not detrimentally or unacceptably raise the ambient or background noise climate in nearby sensitive areas or over a wider area.

Night–Time

At all receivers except positions A, 1 and 5, the rating levels from the RDF alone, without activity at the cargo berth and internal roads, achieve the 10dB below background L_{A90} criterion stated in the Cheshire Planning Noise Guidelines on Incinerators. This demonstrates that based on BS4142 assessment methodology, it is a positive indication that complaints are unlikely.

At positions A, 1 and 5, where excesses do occur, they are no more than 3dB above the Cheshire guideline criteria. Referring to the definition in PPG 24 on the change in decibels, *"a change of 3 dB(A) is the minimum perceptible under normal conditions"*. Therefore this excess above the Cheshire guideline criterion would only just be perceptible, in the worst case. In BS4142, it is stated that *"... levels below about 35 dB are considered to be very low"*

When the whole DBERR application (RDF facility plus other associated activities such as the cargo berth and internal vehicle movements) is assessed at night against the current night time ambient L_{Aeq} noise level, the maximum change in average noise level is 0.8dB. Referring to the significance criteria in Table 15.2.8.2, this can be assessed as having no impact.

These levels are also in line with EPNBC local policy GEN4 as they would not detrimentally or unacceptably raise the ambient or background noise climate in nearby sensitive areas or over a wider area.

15.5.2.2 Operational Noise –CCC Application

A separate assessment of the CCC Application has been provided to allow this application to be decided on its own merits. A noise contour plot of the predicted emission levels is shown in Figures 15.6 and 15.7.

Table 15.5.2.2: CCC Application - Predicted Operational Noise Levels

Position	Description	Existing Ambient				Predicted		Change in L_{Aeq} dB	
		Day		Night		Day	Night		
		L_{Aeq} dB	L_{A90} dB	L_{Aeq} dB	L_{A90} dB	$L_{Aeq,T}$ dB	$L_{Aeq,T}$ dB	Day	Night
A	Holme Farm	58	*43*	47	*40*	42	39	0.1	0.7
B	Station Road, Ince. North of Kemira road	54	*45*	47	*43*	35	28	0.1	0.1
C	Spring Farm, Helsby Marsh	66	*64*	62	*57*	29	22	0	0
1	Duke of Wellington, Ince	46	*43*	41	*40*	35	30	0.3	0.3
2	Barebrick House, Ince.	57	*44*	52	*40*	33	25	0	0
3	Ince Orchards	51	*43*	47	*45*	32	23	0	0
4	Orchard Park Road	55	*45*	44	*43*	34	25	0	0.1
5	Redwoods Drive, Elton	57	*51*	43	*40*	34	27	0	0.1
6	Parklands Drive, Elton	57	*51*	44	*41*	32	26	0	0.1
7	Meadow Lane, Elton	53	*51*	50	*49*	29	24	0	0
9	Industrial Area Helsby	63	*58*	47	*45*	26	19	0	0
10	Lower Rake Lane, Helsby	67	*66*	61	*57*	27	20	0	0
11	Old Chester Road, Helsby	60	*53*	51	*48*	26	20	0	0
12	Bottom of Bank House Lane	64	*63*	53	*50*	26	20	0	0
13	Bottom of Smithy Lane, Helsby	65	*64*	56	*53*	26	19	0	0
[14]	*Ince Banks Pos 1**	*44*	*40*	-	-	39	34	1.1	
[15]	*Ince Banks Pos 2**	*48*	*40*	-	-	61	63	13.5	
[16]	*Ince Banks Pos 3**	*48*	*40*	-	-	42	40	0.9	

*The impact on Ince Banks is discussed in Section 15.5.6

The predicted noise levels are based on the general level of activity assumed on the site from the information supplied. It can be seen from Table 15.5.2.2 and Figures 15.6 and 15.7 that the site itself produces low noise level at the majority of nearby residences.

The maximum change in L_{Aeq} noise level would be at Holme Farm at night. This change in noise level would be 0.7dB, which with reference to Table 15.2.8.2 can be assessed to have no impact.

The highest L_{Amax} events from the operational facility are predicted to be from the cargo berth. These events have been calculated at the nearest receiver (Home Farm) using the measured data described in Section 15.4.2.8. Unloading of rail freight would create noise of a similar nature, although resulting in lower L_{Amax} levels at Holme Farm due to the greater distance from the receivers and the additional screening loss offered by the buildings.

These levels are also in line with EPNBC local policy GEN4 as they would not detrimentally or unacceptably raise the ambient or background noise climate in nearby sensitive areas or over a wider area.

The calculated typical maximum noise level from the cargo berth at Holme Farm would be approximately 54dB L_{Amax}. Ambient L_{Amax} levels monitored at the Farm regularly reach the 55-60dB range, as can be studied on the environmental time history in Figure 15.2.

BS8233:1999 *'Sound insulation and noise reduction for buildings-Code of practice'* states that "*For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax}.*"

This guideline would equate to approximately 60dBL_{Amax} outside a window, assuming a 15dB loss through an open window. The night-time L_{Amax} events from the operation of the facilities have been predicted to be comfortably below this level.

15.5.2.3 *Operational Noise – Entire Site*

The following table indicates the combined impact of the both CCC and DBERR applications. A noise contour plot of the predicted noise emissions is shown in Figures 15.8 and 15.9.

Table 15.5.2.3: Entire Site - Predicted Operational Noise Levels

Position	Description	Existing Ambient				Predicted		Change in L_{Aeq} dB	
		Day		Night		Day	Night		
		L_{Aeq} dB	L_{A90} dB	L_{Aeq} dB	L_{A90} dB	$L_{Aeq,T}$ dB	$L_{Aeq,T}$ dB	Day	Night
A	Holme Farm	58	*43*	47	*40*	42	40	0.1	0.8
B	Station Road, Ince. North of Kemira road	54	*45*	47	*43*	36	33	0.1	0.2
C	Spring Farm, Helsby Marsh	66	*64*	62	*57*	31	29	0	0
1	Duke of Wellington, Ince	46	*43*	41	*40*	36	34	0.4	0.7
2	Barebrick House, Ince.	57	*44*	52	*40*	34	30	0	0
3	Ince Orchards	51	*43*	47	*45*	34	33	0.1	0.2
4	Orchard Park Road	55	*45*	44	*43*	36	32	0	0.3
5	Redwoods Drive, Elton	57	*51*	43	*40*	36	34	0	0.5
6	Parklands Drive, Elton	57	*51*	44	*41*	34	31	0	0.2
7	Meadow Lane, Elton	53	*51*	50	*49*	31	29	0	0
9	Industrial Area Helsby	63	*58*	47	*45*	27	25	0	0
10	Lower Rake Lane, Helsby	67	*66*	61	*57*	28	26	0	0
11	Old Chester Road, Helsby	60	*53*	51	*48*	28	26	0	0
12	Bottom of Bank House Lane	64	*63*	53	*50*	28	25	0	0
13	Bottom of Smithy Lane, Helsby	65	*64*	56	*53*	27	25	0	0
[14]	*Ince Banks Pos 1**	*44*	*40*	-	-	40	38	1.4	
[15]	*Ince Banks Pos 2**	*48*	*40*	-	-	61	63	13.5	

Position	Description	Existing Ambient				Predicted		Change in L_{Aeq} dB	
		Day		Night		Day	Night		
		L_{Aeq} dB	L_{A90} dB	L_{Aeq} dB	L_{A90} dB	$L_{Aeq,T}$ dB	$L_{Aeq,T}$ dB	Day	Night
[16]	*Ince Banks Pos 3**	*48*	*40*	-	-	42	41	1	

*The impact on Ince Banks is discussed in Section 15.5.6

The predicted noise levels are based on the general level of activity assumed on the entire site from the information supplied. It can be seen from Table 15.5.2.3 and Figure 15.8 and 15.9 that the site itself has very low noise impact on the majority of nearby residences.

The maximum change in L_{Aeq} noise level would be at Holme Farm at night. This change in noise level would be 0.8dB, which with reference to Table 15.2.8.2 can be assessed to have no impact.

These levels are also in line with EPNBC local policy GEN4 as they would not detrimentally or unacceptably raise the ambient or background noise climate in nearby sensitive areas or over a wider area.

15.5.2.4 BS4142 Assessment of Operational Noise – Entire Site

Whilst it is not entirely appropriate to use BS4142 to assess all types of noise source from the various elements cumulatively, the following has been included to demonstrate what would happen if a BS4142 assessment were applied to the whole site, and what the likely conclusions would be.

It can be seen from the above results tables that, in all operational noise cases (CCC, DBERR and the entire site application), the predicted specific noise levels are at or below the prevailing background L_{A90} noise levels at all residential receiver locations.

Using an extreme worst case, robust assumption that a 5dB feature correction is applied to all predicted operational noise levels, the highest rating level (occurring at only Holme Farm) would be +5dB above the background L_{A90}.

Table 15.5.2.4: Example BS4142 calculation – Entire Site (ref Table 15.5.2.3)

Position	Background L_{A90}	Predicted Specific Noise Level	Rating Level (+5dB)	Difference
Holme Farm (Day)	43	42	47	+4
Holme Farm (Night)	40	40	45	+5
Station Road (Day)	45	36	41	-4
Station Road (Night)	43	33	38	-5

BS4142 states that, when comparing the rating level with the background level, "*a difference of +5dB is of marginal significance*".

At all other receptor locations, the rating level would be below the background L_{A90} levels (negative difference). The noise impact would therefore be considered to be less than "*of marginal significance*" with lower values tending to a level at which noise complaints would be unlikely.

15.5.2.5 Emergency Venting

The RDF facility would contain steam venting boiler safety valves for use in the event of an emergency. These would also be used for a brief period during stages of commissioning of the RDF facility.

Measured noise levels of boiler safety valve testing at Eastcroft EfW plant indicate that noise levels at 500m would be in the region of 64dB$L_{Aeq.}$

No residential receivers are within 1000m of the RDF facility, therefore the anticipated noise levels from boiler safety valve tests would be in the region of 60dB.

This could be considered to be a substantial impact if it was a continuous or frequent event, however, as the venting of the safety valves are emergency procedures, the impact is significantly reduced..

Commissioning of the RDF facility and infrequent maintenance testing would also require the valves to be operated. In such cases the impact would be minimised by providing advance notice to the community and undertaking these tasks during the daytime only.

15.5.3 Road Traffic Noise Impact Assessment

Traffic flow data from the Traffic assessment has been used, combined with noise data from the background noise surveys, to assess the likely change in noise levels at residential or sensitive receivers. These results are presented in Table 15.4.3.7 and 15.4.3.8.

In terms of absolute noise levels in outdoor living areas, the WHO guidelines advise that, in order to avoid annoyance, daytime noise levels would have to be maintained at 55 dB $L_{Aeq,16h}$ or less. The 16-hour L_{Aeq} is the average level between 07:00h and 23:00h.

For road traffic noise, the difference between the $L_{Aeq,16h}$ and $L_{A10,18h}$ descriptors is typically 2 to 3 dB. Hence, 55 dB $L_{Aeq,16h}$ is equivalent to 57 to 58 dB $L_{A10,18h}$.

The baseline survey data (Table 15.3.1.1) shows that these aspirational levels are already exceeded at most receptor locations. This is the case in the vast majority of urban, suburban and semi-rural locations.

The extent to which these existing noise levels would be further increased by the proposed development provides an indication of the relative severity of the impact rather than a comparison with this notional threshold relating to the onset of noise effects.

To easily quantify the change in noise level at each receptor, the changes in road noise level from current baseline levels (detailed in Section 15.4.5) have been tabulated below.

Table 15.5.3.1: Daytime Change in Traffic Noise

Position	Description	Change in Traffic Noise Level $L_{A10,18hr}$ dB(A)				
		2007 Base	2022 Base	2022+DBERR	2022+CCC	2022+Entire Site
B	Station Road, Ince. North of the Kemira road	*55.0*	*54.9*	+0.4	+2.8	+3.1
2	Barebrick House, Ince.	*51.3*	*51.4*	+0.2	+1.9	+2.0
7	Meadow Lane, Elton	*52.6*	*51.9**	+0.2*	+1.6*	+1.8*
8	A5117/Poole Lane Junction	*68.3*	*68.9*	+0.1	+0.8	+0.8

* N.B. 2022 base is lower than 2007 due to the proposed closure of oils sites road and therefore lower traffic flows on Poole Lane.

Table 15.5.3.2: Night time Change in Traffic Noise

Position	Description	Change in Traffic Noise Level $L_{A10,6hr}$ dB(A)				
		2007 Base	2022 Base	2022+DBERR	2022+CCC	2022+Entire Site
B	Station Road, Ince. North of the Kemira road	*48.3*	*48.2*	+0.7	+3.6	+3.9
2	Barebrick House, Ince.	*43.7*	*43.7*	+0.5	+2.9	+3.2
7	Meadow Lane, Elton	*46.5*	*45.1**	+0.4*	+2.2*	+2.5*
8	A5117/Poole Lane Junction	*60.0*	*60.3*	+0.3	+1.4	+1.7

* N.B. 2022 base is lower than 2007 due to the proposed closure of oils sites road and therefore lower traffic flows on Poole Lane.

15.5.3.1 DBERR Application – Road Traffic Noise Impact

From the above comparisons, the noise impact from traffic associated with the DBERR application would produce a rise in traffic noise levels above the existing base of less than 1dB during both daytime and night time. Comparison with Table 15.2.8.2 suggests that this would produce no impact.

15.5.3.2 CCC Application – Road Traffic Noise Impact

From the above comparisons, the noise impact from traffic associated with the CCC application would produce a moderate impact at residences on Station Road due to the increased flows on Kemira Road. As such, mitigation measures would be required in order to reduce this impact.

Increase in traffic noise on Poole Lane would produce a change in road traffic noise of between 1 and 3dB day and night at the special case on Meadow Lane. This would produce a slight impact when referred to Table 15.2.8.2. However, if the predicted operational is compared with the 2007 base, there would be no impact.

Increase in traffic noise on the houses at the A5117/Poole Lane Junction would result in a slight impact both day and night.

15.5.3.3 Entire Site – Road Traffic Noise Impact

The noise impact from traffic associated with the entire site would produce a moderate impact at residences on Station Road due to the increased flows on Kemira Road. As such, mitigation measures would be required in order to reduce this impact.

Increase in traffic noise on Poole Lane would produce a change in road traffic noise of between 1 and 3dB day and night at the special case on Meadow Lane. This would produce a slight impact when referred to Table 15.2.8.2. However, if the predicted operational is compared with the 2007 base, there would be no impact.

Increase in traffic noise on the houses at the A5117/Poole Lane Junction would result in no impact during the daytime and a slight impact during the night-time. It should be noted that a change of 1.7dB, although defined as a slight impact in Table 15.2.8.2, would be a negligible change in noise level.

3dB is considered the minimum change in noise level to be perceptible, according to PPG24.

15.5.4 Rail Traffic Noise Impact Assessment

The typical L_{Aeq} hour levels for both an existing passenger train pass and a potential freight train pass have been calculated.

In both cases the difference in L_{Aeq} level is <2dB and as such can be considered to be a slight impact at worst.

The typical rise in the hourly L_{Aeq} levels due to a freight train pass is 0.9dB higher than the existing passenger trains.

The slight increase in the rail noise due to the proposed developments could therefore be considered to have no impact.

15.5.5 Shipping Traffic Noise Impact Assessment

The number of commercial vessel movements passing through the Ince section of the Manchester Ship Canal from January to December 2007 was approximately 607 in total or a 1,214 two-way flow (excluding smaller craft such as tugs and pleasure vessels but including barges). The speed limit for vessels on the canal is a restriction to 6kts.

The latest transport assessment data shows that the maximum frequency of ships serving the site per year would be 206. This would equate to an additional two-way flow of 412 ships per year (34% increase).

Converting the figures down to average ship passes per day would give the following analysis.

Table 15.5.5.1: Shipping Level Increase

Typical Existing Baseline	Typical Baseline + Development
3 ships/day	4 ships/day

Holme Farm is one of the nearest residential receivers in Ince and is approximately 230m from the canal.

The worst case predicted $L_{Aeq,1hour}$ noise levels due to a ship pass at Holme Farm and the measured existing ambient noise levels are tabulated below.

Table 15.5.5.2: Ship Noise Levels – Holme Farm

At Holme Farm	Predicted $L_{Aeq,1\ hour}$	Ambient Day L_{A90} / L_{Aeq}	Ambient Night L_{A90} / L_{Aeq}
Ship pass	29dB	43-56	40-47
Tug pass	31dB		

The above table shows that the noise levels from ships on the nearest residential receivers are below the measured background noise levels during day and night.

As such, any additional ship passes would not create a change in existing average daily noise levels, nor be noticeable as a new noise source to the area.

Therefore the increase in shipping activity due to the proposed developments remains consistent with the existing noise climate and would produce no noise impact.

The noise sources associated with loading and unloading are included in the cargo berth assessment.

15.5.6 Habitat Impacts

The mechanisms by which any wildlife noise impact could be caused are a startle response and interference with communication.

This section of the ES does not discuss the affect on flora or fauna as this is covered in the Ecology section. In order for any assessment to be made, however, the noise and vibration levels which may be relevant to these mechanisms are summarised below.

15.5.6.1 Ambient Noise on Ince Banks

Background Noise Levels (L_{A90}) are controlled by industrial and traffic noise from the nearby industry and road networks. This was measured at $40dBL_{A90}$ during the noise survey.

Average Noise Levels (L_{Aeq}) are controlled by small aircraft over flights, local industry, agricultural activities and noise from birds and other fauna on Ince Banks. The average level measured during the survey was $45dBL_{Aeq.}$

Maximum noise levels were mainly due to small aircraft over flights or bird calls. The typical maximum noise level measured during the survey was $65dBL_{Amax}$ and the highest was $67dBL_{Amax.}$

15.5.6.2 Construction Noise on Ince Banks

The highest level of construction noise on Ince Banks would be due to construction of the cargo berth. The width of the canal at the berth is approximately 100m.

Worst case average noise levels from construction of the Cargo Berth area would be around $60\text{-}65dBL_{Aeq.}$. Slightly further away from the canal bank (i.e. 300m from berth), noise levels are predicted to be considerably lower (45-55dB), given the increased distance and the raised ground at the edge of the canal, which would provide a degree of attenuation.

Piling on the canal berth could generate maximum noise levels of up to 70dB$L_{Amax.}$ Again, at distances of approx 300m from the canal berth, L_{Amax} events are predicted to be in the region of 55-65 dB

15.5.6.3 Operational Noise on Ince Banks

The highest operational noise from the proposed developments on Ince Banks would be during bulk cargo shipping activities on the canal berth.

The worst case calculations show that average noise levels during this activity could be up to 63dBL_{Aeq} at the nearest approach (100m). At distances between 300m-500m from the edge of the canal, this average noise level would drop to between 42-47 dB $L_{Aeq,}$ which is at a level similar to the existing noise climate.

Data available for the bulk cargo discharge cycle suggests that slightly higher L_{Amax} values, in the region of 75 dB, could be generated at the closest parts of Ince Banks during unloading. This activity would also be associated by elevated average noise levels locally. Again, at further distances (300-500m) these maximum noise levels are predicted to be between 55 and 65dB.

15.5.6.4 Vibration on Ince Banks

The highest vibration from the development is likely to be caused by construction piling on the canal berth.

BS5228 part 4 provides data on a range of piling activities and the associated measured vibration levels. By averaging all of the data in BS5228: part 4, the typical vibration levels from piling the berth at the nearest point on Ince banks, 100m away, have been calculated. A simple cylindrical decay of vibration has been assumed in the calculations.

Typical vibration levels at 100m would be 0.4mm/s p.p.v for sheet piling and 0.5mm/s p.p.v for Driven cast-in-place (drop hammer) piling.

These levels of vibration would correspond to a low probability of adverse comment in residential properties, however the effect on fauna is not covered in this section.

Piling operations on and around the canal berth could be mitigated by using ‘soft start’ procedures (as utilised in offshore piling), should this be deemed necessary, to minimise any adverse startle reaction and enable any fauna in the vicinity to habituate temporarily or take short term avoidance action if required.

15.6 Proposed Mitigation

The above assessment has shown that few adverse impacts are expected to occur and that they would be of low significance.

Mitigation of the majority of these impacts such that they are reduced to “none” can be achieved through relatively straightforward measures as described below.

15.6.1 Construction Noise Mitigation

15.6.1.1 Construction Noise Mitigation

The following key factors were identified as determining the degree and type of mitigation required.

Hours of work:

Appropriate hours of noisy work (e.g. heavy machinery, demolition and piling) in areas located near residential properties would be proposed and agreed with the local authority. The following construction hours are proposed.

- Monday – Friday 0700h-1900h
- Saturday 0800h-1400h
- Sunday, Public & Bank Holidays No noisy working

Working hours where agreed would be rigorously observed for any operations that are likely to generate noise levels noticeable by neighbouring residents. Any exceptions deemed essential to the works, which have to be authorised by the local authority, would also be communicated to local residents.

Attitude to the site operator:

In conjunction with the above, effective communication of site activities and liaison with local residents is essential in cultivating a positive attitude in the community. A dedicated telephone number and designated staff contact would be made available to respond to any complaints or queries, with a messaging service for out-of-hours enquiries. Information on current and forthcoming activities would be made freely available using site and community notice boards.

Initial public meetings and regular meetings with local representatives would be undertaken.

Noise Characteristics:

Some noisy activities, such as piling, are sometimes particularly intrusive due to tonal or impulsive characteristics, which tend to draw more attention to their operation. An awareness of these issues is important in liaison with local residents.

Critical activities for detailed review and liaison would include:

- Piling;
- High power grinders/drills/saws;
- Concrete delivery or batching plant/operations;

- Haul roads, holding areas and access points;
- Fixed and mobile mechanical plant (e.g. generators, compressors, excavators, etc.).

General Noise Control Examples:

The following examples of general noise control measures have been identified which would assist in minimising the community impact of noisy operations and procedures. These examples would be integrated into a noise management plan for construction on the site.

- Site vehicles should not be over revved, or left with engines idling in close proximity to residential neighbours.
- All plant and machinery to be properly maintained and silenced in accordance with manufacturer's instructions.
- Auxiliary equipment to be shut down when not in use and sited with due consideration to proximity of neighbours.
- Any unusually noisy small works directly adjacent to residences or public access routes may require temporary screening (e.g. site hoardings).

Phasing of construction of works is a useful means of mitigation in itself. By careful development of a programme of works within individual plots of the development, it would be possible to minimise the duration of noise exposure from particular operations within a phase. This could be achieved by utilising open areas as buffer zones and planning the construction of each plot such that buildings can act as effective noise barriers. This will also be a consideration in the future development of the entire site phasing strategies.

15.6.1.2 Construction Traffic Noise Mitigation

The mitigation to be implemented on Kemira Road for operational traffic noise would be implemented at an early phase of construction. The minimum required to reduce the impact of construction traffic to an acceptable level would be the proposed roadside noise barriers and a reduced speed limit of 30mph along Kemira Road.

15.6.1.3 Construction Vibration Mitigation

Vibration is not predicted to be an issue during construction due to the distance between the site and local residents, provided that best practice measures are observed. For example:

- All plant brought on to the site would be properly maintained and operated in accordance with manufacturers' recommendations.
- The contractor and their sub-contractors would at all times apply the principles of Best Practicable Means as defined in Section 72 of the Control of Pollution Act 1974 and carry out all work in such a manner as to reduce any disturbance from noise and vibration to a minimum.

Piling operations on and around the canal berth would be mitigated by using 'soft start' procedures, should this be deemed necessary, to minimise any adverse startle reaction and enable any fauna in the vicinity to take avoidance action if required.

15.6.2 Operational Noise Mitigation

In order for the detailed design and engineering of the entire site to be able to work to realistic design criteria, it is proposed to build up a scheme of "zoned" plot noise criteria for each development section.

These criteria are based on maximum boundary noise levels for each facility, which would ensure that the overall emissions from the development are within the worst case assessment levels above.

The following preliminary framework would enable manufacturers of all proposed plant items to have a simple target noise criterion to which plant should be designed. The criteria are applicable to all fixed plant items.

If certain plant items cannot meet the plot noise criteria using the best available techniques (BAT) due to close proximity to the plot boundaries, or the costs associated with doing so are unreasonable, they would be assessed and designed individually to ensure that the resultant noise emissions to the nearest sensitive receptors are acceptable and would have no adverse impact.

Table 15.6.2.1: Plot Boundary Noise Criteria

Plot	Nearest Plot Boundary Maximum Total Noise Level $L_{Aeq,T}$ dB
WEEE	55
Timber Facility	62
Soils Facility	55
Block Making Facility	68
Waste Management Facility	60
RDF	68
Ethanol Plant	68
Plastics Village	68
Resource Recovery Village	60
Waste Transfer Station	60
Bulk Cargo Facility	60

These boundary criteria would also ensure that if rated under a BS4142 assessment, the noise levels would be such that they would be less than *'of marginal significance'* and tending towards a level at which noise complaints would be unlikely.

15.6.2.1 Low Frequency Noise Mitigation

Low frequency noise (LFN) is now being studied as a potential problem in some countries. Generally, low frequency noise is defined as that which is dominated by frequencies below 160Hz.

There are no specific guidance levels for LFN. Disturbance by LFN depends on a number of factors, including the character of the sound, whose effects are neither well understood, nor readily predicted.

The spectral results from the worst case calculations indicate that frequencies between 31.5Hz and 125Hz would be at or below the existing measured background levels.

In order to mitigate the possibilities of the development producing any significant levels of LFN, it is proposed that during the detailed design and procurement of the various facilities, potential sources of low frequency noise are identified, designed and assessed against emerging LFN guidance.

15.6.3 Road Traffic Noise Mitigation

Specific mitigation measures would be implemented to mitigate the increase in road traffic noise along the Kemira road, including roadside barriers and lowered speed limits around the intersection of the Kemira road and Station Road. Such measures should provide adequate attenuation to mitigate the adverse noise impact from the increase in traffic levels.

Road traffic noise screening proposals have been incorporated as suggested in initial recommendations, which were incorporated in the application drawings, and optimized to give the best noise screening effect within a realistic barrier height

The scheme of three-metre high roadside barriers has been calculated to give a reduction in the traffic noise from Kemira Road to the nearest residents on Station Road of approximately 6dB.

In the traffic noise calculations, the speed limit has been assumed to have been reduced from the existing 40mph limit to 30mph this would lead to an additional 1dB reduction in Kemira Road noise levels.

15.6.4 Rail Traffic Noise Mitigation

Due to the minimal noise impact from rail traffic, specific mitigation measures are not considered necessary.

15.6.5 Shipping Traffic Noise Mitigation

Due to the minimal noise impact from shipping traffic, specific mitigation measures are not considered necessary.

15.7 Residual Impacts

15.7.1 Construction Traffic Noise – Residual Impacts

The worst case phase of combined construction and site operational traffic flows have been calculated with the installation of the Kemira Road mitigation.

Table 15.7.1: Calculated Construction Traffic Noise Impact

Position	Description	Traffic Noise Level $L_{A10,18hr}$ dB(A)	
		Base (2017))	2017 Construction + Operational
B	Station Road, Ince. North of Kemira road	54.1	+0.3
2	Barebrick House, Ince.	51.2	+0.8
7	Meadow Lane, Elton	51.7	+1.8
8	A5117/Poole Lane Junction	68.8	+0.7

There is potential for a slight impact at Meadow Lane, according to the significance criteria in Table 15.2.8.2, although this rise in traffic noise is below the 3dB difference which PPG 24 describes as the *"minimum perceptible change"*. At all other positions, there would be no impact.

15.7.2 Operational Noise – Residual Impacts

Residual operational noise impacts for all applications are estimated to be below the worst case assessment levels detailed, through the implementation of the individual plot boundary noise criteria detailed in Section 15.6.2. These criteria would be developed with detailed design evolution and in liaison with local authorities.

15.7.3 Road Traffic Noise – Residual Impacts

Provided the previously mentioned mitigation recommended is put in place, the increase in road traffic along the Kemira road would produce no impact on the nearest residences of Station Road, Ince.

In terms of absolute noise levels in outdoor living areas, the WHO guidelines advise that, in order to avoid annoyance, daytime noise levels would have to be maintained at 55 dB $L_{Aeq,16h}$ or less. The 16-hour L_{Aeq} is the average level between 07:00h and 23:00h.

For road traffic noise, the difference between the $L_{Aeq,16h}$ and $L_{A10,18h}$ descriptors is typically 2 to 3 dB. Hence, 55 dB $L_{Aeq,16h}$ is equivalent to 57 to 58 dB $L_{A10,18h}$.

The baseline survey data (Table 15.3.1.1) shows that these aspirational levels are already exceeded at most receptor locations. This is the case in the vast majority of urban, suburban and semi-rural locations.

The extent to which these existing noise levels would be further increased by the proposed development provides an indication of the relative severity of the impact rather than a comparison with this notional threshold relating to the onset of noise effects.

The calculated road noise level changes following the proposed mitigation are as follows.

Table 15.7.3.1: Daytime Change in Traffic Noise - Residual

Position	Description	Change in Traffic Noise Level $L_{A10,18hr}$ dB(A)				
		2007 Base	2022 Base	2022+DBERR	2022+CCC	2022+Entire Site
B	Station Road, Ince. North of the Kemira road	*55.0*	*54.9*	-1.7	-0.2	-0.1
2	Barebrick House, Ince.	*51.3*	*51.4*	-0.5	+0.7	+0.8
7	Meadow Lane, Elton	*52.6*	*51.9*	+0.2*	+1.6*	+1.8*
8	A5117/Poole Lane Junction	*68.3*	*68.9*	+0.1	+0.8	+0.8

* N.B. 2022 base is lower than 2007 due to the proposed closure of oils sites road and therefore lower traffic flows on Poole Lane.

Table 15.7.3.2: Night time Change in Traffic Noise - Residual

Position	Description	Change in Traffic Noise Level $L_{A10,6hr}$ dB(A)				
		2007 Base	2022 Base	2022+DBERR	2022+CCC	2022+Entire Site
B	Station Road, Ince. North of the Kemira road	*48.3*	*48.2*	-2.5	-0.3	0
2	Barebrick House, Ince.	*43.7*	*43.7*	-0.7	+1.3	+1.6
7	Meadow Lane, Elton	*46.5*	*45.1*	+0.4*	+2.2*	+2.4*
8	A5117/Poole Lane Junction	*60*	*60.3*	+0.3	+1.4	+1.7

* N.B. 2022 base is lower than 2007 due to the proposed closure of oils sites road and therefore lower traffic flows on Poole Lane.

15.7.3.1 DBERR Application – Residual Road Traffic Noise Impact

From the above comparisons, the residual noise impact from traffic associated with the DBERR application would produce a decrease in traffic noise levels at residences on Station Road and thus a slight beneficial impact in terms of road traffic noise levels.

At Meadow Lane and the A5117/Poole Lane Junction, road noise levels would increase by a maximum of 0.4dB. Comparison with Table 15.2.8.2 suggests that this would produce no impact.

15.7.3.2 CCC Application – Residual Road Traffic Noise Impact

From the above comparisons, the noise impact from traffic associated with the CCC application would produce no impact at residences on Station Road due to the increased flows on Kemira Road during the daytime. During the night-time, the rise in traffic noise of 1.6dB could be considered to be a slight impact when compared to Table 15.2.8.2, although it is unlikely to be a perceivable change in road noise level.

Increase in traffic noise on Poole Lane would produce a change in road traffic noise of less than up to 2.2dB at night at the nearest houses on Meadow Lane. This would produce a slight impact when referred to Table 15.2.8.2, although when compared against the 2007 base levels, there would be no impact. This increase is less than the minimum perceptible change as described in PPG24.

Increase in traffic noise on the houses at the A5117/Poole Lane Junction would result in a slight impact both day and night.

15.7.3.3 Entire Site – Residual Road Traffic Noise Impact

From the above comparisons, the noise impact from traffic associated with the entire site would produce no impact at residences on Station Road due to the increased flows on Kemira Road during the daytime. During the night-time, the rise in traffic noise of 1.6dB could be considered to be a slight impact when compared to Table 15.2.8.2, although it is unlikely to be a perceivable change in road noise level.

Increase in traffic noise on Poole Lane would produce a change in road traffic noise of up to 2.4dB at night at the nearest houses on Meadow Lane. This would produce a slight impact when referred to Table 15.2.8.2, although when compared against the 2007 base levels, there would be no impact. This increase is less than the minimum perceptible change as described in PPG24.

Increase in traffic noise on the houses at the A5117/Poole Lane Junction would result in a slight impact both day and night.

15.7.4 Rail Traffic Noise – Residual Impacts

Rail traffic has been assessed to have no significant additional noise impact.

15.7.5 Shipping Traffic Noise – Residual Impacts

Shipping traffic has been assessed to have no significant additional noise impact.

15.8 Cumulative Impacts

A number of developments have been identified in the region for which the cumulative impact may be a potential concern. In terms of noise impact however, only developments in the immediate vicinity and those which could result in significant traffic generation in the immediate vicinity are relevant.

Other noise sources from developments which are greater than a kilometre or two from the assessment site cannot have any appreciable cumulative effect due to propagation losses over these distances coupled with the logarithmic characteristics of noise level addition.

Other developments, for which noise would need to be controlled with respect to different critical receptor locations closer to their own boundaries, would not have a significant additive effect at the critical receptors for this assessment site.

Traffic noise impacts related to other schemes can have a significant cumulative effect, however, as the noise sources (vehicles) impinge on the noise climate of the critical receptors at the assessment site.

15.8.1 Construction and Operational Noise - Cumulative

Committed developments which could be close enough to have an additive effect have been identified as the remainder of the EMP4 allocation, EMP8 - Land at Station Road development, and EMP7 - the land available for development adjacent to Quinn Glass. In both cases the most likely scenario in which a cumulative impact could be appreciable would be for a short period during construction, were this to coincide with the construction of the development elements closest to the receptor locations in the direction of these developments.

Operational noise from any activities would be subject to the same standard of noise assessment and enforcement as this application. The worst case would be where critical receptors coincide with the critical receptors studied in this assessment, such that there is a theoretical possibility of a slight cumulative impact (in the order of 3dB(A)). The likelihood of these factors coinciding, however, is very low.

15.8.2 Road Traffic Noise - Cumulative

The traffic assessment has been able to estimate possible future traffic flows associated with the allocations of sites. These flows have been used to assess the change in road noise level due to the addition of the committed developments as detailed in Section 14.

Table 15.8.2.1: AAWT Traffic Levels – Committed Development

Road	Committed Development Flows	
	18hr – Day (%HGV)	6hr – Night (%HGV)
Kemira Road	3280 (11%)	194 (62%)
Pool Lane (South of Kemira Road roundabout)	5108 (15%)	319 (64%)
Poole Lane (North of Cryers Lane junction)	3693 (16%)	235 (65%)
A5117 (West of Poole Lane)	2788 (16%)	178 (65%)
A5117 (East of Poole Lane)	1416 (11%)	84 (62%)

These flows have been combined into the traffic noise calculations to determine the cumulative increase in traffic noise level at the nearest affected sensitive receivers.

The mitigation proposed for Kemira Road has not been included in the calculations of committed development flows alone, however, it has been included in the combined committed and CCC/DBERR traffic calculations.

Table 15.8.2.2: Cumulative Daytime Traffic Noise Levels

Position	Description	Predicted Traffic Noise Level $L_{A10,18hr}$ dB(A)					
		2007 Base	2022 Base	2022 Base+ committed	2022+ DBERR +Com	2022+ CCC+Com	2022+entire site+com
B	Station Road, Ince. North of the Kemira road	55	54.9	+2.2	-1.2	-0.4	-0.3
2	Barebrick House, Ince.	51.3	51.4	+1.4	-0.2	+0.5	+0.6
7	Meadow Lane, Elton	52.6	51.9	+1.6	+1.8*	+2.7*	+2.9*
8	A5117/Poole Lane Junction	68.3	68.9	+0.8	+0.9	+1.4	+1.5

* N.B. 2022 base is lower than 2007 due to the proposed closure of oils sites road and therefore lower traffic flows on Poole Lane.

The traffic noise levels due to the entire site, plus the committed developments during the day are shown to have no impact on the receivers on Station Road. On Meadow Lane and residences on the A5117/Poole Lane Junction, the impact would be considered to be slight.

Table 15.8.2.3: Cumulative Night-time Traffic Noise Levels

Position	Description	Predicted Traffic Noise Level $L_{A10,6hr}$ dB(A)					
		2007 Base	2022 Base	2022 Base+ committed	2022+ DBERR +Com	2022+ CCC+Com	2022+entire site+com
B	Station Road, Ince. North of the Kemira road	48.3	48.2	+4.2	-0.8	0.2	0.4
2	Barebrick House, Ince.	43.7	43.7	+3.5	+0.8	+1.7	+1.8
7	Meadow Lane, Elton	46.5	45.1	+3.3*	+3.5*	+4.4*	+4.6*
8	A5117/Poole Lane Junction	60	60.3	+2.3	+2.4	+3.1	+3.3

* N.B. 2022 base is lower than 2007 due to the proposed closure of oils sites road and therefore lower traffic flows on Poole Lane.

The traffic noise levels due to the entire site, plus the committed developments during the night are predicted to be slight at the receptors on Station Road.

The night time road noise level increase due to the entire site, plus the committed developments would be classed as moderate at the receivers on Meadow Lane and the A5117/Poole Lane Junction. It can, however, be seen that the committed developments alone would have a moderate impact (+3.3dB) at residences on Meadow Lane.

By comparing Table 15.8.2.3 above with Table 15.7.3.2 (residual traffic), the committed developments alone have a greater traffic noise impact at receptors near the A5117 and Poole Lane than the proposed entire site.

Mitigation of these impacts may be required in any event, therefore, and is not deemed necessary as part of the CCC, DBERR or entire site applications.

15.9 Summary

An environmental noise survey has been undertaken at the nearest residential populations to the proposed location of the Resource Recovery Park and its two constituent applications (to CCC and the DBERR) in order to enable the noise impact of the construction and operation of the facilities together and separately to be established. Measurements were made near to Holme Farm, the nearest noise sensitive receiver, and the villages of Ince, Elton and Helsby.

The baseline survey data shows that aspirational WHO guideline levels are already exceeded at most receptor locations. This is the case in the vast majority of urban, suburban and semi-rural locations.

The extent to which these existing noise levels would be further increased by the proposed development has been assessed by determining the severity of the impact rather than a comparison with the notional thresholds relating to the onset of noise effects.

Estimates have been made of likely worst case noise levels due to operation, traffic movements and construction of the facilities and these have been compared to the prevailing background noise climate. The impact of these noise levels are summarised below (referring to Table 15.2.8.2 on determining the significance of noise impacts).

Table 15.9.1: Summary of Highest Residual Noise Impacts

	Operation	Road Traffic	Rail Traffic	Shipping Traffic	Construction
DBERR Application	No Impact	No Impact	No Impact	No Impact	Slight
CCC Application	No Impact	Slight	No Impact	No Impact	Slight/Moderate
Entire Site	No Impact	Slight	No Impact	No Impact	Slight/Moderate
Entire Site+Cumulative	No Impact	Slight/Moderate	No Impact	No Impact	Slight/Moderate

The above table broadly summarises the assessments undertaken. The worst case operational noise emissions from the DBERR application, CCC application and the entire site have been shown to have no impact on the nearest sensitive receivers.

The predicted traffic flows have been demonstrated to have a minimal impact on the nearest receivers to the roads due to the developments provided that the mitigation measures detailed are implemented. When considered cumulatively with the possible additional development allocations, there is potential for a slight to moderate road noise impact, although these are mainly due to the large traffic flows assumed for the additional developments.

Rail and shipping traffic due to the proposed developments have been shown to have no impact on the nearest residential receivers.

Construction of the developments has been shown to have a slight impact. Where some construction activities are at the closest approaches to Holme Farm (i.e. construction of some ecological areas) the impacts could be assessed as moderate.

The worst case construction traffic noise scenario has been considered. This has been shown to have a slight impact at Meadow Lane and no impact at all other receptors, following installation of the Kemira Road noise mitigation measures.