12. NOISE AND VIBRATION

12.1 INTRODUCTION

12.1.1 Objectives of study

ENVIRON have been appointed to prepare a Noise and Vibration Assessment to accompany the planning application for a proposed High Bay Regional Distribution Centre at Ditton.

This chapter sets out an evaluation of the effects that operation of the proposed development will have on the noise climate at sensitive receptors surrounding the site. The assessment described in this chapter also considers the effects of noise and vibration associated with the construction of the proposed development.

In the context of this study, noise can be defined as unwanted or undesirable sound derived from sources such as road traffic, industrial operations or construction works that interfere with normal activities, including conversation, sleep or recreation. Vibration can be defined as the transmission of energy through the medium of ground or air that can result in small movements of the transmitting medium, such as a building, which can cause discomfort or even damage to structures if the movements are large enough.

The assessment provided here outlines the impacts that may result from the proposed development, and where necessary, sets out mitigation measures to control them.

Technical terms or references are occasionally used that may be new to the non-acoustician. To assist the reader, a glossary of terms is contained in *Appendix 12.1*.

It should be noted that the original noise survey and assessment was based upon the previously approved scheme (INNOVIS rail freight park) and it is considered that the data from that time are still relevant.

12.1.2 Scope of Study

The following assessment was based on consultation with Halton Borough Council (HBC) to confirm their requirements in terms of the scope of the assessment, the desired noise climate upon completion of the development proposals and the acceptability of certain noise emissions, such as construction noise and operational noise. Following consultation, the primary issues and proposed approach to the assessment were confirmed in the Noise and Vibration Section of the Environmental Scoping Report issued in October 2004 (relating to the INNOVIS proposals but assumed to still be relevant to the current proposals).

The assessment considers the following potential noise and vibration impacts at noise-sensitive receptors in the vicinity, as a result of the proposed development:

- Plant operation during the site preparation and construction of the proposed development;
- Road movements during the operation of the proposed development; and
- External loading and unloading activities associated with the proposed development's operation.

The methodology for undertaking the assessment is presented in *Section 12.2.*

The existing noise conditions are identified in *Section 16.3*, which includes a general description of the receiving environment, sources of noise and noise climate in the area, and presents the results of baseline environmental noise measurements undertaken at the closest noise-sensitive receptors to the site. Specific noise measurements to determine the noise emitting characteristics of existing external rail freight loading and unloading operations at the site are also described in this section.

Section 16.4 provides an assessment of the likely noise and vibration impacts associated with the construction and operation of the proposed development, identifies mitigation measures to control the impacts and assesses the effectiveness of any mitigation measures that are recommended.

Section 16.5 provides a summary and the conclusions of this noise and vibration assessment.

12.2 ASSESSMENT METHODOLOGY

Each of the potential noise and vibration impacts identified above has been assessed and the significance of each impact identified is presented in the form of scale, ranging from **no** significance to **major** significance. The significance scale in respect of noise impacts is described below, with **moderate** significance being considered as the trigger for the requirement of detailed mitigation measures:

- **No** significance – no perceptible affect on noise levels;
- **Minor** significance – barely perceptible adverse affect on noise levels;
- **Moderate** significance – noticeable adverse affect on noise levels; and
- **Major** significance – very noticeable adverse affect on noise levels.

The assessment of noise and vibration impacts is based upon the principles of a number of official guidance notes and British Standards which are described below.

12.2.1 Construction Noise Impacts

The assessment of construction noise impacts has been carried out with reference to the DoE Advisory Leaflet (AL) 72: *Noise Control on Building Sites*, British Standard 5228: 1997: *Noise and vibration control on construction and open sites*, which are summarised below.

A figure that is often quoted as being an acceptable level of noise from construction or roads maintenance sites is 75 dB $L_{Aeq,T}$ measured at the external façade of an occupied building over the normal working day. This figure was first suggested in the Wilson Report of the Committee on the Problem of Noise in 1963 and subsequently replicated in the DoE Advisory Leaflet (AL) 72 Noise Control on Building Sites. The limits in AL 72 for the core working day, which is now out of print, are;

- 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise, and;
- 75 dB(A) in urban areas near main roads and heavy industrial areas.

Given the setting of the site in close proximity to the A562, A533 and heavy industry, it is proposed to assess the construction works against a daytime noise level of 75 dB(A).

BS 5228 sets out techniques to predict the likely noise and vibration effects from construction works. They are based on detailed information on the type and number of plant being used, their location, and the length of time they are in operation.

At this stage, full details of the proposed construction regime are not available. However, an estimate of the likely effects of noise from the construction phase has been made for the noise-sensitive receptors identified close to the site. The predictions are based on experience from similar schemes elsewhere, the proposed construction regime for the previously approved development and the methodology contained within BS 5228, in terms of the Equivalent Continuous Sound Level, L_{Aeq}, over a 10-hour working day.

Based on the guidance contained within AL 72 the assessment criteria presented in *Table 12.2.1* have been adopted in order to assess the impact of noise associated with the construction of the proposed development.

Table 12.2.1 - Construction Noise Assessment Criteria

Predicted Façade Noise Level, dB(A)	Impact Significance
<55	**No** significance
55 – 65	**Minor** significance
65 – 75	**Moderate** significance
>75	**Major** significance

It is considered that the significance of construction noise impacts will be **moderate** if the AL 72 noise limit is just achieved and non-compliance with the limits would be considered to be of **major** significance. However, it is considered that if construction noise levels at receptors are 10 dB(A) or more lower than the AL 72 noise limits, that the significance of impacts would be minor.

12.2.2 Construction Vibration Impacts

With respect to human exposure to vibration in buildings, BS 6472: 1992: *Guide to evaluation of human exposure to vibration in buildings*, provides guidance relating to the probability with which various degrees of adverse comment are likely.

BS 6472 presents threshold curves that define the lowest perceptible levels of vibration and multiplying factors that correspond to 'satisfactory magnitudes of building vibration to keep human response (annoyance, complaint) to acceptable levels'. Thresholds are given in both the vertical and horizontal axes. In practice, during the daytime, vertical axis vibration normally determines respect to human response. Vibration may be impulsive, such as that due to hammer-driven piling or periodic continuous vibration, such as that due to vibratory driven piling.

BS 5228 advises that humans are known to be very sensitive to vibration with the threshold of perception being typically in the peak particle velocity range of 0.15 to 0.3mms^{-1} at frequencies between 8 and 80 Hz.

Following the criteria set out in BS 6472 and the guidance presented in BS 5228, for residential dwellings and offices, *Table 12.2.2* details the vibration levels at which varying degrees of adverse comment may be expected, provided that the vibration frequency is greater than 8Hz and presents the assessment criteria that have been used to determine the significance of construction vibration impacts.

Table 12.2.2 - Impact Scale for Construction Vibration and Assessment Criteria

Vibration Level, PPV mms	Subjective Response	Impact Significance
< 0.141	Imperceptible	**No** Significance
> 0.141-0.560	Barely perceptible	**Minor** Significance
> 0.560-1.120	Noticeable	**Moderate** Significance
> 1.120-2.240	Easily Noticeable	**Major** Significance

12.2.3 Road Traffic and Railway Noise Impacts

The impact of changes in road traffic noise levels resulting from operation of the proposed development has been assessed in accordance with the principles of the Design Manual for Roads and Bridges (DMRB), 1993: Volume 11: *Environmental Assessment*, the former Department of Transport (DoT) 1988 publication *Calculation of Road Traffic Noise (CRTN)* and 1995 publication *Calculation of Railway Noise (CRN).* The assessment also draws upon the findings of the draft *Guidelines for Noise Impact Assessment* produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.

Although DMRB strictly applies to new road schemes, the procedures contained within the document can also be applied to the assessment of noise from road traffic in general. The development proposals have the potential to affect road traffic noise and vibration levels along existing roads, as additional vehicle movements may result.

DMRB sets out procedures for undertaking the environmental assessment of new road schemes, and accordingly, predictions have been carried out in accordance with CRTN to determine the magnitude of any changes in road traffic noise levels that may result from the proposed development's operation.

CRTN sets out standard procedures for calculating noise levels from road traffic. The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles (HGVs), type of road, site geometry and the presence of noise barriers or acoustically absorbent ground to predict the noise level for any receptor point at a given distance from the road.

Rail related noise levels have not been considered in the context of this development as the rail head and off-loading system is already in existence and has been for many years at the adjacent O'Connor's facility. As such this is regarded as background noise that will exist whether or not the currently proposed development proceeds.

The impact of changes in road traffic noise levels, as a result of the development proposals have been assessed according to the principles of the draft *Guidelines for Noise Impact Assessment* produced by the Institute of Acoustics/Institute of Environmental Management and Assessment Working Party.

The findings of the Working Party are draft at present although they are of some assistance in this exercise. The draft guidelines state that the assessor should set assessment criteria appropriate for the assessment being undertaken. In response to this, the assessment criteria presented in *Table 12.2.3* below have been adopted to assess the impact of any changes in road traffic noise levels resulting from the operation of the proposed development. These are based on key benchmarks that relate to human perception of sound. In particular, a change of 3 dB(A) is generally considered to be the smallest change in noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and a doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

Table 12.2.3 - Road Traffic Noise Assessment Criteria

Change in Noise Level, dB(A)	Impact Significance
0 – 2.9	**No** significance
3.0 – 5.9	**Minor** significance
6.0 – 9.9	**Moderate** significance
>10	**Major** significance

12.2.4 Operational Noise

BS 4142 sets out a method to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises are likely to give rise to complaints from noise-sensitive receptors in the vicinity. The procedure contained in BS 4142 for assessing the likelihood of complaint is to compare the measured or predicted noise level from the source in question immediately outside the dwelling, the $L_{Aeq,T}$ 'specific' noise level, with the $L_{A90,T}$ 'background' noise level.

Where the noise contains a 'distinguishable discrete continuous note (whine, hiss, screech, hum etc.) or if there are distinct impulses in the noise (bangs, clicks, clatters or thumps), or if the noise is irregular enough to attract attention' then a correction of +5 dB is added to the specific noise level to obtain the $L_{Ar,Tr}$ 'rating' noise level.

The likelihood of the noise giving rise to complaints is assessed by subtracting the background noise level from the rating noise level. BS 4142 states 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance. A difference of –10 dB is a positive indication that complaints are unlikely.'

The daytime assessment is carried out over a 1-hour period and the night-time assessment is carried out over a 5-minute period. The periods associated with day or night are not defined within BS 4142, but it states that night should cover the times when the general adult population are preparing for sleep or are actually sleeping. For the purpose of this study the periods presented in Planning Policy Guidance Note (PPG) 24: 1994: *Planning and Noise* are considered to be the most appropriate and, as such, daytime is considered to be 0700-2300 and night-time 2300-0700.

Therefore, based on the guidance contained within BS 4142 and consultation with HBC, the assessment criteria presented in *Table 12.2.4* have been adopted in order to assess the impact of noise associated with the operation of the proposed development, such as loading and unloading activities, and noise from fixed external or building services plant.

Table 12.2.4 - Industrial Noise Assessment Criteria

Excess of Rating Noise Level above Background Noise Level, dB	Impact Significance
-10	**No** significance
+0	**Minor** significance
+5	**Moderate** significance
+10	**Major** significance

It is considered with new operations and items of new plant, that the opportunity exists to minimise noise impacts so far as reasonably practicable. As such, it is considered that noise from the operation of the proposed development should give rise to impacts of no more than **minor** significance, striving where possible to result impacts of **no** significance.

12.3 EXISTING CONDITIONS

The existing noise conditions at the closest noise-sensitive receptors to the site have been determined by a series of environmental noise measurements. Baseline noise measurements were carried out within the three closest existing residential receptor areas to the site at various times of the day and the night, to identify the principal sources of noise affecting the area. Further measurements were undertaken at the location of new residential development, to allow the potential impact of the future operation of the facility to also be considered at this location.

Specific noise measurements were also carried out to determine the noise emitting characteristics of the loading and unloading activities of the existing rail freight distribution operations as these are representative of background conditions

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445: 1991: Parts 1-3, *Description and measurement of environmental noise* and following the guidance given in BS 4142. The noise parameters of $L_{Aeq,T}$, $L_{A90,T}$ $L_{A10,T}$ and $L_{Amax,T}$ were recorded during the measurement period at each position.

All measurements were undertaken approximately 1.5 metres above local ground level and under free-field conditions.

All acoustic measurement equipment used during the noise surveys conformed to Type 1 specification of British Standard 61672: 2003: *Electroacoustics. Sound level meters. Part 1 Specifications.* A full inventory of this equipment is shown in *Table 12.3.1* below:

Table 12.3.1 - Inventory of Acoustic Measurement Equipment

Item	Make & Model	Serial Number
Sound Level Meter	Solo Master	10513
Microphone	MCE212 ½"	39769
Preamplifier	PRES21S ½"	10335
Calibrator	CAL 21	50441971

The noise measurement equipment used during the survey was calibrated at the start and end of each measurement period. The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements. No significant drift in calibration was found to have occurred on the sound level meter.

The microphone was fitted with a protective windshield for the measurements, which are described in greater detail below.

12.3.1 Baseline Noise Measurements

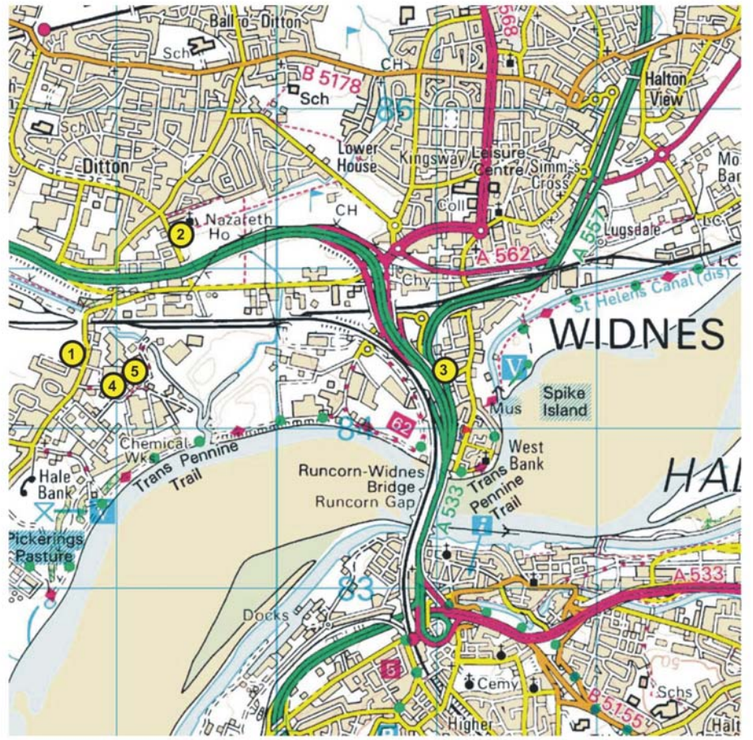
A series of baseline environmental noise measurements were carried out at receptors near the site between 1st and 2nd December 2004, to determine the prevailing noise levels during the day and the night. The weather during the surveys was conducive to noise measurement, it being dry with little or no wind.

Additional noise measurements were carried out at the location of what is now a new and occupied residential development on a former Asda site, on Foundry Lane in Hale Bank. These measurements were undertaken between 20th and 21st May 2005 (the site was not developed at this time). The weather during these additional surveys was also conducive to noise measurement, it being dry with little or no wind.

The locations of the baseline environmental noise measurement positions are described below, complete with National Grid References (NGRs), and identified in *Figure 12.3.1* below:

- Position 1 Hale Bank SJ 48739 84404
- Position 2 Ditton SJ 49393 85194
- Position 3 West Bank SJ 51152 83943
- Position 4 Asda Centre SJ 48965 84235
- Position 5 Asda Close SJ 49195 84448

Figure 12.3.1 Baseline Environmental Noise Measurement Positions



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The results of the baseline environmental noise measurements at each of the positions described above are presented in *Table 12.3.2* below.

Table 12.3.2 - Baseline Environmental Noise Measurement Results

Position	Start Date and Time	Noise Level, dB			
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	$L_{A10,15min}$
1 – Hale Bank	01/12/2004 14:21	52.3	64.8	47.5	54.5
	01/12/2004 15:42	56.0	72.7	47.8	57.1
	02/12/2004 09:06	56.4	70.1	52.8	57.3
	02/12/2004 10:26	50.7	64.4	46.3	52.7
	02/12/2004 02:17	45.3	66.4	40.6	46.3
2 – Ditton	01/12/2004 14:48	59.5	74.9	50.0	62.8
	01/12/2004 16:03	61.4	72.1	54.2	65.4
	02/12/2004 09:40	62.4	74.4	54.9	66.6
	02/12/2004 10:48	64.4	79.8	56.9	68.6
	02/12/2004 02:39	44.5	51.0	39.9	47.2
3 – West Bank	01/12/2004 15:15	52.7	60.6	50.6	53.9
	01/12/2004 16:28	52.4	64.0	50.2	53.2
	02/12/2004 10:03	53.9	60.8	52.2	55.0
	02/12/2004 11:12	56.4	59.3	54.5	57.5
	02/12/2004 03:08	43.2	60.0	37.0	46.1
4 – Asda Centre	20/05/2005 14:07	65.4	83.1	51.2	68.2
	20/05/2005 14:22	64.7	81.7	52.2	68.4
	20/05/2005 15:16	63.8	82.8	50.9	65.5
	20/05/2005 15:31	63.8	82.5	50.3	66.9
	21/05/2005 00:10	46.0	61.4	41.7	48.4
	21/05/2005 00:46	50.6	75.4	39.1	43.8
5 – Asda Close	20/05/2005 14:42	61.9	84.4	52.8	62.5
	20/05/2005 14:57	58.7	77.7	52.2	59.4
	20/05/2005 15:51	64.8	96.2	51.6	60.0
	20/05/2005 16:06	63.2	92.4	51.2	56.0
	21/05/2005 00:28	43.3	55.1	39.1	44.9
	21/05/2005 01:03	40.0	59.5	38.0	41.4

The daytime and night-time noise measurement results in the above table have been processed to determine the average day and night noise levels, which are identified in *Table 12.3.3* opposite. Whilst undertaking the noise measurements, it was noted that the noise climate at all locations was dominated by road traffic, in particular the A562 at Position 1 and 2, the A533 at Position 3 and Foundry Lane at Position 4 and 5. Other significant sources of noise included activities at the nearby chemical works which was discernible at Position 1 (but which will now not be an issue as the chemical works have been decommissioned and demolished), passenger trains regularly travelling along the mainline to the north of the site which were discernible at Position 1, 3 and 5, noise from small industrial units on Foundry Lane which was discernible at Position 4 and 5 and occasional planes flying overhead which were discernible at all positions.

Table 12.3.3 - Summary of Day and Night Average Noise Levels

Position	Period	Noise Level, dB			
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	$L_{A10,15min}$
1 – Hale Bank	Day (0700-2300)	54.5	72.7	48.6	55.4
	Night (2300-0700)	45.3	66.4	40.6	46.3
2 – Ditton	Day (0700-2300)	61.3	79.8	53.0	64.9
	Night (2300-0700)	44.5	51.0	39.9	47.2
3 – West Bank	Day (0700-2300)	54.2	64.0	51.9	54.9
	Night (2300-0700)	43.2	60.0	37.0	46.1
4 – Asda Centre	Day (0700-2300)	64.5	83.1	51.2	67.3
	Night (2300-0700)	48.9	75.4	40.4	46.1
5 – Asda Close	Day (0700-2300)	62.7	96.2	52.0	59.5
	Night (2300-0700)	42.0	59.5	38.6	43.2

Just prior to the daytime measurements at Position 5, significant levels of noise from a ready-mix cement facility were also discernible, although this noise ceased just prior to the measurements being commenced.

The noise-sensitive receptors were all considered to be well screened by other structures on the intervening lane and well distanced from the proposed development. As such, given their setting and existing exposure to noise from a number of transportation and industrial sources, the subjective impression gained was that any activities at the proposed development site are unlikely to be particularly noticeable at any of the noise-sensitive receptors in the vicinity.

12.3.2 Specific Environmental Noise Measurements

A series of specific environmental noise measurements were also carried out at the existing rail freight processing area of the site, to measure the noise emitting characteristics of the operations that are currently undertaken at the site.

The purpose of these measurements was to assess the levels of noise associated with the existing operations, which will cease under the new proposals but which may be replaced by similar operations between O'Connor's and the new development (i.e. rail container handling).

Measurement of the following sources was undertaken:

- Liebherr SMV Reach Stacker Idling – measurement at distance of 10 metres;
- Liebherr SMV Reach Stacker Moving – measurement at a distance of 8 metres;
- Liebherr SMV Reach Stacker Operating – measurement at a distance of 8 metres; and
- Forklift Warehouse Operations – internal reverberant measurement.

The measurement results are summarised in *Table 12.3.4* below, along with the calculated sound power level for the various operating phases of the Liebherr SMV Reach Stacker for use in subsequent noise predictions.

Table 12.3.4 - Specific Environmental Noise Measurement Results

Source	**Noise Level, $L_{Aeq,T}$**	**Sound Power Level, $L_{w,T}$**
Liebherr SMV Idling	70.3	98.3
Liebherr SMV Moving	83.5	109.6
Liebherr SMV Operating	81.1	107.2
Forklift Warehouse Operation	72.8	n/a

12.4 ASSESSMENT, MITIGATION AND RESIDUAL EFFECTS

12.4.1 Construction Impacts -Noise

Impact

It is inevitable with any major development that there will be some disturbance caused to those nearby, particularly during the site clearance and construction phase. However, disruption due to construction is a localised phenomenon and is temporary in nature. In general, only people living or working within 100 metres of the site boundary are likely to be seriously impacted by construction noise.

Receptors further than 100m away from construction works are generally subject to noise levels, associated with construction works lower than the assessment criterion adopted by most local authorities when considering construction noise. In the case of the proposed development, all of the noise-sensitive receptors will be more than 100m away from all phases of the construction works and are therefore unlikely to experience significant impacts as a result of the proposed works.

Notwithstanding this, an assessment has been carried out to determine the likely construction noise levels at the receptors and to quantify the potential extent of any adverse impacts.

Although there are techniques available to predict the likely noise effects from construction works, such as those contained within BS 5228, they are necessarily based on detailed information on the type and number of plant being used, their location and the length of time they are in operation. Such details are not available at this stage.

However, an estimate of the likely effects of noise from the site clearance and construction phase has been made for the noise-sensitive receptors located closest to the site, based on experience of the construction techniques used to construct several other similar developments. The predictions are based on the methodology contained within BS 5228 and are in terms of the $L_{Aeq,T}$ over the core working day.

For the purpose of predicting the likely noise impact, the construction works have been divided into the following phases.

- Site Preparation (demolition and enabling works). It is assumed that dozers, tracked excavators, pneumatic breakers and trucks will be used as part of this stage of the works;
- Foundation (establishing building foundations). It is considered likely that the foundations of the proposed buildings will utilise a bored piling method and will involve a number of piling rigs, support cranes, a bentonite pump, as well as a muckaway lorries and backactors for the removal of spoil. There will also be a galigu cement blending plant;
- Erection (building erection). This phase of the works is assumed to involve the casting of concrete floor slabs 'in-situ', steelfixing, brickwork/blockwork, scaffold erection and roofing, etc. It is assumed that any concreting works will require the use of a concrete pump, concrete truck mixers, compressors and poker vibrators. It is also assumed that cranes will be used as support plant; and
- Roads (minor road improvement works and paving). This element of the works may comprise of several operations that may include breaking of the existing road surface,

removing the broken road surface, excavation for and laying of drainage, excavation and road surfacing.

Predictions have been carried out to determine the noise levels likely to be generated by each of the above phases. The predictions have been carried out as worst case and assume that the intervening ground between the construction noise sources will be acoustically hard such that there will be no attenuation of sound due to ground absorption (although in reality there will be some attenuation). Where construction works are likely to be completely screened at receptors by buildings or objects on the intervening land, due consideration of the likely attenuation has been included in the prediction of noise levels by the subtraction of 10 dB(A) from the predicted level.

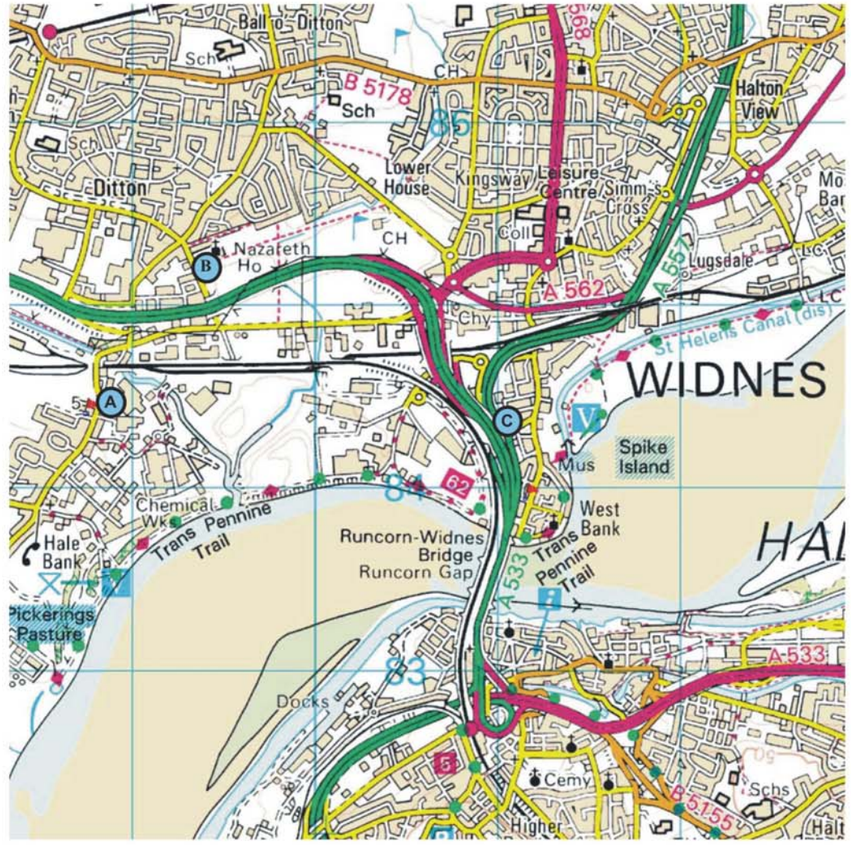
The predictions have been undertaken for the closest existing noise-sensitive receptors to the site, which are described below and identified in Figure 12.4.1 .

- A - Hale Bank – Residential dwellings on Hale Road, approximately 320 metres from the closest proposed construction activities;

- B - Ditton – Elderly people home on Saint Michaels Road, approximately 600 metres from the closest proposed construction activities; and

- C - West Bank – Residential dwelling off West Bank Street, approximately 660 metres from the closest proposed construction activities.

Figure 12.4.1 Construction Noise Prediction and Assessment Locations



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	Scale	Not to Scale	Date 03/06/2005
	Project No	63-C8116	Drawn by KF

The noise levels predicted during each phase of the works are shown in *Table 12.4.1* below. The noise levels presented are 'worst case' when construction activities are closest to each receptor. The predictions have been undertaken for the 10-hour core working day.

Table 12.4.1 - Predicted Construction Noise Levels, $L_{Aeq,10hour}$, dB

Receptor	Site Preparation	Foundation	Erection	Roads
A - Hale Bank	55	55	48	48
B - Ditton	50	49	42	42
C - West Bank	49	48	41	41

Comparison of the predicted noise levels in *Table 12.4.1* with the noise assessment criteria presented in *Table 12.2.1* identifies that the 75 dB(A) criterion adopted for this assessment is not predicted to be exceeded during any of the phases of the construction works. Impacts are predicted to be of **minor** significance during the site preparation and foundation phase in Hale Bank, and of **no** significance during any of the remaining phases or at any other receptors.

As described previously, the predicted noise levels presented above for the foundation phase of the construction works considers the use of bored piling techniques in the establishment of the foundations as these considered to be most likely. However, due to the ground conditions in certain areas of the site, there is a possibility that driven piling techniques may be required. As such, additional predictions have been undertaken to determine the likely impact of these techniques, should they be considered necessary.

The driven piling techniques that could potentially be employed are as follows:

- Sheet Steel Piling - diesel hammer driven;
- Tubular Steel Casing - drop hammer driven , cast in situ; and
- Pre-cast Concrete Piles - drop hammer driven.

The noise levels predicted for the foundation phase, utilising each of the above piling techniques are shown in *Table 12.4.2* below. The noise levels presented are 'worst case' when construction activities are closest to each receptor. The predictions have been undertaken for the 10-hour core working day.

Table 12.4.2 - Predicted Construction Noise Levels, $L_{Aeq,10hour}$, dB

Receptor	Sheet Steel Piling	Tubular Steel Casing	Pre-cast Concrete Piles
A - Hale Bank	65	59	61
B - Ditton	59	54	55
C - West Bank	58	53	55

Comparison of the predicted noise levels in *Table 12.4.2* with the noise assessment criteria presented in *Table 12.2.1* identifies that the 75 dB(A) criterion adopted for this assessment is not predicted to be exceeded during the foundation phase of the construction works with any of the driven piling techniques. Impacts are predicted to be of **moderate** significance for sheet steel piling techniques at receptors in Hale Bank, and of **minor** significance at all other receptors and for all other techniques, but such techniques are unlikely to be used at the site perimeter

Mitigation

Given that the impact of noise during construction of the proposed development is predicted to meet the 75 dB(A) criterion adopted for this assessment and be at worst, of **minor** significance at the closest receptors in Hale Bank during the site preparation phase, and of **no** significance for all remaining phases and at all other receptors, it is considered that no additional mitigation measures are required to control noise from construction of the development.

Should driven piling techniques be required, then noise levels are predicted to meet the 75 dB(A) criterion adopted for this assessment, with impacts of **minor** significance predicted at all receptors for all driven piling techniques, with the exception of receptors in Hale Bank that would experience impacts of **moderate** significance should sheet steel piling be required. As such, it is considered that no additional mitigation measures are required to control noise from construction of the development, however, should driven piling be required, the avoidance of sheet steel piling techniques close to receptors would clearly be of benefit and result in impacts of no more than **minor** significance. In practice, such techniques are mainly going to be employed in the centre of the site associated with the diversion of Steward's Brook and towards Marsh Brook (farthest away from Hale Bank where the most sensitive receptor communities are likely to exist).

Residual Impacts

As no mitigation measures are considered necessary, the impacts predicted above will remain, but are transient in nature being associated with the construction phase of the development

12.4.2 Construction Impacts - Vibration

Impact

There are currently no British Standards that provide a methodology to predict levels of vibration from construction activities, other than that contained within BS 5228: Part 4, which relates to percussive or vibratory piling only.

Table 12.4.3 below details the distances at which certain activities give rise to a just perceptible level of vibration; these figures are based on historical field measurements.

Table 12.4.3 - Distances at which Vibration may just be Perceptible

Construction activities	Distance from activity when vibration may just be perceptible, metres
Excavation	15
Heavy Vehicles (e.g. dump trucks)	10
Hydraulic Breaker	20
Auger Piling (e.g. CFA Piling)	20
Driven Piling (e.g. diesel hammer sheet steel piles)	50

On the basis of the above and given that the nearest sensitive receptors to the construction works are at least 320 metres away, it is considered highly unlikely that vibration from the construction works will be perceptible at any sensitive receptor off-site. Given that vibration levels are predicted to be imperceptible, it is considered that the impact of vibration during the construction of the proposed development will be of **no** significance at all receptors.

Mitigation

Given that the impact of vibration during the construction of the proposed development is predicted to be of **no** significance at all receptors, it is considered that no mitigation measures are required to control vibration from construction of the development.

Residual Impacts

As no mitigation measures are considered necessary, the impacts predicted above will remain.

12.4.3 Operation Impacts - Road Traffic

Impact

The traffic flow data provided by ADL has been used as the basis of the road traffic noise assessment. The data provided was in terms of 18-hour flows for the year of opening (2010) with and without the development. Information was also provided allowing the percentage of heavy goods vehicles (%HGV) with and without the development to be calculated.

The traffic data provided was sufficient to allow road traffic noise predictions to be undertaken in accordance with CRTN, allowing predicted noise levels both with and without the development to be compared and the impact of any changes in level assessed on all of the roads considered in ADL's traffic assessment which are as follows:

- Speak Road (A562)
- Queensway (A533)
- Desoto Road
- Ditton Road
- Hale Road
- Halegate Road

The figures presented in *Table 12.4.4* below set out the likely changes in road traffic noise levels during operation of the proposed development. The change has been calculated between the 2010 year of opening with and without the development.

Table 12.4.4 - *Predicted Changes in Road Traffic Noise Levels as a Result of Proposed Development in 2008 Year of Opening, dB*

Road4	Predicted Change in Road Traffic Noise Level, $L_{A10,18hour}$		
	Predicted Level 2010 without Development	Predicted Level 2010 with Development	Difference, dB
Speak Road (A562)	78.5	78.7	0.2
Queensway (A533)	79.7	79.7	0.0
Desoto Road	73.4	73.8	0.4
Ditton Road	71.1	71.3	0.2
Hale Road	69.2	69.9	0.7
Halegate Road	64.6	65.2	0.6

Table 12.4.4 identifies that the largest predicted increase in traffic noise level of 0.7 dB will be on Hale Road. Given that a change of 3 dB(A) is generally considered to be the smallest perceptible change in noise, as discussed in section 12.2.3 the results of the assessment indicate that all roads will experience imperceptible increases in noise ranging from 0.0 to 0.7 dB(A). When compared with the criteria adopted for this assessments are considered to be impacts of **no** significance.

Mitigation

Given that the impact of road traffic noise at receptors is predicted to be of **no** significance, it is considered that no mitigation measures are required to control road traffic noise during operation of the proposed development.

Residual Impacts

As no mitigation measures are considered necessary, the impacts predicted above will remain.

12.4.4 Operation Impacts – Loading and Unloading Operations

It is understood that trains will be loaded and unloaded from the existing O'Connor's facility. Given the above measures and the separation distance between the proposed operational areas and noise-sensitive receptors, it is considered that noise from the above sources is unlikely to be perceptible at noise-sensitive receptors off site and will in any event be a prevailing noise source regardless of whether this development proceeds.

As such, the most significant sources of operational noise in respect of potential off-site impact are likely to be the external manoeuvring of HGV's and the operation of forklift trucks.

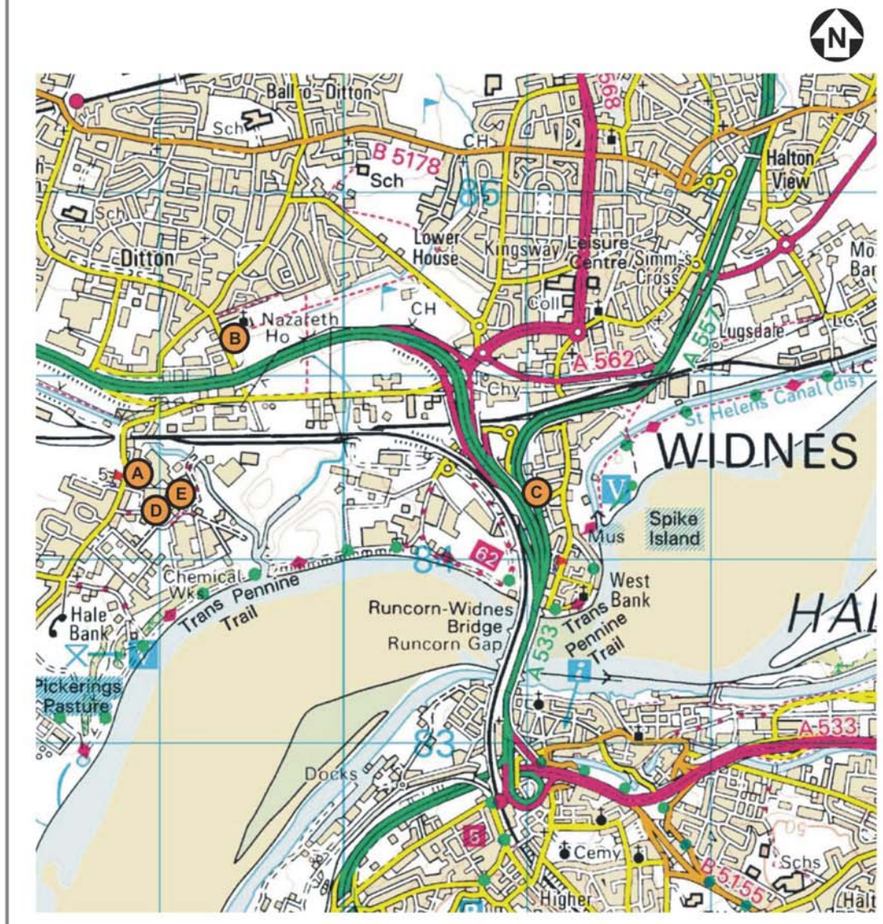
In order to assess the impact of these sources of noise, predictions have been carried out based on library noise emission data for manoeuvring HGV's and operating forklifts, to determine the likely specific noise level at the closest noise-sensitive receptors to the proposed development.

Operational noise levels have been predicted for the same receptors as the construction noise assessment, although in addition, predictions have been undertaken at the location of new residential development on the land of a former Asda store on Foundry Lane. The location of the potential receptors considered in the assessment are described below and presented in *Figure 12.4.2* below.

- D – Asda Centre – Location of new occupied housing development in the centre of the former Asda site, approximately 350 metres from the closest proposed operational activities;

- E – Asda Close – Location of new occupied housing development receptors in the closest area of the former Asda site to the proposed RFT, approximately 210 metres from the closest proposed operational activities;

Figure 12.4.2 Operational Noise Prediction and Assessment Locations



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		Scale: Not to Scale	Date: 03/06/2005
		Project No: 63-C8116	Drawn by: KF

The results of the predictions are presented in *Table 12.4.5* below.

Table 12.4.5 - Predicted Operational Noise at Receptors

Receptor	Specific Noise Level	
	Daytime, $L_{Aeq,1hour}$	Night-time $L_{Aeq,5min}$
Hale Bank	33.5	36.4
Ditton	29.8	33.4
West Bank	28.9	30.7
Asda Centre	33.5	34.9
Asda Close	31.4	33.4

The predicted specific noise levels shown in the table above, along with the results of the environmental noise survey, have been used to assess the likely impact of such operations in accordance with BS 4142. This assessment is described below:

On the basis of experience gained working on similar schemes and at similar facilities, it is considered that a +5 dB acoustic correction should be applied to the specific noise level as recommended in BS 4142 for sources that are irregular enough to attract attention.

The excess of the rating noise level above the background noise level measured during the day and the night at the closest noise-sensitive receptors, taking into consideration the +5dB acoustic correction, has been calculated and is summarised in *Table 12.4.6* below.

Table 12.4.6 - Predicted Operational Noise BS 4142 Assessment

Sensitive Receptor	Period	Level Type			
		Specific, $L_{Aeq,T}$	Rating, $L_{Aeq,T}$	Background, $L_{A90,T}$	Excess of Rating Level above Background Level
Hale Bank	1-Hour Day	33.4	38.4	48.6	-10.2
	5-min Night	36.1	41.1	40.6	+0.5
Ditton	1-Hour Day	29.6	34.6	53.0	-18.4
	5-min Night	33.1	38.1	39.9	-1.8
West Bank	1-Hour Day	28.9	33.9	51.9	-18.0
	5-min Night	30.7	35.7	37.0	-1.3
Asda Centre	1-Hour Day	33.5	38.5	51.2	-12.7
	5-min Night	34.9	39.9	40.4	-0.5
Asda Close	1-Hour Day	31.4	36.4	52.0	-15.6
	5-min Night	33.4	38.4	38.6	-0.2

With respect to the excess of the rating noise level above the background noise level, BS 4142 states:

"A difference of around +10 dB or higher indicates that complaints are likely. A difference of around +5 dB is of marginal significance. A difference of –10 dB is a positive indication that complaints are unlikely."

Therefore, the advice contained within BS 4142 indicates that during the daytime, there is a positive indication that complaints are unlikely from operation of the proposed development. During the night-time, the advice contained within BS 4142 indicates that operational noise is much less than marginal in significance, approaching the complaints unlikely situation.

Comparison of the results in *Table 12.4.6* with the criteria adopted for this assessment, which is presented in *Table 12.2.4* indicates that operational noise impacts during the day are likely to be of **no** significance at all receptors and during the night they are likely to range from **minor** significance at Hale Bank to **no** significance at all other receptors.

Mitigation

Given that the impact of operational noise at receptors is predicted to be of **no** significance during the day and at most **minor** significance during the night, it is considered that no additional mitigation measures are required to control noise during operation of the proposed development.

Residual Impacts

As no mitigation measures are considered necessary, the impacts predicted above will remain.

12.5 Summary and Conclusion

ENVIRON has been appointed to assesses the impact of noise and vibration associated with the construction and operation of a proposed rail freight depot and associated warehousing at Ditton.

A series of environmental noise measurements have been undertaken and noise predictions carried out to identify any noise impacts that are likely as a result of the construction and operation of the proposed development.

Noise levels from the construction of the development have been predicted at noise-sensitive properties in the vicinity of the site and impact of the noise assessed. Impacts are predicted to be of **minor** significance during the site preparation phase at receptors located in Hale Bank, and of **no** significance during any of the remaining phases or at any other receptors.

It is predicted that construction of the proposed development will not give rise to perceptible levels of vibration at any off-site receptor, and as such impact of vibration from construction of the proposed development is predicted to be of **no** significance.

Changes in noise emissions for the roads that are likely to be used to access the proposed development have been predicted, and the impact of changes in noise level assessed. All roads are predicted to experience imperceptible increases in noise, which when compared with the criteria adopted for this assessment and are considered to be impacts of **no** significance.

Noise from external operations at the proposed development, such as the, manoeuvring of rail freight containers, HGV's and the operation of forklift trucks have been predicted at noise-sensitive receptors. The impact of noise from these operations has been assessed and the advice contained within BS 4142 indicates that during daytime, there is a positive indication that complaints are unlikely from operation of the proposed development. During the night-time, the advice contained within BS 4142 indicates that operational noise is much less than marginal in significance, approaching the complaints unlikely situation in most cases. When compared with the assessment criteria, operational noise during the day is likely to be of **no** significance at all receptors and during the night it is likely to range from **minor** significance at Hale Bank to **no** significance at all other receptors.