

KENT INTERNATIONAL GATEWAY

NOISE IMPACT ASSESSMENT REPORT 2863/NIA

March 2009
Revision Number: 5

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1.0 Introduction

A rail freight interchange facility with associated distribution and commercial development is proposed by Kent International Gateway Ltd (KIG) to be constructed to the East of Maidstone, adjacent to Junction 8 of the M20 motorway and the Ashford to Maidstone railway line.

There are various noise and vibration issues relating to the proposed facility which can be broken down into the following two phases:

- Noise and vibration associated with the construction of the scheme.
- Noise and vibration resulting from the operation of the facility; inclusive of industrial activities associated with the operation of the warehouses, increased road traffic, increased frequency of rail movements, intermodal activities, commercial unit operation and the location of mechanical services equipment such as ventilation plant.

RBA Acoustics have been appointed to undertake an assessment of the predicted noise and vibration levels resulting from both the construction phase of the facility and its future operation. The results of the assessment will be used in order to establish the resulting noise and vibration impacts of the proposed development.

2.0 Construction Noise & Vibration Assessment

2.1 Construction Noise Assessment Methodology

Construction noise has been predicted in accordance with the methodology outlined in British Standard BS5228: Part 1: 1997*. This Standard sets out indicative noise level outputs for a wide range of construction plant items and activities expressed as sound power levels (L_W) and activity L_{Aeq} . The prediction framework allows the quoted noise levels to be extrapolated to potential noise sensitive receptor positions (such as residential properties) and $L_{Aeq, period}$ noise levels derived. Factors that are considered in the prediction methodology include:

- Sound power outputs of processes and plant
- Periods of operation
- Distances between noise sources and receptors
- Presence of screening or soft ground attenuation

As a result of the scale of the development, construction works will involve a number of different phases (a reported total of 31) over a period of approximately 7 years. Details regarding the various construction phases have been included in the Environmental Statement and (in the absence of any other information regarding the construction method statement) have been used as the basis of this assessment. The distinct phases of construction are included in the Appendix, however a brief overview is as follows:

* Please note BS5228 was updated and released in January 2009.

- Preparatory works and initial infrastructure
- Construction of site access roads
- Intermodal construction and railway works
- Construction of the industrial units and commercial buildings
- Landscaping

Noise levels associated with sources such as HGVs, tracked excavators and bulldozers, cranes, generators and concrete plant are most typical of the noise emissions that will be produced on a day-to-day basis during the construction phase. It should be noted that due to the sprawling nature of the site, construction works associated with specific areas, such as the individual industrial units, will be potentially concentrated in the vicinity of certain noise sensitive receptors over a distinct period of time.

An inventory of construction site plant has previously been estimated in the application for each phase of construction, from which an effective total sound pressure level (L_{Aeq}) has been calculated for each team of plant (see Appendix). This has been used to estimate $L_{Aeq, period}$ noise levels at noise-sensitive receptors based on the distance of the receptor from the plant team.

2.2 Construction Noise Evaluation Criteria

When considering the impacts of construction noise it is necessary to establish criteria above which some noticeable adverse effect may be experienced. The duration of any impacts is also discussed although the precise programme has yet to be determined.

The guidance documents and standards referred to in the Appendix have been used in order to determine the criteria for the assessment of noise and vibration from the construction phase of the development.

A summary of the recommended criteria for evaluating the impact of construction noise at all noise sensitive receptors is provided below in the table below and further detail of their derivation is given in the Appendix.

Table 2863/T1 - Criteria for Evaluating Noise from Construction

Period	Building/Location	Criteria for Assessment L_{Aeq}	Purpose
Daytime (07:00 – 19:00)	Residential / Façade	75 / 70 / 65 dB [†]	To maintain speech intelligibility
Evening (19:00 – 23:00)	Residential / Façade	65 dB	To avoid disturbance
Night-time (23:00 – 07:00)	Residential / Façade	45 dB *	To avoid sleep disturbance

[†] 70 dB in rural areas 65 dB on Saturdays (07:00 - 13:00)

* or equal to ambient L_{Aeq} levels if the ambient noise level is higher than 45 dB

The criteria in the above Table apply at 1m from the facades of residential and other noise sensitive properties. It should be noted that these criteria are not aimed at providing noise limits for construction activities, but are proposed as criteria for the evaluating the significance of noise impacts associated with the construction programme.

2.3 Construction Vibration Assessment Methodology

Construction phases and items of plant with the potential to cause vibration have been identified and source levels established using, where appropriate, manufacturers' data and BS5228.

Piling works are often one of the greatest concerns during the construction phase of a development. It is advised within the construction noise and vibration section of the Environmental Statement that piling will be required during the construction phases of each of the industrial units.

There are two aspects of vibration impact that require consideration:

- Effect of the vibration on people within buildings
- Effect of the vibration on buildings (or other structures) themselves

2.4 Construction Vibration Evaluation Criteria

A summary of the criteria for assessing the impact of vibration during construction is provided below in the Table 2863/T2 below and is described in more detail in the Appendix.

Table 2863/T2 - Criteria for Evaluating Vibration from Construction

Period	Building/Location	Criterion	Purpose
Daytime (07:00 – 23:00)	Inside dwellings	0.2 to 0.4 m/s ^{1.75} VDV	Low probability of adverse comment from occupants
Night-time (23:00 – 07:00)	Inside dwellings	0.1 to 0.2 m/s ^{1.75} VDV	Low probability of adverse comment from occupants
Anytime	Reinforced or framed buildings	50 mm/s PPV	Protection of building structure
Anytime	Un-reinforced or light framed buildings	15 mm/s PPV	Protection of building structure

VDV Vibration dose value, as given in BS 6472, 2008 - Guide to evaluation of human exposure to vibration in buildings.

PPV Peak particle velocity, as given in BS 7385 Part 2, 1993 - Evaluation and measurement for vibration in buildings

There is little published data on vibration from construction in terms of VDV values and the data in BS 5228 is given in terms of PPV (Peak Particle Velocity). A detailed knowledge of the time for which events that may cause vibration would also be required to carry out an assessment in terms of VDV and this is not available at this stage of the planning proposal.

3.0 Operational Noise and Vibration

3.1 Operational Noise Assessment Methodology

There are numerous potential sources of noise impact associated with the operation of the proposed development. Such sources of noise include the following;

- Activity within the intermodal area, such as the moving of containers and the operation of gantry cranes
- Rail and road movements on-site
- Changes to activity levels on the local rail and road network
- Installation of HVAC equipment

Prediction of noise levels associated with the various noise sources identified above are undertaken using methodology best suited to each particular source, as opposed to a single prediction encompassing the total operation of the proposed development. A review of standards, policies and legislation has been undertaken to determine the most appropriate assessment methodology for each source. The various methodologies are described below.

3.1.1 Intermodal Operation

The intermodal area is advised as being designed so as to accommodate around 200 000 containers per annum. The containers are to be lifted on and off trains via the use of overhead gantry cranes with the containers stored on site prior to delivery, or return, by road or rail.

Noise from such operations have been predicted following source noise level measurements of an existing facility.

3.1.2 On Site Rail and Road Movements

The Ashford to Maidstone railway line bisects the site from East to West. It is from this railway line that reception lines and sidings are to be constructed so as to receive the incoming and departing freight trains, of which approximately 12 trains (24 movements) a day are expected. Rail movements from within the confines of the site are therefore required to be assessed in terms of noise and vibration.

Similarly, with approximately 1700 HGVs (resulting in 3400 movements) relating to the despatch and collection of containers anticipated in any 24 hour period, an assessment of noise associated with these vehicles is necessary.

The methodology detailed in The Calculation of Railway Noise (CRN), The Calculation of Road Traffic Noise (CRTN) and BS5228 shall be used so as determine noise levels from train and HGV movements within the site.

The rail served warehouses Ind 01 and 02 are shown to receive trains and therefore containers from within the units themselves. Any noise associated with the unloading of freight is therefore to be kept within the confines of the warehousing.

3.1.3 Changes to Rail and Road Networks

In addition to on site rail and road movements, the development will also result in changes to the wider road and rail networks. Such changes will include the increased numbers of HGVs and additionally road traffic associated with the industrial warehouse units and the commercial buildings. Noise levels resulting from changes to the rail and road network will be calculated using the methodology in CRN and CRTN.

3.1.4 Installation of HVAC Equipment

The industrial warehouse units and commercial buildings are likely to require refrigeration, heating, ventilation and air conditioning (HVAC) installations. Such installations have the potential to cause noise impact and therefore are assessed herein. The noise associated with HVAC equipment will not be apparent until detailed design stage is reached. The noise from such installations is easily controlled via the use of acoustic attenuators, enclosures, louvres etc. with conditions attached so that the Local Authority requirements regarding new items of plant are met.

3.2 Evaluation Criteria

The literature review in the Appendix also allows for criteria to be compiled for assessing the potential noise impact of the development. These recommended criteria are summarised as follows.

Evaluation Method 1

For noise levels resulting from what could be considered to be environmental noise, such as road and rail movements that are already found to contribute to the noise climate in the area, it is proposed to compare the resultant levels of noise that are expected to be generated against threshold levels at which annoyance or disturbance of everyday activities is likely to occur.

Threshold of noise impacts:	Day	L_{Aeq} , (0700-2300 hours)	55 dB
	Night	L_{Aeq} , (2300-0700 hours)	45 dB

Note: Threshold levels are typically adopted so as ensure fair and reasonable assessment of new industry.

If noise change from the scheme fall below these thresholds then no impacts are expected.

If noise change from the scheme is above these thresholds then the extent of the noise impact is evaluated by considering the change in ambient L_{Aeq} noise levels. If the level of noise from the development is below the ambient noise at a receptor, then the noise from the development will be less noticeable and impacts are less likely.

To evaluate the noise change the predicted level of noise is added to the measured ambient noise level to establish the change in noise that would be expected, and this is assessed using the significance rating given in the Institute of Acoustics and the Institute of Environmental Assessment and Management's draft guidance on the Assessment of Environmental Noise.

Evaluation Method 2

Where noise levels resulting from the operation of the rail freight interchange facility cannot be considered to be environmental i.e. the source is atypical from any existing source of noise in the local area, or is considered to be industrial in nature, it is appropriate to apply the methodology and assessment criteria as detailed in BS4142.

This assessment method considers the difference between the predicted noise that will occur with the development in operation and the existing baseline noise level, including rating the change in terms of likelihood of complaint. In addition to the predicted level, a 5dB penalty is also required to be added for any source which is considered to be tonal, impulsive (bangs, clatters, thumps) or irregular enough to attract attention.

Maximum Noise Levels

The two evaluation methods detailed above refer to L_{Aeq} noise levels. In addition it is important to consider the impact of 'one off' maximum noise events. WHO guidelines regarding sleep disturbance recommend a noise level of 60dB L_{Amax} as assessed outside a bedroom window.

4.0 Baseline Conditions

4.1 Overview and Site Description

The proposed development site is located adjacent to Junction 8 of the M20 and the Ashford to Maidstone railway line. The Channel Tunnel Rail Link (CTRL) runs alongside the M20 to the North of the motorway and the A20 (Ashford Road) is to the South of the proposed facility.

The settlement of Bearsted lies to the West and South West of the application site with further individual residential properties to the South.

As discussed in Sections 2.2 and 3.2, a consideration in assessing the noise impact of a scheme is the change in ambient noise levels that it produces at noise sensitive receptors. Accordingly, baseline noise surveys have been carried out close to potentially affected noise sensitive receptors to determine the existing noise levels. A full description of noise sensitive receptors identified throughout the local area is included in the Appendix.

4.2 Measurement Locations

Impacts associated with the construction and operational phase of the proposed rail freight interchange are assessed at existing noise sensitive locations around the development site.

Measurements were therefore undertaken at various locations around the proposed development site. These monitoring locations were selected so as to be representative of noise levels currently experienced at the façades of residential properties worst affected by the proposal and, where possible, typical of other residential properties within the vicinity.

The measurement positions are described in more detail below and are also illustrated on the attached Site Plan 2863/SP1.

Table 2863/T3 – Measurement Positions

Location	Description
Thurnham House	The microphone was located in the garden of Thurnham House attached to a tripod at a height of approximately 1.4m. Traffic noise from the M20 was the major contributor to noise levels. CTRL movements also were considered to add to the noise climate.
Springfield, Roundwell †	Microphone was secured to an A-Frame and positioned 1m from a first floor window to the rear of the property. Local traffic movements along Roundwell and the A20 were the main sources of noise at this location.
Crismill Lodge	Microphone attached to a tripod at a height of approximately 1.4m and positioned in the garden.
17 Fremfins Road †	Microphone attached to an A-Frame and positioned 1m from a first floor window to the rear of the property, overlooking the railway. Ambient noise from the M20 and local train movements along the adjacent railway were contributing factors to the noise climate.
Woodcut Farm	The microphone was attached to a tripod at a height of approximately 1.4m and located within a field to the East of the farmhouse. Traffic noise from the M20 was the major contributor to noise levels. CTRL movements also added to measured noise levels.

† Measurement position was subject to façade reflections and as such a correction to the measured levels reported has been applied in subsequent analyses.

4.3 General

Measurements were made of the L_{A90} , L_{Amax} and L_{Aeq} noise levels over sample periods of 15 minutes duration. Monitoring of the prevailing background noise was undertaken over the following periods:

Friday 16 November to Tuesday 20 November 2007

Friday 30 November to Tuesday 4 December 2007

As a result of the time of year in which measurements were required to be undertaken weather conditions were not always considered to be ideal. Meteorological data was obtained over the survey periods from the Met Office weather station at East Malling. Where weather conditions are considered to have the potential to adversely effect noise levels, this has been indicated in the time history charts.

4.4 Instrumentation

The equipment used to undertake the noise surveys consisted of Type 1 Sound Level Meters, specifically 01dB Solos and Larson Davis 824s and their associated calibrators and environmental protection. All sound level meters were calibrated prior to and on completion of the survey. No significant calibration drifts were found have occurred. In accordance with British Standard requirements all sound level meters hold independent calibration certification.

4.5 Results

A summary of the lowest noise levels measured over the various periods is also provided in the tables below, with the full measured data included in the Appendix. The following analysis is highlighted in the table:

$L_{Aeq, period}$ The equivalent L_{Aeq} levels over the 16 hour daytime, 07:00 to 23:00 hours, and 8 hour night-time 23:00 to 07:00 hours, in accordance with WHO criteria.

$L_{A90, 15min}$ The lowest L_{A90} levels over the daytime and night-time periods, in any 15 minute sample is detailed. In accordance with recommendations stated within BS4142, industrial noise is assessed against the L_{A90} . The assessment of noise against the lowest background does constitute a worst case assessment; however this is arguably an acceptable method in determining any possible future impacts at this stage of a planning application.

$L_{Amax, 15min, range}$ The $L_{Amax, 15min}$ parameter refers to the maximum level of a noise event in any 15 minute sample period. The values in the tables below refer to the lowest and highest measured maximum noise levels over the daytime and night-time periods.

Table 2863/T4 – Daytime Measured Levels

Position	$L_{Aeq, Period}$ dB	L_{A90} dB	L_{Amax} Range dB
Thurnham House	56	47	61 - 96
Springfield, Roundwell	45	38	49 - 73
Crismill Lodge	51	42	52 - 79
17 Fremlins Road	52	41	47 - 84
Woodcut Farm	53	46	56 - 86

Table 2863/T5 – Night-time Measured Levels

Position Number	$L_{Aeq, Period}$ dB	L_{A90} dB	L_{Amax} Range dB
Thurnham House	49	38	58 - 60
Springfield, Roundwell	38	34	43 - 67
Crismill Lodge	45	38	50 - 74
17 Fremlins Road	45	33	50 - 82
Woodcut Farm	46	40	52 - 77

5.0 Construction Phase Impacts

5.1 Construction Noise Impacts

The predictions given in this section are based upon assumed plant inventories for the demolition and construction phases of the development, as described previously and included in the Appendix. Predicted noise levels are also included in the Appendix. The Applicant's Construction Method Statement details site working hours to be the following:

Daytime 08:00 – 18:00
Saturday 08:00 – 13:00

No evening, night-time, Sunday or Bank Holiday operation unless agreed with the Local Authority beforehand.

Slight residual impacts are predicted at Fremlins Road / Mallings Drive and Woodcut Lane when assessed against the weekday daytime criterion for duration of up to 104 weeks during the railway works phase.

The following Table 2863/T6 details the predicted noise impacts where predicted levels are above the worst case recommended 65dB daytime assessment criterion (Saturday). The Table shows that, there are a number of potential significant impacts due to the noise associated with the construction work. The number of impacts can be explained as the proximity of noisy works to existing residences means that noise impacts are unavoidable.

Table 2863/T6 – Construction Noise Impacts

General Location	Impact	Residual *	Duration of Residual Impact (No. of Saturdays)	Approximate Number of Affected Properties
Chestnuts	Severe	Moderate	157	1
Woodcut Lane	Severe	Substantial	157	7
Crismill Road	Severe	Slight	31	8
Roundwell	Severe	Slight	31	13
Fremlins Road / Mallings Drive	Severe	Substantial	147	46
Thurnham Road	Severe	Slight	43	23

* Residual impacts are those impacts that are above the assessment criteria following the adoption of mitigation measures (10dB) including close barrier losses

5.2 Construction Vibration Impacts

In terms of vibration from the construction works affecting local residences, the major cause for concern would be that resulting from vibratory rollers, hydraulic breaking equipment, ballast tamping and piling work activities.

Where such works are located close to receptors it is possible that that vibration levels due to construction work will be perceptible, however the levels of vibration are expected to be below those likely to lead to building damage, particularly at distances of over 20m. If necessary greater confidence of the levels of vibration resulting from the worst case construction works could be achieved by undertaking vibration control testing at representative locations.

6.0 Operational Phase Impacts

The predictions given in this section relate to the various sources of noise as resulting from the operation of the proposed development, as detailed in Section 3.0.

6.1 Intermodal Area

Calculations were undertaken that used the representative results of the source term noise monitoring at an existing rail freight interchange facility of noise sources such as gantry crane operation, loading / unloading containers from HGVs and the stacking of containers and predicted the resulting noise at surrounding residences. The impacts associated with such operations are detailed below. Greater detail regarding the predicted noise levels is included in the Appendix. The rating level includes a 5dB penalty as a result of the nature and characteristics of the noise source (in line with the procedure outlined in BS4142).

Table 2863/T7 – Intermodal Operation Noise Impacts: Daytime

General Location	BS4142 Comment
Chestnuts	Complaints Unlikely
Woodcut Lane	Marginal Significance
Crismill Road	Marginal Significance
Fremlins Road / Mallings Drive	Positive Indication Complaints Likely
Roundwell	Positive Indication Complaints Likely
Thurnham Road	Positive Indication Complaints Unlikely

Table 2863/T8 – Intermodal Operation Noise Impacts: Night-time

General Location	BS4142 Comment
Chestnuts	Marginal Significance
Woodcut Lane	Positive Indication Complaints Likely
Crismill Road	Complaints Likely
Fremlins Road / Mallings Drive	Positive Indication Complaints Likely
Roundwell	Positive Indication Complaints Likely
Thurnham Road	Complaints Unlikely

Maximum noise events are predicted to be just below the 60dB assessment criterion at all locations.

Conclusion

Complaints regarding noise would be likely (i.e. above marginal significance) at around 60 properties around Woodcut Lane, Crismill Road, Mallings Drive, Fremlins Road and Roundwell during night-time periods and at around 55 properties during the daytime.

6.2 On Site Road and Rail

Noise levels from road and rail traffic associated with the operation of the proposed development have been predicted at existing residential locations in line with the methodology outlined in Section 3.1.2. The impacts associated with these movements are detailed in the Table below. Please refer to the Appendix for more details of the noise predictions.

Initial noise predictions submitted as part of the Planning Application identified that rail noise levels resulting from the use of the Western Sidings would result in impacts at receptors along Fremlins Road and Mallings Drive. In light of this noise impact a noise barrier was specified running alongside the sidings from, approximately, the entrance to the intermodal area to almost the end of the IND 01 warehouse. The noise barrier is advised as being 5m high, extending 20m across the rail sidings and open on the opposite side. *The effect of this barrier has been taken into account in the predictions detailed below.*

In addition, noise impacts as a result of on site road traffic were identified at Chestnuts, Hunters Lodge (Woodcut Lane) and Crismill Road and noise barriers 3.5m high were suggested as possible mitigation measures. Unlike the enclosure of the Western Sidings, the specific locations of these barriers are not included on any site plan, with only a written description included. As such the barrier attenuation is *not* included in the impact Table below, however it is possible that a barrier could reduce noise levels by 5 to 10 dB and as such reduce the impact of on site road traffic at these locations to 'slight'. Noise barrier development should be appropriately conditioned in any approval.

Table 2863/T9 – On Site Road & Rail Noise Impacts: Daytime

General Location	Impact		
	Roads	Rail	Cumulative
Chestnuts	Substantial	None	Substantial
Woodcut Lane	Substantial	None	Substantial
Crismill Road	None	None	None
Fremlins Road / Mallings Drive	None	None	None
Roundwell	None	None	None
Thurnham Road	None	None	None

Table 2863/T10 – On Site Road & Rail Noise Impacts: Night-time

General Location	Impact		
	Roads	Rail	Cumulative
Chestnuts	Severe	None	Severe
Woodcut Lane	Substantial	None	Substantial
Crismill Road	Moderate	None	Moderate
Fremlins Road / Mallings Drive	None	None	None
Roundwell	None	None	None
Thurnham Road	None	None	None

L_{Amax} noise events are predicted to be below the 60dB assessment criterion at all locations.

Conclusion

Without mitigation, substantial adverse impact regarding noise at 2 properties during the daytime and night-time.

6.3 Off Site Road and Rail Movements

The creation of new site roads and rail sidings result in the introduction of new sources and can result in noise impacts, as detailed above. The effect of increased traffic on the existing road and rail network is less perceptible in terms of noise levels as, generally speaking, the number of movements would be required to double for a noticeable difference in terms of noise increase. Other factors affect this approximation such as the composition of the traffic and the percentage of HGVs of the overall number of movements.

It is proposed that HGVs will access the site to the East along a designated site entrance. As such any significant increases to the number of HGVs making up the traffic composition will be concentrated to the M20 – A20 link road and the Eastern part of the A20, away from the majority of noise sensitive locations. The only receptor potentially affected by such movements would be the Chestnuts property, as this is located close to the A20 and is the furthest lying East of the residential properties. To some extent the impact of such movements has already been addressed at this location in Section 6.2, with a substantial impact predicted as a result of site traffic along the access road, however a wider assessment has also been undertaken based upon the output of the transport model. The results of this assessment are included below.

Table 2863/T11 – Off Site Changes in Traffic Noise Levels

Road Link	Change In Noise Level With – Base (dB)		Impact
	2016	2026	
Ashford Road West	0.2	0.2	Slight
Ashford Road East	0.4	0.4	Slight
Willington Street	0.1	0.0	Slight
Maidstone Services	0.0	0.0	Slight
M20 - A20 Link Road	1.3	1.3	Slight
M20 West	0.8	0.7	Slight
M20 East	0.9	0.8	Slight

In addition to road traffic, the development will result in an increase in rail movements on the Maidstone – Ashford railway line. There would be an additional 24 freight train movements as a result of the development (12 arrivals and 12 departures), with 8 movements during the daytime (06:00 – 00:00 as defined in CRN) and 4 movements during the night-time (00:00 – 06:00 as defined in CRN). Noise levels associated with the additional movements have been added to the predicted noise levels calculated from existing movement information (as received in the Planning Application). The results are included in the Table below.

Table 2863/T12 – Off Site Changes in Rail Noise Levels

Period	Change In Noise Level (dB)	Impact
Daytime (06:00 – 00:00)	1.0	Slight
Night-time (00:00 – 06:00)	2.3	Slight

Conclusion

Slight adverse change in road traffic noise levels. Slight impact at Fremlins Road and Mallings Drive resulting from increased trains on the rail network.

6.4 Warehouse Loading / Unloading

The loading bays to each of the warehouses have been positioned such that they are away from noise sensitive locations and afforded acoustic screening by the warehouses.

The rail served warehouses Ind 01 and Ind 02 are shown to receive trains and therefore containers from within the units themselves. Any noise associated with the unloading of freight is therefore kept within the confines of the warehousing. Should this not be the case then any unloading of rail freight direct to the Industrial units would be undertaken on the South side of the warehouses at a distance of approximately 100m from the residential locations along Fremlins Road and Mallings Drive. Industrial noises associated with such operations are likely to be audible at the residences during the daytime and night-time and therefore potentially significant impacts could be generated which would cause further disturbance to occupants of these properties. Any approval should include be conditioned such that any unloading to the rail served warehouses should be contained within the buildings.

6.5 Installation of HVAC Equipment

As discussed in Section 3.2.4, the noise levels resulting from any HVAC installations required at the development will not become apparent until design is progressed. However, noise emissions from such installations can be readily controlled using attenuation measures such as acoustic enclosures, louvres and silencers. Noise emission levels would be determined in line with the existing requirements of Maidstone Borough Council and evidence that such levels are achievable would be submitted to the Environmental Health Department. Therefore no noise impacts are predicted from such sources.

Conclusion

No impact assuming noise emissions are designed in line with Local Authority requirements.

6.6 Operational Vibration

As a result of the distances separating the intermodal area from nearby residences and the slow speed of trains there are no impacts expected as a result of vibration associated with this aspect of the development.

As detailed in Section 6.3, changes to the number of rail movements have the potential to impact upon nearby residences, in particular those along Fremlins Road and Mallings Drive. As with the prediction of noise levels, the additional number of movements has been added to the advised current frequency of movements so as to determine a cumulative vibration dose.

The change in vibration levels has been calculated as a vibration dose value. The results of the assessment indicate that there are no impacts in terms of the increased vibration dose at the worst case receptors along Fremlins Road.

Conclusion

No impact from rail generated vibration.

6.7 Cumulative Operational Impacts

In addition to assessing each of the potential noise sources individually it is important to consider the potential for cumulative operation of all sources. To this end, Table 2863/T13 below highlights the results of the analysis when the individual noise levels are combined. More detail regarding the individual contribution of all sources is included in the Appendix.

Table 2863/T13 – Cumulative Operational Impacts

General Location	Daytime Cumulative Impact	Night-time Cumulative Impact
Chestnuts	Substantial	Severe
Woodcut Lane	Substantial	Substantial
Crismill Road	None	Moderate
Fremlins Road / Mallings Drive	None	Moderate
Roundwell	None	Substantial
Thurnham Road	None	None

From the above Table 2863/T13 it can be seen that the individual contributions from the various individual noise sources have the potential to result in significant impacts, particularly during the night-time, at all locations except Thurnham Road. This is naturally an extremely worst case scenario. It should also be reminded that the impacts at Chestnuts, Woodcut Lane and Crismill Road may be reduced following development of noise barriers around the site access roads at each of these locations.

6.8 Landscaping and Bunding

Significant landscaping is proposed across the development site so as to attempt to reduce the visual impact of the scheme. Bunding has therefore been specified within the extent of the site boundary, most notably around the large Industrial Units. In terms of providing acoustical attenuation, the bunding is largely insignificant in terms of the main cause of noise impact, i.e. the operation of the Intermodal Area upon receptors along Roundwell and Mallings Drive. This is as a result of the open area of land (not forming part of the proposed application site) ensuing no additional screening can be provided.

6.9 Refrigerated Vehicles

The predictions of noise associated with on-site road and rail movements have assumed that the source of noise is engine / movement related. The distribution of perishable goods in and out of the facility would likely require the use of refrigerated HGVs and rail trucks. For the purposes of the predictions, it is assumed that whilst HGVs and rail trucks are in motion the noise from refrigeration plant on the vehicles would be insignificant compared to the vehicles other noise sources.

Any noise impact associated with such sources would therefore be restricted to periods where the vehicles were stationary.

The noise barrier that is proposed to run alongside the western sidings would assist in mitigating noise from stationary refrigerated containers waiting within the siding to the residential locations along Fremlins Road and Mallings Drive.

Refrigerated HGVs are likely to only be stationary within the loading / unloading areas of the warehouses. Such areas have been restricted to the opposite side of the units from the residential areas i.e. on the northern side of the warehousing closest to the motorway. The warehouses provide screening from the refrigeration unit to the residential receptors such that low noise levels are predicted. The worst affected location is identified as being Woodcut Lane, however noise levels at this location are 10dB below the lowest $L_{Aeq, period}$ level and 4dB below the lowest measured $L_{A90, 15 \text{ minute}}$. No impacts are therefore predicted.

7.0 Review of Logistics Rationale

Further to the information submitted as part of the planning application, a review of the *Strategic Rail Freight Interchange in Kent: Logistics Rationale* report produced by Jacobs Consultancy has also been undertaken.

The outcome of this report, in terms of affecting the noise and vibration study is outlined as follows.

- Based upon the assumptions regarding usage of the facility as included in the application, predicted road and rail movements (Applicant & Jacobs Consultancy) are comparable.
- However, the Jacobs report identifies that the use of the facility, as anticipated in the application, is optimistic in terms of rail activity. The result of this over estimation is likely to be increased road traffic as outlined as follows:
 - i) Rail facility used less – approximately 10% increase in HGV movements to and from site (currently estimated at 3400).
 - ii) Shift in use to a Regional Distribution Centre function would increase in HGV movement to site from 3400 to 6000-7000 per day.
 - iii) As (ii) but mainly centred around perishable goods would increase HGV movement from 3400 to 11000.

The increase in HGV movements resulting from the shift in use of the facility has the potential to affect the noise predictions and therefore the anticipated noise impact detailed in Section 6.2. In terms of noise levels, an increase in HGVs of 10% above the originally estimated number of 3400 is of negligible difference. However the doubling and trebling in the number of HGVs would increase predicted noise levels by around 3dB and 5dB respectively. The potential changes to the classification of noise impact (without mitigation) are detailed in the following Tables.

Table 2863/T14 – On Site Road Noise Impacts: Daytime

General Location	Noise Impact as a Result of Changes in HGV Movements			
	Application	10% Increase	Doubling	Trebling
Chestnuts	Substantial	Substantial	Severe	Severe
Woodcut Lane	Substantial	Substantial	Substantial	Substantial
Crismill Road	None	None	None	None
Fremlins Road / Mallings Drive	None	None	None	None
Roundwell	None	None	None	None
Thurnham Road	None	None	None	None

Table 2863/T15 – On Site Road Noise Impacts: Night-time

General Location	Noise Impact as a Result of Changes in HGV Movements			
	Application	10% Increase	Doubling	Trebling
Chestnuts	Severe	Severe	Severe	Severe
Woodcut Lane	Substantial	Substantial	Severe	Severe
Crismill Road	Moderate	Moderate	Substantial	Substantial
Fremlins Road / Mallings Drive	None	None	None	Moderate
Roundwell	None	None	None	Substantial
Thurnham Road	None	None	None	None

The potential additional on site HGV movements are predicted to have little additional impact upon properties during the daytime.

Significant noise impacts (moderate, substantial) are predicted during the night-time as a result of the increase in movements from 3400 to 11000. The additional 5dB causes the noise from HGVs on site roads to exceed the night-time threshold level (45dB) for the assessment of noise impact at Fremlins Road, Mallings Drive and Roundwell.

Such significant increases in HGVs will also impact upon the predictions regarding noise from stationary refrigerated vehicles referred to in Section 6.6. Noise emissions from these sources could be minimised by enforcing a condition such that any refrigerated plant associated with vehicles must be switched off whilst stationary on-site.

Mitigation

Extensive noise barrier installation would be required to site roads in order to reduce the level of noise impact at receptors to an acceptable level. Such mitigation is not currently detailed in the Application.

8.0 Effect of Phased Construction on Operational Noise

The scale of the development is such that its construction is scheduled to take place over a period of 7 years. It is expected that the operation of the facility will begin before the construction period is complete. There are various considerations with regards to the phased operation of the Intermodal Area which are outlined as follows.

8.1 Intensification of use of Intermodal Area

The operation of the Intermodal Area has been examined by Jacobs Consultancy in terms of the intensification in use over the construction period. There are three distinct phases of operation identified:

- Phase 1: Standalone intermodal terminal
- Phase 2: Operation without the rail connected warehouses
- Phase 3: Full site development and operation

In terms of quantifying the intensification of use of the Intermodal terminal, Jacobs have established the approximate number of container moves per day for each of the phases.

- Phase 1: 616 (23% of full operation)
- Phase 2: 1701 (64% of full operation)
- Phase 3: 2660 (full operation)

The extent of the use of the Intermodal Area should be considered in the assessment of noise impact over the various phases.

The main body of this report refers to the assessment of a fully operational facility based upon projected patterns of use and measurements of existing noise sources. These analyses have established that noise impacts associated with on site rail and road movements can generally be mitigated and as such the use of the facility in terms of lower intensification would not have any additional impact assuming the required mitigation works are installed at Phase 1.

As described in Section 3.2, the method for assessing noise resulting from use of the Intermodal Area is slightly different as the source of noise is atypical from any existing source of noise within the local area. The assessment method used in the analysis of noise from the Intermodal Area is concerned with periods of duration 1 hour during the daytime and 5 minutes during the night-time (reference BS4142) as opposed to averaging noise levels over the 16 hour daytime and 8 hour night-time periods. The intensification of the use of the Intermodal Area is not considered to have any effect on this assessment as a worst case scenario of constant use over the assessment period (1 hour / 5 minutes) has been assumed.

8.2 Acoustic Screening of Intermodal Area

The rail served Industrial Units 01 and 02 are scheduled to be constructed as part of the final phase of the programme and as such there is likely to be a period of time where residential properties to the West of the site will not be afforded any screening from activities within the Intermodal Area.

The impact of the operation of the Intermodal Area upon receptors along Thurnham Lane in the absence of Industrial Units 01 and 02 is detailed as follows.

Daytime	Complaints Unlikely
Night-time	Marginal Significance

The previously predicted noise impact (with the screening provided by Ind 01 & 02) corresponded to a positive indication that complaints are unlikely. Without the screening provided by these units, the impact will become marginal although still below a level likely to cause complaint. It is a result of the large separating distances and the prevailing background noise levels that, even with direct line of sight, there is no positive indication that complaints are likely.

9.0 Comment on Applicant's Noise and Vibration Planning Assessment

An assessment of the noise and vibration impacts associated with the proposed Kent International Gateway was submitted by the applicant as part of the Environmental Statement.

In general whilst we agree with majority of the methodology used, there are aspects of the assessment that are considered to show the impact of the development to be overly positive when compared to our review. These differences occur as a result of the application assessing the impacts using a more averaged approach, where as our assessment also gives importance to the worst case scenario, as explained as follows.

Baseline Monitoring

Long term noise monitoring (10 days) has been undertaken on behalf of the application at 4 locations around the development site. The results of the surveys are included in the Environmental Statement as time history charts and the mean noise levels are also summarised. The mean L_{Aeq} and L_{A90} noise levels over the entire 10 day measurement period are detailed for daytime (07:00 - 23:00) and night-time (23:00 - 07:00) periods at each location. It is these results that form the basis of the assessment.

Long term baseline noise monitoring (up to 4 days) was also undertaken as part of our study at various locations around the development site. Locations were selected so as to be consistent with the previous noise monitoring and also to obtain data at receptors which were not previously subject to long term monitoring, such as Fremlins Road.

Instead of averaging the daytime and night-time noise levels over the entire survey period, the daily L_{Aeq} levels are reported below so as to determine any variation in noise levels from day to day (including over the weekend). The results of our baseline monitoring are included in the Appendix of this report and are included again below for a comparison between the two surveys. Whilst survey positions are not identical, a useful comparison is still able to be drawn.

Table 2863/16 – Measured Levels ($L_{Aeq, period}$)

General Location	Daytime (07:00 - 23:00)		Night-time (23:00 - 07:00)	
	RBA Acoustics $L_{Aeq, period}$ dB	Application Averaged $L_{Aeq, period}$ dB	RBA Acoustics $L_{Aeq, period}$ dB	Application Averaged $L_{Aeq, period}$ dB
Thurnham Lane	57 / 56 / 56 / 57	56	52 / 49 / 55 / 55	56
Roundwell	46 / 45 / 48	54	44 / 38 / 50	54
Crismill Road	58 / 51 / 56 / 57	57	58 / 45 / 53 / 53	56
Fremlins Road	57 / 52 / 54 / 55	-	57 / 45 / 50 / 54	-
Woodcut Lane	54 / 53 / 55 / 56	60	51 / 46 / 55 / 54	59

From the Table above it can be seen that there are day to day variations in noise levels, particularly during the night-time at the weekend. By averaging the measured levels over an entire survey period, as reported in the application, these quieter periods are given less importance. In addition, the levels reported at the Roundwell measurement location are found to vary considerably which will again tend to underestimate any noise impact.

The baseline levels recording during our surveying at Roundwell are much lower than those reported by the Applicant which accentuates the difference in classification of noise impact even though predicted levels are consistent.

This has a significant outcome on the results of the assessment as the high levels recorded by the applicant are used as the basis of assessment. These levels have also been used by the applicant in the assessment of noise at Fremlins Road and Mallings Drive.

In addition to the measurement of L_{Aeq} noise levels, the noise parameter L_{A90} is also reported. The L_{A90} is described as being the noise level that is exceeded for 90% of the measurement period. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise using BS4142.

Averaged L_{A90} noise levels are provided by the applicant and are summarised below. Also included in the table are the lowest $L_{A90, 15mins}$ as recorded over our surveys. As described in Section 4.5 of this report, the use of the lowest recorded L_{A90} is a worst case assessment method. However, when assessing a noise source that is likely to occur at any time of the day or night, we consider its use to be justified, particularly given that this review should establish any potential impact as opposed to the average case.

Table 2863/17 - Measured Levels (L_{A90})

General Location	Daytime (07:00 - 23:00)		Night-time (23:00 - 07:00)	
	RBA Acoustics L_{A90} dB	Application Averaged $L_{A90, period}$ dB	RBA Acoustics L_{A90} dB	Application Averaged $L_{A90, period}$ dB
Thurnham Lane	51 / 48 / 47 / 49	50	44 / 38 / 42 / 40	48
Roundwell	43 / 41 / 38	49	41 / 34 / 42	47
Crismill Road	46 / 42 / 48 / 51	52	49 / 38 / 43 / 41	49
Fremlins Road	41 / 41 / 47 / 51	-	50 / 33 / 41 / 41	-
Woodcut Lane	49 / 47 / 46 / 51	56	46 / 40 / 45 / 44	51

As can be seen in the Table, and as described previously, the lower levels recorded, particularly over the weekend, mean that the potential for noise impact is more apparent.

Intermodal Operation

In general our approach and assessment with regard to environmental noise sources such as on site and off site road and rail traffic, draw similar conclusions to that provided by the applicant. The differences with regards to the outcome of the noise assessments are as a result of Intermodal operation.

Intermodal activity, not including HGV / rail movement, is assessed in the Environmental Statement under the heading Gantry Cranes. The assessment reports that the predicted level of 44dB $L_{Aeq,T}$ is below the baseline L_{Aeq} for both daytime and night-time periods (54dB / 54dB) at the nearest affected residences and therefore no impact is predicted and no quantitative assessment is provided. As described previously, the interpretation of the results of our baseline monitoring (at Roundwell and Fremlins Road) would suggest that this predicted level would be significantly above the L_{Aeq} baseline on some occasions, as a result noise impact would be predicted.

The assessment method used in determining the noise impact of the Intermodal operation also differs.

As described in detail in Section 3.2, in addition to the evaluation of noise levels in terms of change in L_{Aeq} above a threshold limit, a BS 4142 evaluation has also been undertaken.

BS 4142 is a standard that provides the framework for the prediction and assessment of industrial noise against the background (L_{A90}) noise levels. The assessment is in terms of establishing the likelihood of complaint of an industrial noise source upon residential properties. There are many opinions as to the application of this standard as its use is often misquoted. Further information regarding the standard is provided within the Appendix and the reasons for our including this type of assessment are found within Section 3.2. It is our professional opinion that the use of BS4142, when assessing noise from the operation of the cranes etc from within the Intermodal Area, is entirely valid.

For the purposes of the BS 4142 assessment, the lowest daytime and night-time L_{A90} levels measured during the survey period have been used. It is accepted that the use of the lowest L_{A90} does constitute a worst case assessment. However, given the nature of the proposed development and its 24 hour a day, 7 days a week operation, the use of the lowest L_{A90} is considered reasonable as residents may be affected at any time.

Cumulative Impact

As mentioned previously, a quantitative assessment of noise from the operation of the cranes / container loading and unloading was not undertaken as part of the applicants noise study as levels were below the measured mean L_{Aeq} . It is not clear as to whether the noise levels from this operation have been included within the cumulative impact calculation, as only road and rail are mentioned. As a result, it is considered that the potential cumulative impacts are underestimated.

10.0 Summary

A summary of the noise and vibration assessment is included as follows.

10.1 Summary of Application Information

This report provides an assessment of the predicted noise and vibration levels resulting from both the construction and future operational phases of the proposed Kent International Gateway development. The assessment is based upon the information submitted as part of the Planning Application and traffic data provided by Maidstone Borough Council.

A review of standards and documentation has been undertaken so as to develop a framework for the prediction and assessment of noise and vibration levels. The assessment methodology recognises that industry responsible for the creation of jobs and infrastructure will generate noise and also that the impact of such noise should not unduly impact on the life of existing residents.

Noise levels during the construction phase of the development will require mitigation in terms of considerate site operation, the use of quiet machinery and close positioned noise barriers. Despite the mitigation measures, residual noise impacts are predicted at receptors close to the various phases of work, potentially for periods of up to 157 weeks.

Vibration levels resulting from both the construction and operational phases are below those likely to result in adverse comment or (in terms of construction activities) damage to buildings.

The impact of operational noise levels has been assessed by means of two different approaches dependent on the source of the noise. For the assessment of noise levels that could be considered to be environmental in nature, i.e. comparable to those sources of noise currently experienced in the area such as road traffic and the nearby regional and international railways, predicted noise levels were assessed against threshold limits whose origins were in guidance such as WHO and various British Standards. Should the thresholds be exceeded, the change in ambient noise was established and assessed in terms of impact. This methodology determined that slight residual increases in road and rail noise would be experienced in the local area and that substantial-severe impact could result at individual properties adjacent to site roads without the use of extensive noise barrier development and installation. Noise barriers around site roads would reduce the noise impact at receptors to an insignificant level. The development of the enclosure of the Western Sidings so as to reduce noise levels has been included within the Planning Application and its attenuating effect has therefore been considered in this review.

When considering the noise impact of the operation of the intermodal area, consideration should also be given to the impact of introducing a new noise source to the local environment. Weight should also be given to the industrial nature of the noise source and the intermittent and impulsive characteristics associated with the loading, unloading and relocating of the containers around the intermodal area. To this end a BS4142 assessment has also been included providing a comparison between the predicted 'rating level' and the background noise. This assessment comments on the likelihood of complaint arising from the introduction of a new industrial noise on existing residential locations.

The outcome of this assessment indicated that complaints regarding noise, during both daytime and night-time periods, were likely at numerous residential locations around the proposed development site, most notably, properties along Roundwell and Mallings Drive.

The introduction of a new noise source that has been considered to result in a positive indication that complaints would be expected as a result of its operation is therefore an unacceptable effect and sufficient grounds for refusal of the Planning Application.

10.2 Summary of Rail Logistics Rationale in terms of Noise

The Rail Logistics Rationale prepared by Jacobs consultancy identified that the use of the rail interchange aspect of the development is over optimistic. It is advised that in order for the development to be economically viable would result in a shift in use to that of a Regional Distribution Centre. As such, the resulting number of HGVs on site roads is predicted to increase dramatically.

An assessment of the additional on site HGV movements has therefore been included within this report.

The results indicate that predicted levels are to have little additional impact upon properties during the daytime to those identified in the application (as a result of the levels falling below the assessment threshold).

Significant noise impacts (moderate, substantial) are predicted during the night-time as a result of the increase in movements from 3400 to 11000. The additional 5dB causes the noise from HGVs on site roads to exceed the night-time threshold level for the assessment of noise impact, hence the greater impact. Extensive noise barrier installation would be required to site roads in order to reduce the level of noise impact at receptors to an acceptable level. Such mitigation is not currently detailed in the Application.

10.3 Summary of Application Noise and Vibration Assessment

In general we agree with the methodology and predictions included in the Noise and Vibration chapter of the Environmental Statement. However, there are differences that can be explained by the Applicant taking a more 'optimistic' approach to the assessment as opposed to our more 'worst case' assessment.

Differences include the applicant averaging the long term baseline monitoring results which do not give weight to individual quieter periods, such as weekends.

We also consider that noise from the Intermodal Area, such as crane operation, and container stacking / unloading etc. should be assessed as an industrial source, as resulting noises are atypical from any environmental source currently affecting the baseline noise climate. We have therefore undertaken a BS4142 assessment which identified that complaints would be likely at around 60 receptors.

The Noise and Vibration section of the Environmental Statement does not include noise from the Intermodal Area in the cumulative impact predictions, which may be an underestimation of the overall cumulative impact.

11.0 Conclusion

The conclusions of the noise and vibration assessment of both the construction and future operational phases of the proposed Kent International Gateway development are detailed as follows.

The scale of the development is such that residual impacts during the construction phase will occur on 157 occasions during weekend working. Such intensive disruption of the amenity of local residents is considered to be unacceptable and grounds for refusal.

Noise arising from the operation of the Intermodal Area has been determined as resulting in levels that are likely to cause complaint from residential occupants of receptors including Mallings Drive and Roundwell. Under no circumstances can noise arising from the operation of the Intermodal Area be mitigated, this is considered to be unacceptable and a therefore a major reason for refusing this application