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**PPG 24 Assessment Concerning Rail Noise
For
Proposed Development at
Former Goods Yard, Goring Street
Goring, Worthing**

(Addendum to Initial Report Dated 19th June 2006)

2nd August 2006

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24th July 2006

Dear John

RE: Goring Street (Former Goods Yard)

The purpose of this document is to address the questions set out by the Development Control Department of Worthing Borough Council regarding the initial railway noise assessment conducted by Sound Solutions. The questions are listed below and are numbered as they were in the original E-Mail dated 29th June 2006. Number one is omitted from this document as it relates to the noise assessment of the adjacent factory unit and is addressed in a different document.

- 2.0 *"The night time rail noise has been predicted rather than measured and also the assumption has been made to the non-existence of freight trains at night. This could have a bearing on the NEC and tip the development into category "C"."*
- 3.0 *"Station announcements and level crossing activities may also impact on this development due to the close proximity of Goring Station and the level crossing adjoining the site."*
- 4.0 *"The other point is that there is no evidence that the consultant has contacted the railway operators to confirm future line usage (potential intensification.)"*

I listed below are the responses to the individual questions raised:

- 2.0 Night time rail noise has indeed been predicted rather than measured. The prediction was made using the following information:
- a) Current time table data which details the number of passenger trains that pass through (stopping and non-stopping) Goring by Sea railway station.
 - b) Train Sound Exposure levels were measured on site during the day time. These individual measurements were then grouped into train types based on train length. The individual measurements were then averaged for each train type in order to create a "typical" sound exposure level for each train type.

The above is in accordance with Calculation of Rail Noise 1995 which states the following in section 43 paragraph 2 (Sampling):

"In order to determine the LAeq,18h or LAeq,6h noise level it may be necessary to carry out SEL noise measurements of each train pass-by over the full time period of interest. Exceptions to this may occur when the train mix and speed of individual train types remain reasonably constant over the relevant time period. For this situation, it is acceptable to measure a representative sample of individual train pass bys of each train type running on each track and determine an arithmetic mean value for the SEL for each case."

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Acoustic Associates

FROM JOHN CRIPPTANS
247036.

cc. A. GREENWOOD.
A. KING.
T. WHEELER.

In order to sample all types of train that travel on the particular line the survey was deliberately conducted over a duration that covered a busy and a quiet period of train operation. Conducting the sampling in this way takes into account the fact that rail companies will try to match train type with demand.

Another point that should be noted is the fact that a train SEL measured in the daytime is likely to be marginally higher than if an identical train SEL was measured at night time. This is due to the fact that in the daytime the background noise levels are generally higher than at night time and during the train SEL measurement background noise will be "captured" as well as the train noise.

The effect of noise from night time freight train activity is hard to assess due to irregularity of freight operations and the non existence of any useful information documenting freight train activities. However reference can be made to the Network Rail Business Plan 2006 for Brighton & Sussex which states the following on page 9:

"The gauge and route availability is considered adequate for the limited freight traffic on the main Sussex route. The freight capability of the West London Line is considered adequate."

The Duty Manager at Brighton mainline station was also consulted and he said that the most common type of freight train activity was that of rail maintenance trains that carry rail supplies/plant machinery and to his knowledge these operated only occasionally. He did not rule out the existence of other commercial freight trains but did state that they would be very occasional on that route.

3.0 With regards to station announcements and level crossing activities Calculation of Rail Noise 1995 states the following in section 36 paragraph 1 (Stations):

"An additional point to note is that the noise generated by the public address system or other non-train related noise sources should not be considered for the purpose of calculating the relevant noise levels"

The initial report followed the above guidelines and did not give details or noise levels of station announcements and level crossing activities. However during the initial visit on the 9th June 2006 the factors detailed above were investigated.

During the rail noise survey it was noted that station announcements were just audible within the background noise. The fact that the announcements were just audible within background means that it would be hard to conduct an accurate measurement of the announcement without also measuring underlying background noise. It also means that the noise level generated by the station announcements would be lower than the ambient level. It is considered that the station announcement noise should not cause annoyance.

It was possible to conduct a measurement of the siren that operates before the level crossing gates are closed. Three siren noise measurements of sound exposure level were conducted in the same way as the individual train SEL measurements on the 9th June 2006. All three measurements were taken at an approximate distance of 30m from the level crossing and are detailed below:

Measurement	SEL
1	74.1 dB(A)
2	73.1 dB(A)
3	73.9 dB(A)

(For details of measurement equipment weather conditions etc. see main report dated 19th June 2006)

The current site layout shows that the nearest dwelling to the level crossing is 20m away. The Siren will be propagating as a point source rather than the line source propagation of the railway line.

Distance correction of a point source is detailed below:

$$\begin{aligned} \text{Correction (dB)} &= 20 \text{ Log (R1/R2)} \\ &= 20\text{Log}(30/20) \\ &= 3.5 \text{ dB} \end{aligned}$$

Therefore the siren noise at the nearest dwelling to the level crossing will be as follows:

Measurement	SEL
1	77.6 dB(A)
2	76.6 dB(A)
3	77.4 dB(A)

Now it is possible to treat the siren noise as an individual type of train in order to see what effect the siren will have on the Noise Exposure Category of the development. As with the train noise calculations the first step is to arithmetically average the individual SEL measurements:

$$\text{Average Siren SEL} = 77.2 \text{ dB(A)}$$

The next step would be to predict the number of events in both day time and night time periods. The siren operates every time the level crossing barriers are lowered. This does not happen for every train pass by as sometimes more than one train will pass by whilst the barriers remain closed. A conservative estimate would be that the siren operates for 80% of train pass bys in the daytime and 100% during the night time. A total of some 160 trains pass through Goring by Sea Station during each weekday. Out of the 160 passenger trains that pass through the station 14 travel between 23:00hrs & 07:00hrs and 146 travel between 07:00hrs & 23:00hrs.

Therefore it is predicted that the siren will operate 117 times in the day and 14 times in the night.

L_{Aeq} Conversion for Individual Train Types

The SEL data for the siren can now be converted into L_{Aeq} data for both of the time periods using the following formula:

$$L_{Aeq} = \text{SEL} - 10\text{Log T} + 10\text{Log N}$$

Where N = no. of events in period
T = no. of seconds in period

07:00hrs - 23:00hrs

$$\text{Siren } L_{Aeq(16hr)} = 77.2 - 10\text{Log } 57600 + 10\text{Log } 117 = 50.3\text{dB(A)}$$

23:00hrs - 07:00hrs

$$\text{Siren } L_{Aeq(8hr)} = 77.2 - 10\text{Log } 28800 + 10\text{Log } 14 = 44.1\text{dB(A)}$$

The nearest dwelling to the level crossing is approximately 12m from the nearest active rail. The worst case rail noise readings at a point 12m from the nearest active rail (as calculated by computer model) are as follows:

07:00hrs - 23:00hrs = 57 dB(A)

23:00hrs - 07:00hrs = 50 dB(A)

To gauge the effect the siren will have it is now possible to add (logarithmically) the calculated Siren L_{Aeq} (daytime and night time) to the values above to get the rail + siren noise levels:

07:00hrs - 23:00hrs = 58 dB(A)

23:00hrs - 07:00hrs = 51 dB(A)

(In accordance with PPG24 figures above have been rounded to nearest highest integer)

Determination of Noise exposure Category (Rail Noise)

Free Field Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings $L_{Aeq,T}$ dB				
	Noise Exposure Category			
Rail Noise	A	B	C	D
07.00-23.00	<55	55 - 66	66 - 74	>74
23.00-07.00	<45	45 - 59	59 - 66	>66

07.00 - 23.00 Free Field measured level = 58 dB(A) $L_{eq(16hr)}$

23.00 - 07.00 Free Field measured level = 51 dB(A) $L_{eq(8hr)}$

07.00 - 23.00 Noise Exposure Category B

23.00 - 07.00 Noise Exposure Category B

- 4.0 Potential intensification of rail traffic on the south coast route is detailed in the Network Rail Business Plan 2006 for Brighton & Sussex which states the following on pages 8 & 9:

Future demand:

"Passenger demand is expected to remain high throughout the route, with peak commuter demand growing in line with increasing employment in London. The BML RUS predicts a growth rate of between 1% and 3% per year up to 2012."

Future capacity:

"The route is operating close to the maximum number of trains that can be run at present and several measures are envisaged as being necessary to accommodate the predicted growth:

- Implementation of a revised main line timetable structure. The changes proposed by the BML RUS would ensure that all peak period trains operate at the maximum length that the infrastructure is capable of accommodating. This would therefore provide an overall increase in passenger capacity."

The above can be interpreted to show that the number of train pass bys through Goring is not likely to change in the future. The increase in demand will be met by the rail companies running trains of longer length during peak periods.

The initial report dated the 19th June 2006 calculated the frequency of the different train types for both time periods details of which are detailed below:

07:00hrs & 23:00hrs:		23:00hrs & 07:00hrs	
Train Type	No. Of Trains	Train Type	No. Of Trains
2-coach trains	12	2-coach trains	1
3-coach trains	53	3-coach trains	5
4-coach trains	65	4-coach trains	6
8-coach train	16	8-coach train	2

During 07:00hrs & 23:00hrs 571 individual coaches pass by Goring Station. The maximum possible percentage increase of 3% per year will mean that it is likely that in 2012 the number of individual coach pass bys will rise to 674. As the increase is to happen during peak times it is likely that some of the four coach trains will be upped to 8 coach trains. The calculated increase in coaches could be accommodated by changing 25 of the 4-coach trains to 8-coach trains.

During 23:00hrs & 07:00hrs 56 individual coaches pass by Goring Station. The maximum possible percentage increase of 3% per year will mean that it is likely that in 2012 the number of individual coach pass bys will rise to 66. As the increase is to happen during peak times it is likely that some of the four coach trains will be upped to 8 coach trains. The calculated increase in coaches could be accommodated by changing 3 of the 4-coach trains to 8-coach trains. The predicted table of train types for 2012 is as follows:

07:00hrs & 23:00hrs:			
Train Type	No. Of Trains	Train Type	No. Of Trains
2-coach trains	12	2-coach trains	1
3-coach trains	53	3-coach trains	5
4-coach trains	39	4-coach trains	3
8-coach train	41	8-coach train	5

The calculation detailed in section 3.2 of the initial report can now be recalculated to give the 2012 predicted noise levels:

07:00hrs - 23:00hrs

2-coach trains	$L_{Aeq(16hr)} = 87.3 - 10\text{Log } 57600 + 10\text{Log } 12$	=50.64dB(A)
3-coach trains	$L_{Aeq(16hr)} = 83.4 - 10\text{Log } 57600 + 10\text{Log } 53$	=52.98dB(A)
4-coach trains	$L_{Aeq(16hr)} = 85.3 - 10\text{Log } 57600 + 10\text{Log } 39$	=53.61dB(A)
8-coach trains	$L_{Aeq(16hr)} = 85.9 - 10\text{Log } 57600 + 10\text{Log } 41$	=54.42dB(A)

23:00hrs - 07:00hrs

2-coach trains	$L_{Aeq(8hr)} = 87.3 - 10\text{Log } 28800 + 10\text{Log } 1$	=43.47dB(A)
3-coach trains	$L_{Aeq(8hr)} = 83.4 - 10\text{Log } 28800 + 10\text{Log } 5$	=45.80dB(A)
4-coach trains	$L_{Aeq(8hr)} = 85.3 - 10\text{Log } 28800 + 10\text{Log } 3$	=45.48dB(A)
8-coach trains	$L_{Aeq(8hr)} = 85.9 - 10\text{Log } 28800 + 10\text{Log } 5$	=48.30dB(A)

L_{Aeq} Conversion for day and night time periods

A process of addition (logarithmically) can now be used in order to obtain the day and night time L_{Aeq} values for all of the train types.

07:00hrs - 23:00hrs	$L_{Aeq(16hr)}$ Total (Free Field)	=	60dB(A)
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23:00hrs - 07:00hrs	$L_{Aeq(8hr)}$ Total (Free Field)	=	53dB(A)
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(In accordance with PPG24 figures above have been rounded to nearest highest integer)

The above shows the predicted 2012 rail noise levels at 6m from the nearest rail.

The noise levels at the dwelling (12m from rail) that is nearest the level crossing will be 3dB less than the levels detailed above due to the doubling of distance. The previously calculated siren noise can now be combined with the predicted noise levels above:

07:00hrs - 23:00hrs

Siren	$L_{Aeq(16hr)} = 77.2 - 10\text{Log } 57600 + 10\text{Log } 117$	=50.3dB(A)
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Total noise	=	50.3dB(A)	+	57 dB(A)	=	58 dB(A)
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23:00hrs - 07:00hrs

Siren	$L_{Aeq(8hr)} = 77.2 - 10\text{Log } 28800 + 10\text{Log } 14$	=	44.1dB(A)
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Total noise	=	44.1 dB (A)	+	50 dB(A)	=	51 dB(A)
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07:00hrs - 23:00hrs = 58 dB(A)

23:00hrs - 07:00hrs = 51 dB(A)

(In accordance with PPG24 figures above have been rounded to nearest highest integer)

Determination of Noise exposure Category (Rail Noise)

Free Field Noise Levels Corresponding To The Noise Exposure Categories For New Dwellings LAeq,T dB				
	Noise Exposure Category			
Rail Noise	A	B	C	D
07.00-23.00	<55	55 - 66	66 - 74	>74
23.00-07.00	<45	45 - 59	59 - 66	>66

07.00 - 23.00 Free Field measured level = 58 dB(A) $L_{eq(16hr)}$

23.00 - 07.00 Free Field measured level = 51 dB(A) $L_{eq(8hr)}$

07.00 - 23.00 Noise Exposure Category B

23.00 - 07.00 Noise Exposure Category B

Conclusions

Using the measured siren noise levels and Network Rail's predictions for increased rail traffic to predict possible worst case scenario rail noise levels shows that development will still fall into NEC B for both time periods.

The lack of detailed freight train activity information makes it hard to quantify potential increases in night time rail noise levels. However the limited information that has been acquired from Network Rail and local railway staff indicates that night time freight train activity is very occasional on this particular line. The fact that at present the night time noise levels fall into the middle of NEC B should mean that even with the limited night time freight activity the night time NEC category will not change.

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