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By email

Date: 15th May 2013
Reference: R1401-551 Rev 1

Dear Steve

RE: Bognor Relief Road - Estimation of Potential Night-time Noise Levels from Construction of Viaduct over Railway

Further to recent correspondence and our meeting last week with Graham Evans from Arun District Council's Environmental Health Department. I am pleased to provide the results of indicative calculations of the likely noise levels that can be expected at the nearest residential properties, from the works associated with construction of the viaduct over the railway for the Bognor Relief Road during the night-time period.

As discussed at our meeting we understand that you will require to undertake the following works at night:

- Delivery and offloading of viaduct beams. Night-time deliveries are required due to the size of the beams and the resulting traffic congestion that would occur if they were to be delivered during the day;
- Construction of the viaduct over the railway. This is to be undertaken on a continuous basis, most likely over weekend possessions from Network Rail. It should be noted that the precise duration and timing of the possessions is not yet agreed with Network Rail;
- Any additional viaduct construction works (away from the railway) which unavoidably run over from the normal (consented) construction hours (for example as a result of delays caused by adverse weather).

Construction Noise Methodology

Detailed advice on assessing noise from construction sites can be found in British Standard 5228 Part 1. This standard provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.

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It makes reference to a number of factors which are likely to affect the significance and acceptability of construction site noise. These are:

- i) Site location;
- ii) Existing ambient noise levels;
- iii) Duration of site operations;
- iv) Hours of work;
- v) Attitude of the site operator;
- vi) Noise characteristics.

It is generally recognised that for industrial noise the likelihood of complaints is related to the difference between the noise from the industrial source and the existing background noise level. British Standard 5228, however, recognises that this relationship between response and noise level differences may well be different for construction noise activities, and a greater difference may be tolerated when it is known that the operations are of a relatively short duration. It would be anticipated that the longer the construction activities are scheduled for, the closer the perception of a construction site to a permanent industrial facility, particularly if the construction activities take place at night. It is therefore important to consider the duration of the proposed works in addition to the hours of construction working within the context of the development area.

With respect to hours of work, BS 5228 makes reference to the fact that noise levels generated during the evening (19.00 to 23.00) may need to be lower than the daytime (07.00 to 19.00) period (a figure of 10 dB is quoted) and also that for any night-time operations (23.00 to 07.00) levels should be quieter still.

BS 5228 gives guidance on the assessment of construction noise relative to the existing ambient noise level and this is summarised below.

Period of Assessment	Category A	Category B	Category C
Night-time (23.00 – 07.00)	45	50	55

Table 1: Night-time Construction Noise Threshold of Significant Effect

The Category A threshold is to be used when ambient noise levels (when rounded to the nearest 5 dB) are less than 45 dB. Category B threshold values are to be used when ambient noise levels (when rounded to the nearest 5 dB) are equal to 45 dB and Category C is used when ambient noise levels (when rounded to the nearest 5 dB) are higher than 45 dB.

If the total noise level (ambient plus construction noise) exceeds the appropriate category value, then a significant effect is deemed to occur.

At the current time an ambient noise survey has not been undertaken however ambient noise levels in the area are thought to be 'low' and therefore it is likely that a Category A threshold value would apply.

Calculations

Calculations of the potential noise levels generated by the construction works have been carried out using the guidance of BS 5228. The level of noise generated by the construction activities will depend upon a range of factors, which include plant to be used, distance between source and receptor and % on-time for each item of plant.

The following night-time phases and plant are assumed for use on the site.

Phase		Plant to be used
1	Piling & erection of piers	Rotary piling rig, dump truck, HGV delivery vehicles, tracked excavator, lighting generator, concrete pump.
2	Beam construction	Crane, dump truck, HGV delivery vehicles, air compressor, pneumatic drills, lighting generator.

Table 2: Viaduct Night-time Construction Phases

Source noise data for the plant has been taken from the database contained in BS 5228 and also from measurements of similar plant undertaken by 24 Acoustics in the past.

Two construction cases have been assumed. 1. An assumption that all night-time working will be centred in the area near the railway 2. A worst-case scenario, assuming the night-time work site is at the closest viaduct location to each receptor property.

The calculations (with all assumptions) are appended to the rear of this letter and the results summarised in Tables 3 and 4 below.

Phase		Receptor & Night-time Construction Façade Noise Level, dB LAeq, 1 hour			
		Sack Barn	Hoe Farm	Shripney	Camp site
1	Piling & erection of piers	49	40	41	40
2	Beam construction	49	40	41	40

Table 3: Summary of Calculated Façade Noise Levels, Work at Railway Viaduct

Phase		Receptor & Night-time Construction Façade Noise Level, dB LAeq, 1 hour			
		Sack Barn	Hoe Farm	Shripney	Camp site
1	Piling & erection of piers	53	46	45	43
2	Beam construction	54	47	46	43

Table 4: Summary of Calculated Façade Noise Levels, Worst Case Assumption.

No information is currently available regarding the ambient noise levels at the nearest residential properties, however, it is considered that ambient noise levels in the area at night will be low and therefore there is the potential for some impact at Sack Barn, and to a lesser extent, Hoe Farm, when viaduct construction is at its nearest point to these properties.

The noise from night-time HGV beam deliveries have not been calculated as it is difficult to quantify the likely the noise level from a single moving source. Noise levels from this activity are considered likely to be no greater (but in reality probably substantially lower) than operational traffic noise levels on the new road, once open. Note the predictions have, however, included the noise from the offloading of the vehicles under the Phase 2 operations described in Tables 2-4.

In mitigation, all work will be undertaken with all reasonable skill and care and will use best practice to minimise the noise impact upon neighbouring properties. A code of construction practice will be drawn up and agreed with the LPA and this will provide details of the developer's commitment to minimise the noise impact upon the neighbouring properties by the following:

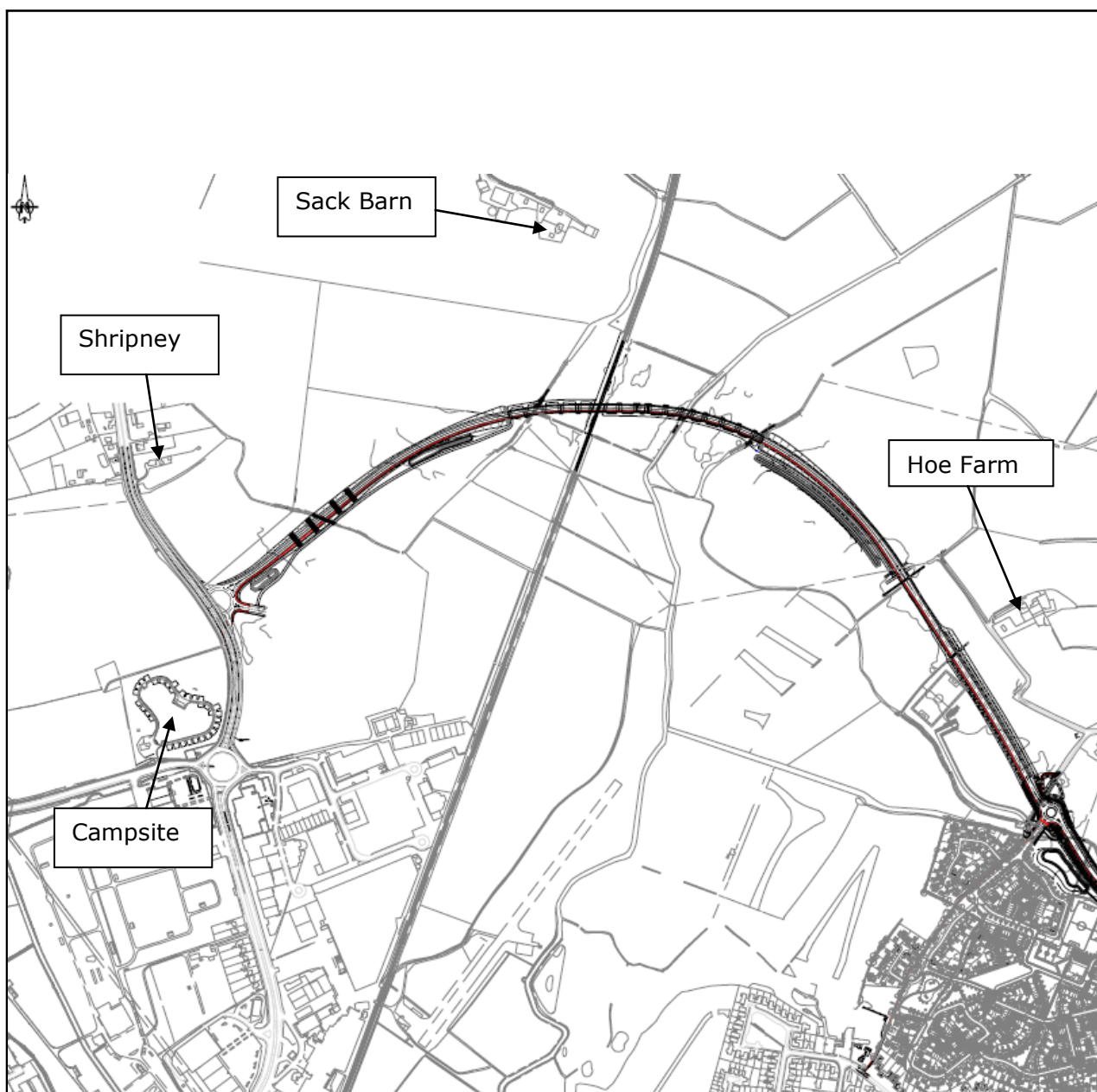
- Provision of a (well publicised) initial consultation meeting to which all local residents will be invited. The meeting will include details of the work that is planned with details of the phases of work, the timings and durations;

- Provision of updates regarding construction progress to the local population via leaflets to be distributed in public areas;
- Commitment to ensure that all staff on site are informed of the requirement to use best practice to minimise noise emission, particularly at night;
- Commitment to minimise the use of horns and reversing alarms where possible;
- No radios to be used on site;
- No shouting or loud hailers to be used (except in case of emergency);
- Commitment to use of modern well-maintained plant throughout.

I trust you will find the above of interest to you. Should you have any queries please do not hesitate to contact me.

Yours sincerely,
For 24 Acoustics Ltd

Reuben Peckham BEng MPhil CEng MIOA
Director Principal Consultant



Project: Bognor Relief Road Viaduct	Description: Site Location and Nearest Residential Properties		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: A	
Date: March 2013	Drawn By: RP	Job No: R1401	

APPENDIX A: CONSTRUCTION NOISE CALCULATIONS

Assumption- Work undertaken at Viaduct/ Railway Intersection

Construction Noise Calculation Sheet, Based upon BS 5228, 2009										
PROJECT : Bognor Relief Road Viaduct										
Phase : 1, Piling & pier erection										
						Notes : 1. With screening use hard ground 2. Facade correct. is +3				
Sack Barn										
Plant Details		PWL	distance , m	% soft ground	Adjustments, dB(A)		Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type					distance	screening reflection		%	Correct. dB	
Auger piling rig		108	335	75	63	0 0	45	50	-3.01	42
Dump Truck		102	335	75	63	0 0	39	75	-1.25	38
Lighting generator		93	335	75	63	0 0	30	100	0.00	30
HGV delivery		112	335	75	63	0 0	49	25	-6.02	43
Concrete Pump		108	335	75	63	0 0	45	100	0.00	45
Cement Mixer Truck		103	335	75	63	0 0	40	25	-6.02	34
							Total SPL due to fixed plant =			49
Hoe Farm										
Plant Details		PWL	distance , m	% soft ground	Adjustments, dB(A)		Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type					distance	screening reflection		%	Correct. dB	
Auger piling rig		108	825	75	72	0 0	36	50	-3.01	33
Dump Truck		102	825	75	72	0 0	30	75	-1.25	29
Lighting generator		93	825	75	72	0 0	21	100	0.00	21
HGV delivery		112	825	75	72	0 0	40	25	-6.02	34
Concrete Pump		108	825	75	72	0 0	36	100	0.00	36
Cement Mixer Truck		103	825	75	72	0 0	31	25	-6.02	25
							Total SPL due to fixed plant =			40
Shripney										
Plant Details		PWL	distance , m	% soft ground	Adjustments, dB(A)		Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type					distance	screening reflection		%	Correct. dB	
Auger piling rig		108	760	75	71	0 0	37	50	-3.01	34
Dump Truck		102	760	75	71	0 0	31	75	-1.25	30
Lighting generator		93	760	75	71	0 0	22	100	0.00	22
HGV delivery		112	760	75	71	0 0	41	25	-6.02	35
Concrete Pump		108	760	75	71	0 0	37	100	0.00	37
Cement Mixer Truck		103	760	75	71	0 0	32	25	-6.02	26
							Total SPL due to fixed plant =			41
Campsite										
Plant Details		PWL	distance , m	% soft ground	Adjustments, dB(A)		Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type					distance	screening reflection		%	Correct. dB	
Auger piling rig		108	840	75	72	0	36	50	-3.01	33
Dump Truck		102	840	75	72	0	30	75	-1.25	29
Lighting generator		93	840	75	72	0	21	100	0.00	21
HGV delivery		112	840	75	72	0	40	25	-6.02	34
Concrete Pump		108	840	75	72	0	36	100	0.00	36
Cement Mixer Truck		103	840	75	72	0	31	25	-6.02	25
							Total SPL due to fixed plant =			40

PROJECT : Bognor Relief Road Viaduct											
Phase : 2, Beam erection											
						Notes :	1. With screening use hard ground 2. Facade correct. is +3				
Sack Barn											
Plant Details		distance	% soft	Adjustments, dB(A)			Resultant	Activity duration		Activity	
Type	PWL	, m	ground	distance	screening	reflection	LAeq, 1hour	%	Correct. dB	LAeq	
250T Crane	106	335	75	63	0	0	43	50	-3.01	40	
Dump Truck	102	335	75	63	0	0	39	75	-1.25	38	
Lighting generator	93	335	75	63	0	0	30	100	0.00	30	
HGV delivery	112	335	75	63	0	0	49	50	-3.01	46	
Air compressor	106	335	75	63	0	0	43	100	0.00	43	
Pneumatic drill	100	335	75	63	0	0	37	50	-3.01	34	
							Total SPL due to fixed plant =		49		
Hoe Farm											
Plant Details		distance	% soft	Adjustments, dB(A)			Resultant	Activity duration		Activity	
Type	PWL	, m	ground	distance	screening	reflection	LAeq, 1hour	%	Correct. dB	LAeq	
250T Crane	106	825	75	72	0	0	34	50	-3.01	31	
Dump Truck	102	825	75	72	0	0	30	75	-1.25	29	
Lighting generator	93	825	75	72	0	0	21	100	0.00	21	
HGV delivery	112	825	75	72	0	0	40	50	-3.01	37	
Air compressor	106	825	75	72	0	0	34	100	0.00	34	
Pneumatic drill	100	825	75	72	0	0	28	50	-3.01	25	
							Total SPL due to fixed plant =		40		
Shripney											
Plant Details		distance	% soft	Adjustments, dB(A)			Resultant	Activity duration		Activity	
Type	PWL	, m	ground	distance	screening	reflection	LAeq, 1hour	%	Correct. dB	LAeq	
250T Crane	106	760	75	71	0	0	35	50	-3.01	32	
Dump Truck	102	760	75	71	0	0	31	75	-1.25	30	
Lighting generator	93	760	75	71	0	0	22	100	0.00	22	
HGV delivery	112	760	75	71	0	0	41	50	-3.01	38	
Air compressor	106	760	75	71	0	0	35	100	0.00	35	
Pneumatic drill	100	760	75	71	0	0	29	50	-3.01	26	
							Total SPL due to fixed plant =		41		
Campsite											
Plant Details		distance	% soft	Adjustments, dB(A)			Resultant	Activity duration		Activity	
Type	PWL	, m	ground	distance	screening	reflection	LAeq, 1hour	%	Correct. dB	LAeq	
250T Crane	106	840	75	72	0		34	50	-3.01	31	
Dump Truck	102	840	75	72	0		30	75	-1.25	29	
Lighting generator	93	840	75	72	0		21	100	0.00	21	
HGV delivery	112	840	75	72	0		40	50	-3.01	37	
Air compressor	106	840	75	72	0		34	100	0.00	34	
Pneumatic drill	100	840	75	72	0		28	50	-3.01	25	
							Total SPL due to fixed plant =		40		

Worst Case Assumption- Closest Viaduct Point to Receptor**PROJECT : Bognor Relief Road Viaduct****Phase : 1, Piling & pier erection**

Notes : 1. With screening use hard ground
2. Facade correct. is +3

Sack Barn

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration % Correct. dB		Activity LAeq
				distance	screening	reflection				
Auger piling rig	108	300	75	62	0	3	49	50	-3.01	46
Dump Truck	102	300	75	62	0	3	43	75	-1.25	42
Lighting generator	93	300	75	62	0	3	34	100	0.00	34
HGV delivery	112	300	75	62	0	3	53	25	-6.02	47
Concrete Pump	108	300	75	62	0	3	49	100	0.00	49
20t Excavator	99	300	75	62	0	3	40	25	-6.02	34
Total SPL due to fixed plant =										53

Hoe Farm

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration % Correct. dB		Activity LAeq
				distance	screening	reflection				
Auger piling rig	108	585	75	68	0	3	43	50	-3.01	40
Dump Truck	102	585	75	68	0	3	37	75	-1.25	35
Lighting generator	93	585	75	68	0	3	28	100	0.00	28
HGV delivery	112	585	75	68	0	3	47	25	-6.02	41
Concrete Pump	108	585	75	68	0	3	43	100	0.00	43
20t Excavator	99	585	75	68	0	3	34	25	-6.02	28
Total SPL due to fixed plant =										46

Shripney

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration % Correct. dB		Activity LAeq
				distance	screening	reflection				
Auger piling rig	108	640	75	69	0	3	42	50	-3.01	39
Dump Truck	102	640	75	69	0	3	36	75	-1.25	34
Lighting generator	93	640	75	69	0	3	27	100	0.00	27
HGV delivery	112	640	75	69	0	3	46	25	-6.02	40
Concrete Pump	108	640	75	69	0	3	42	100	0.00	42
20t Excavator	99	640	75	69	0	3	33	25	-6.02	27
Total SPL due to fixed plant =										45

Campsite

Plant Details Type	PWL	distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration % Correct. dB		Activity LAeq
				distance	screening	reflection				
Auger piling rig	108	830	75	72	0	3	39	50	-3.01	36
Dump Truck	102	830	75	72	0	3	33	75	-1.25	32
Lighting generator	93	830	75	72	0	3	24	100	0.00	24
HGV delivery	112	830	75	72	0	3	43	25	-6.02	37
Concrete Pump	108	830	75	72	0	3	39	100	0.00	39
20t Excavator	99	830	75	72	0	3	30	25	-6.02	24
Total SPL due to fixed plant =										43

Worst Case Assumption- Closest Viaduct Point to Receptor**PROJECT : Bognor Relief Road Viaduct****Phase : 2, Beam erection**

Notes : 1. With screening use hard ground
2. Facade correct. is +3

Sack Barn											
Plant Details		PWL	distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type					distance	screening	reflection		%	Correct. dB	
250T Crane	106	300	75	62	0	3	47	75	-1.25	46	
Dump Truck	102	300	75	62	0	3	43	75	-1.25	42	
Lighting generator	93	300	75	62	0	3	34	100	0.00	34	
HGV delivery	112	300	75	62	0	3	53	50	-3.01	50	
Air compressor	106	300	75	62	0	3	47	100	0.00	47	
Pneumatic drill	100	300	75	62	0	3	41	50	-3.01	38	
							Total SPL due to fixed plant =			54	

Hoe Farm							Total SPL due to fixed plant =				34
Plant Details		distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration		Activity LAeq	
Type	PWL			distance	screening	reflection		%	Correct. dB		
250T Crane	106	585	75	68	0	3	41	75	-1.25	39	
Dump Truck	102	585	75	68	0	3	37	75	-1.25	35	
Lighting generator	93	585	75	68	0	3	28	100	0.00	28	
HGV delivery	112	585	75	68	0	3	47	50	-3.01	44	
Air compressor	106	585	75	68	0	3	41	100	0.00	41	
Pneumatic drill	100	585	75	68	0	3	35	50	-3.01	32	
							Total SPL due to fixed plant =				47

Shripney							Total SPL due to fixed plant =			47
Plant Details		distance , m	% soft ground	Adjustments, dB(A)			Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type	PWL			distance	screening	reflection		%	Correct. dB	
250T Crane	106	640	75	69	0	3	40	75	-1.25	38
Dump Truck	102	640	75	69	0	3	36	75	-1.25	34
Lighting generator	93	640	75	69	0	3	27	100	0.00	27
HGV delivery	112	640	75	69	0	3	46	50	-3.01	43
Air compressor	106	640	75	69	0	3	40	100	0.00	40
Pneumatic drill	100	640	75	69	0	3	34	50	-3.01	31
							Total SPL due to fixed plant =			46

Campsite										
Plant Details		PWL	distance , m	% soft ground	Adjustments, dB(A)		Resultant LAeq, 1hour	Activity duration		Activity LAeq
Type					distance	screening		reflection	%	
250T Crane	106	830	75	72	0	3	37	75	-1.25	36
Dump Truck	102	830	75	72	0	3	33	75	-1.25	32
Lighting generator	93	830	75	72	0	3	24	100	0.00	24
HGV delivery	112	830	75	72	0	3	43	50	-3.01	40
Air compressor	106	830	75	72	0	3	37	100	0.00	37
Pneumatic drill	100	830	75	72	0	3	31	50	-3.01	28
							Total SPL due to fixed plant =			43