

APPENDIX 8-9

VIBRATION MONITORING DETAILS

Movement of HGVs Along Access Road

HGV Vibration Measurements

Measurements of ground borne vibration were undertaken at site at positions close to the nearest residential property (i.e. rear garden boundary of nearest receptor). The methodology described below was employed during the vibration survey.

Measurement Technique

Vibration measurements were made, in the three mutually perpendicular axes, during the monitoring period. The Nomis seismograph was set to the 'continuous' and 'trigger' mode settings (trigger level of 0.3 mm/sec) and was placed at a distance of approximately 2 metres from the garden boundary (circa 10m from kerbside). Some additional measurements were taken at a distance of 2 metres from the kerbside of the access road for additional information. The seismograph has monitored the ground borne vibration in terms of Peak Particle Velocity (PPV).

Results of Survey

During the vibration survey, the seismograph transducer triggered during HGV movements when certain vehicles were travelling over the speed 'hump'. The maximum levels of vibration recorded ranged between 0.45mm/s to 0.83mm/s at the rear garden boundary position. Readings taken at closer distance (i.e. within 2 metres of the kerbside) showed the maximum vibration to be between 0.51mm/s and 1mm/s.

Results are provided on the following page:

Table of Vibration Results: Date of Tests: 10 March 2008

Position	Vibration Magnitude (mm/sec)			Peak Frequency (Hz)	Activity
	Horizontal x	Tranverse y	Vertical z		
Adjacent to nearest dwelling (in car park)	0.445	0.191	0.318	512	HGV into site
" " "	0.318	0.191	0.445	11.6	HGV into site
" " "	0.254	0.254	0.381	14.2	HGV out of site
" " "	0.318	0.191	0.381	15.5	HGV out
" " "	0.826	0.191	0.381	512	1 x HGV in, 2 x HGVs out
" " "	0.381	0.191	0.381	11.3/256	HGV in
" " "	0.318	0.254	0.318	2.8/12.4	HGV out
" " "	0.318	0.191	0.445	14.6	HGV in
" " "	0.254	0.254	0.318	15.5	HGV out
" " "	0.699	0.445	0.318	512	3 x HGVs in, 1 x HGV out
" " "	0.318	0.191	0.318	2.9/13.4	HGV in
" " "	0.445	0.191	0.254	512	HGV in
" " "	0.318	0.191	0.318	11.9/128	HGV out
" " "	0.254	0.191	0.508	14.6	HGV & skip wagon in
" " "	0.254	0.191	0.445	11.6	HGV out
" " "	0.318	0.191	0.572	-	Continuous mode (48 HGV movements over 1hour)
Within 5m of kerbside	0.508	0.254	1.016	10.6	2 x HGVs into site
" " "	0.318	0.127	0.318	13.1	HGV in
" " "	0.318	0.127	0.381	12.8	HGV out
" " "	0.381	0.191	0.572	10.8	HGV in

Monitoring of HGVs and other vehicles at kerbside

The seismograph only triggered when some of the vehicles passed the monitoring positions.

The following tables detail the results of the ground vibration survey.

Position 1:

Ground Vibration Measurements

Time:	Location:	Position:	Vibration level		
			X	Y	Z
08:26	Scawby Road (corner) (2m from kerbside)	Cars near & farside	0.191	0.127	0.318
08:26	Scawby Road (corner) (2m from kerbside)	HGV far side	0.191	0.127	0.254
08:38	Scawby Road (corner) (2m from kerbside)	Cars near & farside	0.191	1.27	0.254
08:39	Scawby Road (corner) (2m from kerbside)	Car far side Car	0.191	1.27	0.254
08:39	Scawby Road (corner) (2m from kerbside)	near side			
08:39	Scawby Road (corner) (2m from kerbside)	Tractor far side	0.254	0.127	0.254
08:39	Scawby Road (corner) (2m from kerbside)	Car near side			
08:43	Scawby Road (corner) (2m from kerbside)	HGV near side	0.318	0.127	0.254
08:43	Scawby Road (corner) (2m from kerbside)	Car near side			
08:44	Scawby Road (corner) (2m from kerbside)	Straw Trailer (empty)	0.191	0.127	0.254
08:44	Scawby Road (corner) (2m from kerbside)	near side			
08:45	Scawby Road (corner) (2m from kerbside)	Car near side	0.318	0.254	0.508
08:46	Scawby Road (corner) (2m from kerbside)	HGV near side	0.254	0.191	0.254
08:56	Scawby Road (corner) (2m from kerbside)	HGV Double Trailer nearside	0.381	0.318	0.381
08:57	Scawby Road (corner) (2m from kerbside)	HGV far side	0.254	0.127	0.318
08:57	Scawby Road (corner)	Car near side	0.381	0.254	0.445
	Highest Levels	Cars	0.254	0.127	
	Highest Levels	HGVs	0.445	0.254	
	Highest Levels	Straw Trailer	0.381	0.318	
	Highest Levels	HGV near side	0.381	0.318	
	Highest Levels	HGV far side	0.445	0.191	

**Position 2
Access Road**

Time:	Location:	Position:	Vibration level		
			X (m/s ²)	Y (m/s ²)	Z (m/s ²)
09:29	Access Road (2-3m)	Straw Trailer (loaded) far side	0.254	0.127	0.254
09:30	Access Road (2-3m)	HGV (Tanker) far side	0.318	0.318	0.254
09:31	Access Road (1m)	Straw Trailer (loaded) near side	0.318	0.318	0.318
09:31	Access Road (5m)	Straw Trailer (loaded) leaving junction	0.191	0.127	0.254
09:33	Access Road (1m)	Car near side	0.191	0.127	0.254
Highest levels		Cars	0.191	0.127	0.254
Highest levels		HGVs	0.318	0.318	0.254
Highest levels		Straw Trailer	0.318	0.318	0.318

**Position 3:
Scawby Road (on pavement)**

Time:	Location:	Position:	Vibration level		
			X	Y (m/s ²)	Z (m/s ²) (m/s ²)
10:59	Pavement (1-2m from Scawby Road) Pavement	HGV Far Side	0.254	0.127	0.254
11:02	(1-2m from Scawby Road) Pavement	Car near side	0.191	0.127	0.254
11:03	(1-2m from Scawby Road) Pavement	HGV Far Side	0.254	0.127	0.254
11:05	(1-2m from Scawby Road) Pavement	Car near side	0.254	0.127	0.254
11:05	(1-2m from Scawby Road) Pavement	HGV (flatbed) loaded near side	0.445	0.318	0.381
11:06	(1-2m from Scawby Road) Pavement	Car near side	0.191	0.127	0.254
11:07	(1-2m from Scawby Road) Pavement	Car near side	0.191	0.127	0.254
11:07	(1-2m from Scawby Road) Pavement	HGV Near Side	0.445	0.381	0.445
11:07	(1-2m from Scawby Road) Pavement	Car near side	0.191	0.127	0.254
11:07	(1-2m from Scawby Road)	HGV Near Side	0.254	0.254	0.254
Highest levels		Cars	0.254	1.270	0.254
Highest levels		HGVs	0.445	0.381	0.445
Highest levels		HGV near side	0.445	0.381	0.445
Highest levels		HGV far side	0.254	0.127	0.254

Research Data

The New Zealand Transport Agency published a research paper entitled 'Ground Vibration from Road Construction' in May 2012, which includes a table of measured PPV values for different types of plant. The results have been provided below as an extract from the paper for ease of reference.

Vibration Levels from a Range of Construction Activities

