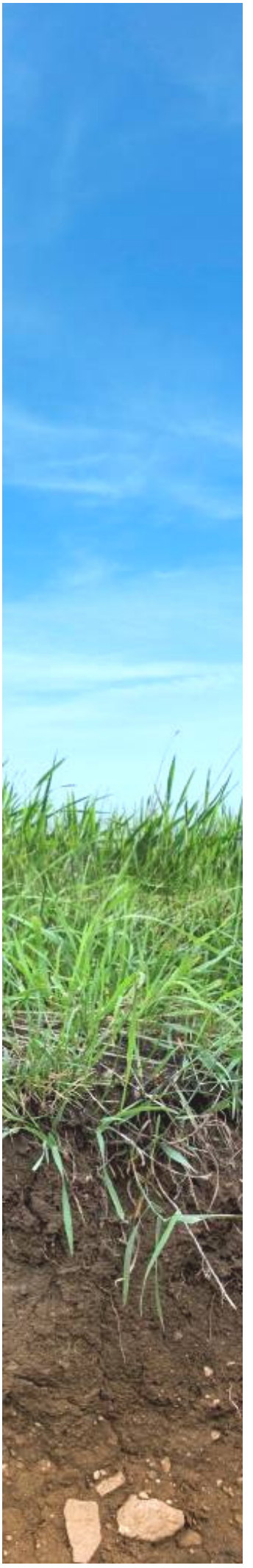
REC
Resource & Environmental Consultants Ltd

Noise Impact Assessment

Milton Park
Abingdon
Oxfordshire

REC Report: 90100
Issued: 28th September 2012

On behalf of Vale of White Horse District Council and MEPC



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QUALITY ASSURANCE

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EXECUTIVE SUMMARY

Background, Rail & Road Traffic Noise Surveys

A Background Noise Survey has been completed in order to measure existing noise levels at a location considered to be representative of the closest sensitive receptor to Milton Park. The results of this survey have been used in an assessment to determine the maximum permissible noise rating level from any Mechanical and Electrical plant which may be installed as part of any future development at Milton Park.

A Rail and Road Traffic Noise Survey has been completed in order to determine the existing level of noise which has the potential to impact upon any office space which may form part of any future development at Milton Park.

Noise Impact Assessment

The Noise Impact Assessment has been completed with due regard to the requirements of Vale of White Horse District Council's Environmental Health Department.

Plant noise emission limits have been set for any proposed Mechanical and Electrical plant which may form part of any future development at Milton Park, these were designated in the interests of protecting residential amenity at the closest noise sensitive receptor.

The measured noise levels from the Rail and Road Traffic Noise Surveys have been used to derive the daytime noise level at noise measurement positions which should be used in determining future development layout or façade specifications for office space. Vale of White Hose District Council have specified maximum internal target noise levels for office space which should not be exceeded.

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APPENDICES

1.0 INTRODUCTION

1.1 Background

Resource and Environmental Consultants (REC) Ltd has been instructed by MEPC Milton Park to undertake a Noise Impact Assessment for Milton Park, Oxford. The Milton Park Local Development Order (LDO) is a partnership between Vale of White Horse District Council as the local planning authority, and MEPC Milton Park as the landowner. Terence O'Rourke Ltd has been instructed by MEPC to help coordinate the LDO process.

The purpose of the Milton Park LDO is to enable a vibrant business area, promoting employment-generating uses at the business park, to maximise the success of the Science Vale UK Enterprise Zone and give greater confidence to business to invest in Milton Park. It is being prepared in accordance with the Town and Country Planning (Development Management Procedure) (England) Order 2010.

The Milton Park LDO will simplify planning control to give greater flexibility for businesses to develop new premises and facilities or adapt existing premises, whilst maintaining a successful and diverse mix of employment generating uses. Development will only be permitted where the local authority is satisfied that it is in accordance with the permitted uses and development parameters set out in the Order. Development proposals not in accordance with the provisions of the Order will be determined by a planning application.

The LDO has been designed to be effective for a period of 15 years to reflect the typical timescale of business leases and give greater certainty for potential investors.

The report is commissioned by Terrance O'Rourke on behalf of Vale of WHDC and MEPC.

1.2 Limitations

The limitations of this report are presented in Appendix I.

1.3 Confidentiality

REC has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from REC; a charge may be levied against such approval.

2.0 SITE DESCRIPTION

2.1 Site location

The Site is located approximately 3.5km north west of Didcot in Oxfordshire. The Site is bound by the A34 to the west, farmland and residential receptors to the north, Didcot Power Station to the east and the Reading to Swindon railway line to the south.

The key source of noise impacting upon the Site is from passenger and freight train movements on the railway line to the southern Site boundary.

All acronyms used within this report are defined in the glossary presented in Appendix II.

The Site Location Plan is contained in Figure 1 of Appendix III.

2.2 Purpose of the Local Development Order

MEPC are seeking a LDO in order to simplify planning control across the complete Site, including areas identified for expansion in the Enterprise Zone bid and sites with extant planning permission. The LDO will permit development, where it is within defined parameters, including change of use and operational development, without the need for a planning application.

Any future development on the Site will need to consider the impact of noise on the new development and also development generated noise on nearby sensitive receptors. This includes:

- Noise from passing passenger and freight trains on the Swindon to Reading railway line upon any proposed commercial or office space of a new development;
- Noise from vehicles using the A34; and,
- Noise from any Mechanical and Electrical (M&E) plant installed as part of a new development upon nearby residential receptors.

Accordingly this Noise Assessment has set M&E plant noise emission limits at the closest residential receptors and an assessment has been made to determine the level of noise impact at the Site boundaries from train movements on the railway line and from vehicles using the A34 dual-carriageway.

3.0 ASSESSMENT CRITERIA

3.1 Local Authority Guidance and Criteria – Vale of White Horse District Council Environmental Health Department.

REC has contacted Mr Alec Natton, Environmental Health Officer at VWHDC and the following noise assessment criteria have been agreed:

- The noise rating level of any fixed M&E plant shall not exceed 5dB below the existing background noise level when measured or calculated outside the closest residential receptor; and,
- The internal noise level within office space associated with any future development shall not exceed the BS8233 internal target 'Good' criteria which is 40dB $L_{Aeq,16hr}$.

3.2 BS4142:1997: Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

This standard is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.

The procedure contained in BS4142 for assessing the likelihood of complaints is to compare the measured or predicted noise level from the source in question, the 'specific noise level' immediately outside the dwelling, with the background noise level. Where the noise contains a 'distinguishable discrete continuous note (whine, hiss, screech, hum etc.) or if there are distinct impulses in the noise (bangs, clicks, clatters or thumps), or if the noise is irregular enough to attract attention' then a correction of +5dB is added to the specific noise level to obtain the 'rating level'.

The likelihood of noise provoking complaints is assessed by subtracting the background noise level from the rating noise level. BS4142 states:

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

For the daytime, this assessment is carried out over a 1-hour period, and over a 5 minute period at night. The day and night-time periods are not defined in the Standard but it states that night should cover the times when the general adult population are preparing for sleep or are actually sleeping. For the purposes of this assessment it is assumed that the day and night periods reflect those stated in the now revoked Planning Policy Guidance Note (PPG) 24, i.e. day is 07:00 to 23:00 hours and night 23:00 to 07:00 hours.

As details for any M&E plant are not available, this assessment has set plant noise emission limits based on the existing measured background noise level and in regards to the criteria set by VWHDC.

3.3 Calculation of Road Traffic Noise 1988

This memorandum, produced by the Department of Transport for the Welsh Office, describes the procedures for calculating noise from road traffic. Section III of this memorandum details the shortened measurement procedure whereby measurements of the L_{10} parameter are made over any three consecutive hours between 10:00 and 17:00. From the arithmetic average of the three 1-hour values, the $L_{10,18hr}$ noise levels is derived before

derivation of the $L_{Aeq,16hr}$ value.

3.4 Calculation of Railway Noise 1995

The method set out in The Calculation of Railway Noise (CRN), issued by the Department of Transport, is of assistance in determining rail traffic noise over a typical 16 hour daytime period. The guidance provided in CRN allows for a sample number of train pass-bys to be measured, for each line, and the wider 16 hour daytime period to be derived.

CRN is prescriptive in stating that where the survey is based on noise measurements of a sample of trains using a specific track, the number of train bypass used in the sample should be sufficiently representative of the total use of the track.

Accordingly this assessment has measured a representative sample of passenger train and freight train pass-bys.

3.5 British Standard BS8233:1999: Sound Insulation and Noise Reduction for Buildings – Code of Practice

The scope of this standard is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

The standard suggests suitable internal noise levels within different types of buildings, including office space, and these are repeated in Table 3.1.

Table 3.1: BS8233 Recommended Internal Noise Levels

Criterion	Typical Situation	Design Range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable conditions for study and work requiring concentration	Cellular Office	40	50
	Staff Room	35	45
	Meeting Room, Executive Office	35	40

It should be noted that VWHDC require the ‘Good’ internal target noise levels to be met within office spaces.

4.0 NOISE SURVEYS

4.1 Background Noise Survey

A Background Noise Survey has been undertaken by REC at the Site. This survey was carried out to establish the existing prevailing noise climate at a location considered to be representative of the closest noise-sensitive residential dwellings to the Site. The Background Noise Survey was conducted over the following period:

- 07:00 Friday 27th July 2012 – 02:00 Tuesday 31st July 2012.

The following noise measurement position was chosen for the survey:

- Noise measurement position 1 (NMP1): - Located on the northern boundary with the closest residential receptor to the Site. The microphone of the sound level meter was located at a height of approximately 1.5m above ground level and in free-field conditions. This measurement position was adopted as it was considered to be representative of the existing background noise climate at the closest residential dwelling to the Site. Noise sources at this location consisted of distant regular train movements on the Swindon to Reading railway line, occasional vehicle movements in the car park associated with commercial units 65 and 66 and occasional vehicle movements on Old Moor Road.

4.2 Railway Traffic Noise Survey

REC has completed a series of noise measurements of passenger and freight trains on the Swindon to Reading railway line. This noise survey was completed over the following period:

- Attended daytime noise measurements of trains immediately next to the railway line from 13:25 – 16:22 on Thursday 26th July 2012.

The following noise measurement position was chosen for this noise survey:

- Noise Measurement Position 2 (NMP2): - Located on the Site boundary with the railway line at height of 4m above ground level in order for the microphone to be at the same height as the railway line. The microphone was located approximately 20m from the eastbound (to Reading) line and approximately 24m from the westbound (to Swindon) line in free-field conditions. The sound level meter measured continuously throughout the measurement period.

4.3 Road Traffic Noise Survey

REC has completed a short-term road traffic noise measurement in accordance with the guidance stated in CRTN. This noise survey was completed over the following period:

- Attended daytime noise measurements of road traffic using the A34 from 10:00 – 13:00 on Thursday 26th July 2012.

The following noise measurement position was chosen for this noise survey:

- Noise Measurement Position 3 (NMP3): - Located 14m from the nearside kerbstone of the A34. The microphone was located 2m above ground level and in excess of 3m from any acoustically reflective surfaces in free-field conditions. Noise sources at this measurement position consisted predominantly of road traffic on the

A34 with occasional vehicles using the south-bound slip road of the A34.

The noise surveys were completed using the specification noise measurement equipment shown in Table 4.1.

Table 4.1: Noise Measurement Equipment

Measurement Position	Equipment Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
All positions	Sound level meter	01dB-Metravib Black Solo	65211	2nd May 2013
	Pre-amplifier	01dB-Metravib PRE21S	15667	
	Microphone	Microtech Gefell GmbH MCE212	103328	
	Calibrator	01dB-Metravib Cal 21	34113643	23rd March 2013

The sound level meter had been calibrated to the manufacturer's traceable standard in May 2011.

The weather conditions during the noise surveys was conducive towards the measurement of environmental noise, being fine and dry with wind speeds consistently below 5.0m/s.

A summary of the lowest measured 1-hour daytime and night-time sound pressure levels from the Background Noise Survey are presented in Table 4.2, with the full tabulated noise measurement data presented in Appendix IV.

The daytime and period as suggested in PPG24 have been adopted for this assessment which is 07:00 – 23:00 for daytime and 23:00 – 07:00 for night-time. Although PPG24 has now been revoked, it is still considered useful in determining a standard for daytime hours.

Table 4.2: Summary of Lowest Measured 1 Hour Noise Levels at NMP1 – Freefield

Measurement Position	Time period		Measured Sound Pressure Level (dB)			
	Day	Period	$L_{Aeq,T}$	$L_{Amax,fast}$	$L_{A90,T}$	$L_{A10,T}$
NMP1	Friday 27th July	Daytime 07:00 – 23:00	45.3	56.4	41.7	46.3
		Night-time (23:00 – 07:00)	41.5	46.7	37.5	43.9
	Saturday 28th July	Daytime (07:00 – 23:00)	45.8	52.4	43.0	47.7
		Night-time (23:00 – 07:00)	44.9	51.1	40.4	47.2
	Sunday 29th July	Daytime (07:00 – 23:00)	48.1	56.9	44.6	50.5
		Night-time (23:00 – 07:00)	46.1	52.2	42.2	48.5
	Monday 30th July	Daytime (07:00 – 23:00)	49.5	58.2	46.0	51.2

	Night-time (23:00 – 02:00)	47.2	56.4	42.7	48.7	

A summary of the measured sound pressure levels from the Railway Traffic Noise Survey are presented in Table 4.3.

Table 4.3: Summary of Measured Train Noise Levels

Measurement Period			Duration (hh:mm:ss)	Train Type	Direction	Provider	Measured Sound Pressure Level $L_{Aeq,T}$ (dB)
Day	Start Time	End Time					
Thursday 26th July 2012	13:25:08	13:25:32	00:00:24	Passenger - 7 Carriages	Westbound	FGW*	77.2
	13:28:48	13:29:22	00:00:34	Passenger - 7 Carriages	Westbound	FGW	69.0
	13:39:00	13:39:32	00:00:32	Passenger - 7 Carriages	Eastbound	FGW	68.8
	13:41:16	13:41:40	00:00:24	Passenger - 7 Carriages	Eastbound	FGW	68.6
	13:44:04	13:44:24	00:00:20	Passenger - 7 Carriages	Eastbound	FGW	72.9
	13:44:22	13:45:02	00:00:40	Passenger - 7 Carriages	Westbound	FGW	72.7
	13:47:40	13:48:06	00:00:26	Passenger - 7 Carriages	Eastbound	FGW	70.3
	13:52:58	13:53:30	00:00:32	Passenger - 7 Carriages	Westbound	FGW	70.5
	14:07:16	14:07:50	00:00:34	Passenger - 7 Carriages	Westbound	FGW	69.8
	14:19:38	14:20:26	00:00:48	freight - 24 hoppers	Eastbound	EWS	66.5
	14:22:16	14:22:50	00:00:34	Passenger - 7 Carriages	Eastbound	FGW	70.5
	14:25:56	14:26:32	00:00:36	Passenger - 7 Carriages	Eastbound	FGW	70.2
	14:30:08	14:30:36	00:00:28	Passenger - 7 Carriages	Westbound	FGW	71.8
	14:33:54	14:34:24	00:00:30	Passenger - 7 Carriages	Westbound	FGW	70.1
	14:44:38	14:45:06	00:00:28	Passenger - 7 Carriages	Eastbound	FGW	71.5
	14:57:02	14:58:16	00:01:14	freight - 35 hoppers	Westbound	EWS	59.3
	15:00:50	15:01:30	00:00:40	Passenger - 7 Carriages	Eastbound	FGW	70.7
	15:02:26	15:02:58	00:00:32	Passenger - 7 Carriages	Westbound	FGW	71.6
	15:04:26	15:05:34	00:01:08	freight - 30 hoppers	Eastbound	EWS	60.5

	15:13:36	15:14:10	00:00:34	Passenger - 7 Carriages	Westbound	FGW	68.4
	15:18:16	15:18:54	00:00:38	Passenger - 7 Carriages	Westbound	FGW	68.5
	15:26:00	15:26:32	00:00:32	Passenger - 7 Carriages	Eastbound	FGW	72.2
	15:28:38	15:29:16	00:00:38	Passenger - 7 Carriages	Eastbound	FGW	69.1
	15:35:18	15:35:56	00:00:38	Passenger - 7 Carriages	Eastbound	FGW	70.7
	15:42:06	15:42:44	00:00:38	Passenger - 7 Carriages	Eastbound	FGW	71.0
	15:50:02	15:50:40	00:00:38	Passenger - 7 Carriages	Eastbound	FGW	71.2
	15:55:56	15:56:28	00:00:32	Passenger - 7 Carriages	Eastbound	FGW	70.6
	15:59:50	16:00:18	00:00:28	Passenger - 7 Carriages	Eastbound	FGW	68.7
	16:00:30	16:01:00	00:00:30	Passenger - 7 Carriages	Westbound	FGW	72.9
	16:11:46	16:12:18	00:00:32	Passenger - 7 Carriages	Westbound	FGW	70.6
	16:15:42	16:16:30	00:00:48	freight - 26 hoppers	Eastbound	EWS	65.5
	16:17:04	16:17:36	00:00:32	Passenger - 7 Carriages	Eastbound	FGW	74.1
	16:22:54	16:23:28	00:00:34	Passenger - 7 Carriages	Westbound	FGW	68.8

* FGW = First Great Western

A summary of the measured sound pressure levels from the Road Traffic Noise Survey are presented in Table 4.4.

Table 4.4: Summary of Measured Road Traffic Noise Levels

Measurement Period			Duration (hh:mm:ss)	Measured Sound Pressure Level (dB)			
Day	Start Time	End Time		$L_{Aeq,1hr}$	$L_{Amax,fast}$	$L_{A90,1hr}$	$L_{A10,1hr}$
Thursday 26th July 2012	10:00	11:00	01:00:00	72.7	88.7	64.6	76.6
	11:00	12:00	01:00:00	72.2	85.2	63.7	75.8
	12:00	13:00	01:00:00	72.1	84.3	63.9	75.7

Section 5.0 details the Noise Assessments.

5.0 NOISE IMPACT ASSESSMENT

5.1 Plant Noise Emission Limits Assessment

It is necessary to set M&E plant noise emission limits for any future development. The noise emission limit criteria imposed by VWHDC is for the total noise rating level from M&E plant not to exceed the existing measured background noise level by -5dB.

The proposed operating periods for any future M&E plant is unknown and so Table 5.1 details the derived plant noise emission limits for daytime and night-time during the weekday and weekend periods based on the measured background noise levels detailed previously in Table 4.2.

Table 5.1: Calculated Plant Noise Emission Limits

Period	Lowest Measured 1-Hour Background Noise Level, freefield L_{A90} (dB)	Criteria	Derived Plant Noise Emission Limit L_{Ar} (dB)
Weekday (07:00 – 23:00)	41.7	L_{A90} -5dB	36.7
Weekday (23:00 – 07:00)	37.5		32.5
Weekend (07:00 – 23:00)	43.0		38.0
Weekend (23:00 – 07:00)	40.4		35.4

Table 5.1 indicates the total maximum permissible noise rating levels from M&E plant at the closest residential receptor for weekday and weekend daytime and night-time periods.

The final plant noise emission limit will need to be designated once the operating schedule for any M&E plant has been decided.

5.2 Railway Traffic Noise Assessment

It is likely that any future office space developed at the Site will only be used during the daytime period and so this assessment has derived the noise level for the daytime period from the railway line.

The daytime average ($L_{Aeq,t}$) noise levels have been derived by measurement of individual train pass-bys. For each train pass-by, the total L_{Aeq} and elapsed time was measured before being converted into a Sound Event Level (SEL) using the following formula:

$$SEL = L_{eq} + 10 \times \log T$$

Where T = pass-by duration in seconds

The required $L_{eq,16hr}$ (daytime) value was derived as follows:

$$L_{eq,16hr} = (SEL^* - (10\log 60 \times 60 \times 16)) + (10\log \text{Total 16hr Train Movements})$$

* Average SEL used for all train pass-bys

REC have obtained the passenger timetable from the First Great Western website which details the number of trains which pass the Site travelling to Reading (eastbound) and to Swindon (westbound).

Accordingly, REC has measured both eastbound and westbound train pass-bys. Table 5.2 details the measured train pass-bys and the calculated SEL for trains travelling eastbound.

Table 5.2: Measured Train Noise Levels, Eastbound

Start Time	End Time	Measurement Duration (hh:mm:ss)	Train Type	Measured Sound Pressure Level $L_{Aeq,T}$ (dB)	Calculated SEL (dB)	Calculated Average SEL (dB)
13:39:00	13:39:32	00:00:32	Passenger	68.8	83.9	85.7
13:41:16	13:41:40	00:00:24	Passenger	68.6	82.4	
13:44:04	13:44:24	00:00:20	Passenger	72.9	85.9	
13:47:40	13:48:06	00:00:26	Passenger	70.3	84.4	
14:22:16	14:22:50	00:00:34	Passenger	70.5	85.8	
14:25:56	14:26:32	00:00:36	Passenger	70.2	85.8	
14:44:38	14:45:06	00:00:28	Passenger	71.5	86.0	
15:00:50	15:01:30	00:00:40	Passenger	70.7	86.7	
15:26:00	15:26:32	00:00:32	Passenger	72.2	87.3	
15:28:38	15:29:16	00:00:38	Passenger	69.1	84.9	
15:35:18	15:35:56	00:00:38	Passenger	70.7	86.5	
15:42:06	15:42:44	00:00:38	Passenger	71	86.8	
15:50:02	15:50:40	00:00:38	Passenger	71.2	87.0	
15:55:56	15:56:28	00:00:32	Passenger	70.6	85.7	
15:59:50	16:00:18	00:00:28	Passenger	68.7	83.2	
16:17:04	16:17:36	00:00:32	Passenger	74.1	89.2	
14:19:38	14:20:26	00:00:48	Freight	66.5	83.3	81.5
15:04:26	15:05:34	00:01:08	Freight	60.5	78.8	
16:15:42	16:16:30	00:00:48	Freight	65.5	82.3	

Table 5.3 details the measured train pass-bys and the calculated SEL for trains travelling westbound.

Table 5.3: Measured Train Noise Levels, Westbound

Start Time	End Time	Measurement Duration (hh:mm:ss)	Train Type	Measured Sound Pressure Level $L_{Aeq,T}$ (dB)	Calculated SEL (dB)	Calculated Average SEL (dB)
13:25:08	13:25:32	00:00:24	Passenger	77.2	89.2	85.9
13:28:48	13:29:22	00:00:34	Passenger	69	84.3	
13:44:22	13:45:02	00:00:40	Passenger	72.7	88.7	
13:52:58	13:53:30	00:00:32	Passenger	70.5	85.6	
14:07:16	14:07:50	00:00:34	Passenger	69.8	85.1	
14:30:08	14:30:36	00:00:28	Passenger	71.8	86.3	
14:33:54	14:34:24	00:00:30	Passenger	70.1	84.9	
15:02:26	15:02:58	00:00:32	Passenger	71.6	86.7	
15:13:36	15:14:10	00:00:34	Passenger	68.4	83.7	

15:18:16	15:18:54	00:00:38	Passenger	68.5	84.3	
16:00:30	16:01:00	00:00:30	Passenger	72.9	87.7	
16:11:46	16:12:18	00:00:32	Passenger	70.6	85.7	
16:22:54	16:23:28	00:00:34	Passenger	68.8	84.1	
14:57:02	14:58:16	00:01:14	Freight	59.3	78.0	78.0

Table 5.4 details the number of timetabled passenger trains which pass the Site both eastbound and westbound.

Table 5.4: Timetabled Weekday Train Movements

Direction of Travel	No./24 Hours Daytime (07:00 – 23:00)
Eastbound (to Reading)	69
Westbound (to Swindon)	74

From the data detailed in Tables 5.2, 5.3 and 5.4, the daytime noise levels have been derived and are displayed in Table 5.5.

Table 5.5: Weekday Daytime Noise Levels

Direction of Travel	Period	Train Type	Calculated Noise Level $L_{Aeq,16hr}$ (dB)	Calculated Combined Noise Level for Line $L_{Aeq,16hr}$ (dB)	Calculated Total Combined Noise Level $L_{Aeq,16hr}$ (dB)	At Measurement Distance (m)
Eastbound (to Reading)	Daytime (07:00 – 23:00)	Passenger	56.5	56.6	59.8	22*
		Freight	38.7			
Westbound (to Swindon)	Daytime (07:00 – 23:00)	Passenger	56.9	57.0		
		Freight	30.4			

* Average measurement distance of the two lines

The results of the Railway Traffic Noise Assessment can be used in determining the level of noise impact for future development in the following zones of the Site:

- MP6;
- MP3
- MP7; and,
- MP8

These zones are shown in Figure I of Appendix III.

5.3 Road Traffic Noise Assessment

For the purposes of this assessment, the daytime average (L_{Aeq}) noise levels have been calculated based on the shortened measurement procedure detailed in CRTN. The respective daytime and night-time noise levels have been derived using the following calculations:

1. Derivation of the $L_{A10,18hr}$ noise level by using the following formula:

$$L_{10,18hr} = L_{10,3hr} - 1dB$$

2. Derivation of the $L_{Aeq,16hr}$ noise level by using the following formula:

$$L_{eq,16hr} = L_{10,18hr} - 2dB$$

The calculated daytime sound pressure levels from NMP3 have been derived and are detailed in Table 5.6.

Table 5.6: Daytime Noise Levels from Road Traffic Noise at NMP3

Measurement Position	Period	Calculated Noise Level $L_{Aeq,16hr}$ (dB)	At Measurement Distance (m)
NMP3	Daytime (07:00 – 23:00)	73.0	14

Table 5.6 indicates that at 14m from the nearside kerbstone of the A34, the daytime noise level is 73dB $L_{Aeq,16hr}$.

The results of the Road Traffic Noise Assessment can be used in determining the level of noise impact for future development in the following zones of the Site:

- MP5; and,
- MP8.

These zones are shown in Figure I of Appendix III.

5.4 Local Development Order Parameters

Based on the assessment results, the following parameters are proposed for inclusion within the LDO:

- The noise rating level from any M&E plant shall not exceed the following noise emission limits when measured or calculated at the closest noise sensitive receptor:
  - Weekday Daytime: 36.7dB;
  - Weekday Night-time: 32.5dB;
  - Weekend Daytime: 38.0dB; and,
  - Weekend Night-time: 35.4dB.
- The calculated noise level from railway traffic is 59.8dB $L_{Aeq,16hr}$ at 22m and this noise level shall be used in determining rail traffic noise impacts upon proposed office space on the Site. This noise level should be used in conjunction with VWHDC's internal target noise criteria level for office space; and,
- The calculated noise level from road traffic is 73.0dB $L_{Aeq,16hr}$ at 14m and this noise level shall be used in determining road traffic noise impacts upon proposed office space on the Site. This noise level should be used in conjunction with VWHDC's internal target noise criteria level for office space.

It is considered that the design of any future development in accordance with the above parameters should control noise levels sufficiently at both on-Site and off-Site sensitive locations to an acceptable level.

6.0 CONCLUSION

REC have been commissioned by Terence O'Rourke to undertake a Noise Assessment in support of a proposed LDO for Milton Park in Oxfordshire.

This assessment has been undertaken to determine existing levels of noise which currently impact upon the development and also to establish the existing background noise climate at the closest noise sensitive receptor to the Site. This study has been completed with due regard to the requirements of VWHDC's Environmental Health Department.

It has been agreed with VWHDC that the noise rating level from any M&E plant items which may form part of any future development shall not exceed the existing measured background noise level by -5dB.

This assessment has determined the level of noise associated with the Swindon to Reading railway line and also the level of noise associated with the A34 which can be used in determining any building set-back distances or building façade specifications.

This assessment has set plant noise emission limits for any M&E plant items which may form part of any future development which should be adhered to at the closest noise sensitive receptor.

It is considered that by adhering to the M&E plant noise limits and due consideration towards the measured railway and road traffic noise levels and adoption of the VWHDC internal target noise criteria for office space, noise levels can be controlled to an acceptable level without affecting residential or commercial amenity.

APPENDIX I LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between REC Ltd and the Client as indicated in Section 1.2.

2. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.

3. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

4. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

5. REC can not be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by REC is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by REC in this connection without their explicit written agreement there to by REC.

APPENDIX II GLOSSARY OF ACOUSTICAL TERMINOLOGY

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

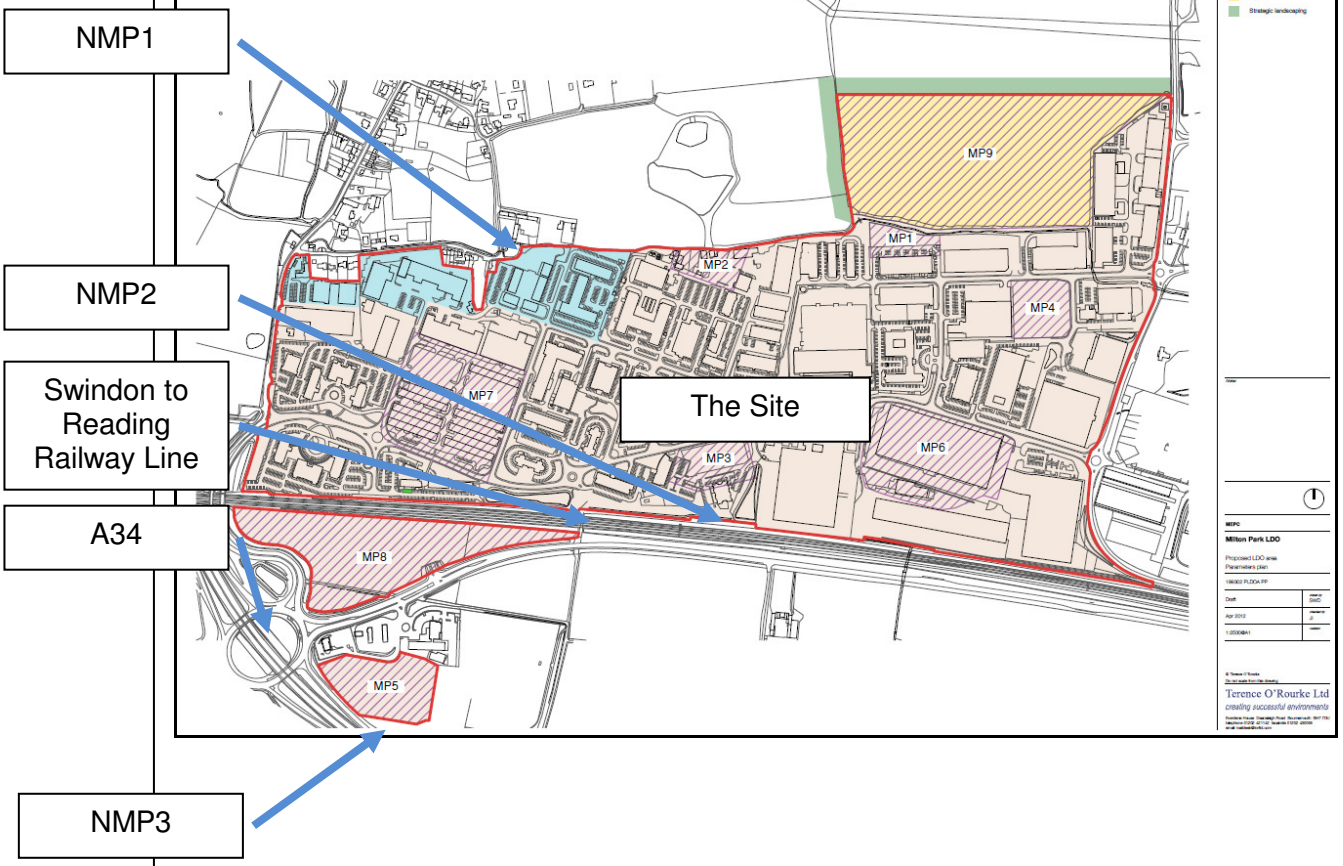
TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

Sound Level	**Location**
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 4 0dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of pain

ACOUSTIC TERMINOLOGY

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq, T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.
BS4142: 1997	This British Standard describes a method of determining the level of a noise of an industrial nature, together with procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity.

APPENDIX III FIGURES



REC
Resource & Environmental Consultants

Figure 1

NMP1, NMP2, NMP3

APPENDIX IV FULL TABULATED SURVEY RESULTS

Table 1: 1-Hour Noise Levels from the Baseline Noise Survey

Day	Period start	Measured Sound Pressure Level, dB			
		$L_{Aeq,1hr}$	$L_{Amax,fast}$	$L_{A90,1hr}$	$L_{A10,1hr}$
Friday	27/07/2012 07:00	51.4	57.4	49.7	52.5
Friday	27/07/2012 08:00	49.7	56.4	47.5	51.1
Friday	27/07/2012 09:00	50.7	67.3	46.6	51.6
Friday	27/07/2012 10:00	48.0	59.4	44.1	50.1
Friday	27/07/2012 11:00	49.5	67.7	43.4	51.3
Friday	27/07/2012 12:00	47.8	59.6	44.1	49.9
Friday	27/07/2012 13:00	48.8	68.3	43.1	49.9
Friday	27/07/2012 14:00	47.4	65.1	41.7	48.9
Friday	27/07/2012 15:00	46.5	58.8	41.8	49.2
Friday	27/07/2012 16:00	49.8	68.7	44.7	49.5
Friday	27/07/2012 17:00	50.2	59.6	46.6	52.4
Friday	27/07/2012 18:00	48.5	56.7	45.0	50.2
Friday	27/07/2012 19:00	50.0	61.6	45.5	51.5
Friday	27/07/2012 20:00	50.5	64.9	46.1	52.3
Friday	27/07/2012 21:00	45.3	57.4	42.7	46.7
Friday	27/07/2012 22:00	48.6	67.9	41.8	46.3
Friday	27/07/2012 23:00	48.9	69.2	40.4	46.0
Saturday	28/07/2012 00:00	42.7	53.6	38.3	44.5
Saturday	28/07/2012 01:00	41.6	46.7	38.1	44.1
Saturday	28/07/2012 02:00	41.7	52.8	37.5	44.0
Saturday	28/07/2012 03:00	41.5	47.5	37.6	43.9
Saturday	28/07/2012 04:00	43.6	51.5	39.5	45.8
Saturday	28/07/2012 05:00	46.7	53.0	42.9	48.8
Saturday	28/07/2012 06:00	49.6	54.8	47.1	51.3
Saturday	28/07/2012 07:00	49.0	61.0	45.7	50.6
Saturday	28/07/2012 08:00	45.8	52.4	43.0	47.7
Saturday	28/07/2012 09:00	46.9	61.7	44.0	48.6
Saturday	28/07/2012 10:00	50.7	62.5	47.8	52.2
Saturday	28/07/2012 11:00	53.9	67.2	50.2	55.7
Saturday	28/07/2012 12:00	52.4	65.4	49.1	53.7
Saturday	28/07/2012 13:00	53.5	59.4	50.3	55.5
Saturday	28/07/2012 14:00	53.7	63.7	50.8	55.4
Saturday	28/07/2012 15:00	53.1	60.2	50.4	54.6
Saturday	28/07/2012 16:00	54.6	62.2	51.3	56.8
Saturday	28/07/2012 17:00	53.5	65.7	50.7	55.2
Saturday	28/07/2012 18:00	54.1	62.3	51.6	56.0
Saturday	28/07/2012 19:00	53.3	62.2	50.6	54.8
Saturday	28/07/2012 20:00	52.1	61.7	49.4	53.6
Saturday	28/07/2012 21:00	51.6	60.9	48.5	53.4
Saturday	28/07/2012 22:00	50.9	58.4	48.0	52.5
Saturday	28/07/2012 23:00	49.2	61.7	45.8	51.0
Sunday	29/07/2012 00:00	48.3	57.6	44.8	50.3
Sunday	29/07/2012 01:00	47.2	56.5	43.0	49.5
Sunday	29/07/2012 02:00	45.1	53.2	41.2	47.2
Sunday	29/07/2012 03:00	44.9	51.1	40.4	47.4
Sunday	29/07/2012 04:00	45.3	51.4	41.4	47.6
Sunday	29/07/2012 05:00	47.2	55.3	42.8	49.7
Sunday	29/07/2012 06:00	47.5	52.9	44.7	49.4
Sunday	29/07/2012 07:00	48.1	56.9	44.6	50.5

Sunday	29/07/2012 08:00	50.7	59.4	47.7	52.4
Sunday	29/07/2012 09:00	52.0	63.2	49.4	53.4
Sunday	29/07/2012 10:00	54.5	70.9	50.0	54.7
Sunday	29/07/2012 11:00	53.1	61.6	50.4	55.2
Sunday	29/07/2012 12:00	53.6	60.6	51.3	55.4
Sunday	29/07/2012 13:00	54.5	63.7	49.9	57.0
Sunday	29/07/2012 14:00	52.5	62.1	49.2	54.4
Sunday	29/07/2012 15:00	54.6	60.0	52.0	56.2
Sunday	29/07/2012 16:00	54.9	62.7	52.8	56.4
Sunday	29/07/2012 17:00	55.3	62.4	52.9	57.0
Sunday	29/07/2012 18:00	55.9	64.4	53.5	57.8
Sunday	29/07/2012 19:00	55.1	62.5	52.8	56.6
Sunday	29/07/2012 20:00	54.4	62.0	52.2	55.7
Sunday	29/07/2012 21:00	54.5	66.7	51.7	55.6
Sunday	29/07/2012 22:00	54.0	69.0	50.3	55.3
Sunday	29/07/2012 23:00	52.0	63.5	48.6	53.8
Monday	30/07/2012 00:00	49.0	59.7	45.0	51.3
Monday	30/07/2012 01:00	47.7	58.9	42.2	49.8
Monday	30/07/2012 02:00	46.1	52.2	42.4	48.5
Monday	30/07/2012 03:00	46.5	53.4	42.5	48.9
Monday	30/07/2012 04:00	48.9	58.9	45.0	50.9
Monday	30/07/2012 05:00	53.0	58.9	49.6	54.8
Monday	30/07/2012 06:00	55.0	62.2	53.0	56.4
Monday	30/07/2012 07:00	54.0	67.9	49.8	55.7
Monday	30/07/2012 08:00	55.4	60.4	53.6	56.8
Monday	30/07/2012 09:00	55.7	68.9	52.8	57.1
Monday	30/07/2012 10:00	54.8	60.2	52.1	56.8
Monday	30/07/2012 11:00	55.9	73.4	52.4	57.3
Monday	30/07/2012 12:00	54.9	60.9	52.4	56.8
Monday	30/07/2012 13:00	56.0	65.0	52.6	58.4
Monday	30/07/2012 14:00	56.8	71.7	53.3	58.4
Monday	30/07/2012 15:00	56.2	70.3	52.9	58.1
Monday	30/07/2012 16:00	56.1	64.7	53.5	57.9
Monday	30/07/2012 17:00	56.0	64.1	53.8	57.5
Monday	30/07/2012 18:00	55.9	70.3	52.7	56.8
Monday	30/07/2012 19:00	53.4	61.2	51.0	55.0
Monday	30/07/2012 20:00	53.5	69.2	49.9	54.1
Monday	30/07/2012 21:00	50.7	63.8	48.0	52.0
Monday	30/07/2012 22:00	49.5	58.2	46.0	51.2
Monday	30/07/2012 23:00	48.8	59.9	44.9	50.8
Tuesday	31/07/2012 00:00	50.1	56.4	47.2	51.9
Tuesday	31/07/2012 01:00	48.0	56.5	45.3	49.5
Tuesday	31/07/2012 02:00	47.2	60.6	42.7	48.7

Table 2: Measured Train Noise Levels

Start Time	End Time	Duration (hh:mm:ss)	Train Type	Direction	Provider	Measured Sound Pressure Level $L_{Aeq,T}$ (dB)	Calculated SEL (dB)
13:25:08	13:25:32	00:00:24	Passenger - 7 Carriages	Westbound	Great Western Trains	77.2	89.2
13:28:48	13:29:22	00:00:34	Passenger - 7 Carriages	Westbound	Great Western Trains	69.0	84.3
13:39:00	13:39:32	00:00:32	Passenger - 7 Carriages	Eastbound	Great Western Trains	68.8	83.9
13:41:16	13:41:40	00:00:24	Passenger - 7 Carriages	Eastbound	Great Western Trains	68.6	82.4
13:44:04	13:44:24	00:00:20	Passenger - 7 Carriages	Eastbound	Great Western Trains	72.9	85.9
13:44:22	13:45:02	00:00:40	Passenger - 7 Carriages	Westbound	Great Western Trains	72.7	88.7
13:47:40	13:48:06	00:00:26	Passenger - 7 Carriages	Eastbound	Great Western Trains	70.3	84.4
13:52:58	13:53:30	00:00:32	Passenger - 7 Carriages	Westbound	Great Western Trains	70.5	85.6
14:07:16	14:07:50	00:00:34	Passenger - 7 Carriages	Westbound	Great Western Trains	69.8	85.1
14:19:38	14:20:26	00:00:48	freight - 24 hoppers	Eastbound	EWS	66.5	83.3
14:22:16	14:22:50	00:00:34	Passenger - 7 Carriages	Eastbound	Great Western Trains	70.5	85.8
14:25:56	14:26:32	00:00:36	Passenger - 7 Carriages	Eastbound	Great Western Trains	70.2	85.8
14:30:08	14:30:36	00:00:28	Passenger - 7 Carriages	Westbound	Great Western Trains	71.8	86.3
14:33:54	14:34:24	00:00:30	Passenger - 7 Carriages	Westbound	Great Western Trains	70.1	84.9
14:44:38	14:45:06	00:00:28	Passenger - 7 Carriages	Eastbound	Great Western Trains	71.5	86.0
14:57:02	14:58:16	00:01:14	Freight - 35 hoppers	Westbound	EWS	59.3	78.0
15:00:50	15:01:30	00:00:40	Passenger - 7 Carriages	Eastbound	Great Western Trains	70.7	86.7
15:02:26	15:02:58	00:00:32	Passenger - 7 Carriages	Westbound	Great Western Trains	71.6	86.7
15:04:26	15:05:34	00:01:08	Freight - 30 hoppers	Eastbound	EWS	60.5	78.8
15:13:36	15:14:10	00:00:34	Passenger - 7 Carriages	Westbound	Great Western Trains	68.4	83.7
15:18:16	15:18:54	00:00:38	Passenger - 7 Carriages	Westbound	Great Western Trains	68.5	84.3
15:26:00	15:26:32	00:00:32	Passenger - 7 Carriages	Eastbound	Great Western Trains	72.2	87.3

15:28:38	15:29:16	00:00:38	Passenger - 7 Carriages	Eastbound	Great Western Trains	69.1	84.9
15:35:18	15:35:56	00:00:38	Passenger - 7 Carriages	Eastbound	Great Western Trains	70.7	86.5
15:42:06	15:42:44	00:00:38	Passenger - 7 Carriages	Eastbound	Great Western Trains	71.0	86.8
15:50:02	15:50:40	00:00:38	Passenger - 7 Carriages	Eastbound	Great Western Trains	71.2	87.0
15:55:56	15:56:28	00:00:32	Passenger - 7 Carriages	Eastbound	Great Western Trains	70.6	85.7
15:59:50	16:00:18	00:00:28	Passenger - 7 Carriages	Eastbound	Great Western Trains	68.7	83.2
16:00:30	16:01:00	00:00:30	Passenger - 7 Carriages	Westbound	Great Western Trains	72.9	87.7
16:11:46	16:12:18	00:00:32	Passenger - 7 Carriages	Westbound	Great Western Trains	70.6	85.7
16:15:42	16:16:30	00:00:48	Freight - 26 hoppers	Eastbound	Great Western Trains	65.5	82.3
16:17:04	16:17:36	00:00:32	Passenger - 7 Carriages	Eastbound	Great Western Trains	74.1	89.2
16:22:54	16:23:28	00:00:34	Passenger - 7 Carriages	Westbound	Great Western Trains	68.8	84.1

Table 3: Measured 3hr Road Traffic Noise Levels

Day	Period start	Measured Sound Pressure Level, dB			
		$L_{Aeq,1hr}$	$L_{Amax,fast}$	$L_{A90,1hr}$	$L_{A10,1hr}$
Thursday	26/07/2012 10:00	72.7	88.7	64.6	76.6
Thursday	26/07/2012 11:00	72.2	85.2	63.7	75.8
Thursday	26/07/2012 12:00	72.1	84.3	63.9	75.7