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THE TOWN AND COUNTRY PLANNING ACT 1990 SECTION 77

TOWN AND COUNTRY PLANNING (INQUIRIES PROCEDURE) (ENGLAND) RULES 2000

CALL-IN INQUIRY TO CONSIDER LANCASHIRE COUNTY COUNCIL'S APPLICATION FOR PLANNING PERMISSION IN RELATION TO THE CONSTRUCTION OF THE HEYSHAM TO M6 LINK

PROOF OF EVIDENCE

OF

DAVID LEVERSEDGE, CAPITA SYMONDS

ON BEHALF OF LANCASTER AND MORECAMBE COLLEGE

CONTENTS

1. PERSONAL PROFILE

1.1 My name is David Charles Leversedge. My qualifications include an M.Sc. in Environmental Acoustics, the Institute of Environmental Health Diploma in Environmental Health and the Royal Society of Health Diploma in Air Pollution. I am a member of the Chartered Institute of Environmental Health (MCIEH) and a Member of the Institute of Acoustics (MIOA).

1.2 I am employed by Capita Symonds Limited as the Director of Acoustics and Air Quality. My particular areas of expertise are acoustics, including vibration, and air quality. Before joining Capita Symonds, I was employed as an Environmental Engineer by London Underground Limited, working on the Jubilee Line Extension. My responsibilities covered the full range of environmental issues arising from the construction of the infrastructure including noise, vibration and air quality.

1.3 Before working for London Underground, between 1983 and 1993, I was employed as an Environmental Health Officer successively by the London Boroughs of Islington and Greenwich with responsibilities for the assessment of noise and vibration and air quality issues arising within those boroughs. I have therefore been actively involved in assessing the environmental consequences of noise, vibration and air quality for the last twenty years.

1.4 Since the start of my employment with Capita Symonds, I have provided noise and vibration and air quality advice in connection with a number of environmental impact assessments of transport retail and residential developments including noise and vibration and air quality inputs to the Environmental Statement and Sustainability Appraisal for Hatfield Aerodrome. The proposed development comprises a mix of housing, commercial and educational land uses on a former airfield close to a busy road network and substantial residential development. I have provided similar inputs into the Leavesden Aerodrome development, the Grand Arcade in Cambridge and the Oxford Westgate development (air quality only), two city centre retail developments. I have also provided noise and vibration and air quality inputs into Environmental Assessments for the M6 Carlisle to Gretna extension (air quality only), the Parkside Colliery Development and the proposed Wrexham industrial estate access roads.

2. SCOPE OF EVIDENCE

2.1 During the course if my evidence I shall;

(i) Introduce and discuss the relevant noise, vibration and air quality guidance., with particular reference to the Design Manual for Roads and Bridges (DMRB), BS5228:1997 'Noise and vibration control on construction and open sites', BS 8233:1999 ' Sound insulation and noise reduction in buildings' and the Building Research Establishment guidance on the control of pollution from construction practices.

(ii) Comment on the noise and air quality sections of the Environmental Statement as they relate to the College.

(iii) Comment on the DMRB assessments that have been undertaken for the Link Road with reference to the College.

(iv) Comment on the impact of the road on the College during the construction period, addressing in particular:-

Noise & Vibration impacts during the construction phase likely to cause disruption.

Air quality impacts during construction phase.

(v) The measures the Council has suggested addressing the above issues and why they are inadequate.

(vi) Comment upon the longer term impacts of the road upon the immediate environment and operation of the College

(vii) Discuss if noise and air quality impacts caused by the proposed road are considered acceptable in accordance with relevant guidelines.

(viii) Comment upon the inadequacies of the Council's proposed mitigation of these problems.

(ix) In summary, the cumulative impact on all these things.

(x) In anticipation of this proof of evidence being more than 1500 words also provide a summary proof.

3. NOISE AND AIR QUALITY GUIDANCE

3.1 In this section I shall provide a brief summary of the guidance I have referred to in the production of my evidence.

3.2 To assist the reader who is not familiar with noise terminology, I have included below a glossary of the noise and vibration terms used in me evidence.

3.3 Noise is defined as unwanted sound. The range of audible sound is from 0dB to 140dB. The frequency response of the ear is usually taken to be about 18Hz (number of oscillations per second) to 18,000Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than at the lower and higher frequencies, and because of this, the low and high frequency component of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most used and which correlates best with the subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.

3.4 A few examples of noise of various levels are given below:

Sound Level dB(A)			Environmental Condition
0	-	10	Threshold of hearing
10	-	20	Broadcasting Studio
20	-	30	Bedroom at night
30	-	40	Library
40	-	50	Living room urban area
50	-	60	Typical Business Offices
60	-	70	Conversation Speech
70	-	80	Average traffic on street corner
80	-	90	Inside bus
100	-	110	Alarm Clock (1m away)
110	-	120	Loud car horn (1m away)
120	-	130	Pneumatic drill (1m away)
130	-	140	Threshold of pain

3.5 The subjective response to a noise is dependent not only upon the sound pressure level and its frequency, but also its intermittency. Various indices have been developed to try and correlate annoyances with the noise level and its fluctuations. The indices and parameters used in this evidence are defined below:

(i) Equivalent Continuous Sound Pressure Level (L_{Aeq}): The A-weighted sound pressure level of a steady sound that has, over a given period, the same energy as the fluctuating sound under investigation. As LAeq is a time weighted average, it is usual to see a reference to the period over which the measurement has been taken, for example $L_{Aeq,1\ hour}$ is the L_{Aeq} over a period of an hour. Where there is no such period defined the term is written as $L_{Aeq,T}$ to denote this.

(ii) L_N: the A-weighted sound level exceeded for N% of the measurement period. For example L_{90} is the steady noise level which is exceeded for 90 percent of the time. LA_{90} is often used to describe the background noise level, and LA_{10} is used as a descriptor of road traffic.

(iii) L_{AMAX}: The maximum 'A' weighted noise level recorded during a measurement period.

BS8233:1999 'Sound insulation and noise reduction in buildings - Code of practice'

3.6 The scope of British Standard BS8233:1999, recommends design criteria for internal noise levels within noise sensitive properties. This standard suggests criteria, such as reasonable listening conditions, and proposes noise limits that will normally satisfy these criteria for most people.

3.7 With respect to classrooms the standard provides limits for 'good' and 'reasonable' noise levels. A level of 35 $L_{Aeq,T}$ equates to a 'good' condition, 40 $L_{Aeq,T}$ equates to a 'reasonable' condition. An extract of the indoor ambient noise levels in spaces when they are unoccupied from the standard that may be applicable to uses within the college are shown in Table 1 below;

Table 1 – Indoor ambient noise levels in spaces when they are unoccupied

Criterion	Typical situations	Design range LAeq,T dB	
		Good	Reasonable
Reasonable conditions for study and work requiring concentration	Library, cellular office, museum	40	50
Reasonable conditions for study and work requiring concentration	Staff room	35	45
Reasonable conditions for study and work requiring concentration	Meeting room, executive office	35	40
Reasonable listening conditions	Classroom	35	40
Reasonable listening conditions	Lecture theatre	30	35

3.8 The standard also contains information on the attenuation that can be anticipated from various glazing configurations. These are presented below in Table 2:

Table 2 – Sound insulation of typical windows

Description	Weighted sound reduction index R_w *dB*
Any type of window in a façade when partially open	10 -15
Single glazed windows (4mm glass)	22-30
Thermal insulating units (6-12-6)	33-35
Secondary glazed windows (6-100-6)	35-40
Secondary glazed windows (4-200-4)	40-45

BS 5228:1997 'Noise and Vibration Control on Construction and Open Sites - Part 1 : Code of Practice for Basic Information and Procedures'

3.9 This standard contains general guidance as to the control of noise and vibration from construction and demolition. It represents the generally accepted industry best practice for controlling noise and vibration from works of construction, excavation and demolition. It also contains a methodology for predicting noise levels that can arise from various construction techniques as well as recognised methods of mitigating excessive noise levels.

Semantic noise descriptors

3.10 In order to assess the impact of the predicted changes to noise levels on existing roads, reference has been made to semantic descriptors, which effectively gauge community response to noise.

3.11 For existing noise sensitive properties, the change in noise levels between the existing and with development situations has been assessed. The change in traffic noise levels can be categorized with semantic descriptors according to the scale of the change. There are various descriptors that are adopted but the latest proposals by the joint Institute of Acoustics/Institute of Environmental Assessment (IOA/IEMA), noise impact assessment working party are shown in Table 3 below.

Table 3 : Semantic noise descriptors for changes in noise levels

Noise Change (dB)	**Category**
0	No impact
0.1 to 2.9	Slight impact
3.0 to 4.9	Moderate impact
5.0 to 9.9	Substantial impact
10.0 or more	Severe impact

3.12 In addition to the use of the semantic descriptors above, whether or not any change in noise levels is significant has been assessed. PPG24 Planning and Noise states that ‘a change of 3dB(A) is the minimum perceptible under normal conditions’ and this value has been used to determine whether the change is significant.

Guidelines for Community Health World Health Organisation 2000

3.13 This guidance represents the international perspective on the effects of noise on health and well being. The guidance considers a range of activities and proposes guideline noise levels for various tasks and locations. Many of these guidelines have been incorporated into UK guidance such as PPG 24 ‘Planning and Noise’ and BS8233:1999 which I have cited above.

3.14 The guidance makes several references to the effects of noise in places of learning. In the Executive Summary, Section 3 ‘Adverse health effects of noise’ under the heading ‘Social and behavioural effects of noise; annoyance’, the guidelines state;

‘There is a particular concern that high-level continuous noise exposures may increase the susceptibility of school children to feelings of helplessness’.

3.15 In section 4 of the Executive Summary, ‘Guideline values’,

‘When listening to complex messages (at school, foreign languages, telephone conversations), the signal-to-noise ratio should be at least 15 dB with a voice level of 50 dB(A). This sound level corresponds on average to a casual voice level in both men and women at 1 m distance. Consequently for clear speech intelligibility the background level should not exceed 35 dB(A). In classrooms or conference rooms where speech levels is of paramount importance, or for sensitive groups, the background noise level should be as low as possible.’

3.16 Further reference to schools and pre-schools can be found in the section ‘Specific environments’ as follows;

‘To be able to hear and understand spoken messages the background noise level should not exceed 35 dB LAeq during teaching sessions.’

The Guidelines continue;

'For outdoor playgrounds, the sound level from external sources should not exceed 55 dB LAeq.'

The Design Manual for Roads and Bridges (DMRB) Vol 11 Section 3 'Nuisance from Road Traffic Noise'.

3.17 This document provides guidance and the methodology to be undertaken when assessing the impacts of noise from new road schemes. In Section 3.5 it states;

'In recent years, evidence has been accumulating from surveys before and after sudden changes in noise exposure. It indicates that people would be more sensitive to abrupt changes in traffic noise associated with new road schemes, than would be predicted from steady state evidence. In the period following a change in traffic flow, people may find benefits or disbenefits when the noise changes are as low as 1 dB(A) – equivalent to an increase in flow of 25% or a decrease of 20%. These effects last for a number of years.'

3.18 In Section 4 on Noise Surveys, DMRB states that;

'Particular care should be taken to identify locations which are particularly sensitive to noise and vibration. Schools… come into this category.'

Calculation of road traffic noise

3.19 In the introduction to this document, published by HMSO in 1988, it states;

'*This memorandum describes the procedures for calculating noise from road traffic'*

3.20 The Memorandum represents the most recently published UK advice on the calculation of road traffic noise. The introduction states that the memorandum is divided into 3 sections;

(i) 'Section I containing 'a general method of calculation set out step by step for predicting noise levels at a distance from a highway taking into account different traffic parameter, intervening ground cover, road configuration and site layout.'

(ii) *Section II 'provides additional procedures that may need to be considered when applying the method in Section I to specific situations e.g. road junctions.'*

(iii) *Section III 'the procedure and requirements to be met during such measurements are detailed, together with details of a simplified measurement procedure which is acceptable in certain circumstances.*

3.21 Examples of the procedures are given in Annexes 1 -18.

Dust Nuisance

3.22 Dust is defined as particles 1 – 75 μm in diameter and is produced through the action of crushing and abrasive forces on materials.

3.23 In order to establish the likely locations surrounding the site that are within an area which, could possibly be affected by the release of dust, research referenced in the DETR publication 'The Environmental Effects of Dust from Surface Mineral Workings' (1995) has been referred to. A study of coal particles referenced in this guidance concluded that small particles of 10 μm can travel for up to 1000 m or further, whereas larger particles of around 20 μm in diameter could travel 500 m, and 300 m in the case of 30 μm particles.. Particles with a diameter of 50 μm were found to fall out within 100 m. This research was carried out on coal particles, but it also is considered to be relevant to particle release from the construction and demolition process.

3.24 For a dust nuisance to arise, the following factors must be present;

(i) finely divided, dry material is present on site as a dust source
(ii) a wind blowing from the site to the receptor
(iii) the wind speed is sufficient to entrap the particles

3.25 The prevailing wind direction is therefore most important in establishing the areas which are most likely to experience any annoyance from dust during the construction process. In recognition of the distances travelled by various sized particles, Part 1 of the research refers to zones around a mineral working where a dust nuisance is likely to occur. It concludes that the most likely zone is an average 200 m from the perimeter of the source. Although under less usual circumstances dust nuisance may occur outside this area, this is identified as the most likely area to experience a potential dust deposition.

'Controlling Particles, Vapour and Noise Pollution from Construction Sites' Building Research Establishment

3.26 Guidance on the mitigation of potential dust nuisance from construction processes has been published by the Building Research Establishment (BRE) as a Pollution Control Guide 2003. The advice is contained in five parts;

(i) Part 1: Pre-project planning and effective management
(ii) Part 2 : Site preparation, demolition, earthworks and landscaping
(iii) Part 3 : Haulage routes, vehicles and plant
(iv) Part 4 : Materials handling, storage, stockpiles, spillage and disposal
(v) Part 5 : Fabrication processes, internal and external finishes

3.27 The contents of these documents provide a comprehensive management and mitigation strategy targeted at the construction process and aimed at minimising dust generation from these processes.

4. REVIEW OF ENVIRONMENTAL STATEMENT

Traffic noise

4.1 Chapter12 of the ES deals of the ES with these topics. In section 12.2 'Existing Conditions', reference is made to the Noise Survey Report that was commissioned to inform the ES. Existing ambient noise levels were measured at 10 locations, which did not include the College. DMRB states that;

'Particular care should be taken to identify locations which are particularly sensitive to noise and vibration. Schools… come into this category.'

The reason for not including the College in the survey is not recorded.

4.2 There are no further references to the College in this Chapter.

4.3 In the Environmental Impact Tables contained in Volume1 Part C of the ES the noise impacts are dealt with on page 21. The table records that there will be an increase of 5 < 10 dB to the western façade, and 1< 3 dB to the southern façade with the preferred route and no change for the do minimum condition. It is not stated in the ES to which buildings on the campus these increases relate. The accompanying comment is as follows;

' The closest College buildings are 40 metres from the centreline of the scheme. The noise levels are based on 2010 predicted traffic flows with high growth.'

4.4 I accept that this distance is correct in relation to the closest distance between centreline and Building F. The edge of the carriageway and the foot of the embankment are in fact closer to Building F, with the edge of the carriageway being within 35 metres and the foot of the embankment being within 20 metres of Building F.

4.5 The mitigation section of the ES (12.4.12 Mitigation Measure (sic)) in 12.4.13 refers to;

'landscaping works by way of provision of earth bunds, false cuttings, together with the provision of a noise barrier along the section of the embankment adjacent to the northeast end of the Torrisholme Bridge.'

It also refers to;

'extensive tree and shrub planting'

There is also a reference to potential to use 'quieter' road surfacing materials as a potential mitigation measure.

4.6 Capita Symonds has been supplied with subsequent correspondence from Lancashire County Council and Eversheds, solicitors for the College, reference HEM11063 CFL/BN dated 4th September 2006. In this letter in section 6 'Traffic Noise and Vibration it states that ;

'The (noise) calculations assume that a 2.5 metre high acoustic barrier is located along both sides of the proposed carriageway from Morecambe Road beyond Torrisholme Bridge.

The calculations are for a reception point 1.5 metres above ground height on the west façade of each building. Noise levels are given for both high growth and Modelled Traffic flows.

Block F	*2025 High Growth*	*2025 Modelled*
Construction Trades	*62 dB(A)*	*61 dB(A)*
Multi Storey Block	*59 dB(A)*	*57 dB(A)*
Block G		
A Level Access Centre	*66 dB(A)*	*64 dB(A)*

These noise levels are outside the buildings and the building fabric would provide some attenuation.'

Construction

4.7 In the Environmental Impact Tables contained in Volume1 Part C of the ES the construction impacts at the College are reported as being 'Major negative'. are The table records that;

'*The College is in close proximity to the scheme and the entrances will be affected temporarily by the remodelling of the Morecambe Road junction and Torrisholme Road.'*

(a) In the letter to Eversheds reference HEM11063 CFL/BN referred to in section 4.5 above, in Section 6 'Disruption Due to Construction' the County Council states;

'The current programme allows 32 months (2 2/3 years) for the construction phase of the scheme. The maintenance period will be 12 months (1 year)….

The type of work undertaken during the maintenance period would be similar to routine highway maintenance work rather than large scale civil engineering work. During the 32 month construction phase, work adjacent to the College would be intermittent rather than continuous.'

Comments on the Environmental Statement

4.8 My first observation on the ES in relation to the College is that although it has considered the advice contained in DMRB for both noise and the air quality implications of the construction process, which I consider to be appropriate, this is the only guidance that has been referred to. As I have shown in Section 3 above there are other very pertinent sources that should have been referred to for noise in relation to schools in order to determine the extent of the very specific impacts of noise and air quality impacts from construction on the College and its grounds. I would therefore have expected to see a more thorough evaluation of the noise impacts on the College carried out which referred to this specific guidance. As I have stated above, DMRB identifies schools as a location sensitive to noise and vibration.

Noise

4.9 In the instance of noise, I consider that the ES is deficient in that has not considered the extent to which noise from the Link Road will impact on activities being carried out the College during both the construction and the operational phases. It is further noted that despite a specific reference being made to schools as noise sensitive premises to be identified there is no noise data available specifically for the school. It is surprising that the school was not included as a receptor point in this instance. In recognition of its status as a sensitive location, it would have been appropriate to have designated the College a place at which to take baseline noise measurements.

4.10 The reference I refer to in 4.3 above states that there will be an increase between 5 and 10 dB at the College. The exact location within the College is not specified. From the draft IOA/IEMA Guidelines such a noise increase would have between a ‘moderate’ and ‘substantial’ impact on the College.

4.11 As the ES has relied upon DMRB, the noise impacts on the College have been expressed as $L_{A10,18hour}$ measurements. This means that the measurement period that has been used is from 06:00 until 24:00 and the noise index that has been used whilst considered to be totally appropriate when judging noise impacts from road traffic on residential uses and as an indicator for other sensitive uses, should be supplemented by the use of a noise index and a time period in the recognised guidance for schools. Schools and colleges are in use during the daytime and in recognition of this any assessment must take into account the impacts that occur when those persons using the college will be affected by them. It is thus more appropriate to use L_{Aeq} , as this is the noise index that is used throughout the guidance on schools and to chose all or part of College t4eaching day for the assessment period. In this instance I consider that 09:00 to 17:00 is more appropriate than the 06:00 until 24:00 used in the ES for assessing the special circumstances relating to the College site as road traffic tends to decrease during the evening and night time period, occasioning a corresponding decrease in noise levels.

4.12 Noise measurements are presented for three times three hour periods for the Thorpe View Day Centre in the ES Technical Assessment Report Volume A. This is the closest noise sensitive receptor to the College. These results, which I consider can reflect current noise levels at a point representative of the College playing fields and pitches furthest from the A589, but only of that location and not of other parts of the College campus and representative of the teaching day record levels all below the $L_{Aeq,T}$ 55 dB recommended in the WHO guidelines for outdoor playgrounds. As I will show later in my evidence, Capita Symonds has taken noise measurements at the College to determine the current noise baseline at several locations within the College premises.

4.13 The proximity of the preferred route to the College will also be likely to produce substantial negative impacts from the construction period as acknowledged in the ES.

4.14 The proposed provision of 2.5 metre high noise barriers on either side of the preferred route will produce some attenuation. As I will show later, these will not however be sufficient to remove substantial impacts from occurring on the College campus.

Vibration

4.15 The ES has covered vibration as it arises from the operational phase of the road in the manner required by DMRB. It has not however addressed vibration arising from the construction process. I have covered this later in my evidence.

Air Quality

4.16 The ES has not provided any details of the impacts that may arise during the construction phase from dust or other pollutants. Due to the proximity of the closest buildings, and in particular Buildings A, E and K to the proposed route to the College, the potential for the deposition of dust within the College grounds on either side of the preferred route alignment, including the playing fields, is very high within 200 metres, as referenced in 3.25 above.

5. CAPITA SYMONDS NOISE MEASURMENT SURVEY

5.1 On Friday 25th May 2007, Capita Symonds undertook a noise measurement survey at the College. The purpose of the survey was to measure noise levels at various locations within the College that are most likely to be affected by an increase in noise levels from the proposed route. These locations and the results can be found in Appendix 1.

5.2 The results show that on the football pitches closest to the A589 and thus currently experiencing the highest noise levels, the levels are all below the WHO guideline level of L_{Aeq} 55 dB for outdoor playgrounds. It is understood that these pitches, when not in use for sport related activities are also used for external lessons for trades.

5.3 The highest noise levels were measured at the western elevation of Building E (Position 3) where a level of L_{Aeq} 57.4 dB was recorded. Allowing for an attenuation of between 10 and 15 dB from a window open for ventilation, as offered as guidance in BS8233:1999 and reported in Table 2 above, the current internal noise level within these classrooms is between L_{Aeq} 47.4 and 42.4 dB and with the single glazed windows closed between L_{Aeq} 35.4 and 27.4 dB.

5.4 Thus with the windows closed, a ‘good’ standard of internal ambient noise level as defined in BS8233:1999 is currently achieved, and the WHO guideline value is also achieved.

6. CAPITA SYMONDS NOISE MODELLING

6.1 In order to determine the extent of noise impacts from the preferred route on the College a baseline noise map has been produced using the IMMI software package. IMMI is specifically designed for noise mapping. It covers all applications from small to very large-scale, including cities/agglomerations, major road and rail networks, major airports and industrial sites.

6.2 More than 20 different European and International calculation methods for noise propagation and air pollution dispersion are available for IMMI, including CRTN. Propagation of noise is calculated taking into account all physical influences on the propagation path. The result of a calculation can be either a horizontal or vertical noise map.

6.3 The baseline road traffic noise levels have been predicted using the Department of Transport Calculation of Road Traffic Noise (CRTN) methodology. This is the method cited for use in DMRB to calculate road traffic. The method requires input in the form of road traffic flows over an 18 hour period between 06:00 and 00:00, the percentage heavy good vehicles (HGVs) in the flows and the average speed for each section of road. The geometry of the road layout, including the road gradient, angle of view from the receptor point, any barriers (in this case reflective barriers 2.5 meters in height on either side of the proposed link road), the nature of the ground over which the sound propagation takes place and the nature of the road surface are all taken into account.

6.4 It is noted that although there is a reference to the use of 'quieter' road surfacing materials, in the Mitigation section of the ES, this has not been included in the mitigation measures referenced in the County Council letter of 4th September 2006. Cross checking of the calculations as stated in 6.7 below confirms that these surfaces are not included in the LCC mitigation strategy.

6.5 The mitigation section also makes reference to 'extensive planting of trees and shrubs' but wisely does not attempt to quantify any noise reduction that these may produce, as the extent of any mitigation effect from such planting is questionable.

6.6 The IMMI output is terms of L_{A10}, 18 hour (06:00-00:00). These results have been converted by Capita Symonds into L_{Aeq}, and using the breakdown of hourly traffic flows made available from an Automatic Traffic Counter in the area. From these results ,the individual hourly noise levels and the average College day noise levels 09:00 – 17:00 have been predicted for 25 receptor points across the College and playing fields. This exercise has been undertaken to determine the average noise levels across the College campus during the school day and excluding non teaching periods using the noise index (L_{Aeq}) . The period that has been selected is 09:00 until 17:00. The predictions for 2010 and 2025 for the preferred scheme are compared to the 2001 baseline calculations and an evaluation of the impact of the change has been made using the draft IOA/IEMA semantic descriptor presented in Table 3. As stated in 6.3 above, these results take into account the mitigation effects of the proposed noise barriers. These results are shown in Table 4 below and the full results of this exercise, together with a figure locating the receptor points is presented in Appendix 2;

Table 3; Assessment of noise impacts on Lancaster and Morecambe College from the preferred route $L_{Aeq,09:00-17:00}$ (dB)

Receptor Point	Floor	2001	2010	Change	2025	Change
Building F						
1	Grd Floor	55.2	61.0	+5.8 substantial negative	61.6	+6.3 substantial negative
2	Grd Floor	51.2	59.8	+8.6 substantial negative	60.4	+9.2 substantial negative
Building A						
3	Grd Floor	48.1	53.1	+5.0 moderate negative	53.7	+5.6 moderate negative
4	Grd Floor	47.0	54.2	+7.2 substantial negative	54.8	+7.8 substantial negative
5	Grd Floor	47.5	54.5	+7.1 substantial negative	55.1	+7.6 substantial negative
Building B						
6	3rd Floor	51.5	54.2	+2.7 slight negative	54.8	+3.3 moderate negative
14	Grd Floor	36.6	43.0	+6.4 substantial negative	43.6	+7.0 substantial negative
Building H						
7	Grd Floor	54.4	55.2	+0.8 slight negative	55.8	+1.3 slight negative
Building D						

12	5th Floor	46.2	53.9	+7.7 substantial negative	54.5	+8.3 substantial negative
13	5th Floor	47.7	55.2	+7.5 substantial negative	55.8	+8.1 substantial negative
Building C						
8	8th Floor	54.8	57.0	+2.2 slight negative	57.6	+2.8 slight negative
10	8th Floor	52.7	55.4	+2.8 slight negative	56.0	+3.3 moderate negative
17	8th Floor	52.7	51.7	-1.0 slight positive	52.2	-0.5 slight positive
18	8th Floor	49.9	49.2	-0.7 slight positive	49.8	-0.1 slight positive
19	8th Floor	24.9	29.7	+4.8 moderate negative	30.3	+5.3 moderate negative
Building S						
9	2nd Floor	54.7	55.9	+1.2 slight negative	56.4	+1.7 slight negative
11	2nd Floor	59.5	60.0	+0.5 slight negative	60.6	+1.1 slight negative
15	2nd Floor	59.2	59.4	+0.1 slight negative	59.9	+0.7 slight negative
16	2nd Floor	52.6	52.1	-0.5 slight positive	52.6	0.0 no change
Building E						
21	1st Floor	57.1	61.4	+4.3 moderate negative	62.0	+4.8 moderate negative
Pitches						
20	1.5 m	60.4	63.3	+2.9 slight negative	63.8	+3.4 moderate negative
22	1.5 m	61.1	63.0	+1.9 slight negative	63.5	+2.4 slight negative
23	1.5 m	60.5	64.5	+3.9 moderate negative	65.0	+4.5 moderate negative
24	1.5 m	54.1	58.9	+4.8 moderate negative	59.5	+5.4 moderate negative
25	1.5 m	49.8	57.6	+7.8 substantial negative	58.2	+8.4 substantial negative

6.7 Receptor Point 21 in the noise mapping exercise corresponds to Location 3 in the Capita Symonds baseline noise measurement survey and Receptor Point 24 corresponds to Location 4. These locations can be found in the Figures in Appendices 1 and 2. The difference between the measured and the modelled results over the measurement period of approximately 11:00 until approximately 15:00 is L_{Aeq} 57.3 – 57.4 = - 0.1dB and 54.2 -54.1= 0.1 dB, which indicates a close correlation between these two sets of results.

6.8 A comparison between the predicted noise levels for Buildings F and C included in the County Council letter of 4th September 2006 (assuming that these are as L_{Aeq}) agree closely with the predictions for 2025 for receptor points 1 and 2 and 8 and 10.

Comments on predicted noise levels

6.9 From Table 3 it can be seen even when the mitigation from the roadside noise barriers has been applied, there are substantial residual impacts across the College campus at Buildings A, B, D and F and on the pitches. Increases in road traffic noise in these locations will be noticeable to persons in these areas, and will require persons in these areas to speak more loudly to one another than at present outside these buildings.

6.10 At receptor locations 24 and 25 which represent part of the area used as playing fields, noise levels are predicted to exceed L_{Aeq} 55 dB, the level which the WHO guidelines have determined as the level which should not be exceeded in outdoor playgrounds which will include playing fields. These increases in the ambient noise levels in on the playing fields which as well as being used for sports activities in association with the Sports Academy of the College are also used for outdoor lessons for Distributive Trades classes produce a noise climate where vocal communication will not be as good as it is currently and exceeds the WHO Guidelines, once again requiring persons in these areas to raise their voices when speaking to one another.

6.11 The substantial predicted increases at the external facades of 4 out of the eight campus teaching buildings assessed, that is Buildings A, B, D and F, have been examined further to determine what the impact would be on internal ambient noise levels. The of L_{Aeq} 35 dB which the WHO Guidelines state should not be exceeded during teaching sessions and BS8233:1999 gives a range of between L_{Aeq} 35 dB for ‘good’ and L_{Aeq} 40 dB for ‘reasonable’. The predictions show that the L_{Aeq} 35 dB level is exceeded over part of the range allowed for attenuation from closed single glazed windows in Table 2 of my evidence, and there is a substantial increase in indoor ambient noise levels, within Buildings A, B, D and F although these will still maintain either a ‘good’ or ‘reasonable’ standard for classrooms.

7. IMPACTS FROM CONSTRUCTION

Noise impacts from construction

7.1 Noise impact from the construction period have not been adequately assessed in the ES. As noted above, there is a reference to impacts being 'Major negative without any explicit reference to noise. In order to determine the impact from construction noise on the school, I have made a series of calculations using BS5228:1997 to represent the noise levels likely to arise from road building activities. Assumptions have been made as to the plant that would be used based on my experience of similar road building projects and shown in Table 4. The results are shown in Table 5;

Table 4 : Plant used in BS5228 calculations

Activity	
Earthworks	Dozer, scraper, front loader, dump truck x 3
Carriageway construction	Paving train
Road surfacing	Lorry, asphalt spreader, chip spreader, road roller

Table 5 : Predictions of noise levels from the construction process using the DMRB sound pressure methodology - dB(A)

Building	**Distances to works***	**Earthworks**	**Carriageway construction**	**Road surfacing**
A	48 62	72.6	59.2	58.2
C	140 150	54.3	39.6	38.6
D	96 115	65.0	59.0	58.0
E	24 34	80.8	68.7	67.7
F	3 14	89.5	77.0	76.0
Playing Fields	10 20	75.4	60.5	59.5

* the first distance is from the foot of the embankment to building façade, and the second distance is from the edge of the carriageway to the building facade

7.2 Predicted noise levels within teaching rooms with windows are shown in Table 6 below.

Table 6 : Noise levels within teaching rooms during construction – dB(A)

Building	Activity	Windows open	Windows closed
A	Earthworks Carriageway construction Road surfacing	62.6 – 57.6 49.2 – 44.2 48.2 -43.2	50.6 – 42.6 37.2 – 29.2 36.2 - 29.2
C	Earthworks Carriageway construction Road surfacing	44.3 – 39.3 29.6 – 24.6 28.6 – 23.6	32.3 -24.3 17.6 – 9.2 15.6 – 8.2
D	Earthworks Carriageway construction Road surfacing	55.0 – 50.0 49.0 – 44.0 48.0 – 43.0	43.0 – 35.0 37.0 – 29.0 36.0 – 28.0
E	Earthworks Carriageway construction Road surfacing	70.8 -65.8 67.0 -62.0 66.0 -61.0	58.8 – 50.8 55.0 – 47.0 54.0 – 46.0

Comments on predicted construction on noise levels

7.3 It can be seen from the predicted noise levels in Table 5 that for teaching rooms on the western elevations of Buildings A and E, internal noise levels during the earthworks period are predicted to be in excess of those recommended as being ‘good’ or ‘reasonable’ in BS8233 and WHO Guidelines with windows open or closed. For Block E all of the construction activities assessed are predicted to exceed the BS:8233 and WHO Guidelines. Impacts are less at the other blocks and for other activities but, with the exception of Building C, for each building there is at least one activity, most notably the construction of earthworks, where the predictions exceed the BS:8233 or the WHO Guidelines.

7.4 Noise levels of this magnitude, especially at Blocks A and E and on the playing fields will materially interfere with speech communication within classrooms and in my opinion may well require that these buildings are not used for teaching whilst these construction activities are being carried out.

7.5 Noise levels on the playing fields are such it is hard to envisage these being in use whilst works are being carried out.

Vibration impacts from construction

7.6 In the absence of any construction programme available at this stage, I have drawn on my experience of construction works to determine which processes may give rise to vibration levels likely to interfere with teaching activities both within the buildings and on the playing fields. The greatest vibration impacts that may arise on the campus are most likely to affect the locations closest to the construction site, in particular the playing fields and Buildings A, E, F and K.

7.7 The processes to be carried out during the construction of the preferred route that have the potential to cause vibration are as follows;

(i) Earthworks and the use of bulldozers and to heavy plant in close proximity to buildings.

(ii) Concreting works

(iii) Fixing of supports for noise barriers and other signs

(iv) Lorry movements on haul roads

7.8 From drawing WD305 September 2006, an extract of which is shown in Figure 1,heavy plant is likely to be operating within less than 10 metres of Building F during the earthworks phase. Not only will this lead to an increase in noise (the predictions above have been carried out assuming that the works will be reasonably symmetrical around the centreline of the road) but increase the opportunity for causing vibration that may be sufficient to cause structural damage to the closet buildings , potentially A, E, F and K, and also annoyance to persons within those buildings being taught and teaching. This is also likely to apply to those persons training and otherwise using the playing fields.

7.9 It is not possible to quantify the levels of vibration that may arise from these activities with reasonable accuracy, as at present the precise plant is unknown and the construction methodology is not available. However the closer that heavy plant and machinery is likely to operate to the College, the less attenuation of the vibration with distance will result, and the more likelihood there is of vibration affecting the buildings and persons within them.

7.10 It is however possible to conclude that the proximity and the likely nature of the works is such that there is a strong likelihood of either building damage or annoyance arising from these works within the College campus. The annoyance is likely to arise from sudden jolts produced by the plant as it operates in the vicinity of the College Buildings, which can interfere with concentration of persons in those classrooms.

Air quality impacts from construction

7.11 Construction and demolition processes have the potential to create dust. The main activities which have been assessed as likely to cause dust are as follows;

(i) Demolition of any on-site structures and hard standing areas;

(ii) Landscaping in various locations;

(iii) Dust from haul roads;

(iv) Excavation, transportation and storage of materials;

(v) Loading and unloading of lorries; and

(vi) Lorry movements on the highway network.

7.12 The prevailing wind direction is from the south-west and hence is from the construction site towards the college.

7.13 The impacts from dust are likely to manifest as an increased level of cleaning being required to remove the dust depositions from windows and ledges around the College.

7.14 The introduction of additional lorry movements during construction is also likely to impact on local pollution concentrations.

7.15 On-site construction machinery also produces emissions, which will add to ambient concentrations in the surrounding area. The type of machinery and Euro rating of the engines is not known at this time, as this will depend on the contractor.

7.16 It is considered therefore that there is potential impact from dust from the construction phase of the development. Without mitigation, there is a potential for this to create a high potential for dust nuisance, that is increased soiling rates of buildings and vehicles over most of the campus and most particularly at those Buildings and the playing fields immediately adjacent to works for the preferred route. It is accepted that a rigorously enforced mitigation strategy would control dust emissions, although this will rely on the careful management of the site especially during the earthworks phase of the construction.

Duration of the works

7.17 From the LCC letter of 4th September 2006, the period of the works is 32 months with a 12 month maintenance period and the works close to the College. It is also state that the works are to be intermittent rather than continuous.

7.18 In terms of the total amount of noise, vibration and dust that the College is likely to receive, I consider that there is likely to be very little difference between an approach where the works on site are intermittent or whether they are continuous. There may be some additional disruption caused by re-establishing the site, but this is likely to be minor in comparison to the works themselves.

7.19 Carrying out the works intermittently does however lengthen the period when the College will be exposed to high levels of noise, vibration. This can have the effect of extending the period when parts of the College may not be able to be used for teaching and in particular Buildings A, E, F and K.

Mitigation

7.20 At present, there is no mitigation strategy proposed to ameliorate part of the effects of these works. I accept that such a strategy is likely to be part of the construction process. It is very likely that such a strategy will reduce some of the impacts I have evaluated in this section. I am of the opinion however that it will be difficult for those uses of the College campus close to the works for the preferred route, for example in Buildings E and F to continue without experiencing serious disruption from noise, vibration and dust .

8. CONCLUSIONS

8.1 In my evidence I have considered the information that has been provided in the ES for the Heysham M6 link road as it impacts on Lancaster and Morecambe College.

8.2 I consider that with the exception of the omission of the College as a noise receptor as part of the baseline survey, the DMRB assessment for noise, vibration and air quality has been carried out satisfactorily.

8.3 I do however consider that it is deficient in that the ES does not refer to any other guidance and has not thoroughly considered the impacts of noise, vibration and air pollutants, especially from the construction process.

8.4 Using guidance from British Standards and the World Health Organisation, the Institute of Acoustics and the Institute of Environmental Management and Assessment, I have predicted that 'substantial' noise impacts arise at four out of the eight buildings assessed on the College campus from the operational phase of the preferred route, even with the proposed mitigation from roadside noise barriers, and that in some locations there is a deterioration of ambient levels within teaching rooms from below to above that specified as a maximum by WHO.

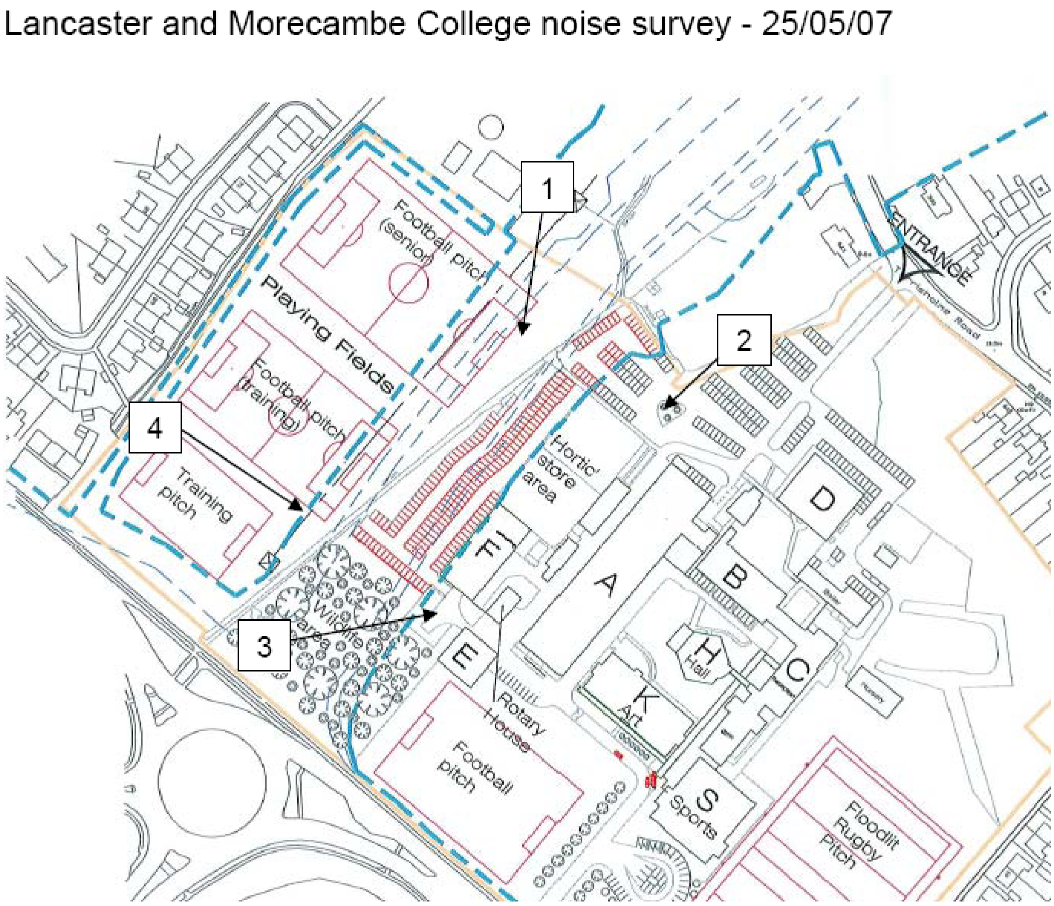
8.5 Noise levels that will result from the road will increase to such an extent that they will exceed the maximum guideline level recommended by the WHO. This is of particular importance to the College as it is a Sports Academy.

8.6 I have predicted that during the construction period levels of noise will exceed those that allow satisfactory verbal communication within College buildings. Vibration and air pollutant levels, and particularly dust from construction are likely to be at such levels that they will interfere with teaching at the college including the use of the playing fields.

APPENDIX 1

Lancaster and Morecambe College noise survey - 25/05/07

Figure 1



Position 1
Football pitch - dominant noise source local traffic + occasional light building work from adjacent site.

Position 2
Car park near to building A - dominant noise source local traffic + general campus activity.

Position 3
Block E/F - dominant noise source road traffic.

Position 4
Football pitch - dominant noise source road traffic

Position 1

Time	$L_{Aeq,5min}$	L_{A1}	L_{A10}	L_{A90}
10:35	50.3	59.2	52.8	45.9
10:40	54.8	65.3	58.6	46.1
12:15	53.2	58.5	54.8	50.9
12:20	53.0	57.3	55.0	50.6
12:25	54.2	66.3	54.0	50.1
13:50	50.9	54.9	52.9	48.7
13:55	51.9	55.9	53.8	49.6
14:00	50.8	56.0	52.2	49.2
Avg	52.7			

Position 2

Time	$L_{Aeq,5min}$	L_{A1}	L_{A10}	L_{A90}
10:50	51.2	57.0	52.7	48.9
10:55	53.0	61.3	56.5	47.8
11:00	53.1	61.7	55.7	48.1
11:35	51.9	58.3	53.9	49.3
11:40	53.3	61.6	54.6	49.4
11:45	51.0	54.9	52.4	49.3
13:30	50.8	58.2	52.7	48.0
13:35	53.8	64.7	54.5	48.1
13:40	55.8	68.0	56.2	49.1
Avg	53.1			

Position 3

Time	$L_{Aeq,5min}$	L_{A1}	L_{A10}	L_{A90}
11:05	58.9	68.0	62.0	54.1
11:10	56.2	62.1	58.3	52.7
11:15	57.4	61.5	59.0	55.0
13:05	58.6	68.2	60.0	54.7
13:10	58.6	68.7	59.7	54.3
13:15	57.3	61.9	59.4	54.7
14:30	57.4	62.3	59.7	54.8
14:35	56.1	62.5	58.0	52.8
14:40	56.7	61.0	58.9	54.2
Avg	57.4			

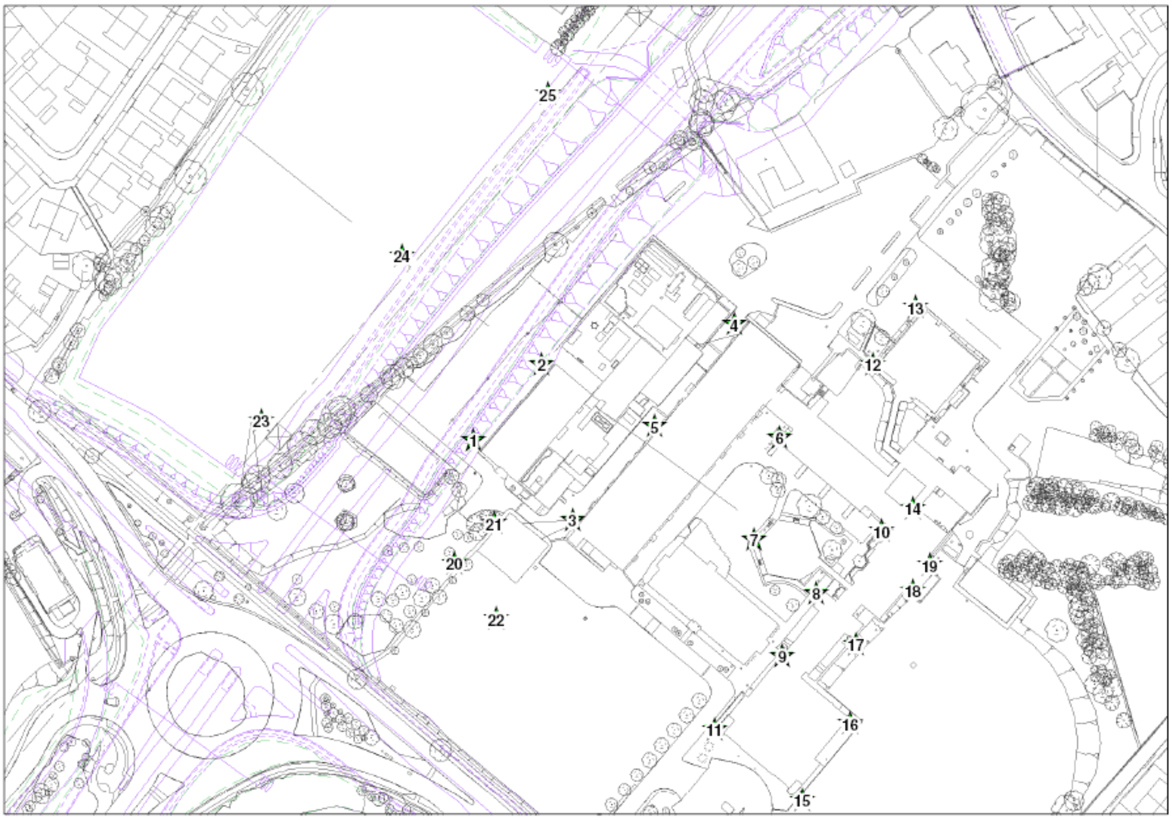
Position 4

Time	$L_{Aeq,5min}$	L_{A1}	L_{A10}	L_{A90}
11:55	55.2	58.8	57.0	52.6
12:00	55.5	60.4	57.0	53.2
12:10	54.7	59.0	56.2	52.4
14:10	53.6	60.2	55.0	51.2
14:15	52.5	55.4	53.8	50.7
14:55	53.7	59.0	55.9	50.5
15:00	53.5	57.0	55.1	51.3
15:05	54.1	57.1	55.6	52.2
Avg	54.2			

APPENDIX 2

IMMI Noise Mapping Results

Figure : Noise Mapping Prediction Points



All predictions $L_{Aeq,1hour}$ (dB)

2001								
Receptor Point	**09:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**
1	54.5	55.1	55.3	55.4	55.4	55.5	55.5	55.3
2	50.4	51.0	51.2	51.3	51.4	51.4	51.4	51.3
3	47.3	47.9	48.1	48.2	48.2	48.3	48.3	48.2
4	46.2	46.8	47.1	47.2	47.2	47.3	47.3	47.1
5	46.7	47.3	47.5	47.6	47.6	47.7	47.7	47.6
6	50.7	51.3	51.6	51.6	51.7	51.7	51.7	51.6
7	53.7	54.3	54.5	54.6	54.6	54.7	54.7	54.5
8	54.0	54.6	54.8	54.9	54.9	55.0	55.0	54.9
9	53.9	54.5	54.7	54.8	54.9	54.9	54.9	54.8
10	51.9	52.5	52.7	52.8	52.8	52.9	52.9	52.8
11	58.8	59.4	59.6	59.7	59.7	59.8	59.8	59.6
12	45.4	46.0	46.3	46.4	46.4	46.5	46.5	46.3
13	47.0	47.6	47.8	47.9	47.9	48.0	48.0	47.8
14	35.8	36.4	36.7	36.7	36.8	36.8	36.8	36.7
15	58.5	59.1	59.3	59.4	59.4	59.5	59.5	59.3
16	51.9	52.5	52.7	52.8	52.8	52.9	52.9	52.7

Receptor Point	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00
17	51.9	52.5	52.7	52.8	52.8	52.9	52.9	52.8
18	49.1	49.7	49.9	50.0	50.0	50.1	50.1	50.0
19	24.2	24.8	25.0	25.1	25.1	25.2	25.2	25.0
20	59.6	60.2	60.5	60.5	60.6	60.6	60.6	60.5
21	56.3	56.9	57.2	57.3	57.3	57.4	57.4	57.2
22	60.3	60.9	61.1	61.2	61.3	61.3	61.3	61.2
23	59.8	60.4	60.6	60.7	60.7	60.8	60.8	60.6
24	53.3	53.9	54.2	54.2	54.3	54.3	54.3	54.2
25	49.0	49.6	49.9	49.9	50.0	50.0	50.0	49.9

2010								
Receptor Point	**09:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**
1	60.3	60.9	61.1	61.2	61.2	61.3	61.3	61.1
2	59.1	59.7	59.9	60.0	60.0	60.1	60.1	59.9
3	52.3	52.9	53.1	53.2	53.2	53.3	53.3	53.2
4	53.5	54.1	54.3	54.4	54.4	54.5	54.5	54.3
5	53.8	54.4	54.6	54.7	54.7	54.8	54.8	54.6
6	53.4	54.0	54.3	54.3	54.4	54.4	54.4	54.3
7	54.5	55.1	55.3	55.4	55.4	55.5	55.5	55.3
8	56.2	56.8	57.0	57.1	57.2	57.2	57.2	57.1
9	55.1	55.7	56.0	56.1	56.1	56.2	56.2	56.0
10	54.7	55.3	55.5	55.6	55.6	55.7	55.7	55.5
11	59.3	59.9	60.1	60.2	60.2	60.3	60.3	60.1
12	53.1	53.7	54.0	54.1	54.1	54.2	54.2	54.0
13	54.4	55.0	55.3	55.3	55.4	55.4	55.4	55.3
14	42.2	42.8	43.0	43.1	43.2	43.2	43.2	43.1
15	58.6	59.2	59.4	59.5	59.5	59.6	59.6	59.5
16	51.3	51.9	52.1	52.2	52.2	52.3	52.3	52.2
17	50.9	51.5	51.7	51.8	51.8	51.9	51.9	51.8
18	48.4	49.0	49.3	49.3	49.4	49.4	49.4	49.3
19	28.9	29.5	29.8	29.8	29.9	29.9	29.9	29.8
20	62.5	63.1	63.4	63.4	63.5	63.5	63.5	63.4
21	60.6	61.2	61.5	61.6	61.6	61.7	61.7	61.5
22	62.2	62.8	63.0	63.1	63.2	63.2	63.2	63.1
23	63.7	64.3	64.5	64.6	64.6	64.7	64.7	64.6
24	58.1	58.7	58.9	59.0	59.0	59.1	59.1	59.0
25	56.8	57.4	57.7	57.7	57.8	57.8	57.8	57.7

2025								
Receptor Point	**09:00**	**10:00**	**11:00**	**12:00**	**13:00**	**14:00**	**15:00**	**16:00**
1	60.8	61.4	61.6	61.7	61.7	61.8	61.8	61.7
2	59.6	60.2	60.4	60.5	60.5	60.6	60.6	60.5
3	52.9	53.5	53.7	53.8	53.8	53.9	53.9	53.8
4	54.0	54.6	54.8	54.9	55.0	55.0	55.0	54.9
5	54.3	54.9	55.1	55.2	55.2	55.3	55.3	55.2
6	54.0	54.6	54.8	54.9	54.9	55.0	55.0	54.9
7	55.0	55.6	55.8	55.9	55.9	56.0	56.0	55.9
8	56.8	57.4	57.6	57.7	57.7	57.8	57.8	57.7
9	55.6	56.2	56.5	56.5	56.6	56.6	56.6	56.5
10	55.2	55.8	56.1	56.1	56.2	56.2	56.2	56.1
11	59.8	60.4	60.6	60.7	60.8	60.8	60.8	60.7
12	53.7	54.3	54.6	54.6	54.7	54.7	54.7	54.6
13	55.0	55.6	55.9	55.9	56.0	56.0	56.0	55.9
14	42.8	43.4	43.6	43.7	43.7	43.8	43.8	43.7
15	59.2	59.8	60.0	60.1	60.1	60.2	60.2	60.0
16	51.9	52.5	52.7	52.8	52.8	52.9	52.9	52.7
17	51.4	52.0	52.3	52.3	52.4	52.4	52.4	52.3
18	49.0	49.6	49.8	49.9	49.9	50.0	50.0	49.9
19	29.5	30.1	30.3	30.4	30.4	30.5	30.5	30.4
20	63.0	63.6	63.8	63.9	64.0	64.0	64.0	63.9
21	61.2	61.8	62.0	62.1	62.1	62.2	62.2	62.1
22	62.7	63.3	63.6	63.6	63.7	63.7	63.7	63.6
23	64.2	64.8	65.1	65.1	65.2	65.2	65.2	65.1
24	58.7	59.3	59.5	59.6	59.6	59.7	59.7	59.6
25	57.4	58.0	58.2	58.3	58.4	58.4	58.4	58.3