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AIR QUALITY DETAILED ASSESSMENT FOR EAST MIDLANDS AIRPORT

NORTH WEST LEICESTERSHIRE DISTRICT COUNCIL

COUNCIL OFFICES, COALVILLE LEICESTERSHIRE

Prepared for
NORTH WEST LEICESTERSHIRE DISTRICT COUNCIL

MARCH 2009
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EXECUTIVE SUMMARY

Conestoga-Rovers & Associates (Europe) Ltd (CRA) have been commissioned by North West Leicestershire District Council to conduct a Detailed Assessment of nitrogen dioxide (NO_2) concentrations arising from aircraft emissions at relevant receptor locations within 1000 metres of the boundary of East Midlands Airport, Castle Donington, Derbyshire. The Detailed Assessment was required following the recommendations of the Air Quality Progress Report submitted to the Department of Environment, Food and Rural Affairs (DEFRA) by North West Leicestershire District Council in April 2008 (CRA, 2008). The Progress Report identified approximately 2,300 residential properties within 1000 metres of the Airport boundary. The Progress Report also identified that the number of annual passenger movements, including freight movements had exceeded the throughput criteria of 5 million passenger movements per annum (mppa), detailed within the technical guidance current at the time, LAQM.TG(03), (DEFRA, 2003). North West Leicestershire District Council was therefore required to conduct a Detailed Assessment of NO_2 emissions from aircraft at relevant receptor locations within 1000 metres of East Midlands Airport. In accordance with this technical guidance the NO_2 concentrations arising from road traffic associated with the airport have not been considered within this Detailed Assessment.

North West Leicestershire District Council extended their NO_2 diffusion tube monitoring network around East Midlands Airport from four to thirteen sites in January 2008 to assess the impact of NO_2 emissions from aircraft at relevant receptor locations.

The NO_2 concentrations recorded by the extended monitoring network, along with those from the long standing monitoring locations have demonstrated that the NO_2 concentrations at the relevant receptor locations due to aircraft emissions are significantly below the annual mean Air Quality Objective of 40μgm^{-3}. The NO_2 concentrations at the thirteen North West Leicestershire District Council operated sites ranged from 15.0 to 27.9μgm^{-3} in 2008, based on nine months data (January to October 2008).

Monitoring conducted by East Midlands Airport within the perimeter also demonstrated that annual mean NO_2 concentrations were below the Air Quality Objective at eight of the nine monitoring locations in 2007 and 2008. The only monitoring location which exceeded the 40μgm^{-3} annual mean Air Quality Objective was Stand 15 which is the closest monitoring location, airside of the passenger terminal. This monitoring location does not meet the relevant public exposure definition in LAQM.TG(09) as it is not a residential property, school or hospital. Therefore an exceedence of the annual mean Air Quality Objective at this location would not require an Air Quality Management Area (AQMA) to be declared.

Overall the NO_2 monitoring results have demonstrated that the annual mean and 1-hour Air Quality Objectives will not be exceeded at relevant receptor locations within 1000 metres of

the boundary of East Midlands Airport due to aircraft emissions. Therefore, an AQMA will not be required to be declared for aircraft emissions from East Midlands Airport.

North West Leicestershire District Council in partnership with East Midlands Airport should continue to monitor NO_2 concentrations at the long standing relevant receptor locations in order to ensure that any future changes in air quality are detected.

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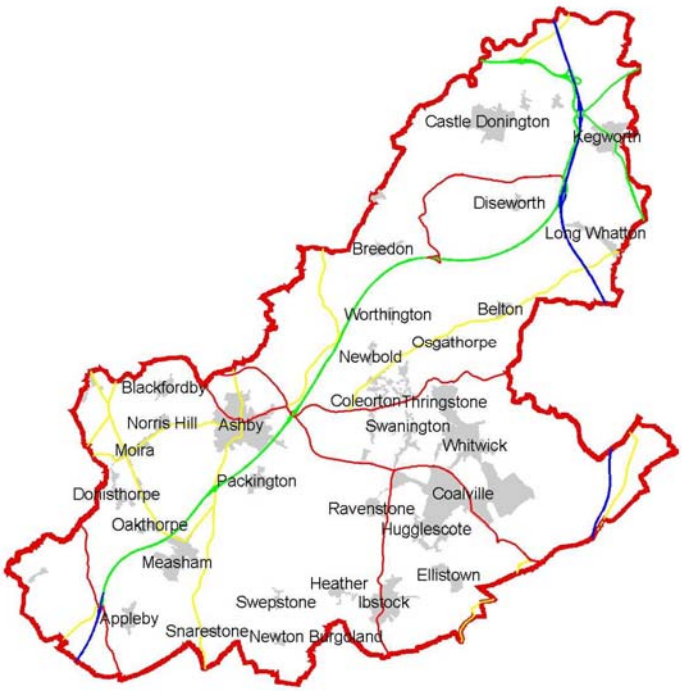
1.0 INTRODUCTION

1.1 DESCRIPTION OF THE DISTRICT

North West Leicestershire lies within the East Midlands, between Leicester, Burton-on-Trent, Derby and Nottingham and encompasses 105 square miles. The major urban areas of the district are the towns of Coalville and Ashby-de-la-Zouch, and the large villages of Castle Donington, Kegworth and Ibstock. The M1, M42/A42 between Birmingham and Nottingham and the A50/A511 from Leicester to Burton-on-Trent all run through the district. East Midlands Airport is located north of Castle Donington.

Figure 1: North West Leicestershire District Council Boundaries



1.2 INTRODUCTION TO REVIEW AND ASSESSMENT

The United Kingdom (UK) Government's Air Quality Strategy for England, Scotland, Wales and Northern Ireland (DEFRA, 2007a) sets out a framework for air quality management, which includes a number of Air Quality Objectives. National and international measures are expected to achieve these objectives in most locations, but where areas of poor air quality remain, air quality management at a local scale has a

particularly important role to play. Part IV of the Environment Act 1995 requires local authorities to periodically review and assess the current, and likely future air quality in their areas. The role of this process is to identify areas where it is unlikely that the Air Quality Objectives will be achieved by the due date. These locations must be designated as Air Quality Management Areas (AQMAs) and a subsequent Action Plan developed in order to reduce pollutant emissions in pursuit of the objectives.

Review and Assessment is a long-term, ongoing process, structured as a series of 'rounds'. Local authorities in England, Scotland and Wales have now largely completed two rounds of Review and Assessment, with the third round underway.

Local Air Quality Management Technical Guidance (LAQM.TG (09)) (DEFRA, 2009) sets out a phased approach to the second and third rounds of Review and Assessment. This prescribes an initial Updating and Screening Assessment, which all authorities must undertake. It is based on a checklist to identify any matters that have changed since the first round. In subsequent years all Local Authorities must undertake a Progress Report. New monitoring data is presented within the Progress Report along with details of any significant changes within the Local Authority area which may have an impact on air quality. If either an Updating and Screening Assessment or Progress Report identifies any areas where there is a risk that the objectives may be exceeded, which were not identified in the previous round, then the Local Authority should progress to a Detailed Assessment.

The purpose of the Detailed Assessment is to determine whether an exceedence of an Air Quality Objective is likely and the geographical extent of that exceedence. If the outcome of the Detailed Assessment is that one or more of the Air Quality Objectives is being, or is likely to be exceeded, then an Air Quality Management Area (AQMA) must be declared. Subsequent to the declaration of an AQMA, a Further Assessment should be carried out to confirm; that the AQMA declaration is justified and that the appropriate area has been declared, to ascertain the sources contributing to the exceedences, and to calculate the magnitude of reduction in emissions required to achieve the objective. This information can be used to inform an Air Quality Action Plan, which will identify measures to improve local air quality.

Conestoga-Rovers & Associates (Europe) Ltd (CRA) have been commissioned by North West Leicestershire District Council to conduct an Air Quality Detailed Assessment of nitrogen dioxide (NO_2) concentrations emitted from aircraft arriving and departing from East Midlands Airport (EMA), Castle Donington, Derbyshire. The Detailed Assessment was required following the recommendations of an Air Quality Progress Report conducted in April 2008 (CRA, 2008), which concluded that the number of passenger movements per annum using East Midlands Airport

exceeded the throughput criteria of 5 million passengers per annum (mppa) as set within the technical guidance that was current at the time, LAQM.TG(03), (DEFRA, 2003). The Detailed Assessment will consider NO_2 concentrations from aircraft only and does not take account of road traffic emissions associated with the airport in accordance with the technical guidance provided by LAQM.TG(03) (DEFRA, 2003).

1.3 AIR QUALITY OBJECTIVES

The Government's Air Quality Strategy (DEFRA, 2007a) provides air quality standards and objectives for key air pollutants, which are designed to protect human health and the environment. It also sets out how the different sectors: industry, transport and local government, can contribute to achieving the Air Quality Objectives. The objectives are prescribed within the Air Quality (England) Regulations 2000 (HMSO, 2000) and the Air Quality (England) (Amendment) Regulations 2002 (HMSO, 2002). This latter publication sets more stringent objectives for benzene and carbon monoxide (CO). The 'standards' are set as concentrations below which health effects are unlikely even in sensitive population groups, or below which risks to public health would be exceedingly small. They are based purely upon the scientific and medical evidence of the effects of a particular pollutant. Short-term exposure to high concentrations of NO_2 may cause inflammation of respiratory airways. Long-term exposure may affect lung function and enhance responses to allergens in sensitised individuals. The young, old and asthmatics will be particularly at risk.

The 'objectives' described in the Regulations set out the extent to which the Government expects the standards to be achieved by a certain date. Table 1 summarises the objectives which are relevant to this report; those relating to NO_2.

The Air Quality Objectives only apply where members of the public are likely to be regularly present for the averaging time of the objective (i.e. where people will be exposed to pollutants). For annual mean objectives, relevant exposure is limited to residential properties, schools and hospitals. The 1-hour objective applies at these locations as well as at any outdoor location where a member of the public might reasonably be expected to stay for 1 hour or more, such as shopping streets, parks and sports grounds, as well as bus stations and railway stations that are not fully enclosed.

Measurements across the UK have shown that the 1-hour NO_2 objective is unlikely to be exceeded unless the annual mean NO_2 concentration is greater than $60\mu gm^{-3}$ (Laxen and Marner, 2003). Thus, exceedences of $60\mu gm^{-3}$, as an annual mean NO_2,

may be used as an indicator of potential exceedences of the 1-hour mean NO_2 objective.

The European Union has also set limit values for NO_2. Achievement of these values is a national obligation rather than a local one. The limit values for NO_2 are the same levels as the UK objective, but are to be achieved by 2010.

Table 1 Air Quality Objectives for NO_2

Status	Time Period	Objective / Value	To be Achieved by[1]
Statutory UK Objective	1-hour mean	200 μgm^{-3} not to be exceeded more than 18 times a year	2005
	Annual mean	40 μgm^{-3}	2005
EU Limit Value	1-hour mean	200 μgm^{-3} not to be exceeded more than 18 times a year	2010
	Annual mean	40 μgm^{-3}	2010

Note 1 The achievement dates for the UK objectives are the end of the specified year; achievement dates for the EU limit values are the start of the specified year.

1.4 KEY FINDINGS OF PREVIOUS REVIEW AND ASSESSMENT REPORTS

Two AQMAs were declared by North West Leicestershire District Council in 2003 due to exceedences in the annual mean NO_2 Air Quality Objective ($40\mu gm^{-3}$) from road traffic emissions at residential properties within 10 metres of the A6 in Kegworth and Molehill House Farm, situated next to the M1 near Kegworth.

The Updating and Screening Assessment conducted in 2006 (NWLDC, 2006) identified two areas within North West Leicestershire; High Street/Bondgate in Castle Donington and Bardon Road to Broom Leys Junction in Coalville as areas in which NO_2 concentrations exceeded the annual mean Air Quality Objective due to road traffic emissions. The Detailed Assessments conducted in both Castle Donington and Coalville in 2007 (NWLDC, 2007) concluded that AQMAs should be declared in both areas. The AQMAs were formally declared in December 2007.

The most recent Progress Report, conducted in April 2008 (CRA, 2008) identified two further locations within the Local Authority area that require Detailed Assessments. These locations are residential properties in the village of Copt Oak due to potential exceedences in the annual mean NO_2 Air Quality Objective of $40\mu gm^{-3}$ related to road traffic emissions and residential properties within 1000 metres of East Midlands

Airport due to NO_2 emissions from aircraft. The Detailed Assessment of air quality within the village of Copt Oak is presented within a separate report, (CRA, 2009).

This report represents the findings of the Detailed Assessment undertaken for residential properties within 1000 metres of East Midlands Airport. The Detailed Assessment for East Midlands Airport was triggered by the number of passenger and freight movements at the airport exceeding the throughput criteria of 5 mppa set within technical guidance current at the time, LAQM.TG (03) (DEFRA, 2003) and 2,300 residential properties being located within 1000 metres of the airport boundary.

2.0 BACKGROUND

2.1 LOCATION

East Midlands Airport is the second largest cargo airport in the UK after Heathrow Airport, London (CAA, 2008) and is situated approximately 350 metres south of the village of Castle Donington, in the north of the district. The village of Diseworth is located approximately 700 metres south of the airport and the M1 is approximately 600 metres to the east.

Aircraft are potentially significant sources of NO_2, particularly during takeoff and up to 200 metres in the air. Above this height, emissions will have minimal impact on ground concentrations. There are approximately 630 residential properties that are within 200 metres vertically of regular flight paths and 2,300 properties within 1000 metres of the airport boundary (Figure 2, Appendix A).

2.2 PASSENGER MOVEMENTS

The Progress Report published in April 2008 (CRA, 2008) presented the total equivalent passenger numbers provided by East Midlands Airport. These are reproduced in Table 2 below. The total passenger numbers for 2008 were not available at the time of publication of this report.

Table 2 Annual Throughput of Passengers and Freight (mppa) for 2004 to 2007 at East Midlands Airport

Type of Cargo	Throughput			
	2004	**2005**	**2006**	**2007**
Passengers	4,382,000	4,192,000	4,727,954	5,406,505
Freight (tonnes)	279,000	293,000	328,084	244,753
Freight - Million passengers per annum (mppa)[1]	2.79[1]	2.93[1]	3.28[1]	2.44[1]
Total mppa	**7.17**	**7.12**	**8.00**	**7.85**

Note 1 Tonnes of freight have been converted to an equivalent number of passengers using 100,000 tonnes = 1 million passengers per annum (mppa).

Freight movements through the airport have decreased by 34,247 tonnes since 2004, to 244,753 tonnes in 2007, however the airport remains the second largest cargo airport in the United Kingdom (CAA, 2008). The technical guidance issued by DEFRA (LAQM.TG (09)) provides details of how to convert tonnes of freight to an equivalent number of passengers per annum (100,000 tonnes of freight = 1 mppa).

This conversion only applies to freight taken in 'freight only' planes and not that which is transported within passenger planes.

Although passenger numbers have fluctuated between 2004 and 2007 there has been an overall increase of 1,024,505 passengers resulting in an increase in throughput of 0.68 mppa during this period. The total number of passengers and freight passing through East Midlands Airport in 2007 exceeded the 5 mppa throughput criteria by 2.85 mppa.

3.0 MONITORING

East Midlands Airport monitors NO_2 concentrations within the Airport's perimeter and at the neighbouring Aeropark, using both passive NO_2 diffusion tubes and a real-time chemiluminescence analyser. The chemiluminescence real-time analyser is operated in partnership with North West Leicestershire District Council who also operates a number of long standing NO_2 diffusion tubes within the vicinity of the Airport. North West Leicestershire District Council extended their NO_2 monitoring locations surrounding the Airport in January 2008; details of which are provided below.

3.1 DIFFUSION TUBES

Diffusion tubes are small plastic tubes with one open end that passively absorb NO_2. After one month the tubes are closed and returned to a laboratory for analysis. North West Leicestershire District Council use Gradko laboratories to prepare and analyse their diffusion tubes using 50% Tri-ethanol amine (TEA) in acetone. East Midlands Airport however use Bureau Veritas laboratories which prepare their diffusion tubes 10% TEA in water.

Diffusion tubes are inexpensive and are able to provide good spatial coverage, however they should ideally, be supported by more expensive automatic techniques, as laboratory analysis will introduce different levels of bias depending on the laboratory used. LAQM.TG (09) (DEFRA, 2009) therefore recommends that a 'bias adjustment factor' is used for diffusion tube measurements. This should be determined by undertaking a co-location study, with a diffusion tube and a real time (reference method) analyser monitoring at the same location. The factor difference can then be applied to all diffusion monitoring undertaken in the district. If a local bias adjustment factor can not be determined, then a default factor, determined from the national database published on the Review and Assessment Helpdesk website, www.uwe.ac.uk/aqm/review/diffusiontube131108.xls should be used (DEFRA, 2008). These national bias adjustment factors have been compiled from co-location studies conducted across the UK using diffusion tubes prepared at a number of different laboratories using a variety of methods. The national bias adjustment factor for Gradko tubes prepared using 50% TEA in acetone is 0.98; based on the results of fifteen co-location studies conducted in 2007. The national bias adjustment factor for diffusion tubes prepared using 10% TEA in water by Bureau Veritas is 0.90; based on seventeen co-location studies undertaken in 2007.

North West Leicestershire District Council co-located two NO_2 diffusion tubes with a real-time chemiluminescence analyser to determine a local bias adjustment factor. This local bias adjustment factor, calculated as 1.04, is applied to all NO_2 diffusion tube results reported by the Authority. It should be noted that the monitoring conducted to determine the bias adjustment factor by North West Leicestershire District Council was undertaken at a monitoring location within an existing AQMA. The NO_2 concentrations at this monitoring location were above the 40μgm^{-3} annual mean Air Quality Objective and were dominated by road traffic emissions.

East Midlands Airport use a local bias adjustment factor of 1.217, calculated using two diffusion tubes co-located with the real-time chemiluminescence NO_2 analyser at the Aeropark which is adjacent to the Airport boundary. The primary source of NO_2 concentrations at the Aeropark are from aircraft emissions. These NO_2 concentrations are much lower than those used to calculate the North West Leicestershire District Council bias adjustment factor.

For the purposes of this Detailed Assessment the East Midlands Airport local bias adjustment factor of 1.217 has been applied to all monitoring data, including the results obtained from North West Leicestershire District Council operated diffusion tubes. This will ensure that a precautionary approach to reporting NO_2 concentrations within the vicinity of East Midlands Airport is maintained.

3.2 CURRENT MONITORING

As well as operating a real time chemiluminescence NO_2 analyser in partnership with North West Leicestershire District Council, East Midlands Airport also operates its own NO_2 monitoring network. This network consists of eight NO_2 diffusion tubes located within the perimeter of the airport. The locations of these diffusion tubes are presented in Figure 3, Appendix A and Figures 4, 5, 6, 7 and 8, Appendix B. Five of the eight diffusion tube locations monitored by East Midlands Airport are not considered to represent areas of relevant public exposure; these are Stand 15, Crash Gate 24 ILS, Crash Gate 4, Central IRVR and Western perimeter fence. Relevant exposure is defined within LAQM.TG(09), (DEFRA, 2009) as a location where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. For the annual mean Air Quality Objective, relevant exposure is limited to residential properties, schools and hospitals.

The results from both the real-time analyser and diffusion tubes are provided to North West Leicestershire District Council on a monthly basis for inclusion within reports and are published on the Airport's website, www.eastmidlandsairport.co.uk.

The monitoring network operated by North West Leicestershire District Council was increased from four to thirteen locations in January 2008 to determine the NO_2 concentrations related to aircraft using the flight paths into and out of East Midlands Airport. The additional monitoring sites where selected as they represent rural or semi-rural residential locations which experience very few vehicle movements, thus the main source of NO_2 would arise from aircraft emissions. The locations of the diffusion tube monitoring sites operated by North West Leicestershire District Council within 1000 metres of East Midlands Airport are presented in Table 3 and Figure 3, Appendix A.

Table 3: North West Leicestershire District Council NO_2 Diffusion Tube Monitoring Locations within 1000 metres of East Midlands Airport

Monitoring Location	Year Site Commissioned
Diseworth Road, Castle Donington	2001
Aeropark, Castle Donington	2003
East Midlands Airport, opp. Hallam Fields, Castle Donington	1986
Kegworth EMA, Whatton Road	2003
Hillside, Kegworth	2008
Gerard Crescent, Kegworth	2008
New Brickyard Lane, Kegworth	2008
Shepherd Walk, Kegworth	2008
Kirby Drive, Kegworth	2008
Thomas Road, Kegworth	2008
Springfield, Kegworth	2008
Isley Walton	2008
Dog Lane, Wilson	2008

4.0 RESULTS

The results of NO_2 concentrations monitored by East Midlands Airport and North West Leicestershire District Council are presented in Table 4. A bias adjustment factor of 1.217 has been applied to all East Midlands Airport and North West Leicestershire District Council results.

Table 4: NO_2 Diffusion Tube Concentrations (μgm^{-3}) at Monitoring Locations in the Vicinity of East Midlands Airport

Diffusion Tube Location	Location Number	Annual Mean NO_2 Concentration (μgm^{-3}) [1]			
		2005	2006	2007	2008 [2]
Stand 15 (amended 16)	1	51.1	45.0	51.1	43.5
Crash gate 27 ILS	2	40.2	40.2	37.2	36.2
Crash gate 4	3	37.7	32.9	32.5	32.5
Central IRVR	4	37.7	36.5	32.5	36.2
Western perimeter fence	5	30.4	30.4	34.9	25.6
Aeropark, Castle Donington	6	34.1	31.6	27.9	28.6
Ambassador Rd, Castle Donington	7	35.3	34.1	34.9	32.9
Aeropark, Castle Donington (2)	8	28.0	26.8	25.6	28.6
Real-time Analyser, Aeropark	9	31.6	38.9	32.5	33.9
Diseworth Lane, Castle Donington	15	23.1	25.5	25.2	27.7
Aeropark, Castle Donington	26	22.6	22.1	21.3	22.7
Castle Donington EMA (opp. Hallam Fields)	13	25.5	23.2	21.9	21.9
Kegworth EMA (Whatton Road)	17	30.2	30.1	26.6	28.6
Dog Lane, Isley Walton [3]	32	-	-	-	17.9
Wilson [3]	39	-	-	-	15.0
New Brick Yard Lane, Kegworth [3]	40	-	-	-	24.1
Shepherd Walk Kegworth [3]	41	-	-	-	25.7
Kirby Drive Kegworth [3]	42	-	-	-	24.9
Thomas Road Kegworth [3]	43	-	-	-	26.0
Springfield Kegworth [3]	44	-	-	-	27.4
Hillside, Kegworth [3]	30	-	-	-	27.9
Gerard Crescent, Kegworth [3]	31	-	-	-	26.4

Note 1 All results are bias adjusted by the East Midlands Airport factor of 1.217

Note 2 Results are the ratified mean of nine months of data, January to October 2008

Note 3 Monitoring location commissioned in January 2008

The East Midlands Airport operated diffusion tube located at Stand 15 (amended 16) recorded NO_2 annual mean concentrations in excess of the $40\mu gm^{-3}$ Air Quality Objective in 2005, 2006, 2007 and 2008; $51.1\mu gm^{-3}$, $45.0\mu gm^{-3}$, $51.1\mu gm^{-3}$ and $43.5\mu gm^{-3}$

respectively. The 2008 result is the average of nine months of monitoring data collected between January and October 2008. The diffusion tube located on Crash Gate 27, at the eastern end of the runway recorded annual mean NO_2 concentrations of 40.2µgm^{-3} in both 2005 and 2006, which is in excess of the 40µgm^{-3} Air Quality Objective. In 2007 and 2008 (January to October 2008) the annual mean NO_2 concentration recorded at this location had decreased to below the Air Quality Objective at 37.2 and 36.2µgm^{-3} respectively. Both Stand 15 and Crash Gate 27 monitoring sites do not represent locations of relevant public exposure and as such exceedences of the annual mean Air Quality Objective at these locations would not lead to an AQMA being declared. The annual mean NO_2 concentrations recorded by the remaining six East Midlands Airport operated diffusion tubes and the real-time analyser were all below the 40µgm^{-3} annual mean Air Quality Objective.

The NO_2 results from the four North West Leicestershire District Council monitoring locations commissioned between 1986 and 2003 demonstrate that NO_2 concentrations between 2005 and 2008 (January to October 2008) have remained significantly below the annual mean 40µgm^{-3} Air Quality Objective. The highest NO_2 annual mean concentration of 30.2µgm^{-3} was recorded at the Kegworth EMA (Whatton Road) monitoring location in 2005.

The NO_2 results from the nine monitoring locations commissioned in January 2008 are all significantly below the 40µgm^{-3} annual mean Air Quality Objective. The 2008 average mean concentrations ranged from 15.0µgm^{-3} recorded in Wilson to 27.9µgm^{-3} recorded on Hillside, Kegworth.

All average NO_2 concentrations recorded in the vicinity of East Midlands Airport in 2008 (January to October 2008) were significantly below 60µgm^{-3}. Therefore it is unlikely that the 1-hour objective will be exceeded at any location due to aircraft movements from East Midlands Airport.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 DISCUSSION

A Detailed Assessment has been conducted to assess the NO_2 concentrations arising from aircraft movements at relevant receptor locations within 1000 metres of the boundary of East Midlands Airport, Castle Donington, Derbyshire. The Detailed Assessment was required following the recommendations of the Air Quality Progress Report submitted to the Department of Environment, Food and Rural Affairs (DEFRA) by North West Leicestershire District Council in April 2008 (CRA, 2008). The Progress Report identified approximately 2,300 residential properties located within 1000 metres of the Airport boundary and that the number of annual passenger movements, including freight movements had exceeded the 5mppa throughput criteria, detailed within the technical guidance that was current at the time, LAQM.TG(03), (DEFRA, 2003). As a result of which North West Leicestershire District Council was required to conduct a Detailed Assessment of NO_2 emissions from aircraft at relevant receptor locations within 1000 metres of the Airport boundary. In accordance with this technical guidance the NO_2 concentrations arising from vehicle movements associated with the airport have not been considered within this Detailed Assessment.

The results from the extended monitoring network commissioned by North West Leicestershire District Council in January 2008 along with those from the long standing monitoring locations have demonstrated that emissions from aircraft using East Midlands Airport are significantly below the $40\mu gm^{-3}$ annual mean Air Quality Objective at relevant receptor locations within 1000 metres of the Airport Boundary. Monitoring conducted by East Midlands Airport within the perimeter has also demonstrated that annual mean NO_2 concentrations were below the $40\mu gm^{-3}$ Air Quality Objective at eight of the nine monitoring locations in 2007 and 2008. The only monitoring location which exceeded the $40\mu gm^{-3}$ annual mean Air Quality Objective was Stand 15 (amended 16) which is the closest monitoring location airside of the passenger terminal. This location does not meet the relevant public exposure criteria defined in LAQM.TG(09) and therefore exceedences of the annual mean Air Quality Objective at this location do not require an AQMA to be declared.

Overall the NO_2 monitoring results have demonstrated that the annual mean and 1-hour Air Quality Objectives will not be exceeded at relevant receptor locations within 1000 metres of the boundary of East Midlands Airport due to aircraft emissions. Therefore, an AQMA will not be required to be declared for aircraft emissions from East Midlands Airport.

The Local Air Quality Management technical guidance, LAQM.TG (03) issued in 2003 by DEFRA has been revised and re-issued in February as LAQM.TG(09), (DEFRA, 2009). In this document the total number of passenger and freight movements per year which would trigger a Detailed Assessment has been relaxed from 5 mppa to 10 mppa. The guidance also stipulates that the background nitrogen oxide (NO_x) concentration must be above 25μgm^{-3} in order to trigger a Detailed Assessment. If both the throughput and background NO_x concentration exceed the criteria laid down in the new guidance a Detailed Assessment must be undertaken. However, the new technical guidance allows for monitoring data from worst-case relevant exposure locations near the airport boundary to be used in preference to the passenger throughput criteria in order to reach a decision on whether a Detailed Assessment is required. This is to reflect the evidence that even at the UK's busiest airports, aircraft are unlikely to give rise in themselves to an exceedence of the Air Quality Objectives in areas with residential populations (DEFRA, 2009).

The UK Government published the White Paper, 'The Future of Air Transport' in December 2003, (DfT, 2003). Known as the Air Transport White Paper (ATWP), it sets out a strategic framework for the development of airport capacity in the UK up to 2030, including specific growth forecasts by airports. East Midlands Airport published its Master Plan 2006-2030, (EMA, 2006) in response to the ATWP detailing future developments at the airport. The East Midlands Airport Master Plan (EMA, 2006), predicts that passenger movements will increase to 21.2 mppa by 2016. If passenger numbers increase at East Midlands Airport as predicted in the Master Plan (EMA, 2006) the throughput criteria of 10 mppa will be exceeded; a review of the NO_x concentrations would be required to determine whether a second Detailed Assessment was necessary.

The predicted background NO_x concentration in 2010 for East Midlands Airport (grid reference 445500:327500) determined from the background air pollution maps at 1km x 1km grid resolution published on the UK National Air Quality Archive website (www.airquality.co.uk) is 30.8μgm^{-3} (NO_x as NO_2). This predicted background concentration exceeds the 25μgm^{-3} background NO_x criteria laid down in the new technical guidance (DEFRA, 2009). This breach of the NO_x background concentration criteria, along with passenger throughput above 10 mppa would trigger a second Detailed Assessment.

As previously discussed, the worst case relevant exposure locations can also be used to determine whether a Detailed Assessment is required; for East Midlands Airport, monitoring data from the NO_2 diffusion tubes and real-time chemiluminescence analyser located at the Aeropark on the northern boundary of the airport would be considered as a worst case relevant exposure location due to its proximity to

residential properties. The annual mean NO_2 concentrations at this location have remained consistently below the Air Quality Objective of $40\mu gm^{-3}$. The NO_2 concentrations at this location should continue to be monitored and only if these concentrations increase above the $40\mu gm^{-3}$ Air Quality Objective should a second Detailed Assessment be conducted.

5.2 RECOMMENDATIONS

Based on the findings of this Detailed Assessment the following recommendations are made to North West Leicestershire District Council:

- The monitored NO_2 concentrations at relevant receptor locations within 1000 metres of the boundary of East Midlands Airport demonstrate that the annual mean Air Quality Objective of $40\mu gm^{-3}$ is not exceeded due to NO_2 emissions from aircraft and therefore an AQMA is not required for East Midlands Airport.

- North West Leicestershire District Council in partnership with East Midlands Airport should continue to monitor NO_2 concentrations at the long standing relevant receptor locations in order to ensure that any future changes in air quality are detected.

6.0 REFERENCES

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APPENDICES

APPENDIX A

FIGURES 2 AND 3

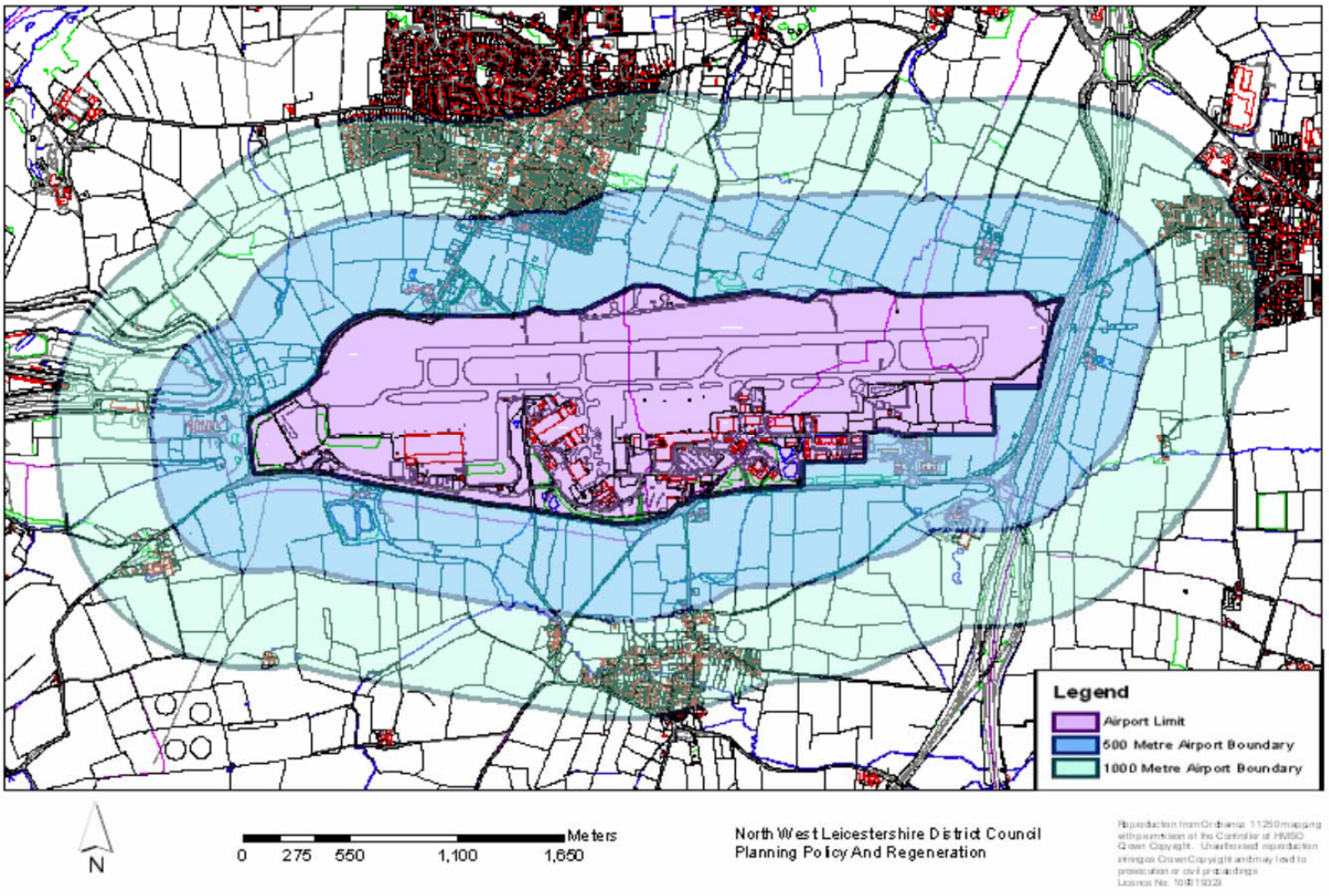

Figure 2: Locations within 500 metres and 1000 metres of East Midlands Airport

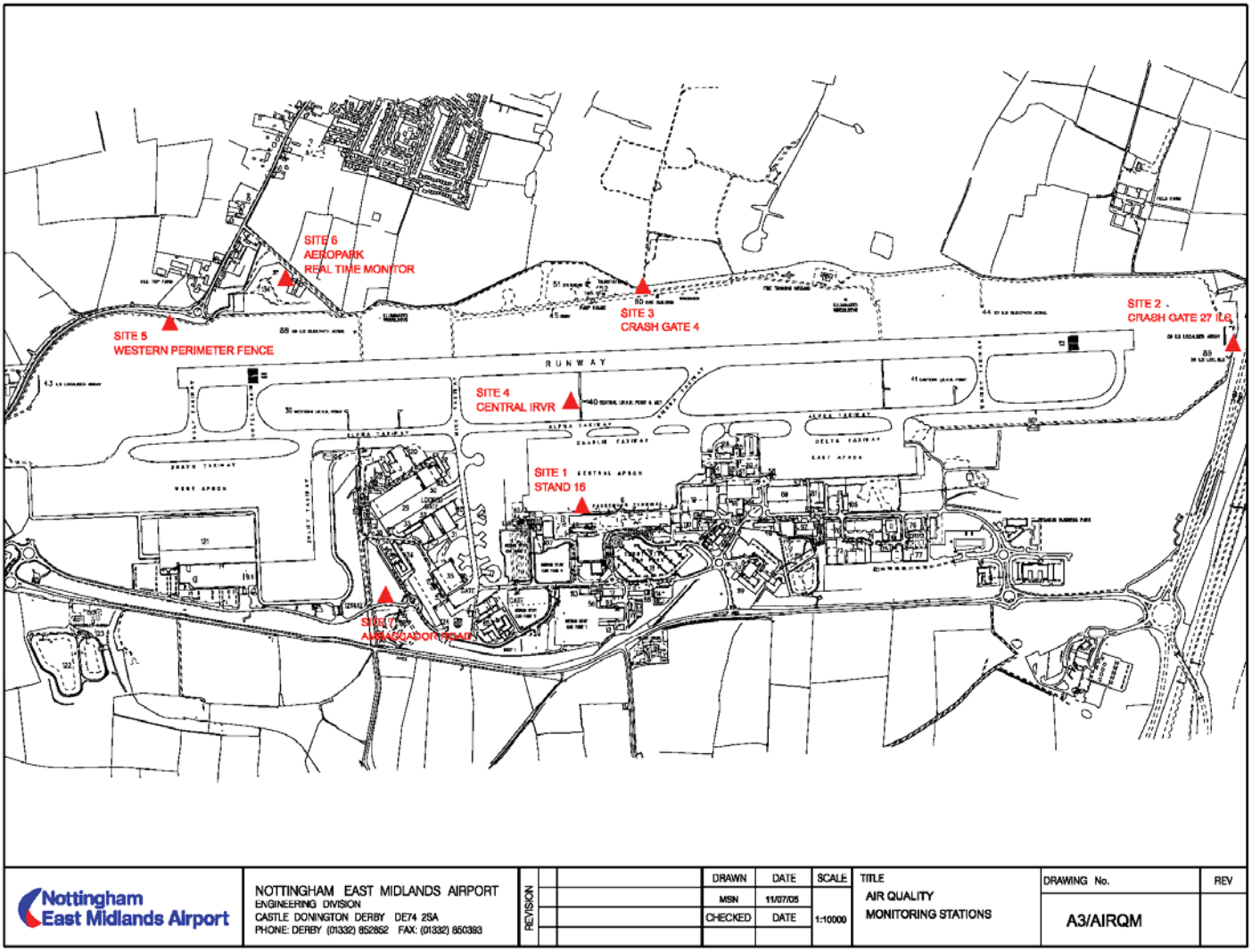

Figure 3: Nitrogen Dioxide Diffusion Tube Locations at East Midlands Airport

APPENDIX B

NORTH WEST LEICESTERSHIRE DISTRICT COUNCIL NO_2 DIFFUSION TUBE LOCATIONS

Figure 4 Photograph illustrating location of Kegworth EMA NO_2 Diffusion Tube on signpost on Whatton Road

Figure 5 Illustrating location of Isley Walton NO_2 Diffusion Tube outside the Manor House

Figure 6 Illustrating location of Wilson NO_2 Diffusion Tube on Telegraph pole on Dog Lane

Figure 7 Illustrating location of NO_2 diffusion tube located on the lamp post in Kirby Drive, Kegworth

Figure 8 Illustrating location of NO_2 diffusion tube located on the lamp post on Shepherd Walk, Kegworth