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Proposal

Air Quality Review and Assessment: 'Updating and Screening Assessment'

Proposal to Three Rivers District Council

netcen/ED48139/Issue 2
August 2003

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	Date	20th August 2003

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1 Introduction

Local Authorities have now completed the first round of local air quality review and assessment. This is a cyclical process, and authorities will need to complete the first part of the next round of review and assessment, the screening exercise as soon as possible. The air quality review and assessment must consider all the pollutants in the UK's national Air Quality Strategy with the exception of ozone.

This section summarises the conclusions from Three Rivers District Council's previous air quality review and assessments completed for the Department of the Environment, Food and Rural Affairs (**defra**). Its key conclusions are presented below.

1.1 CONCLUSIONS FROM THE AIR QUALITY REVIEW (ROUND 1) FOR THREE RIVERS DISTRICT COUNCIL

Three Rivers District Council undertook all Stages 1-4 of review and assessment during the last round. The Stage 3 report concluded that the objectives for NO_2 and PM_{10} would be exceeded at three locations along the M25 motorway within the district, at Chandlers Cross, Chorleywood and at Kings Langley/Abbotts Langley. As a result an air quality management area (AQMA) was declared for NO_2 and PM_{10} covering houses located adjacent to the motorway at these three locations.

In a subsequent Stage 4 assessment, the air quality management areas were re-modelled using the new emission factors, published by **defra** in 2002. This study concluded that the PM_{10} objective for 2004 was unlikely to be exceeded at any relevant location and proposed that the air quality management area for PM_{10} be revoked. Exceedances were predicted for NO_2 within the AQMAs, albeit over a smaller area and it was recommended that the size of the AQMA for NO_2 be reduced to cover the predicted area of exceedance.

Executive Summary

BACKGROUND

Three Rivers District Council has requested a proposal to carry out air quality consultancy for the current round of local air quality review and assessment. **netcen** is well placed to do this work, as it has assisted **defra** in the recent update of the Technical Guidance notes which are to be used in the overall review and assessment process; to date, **netcen** has also undertaken review and assessments for over 100 Local Authorities throughout the UK.

Our air quality assessment work will be carried out using the following proven approach:

- We will update Three Rivers District Council's previous assessment using the new 'updating and screening' assessment methodologies.
- If required and shown to be necessary by the initial screening assessment, we will prepare a 'detailed' assessment, probably for nitrogen dioxide and possibly for PM_{10} particulate matter.

Please note that the 'updating and screening' assessment is equivalent to the previous Stages 1 and 2 combined, whilst the 'detailed' assessment equates to the old Stage 3 assessment.

BENEFITS OF USING NETCEN

AEA Technology plc, working through its operating division **netcen**, can provide:

- Wide-ranging of experience for Stage 1, 2 and 3 and 4 Air Quality Reviews and Action Plans, gained from our work for over 100 local authorities.
- A thorough understanding of the needs of authorities in terms of support, advice and information.
- Detailed familiarity and understanding of the specific needs of Three Rivers District Council, gained through our previous work on your Stage 4 Review and Assessment.
- A robust, proven approach to air quality review and assessment that has been approved by **defra**. Examples of our approach for the previous round of assessments can be seen on the **defra** website, where they have been selected as good examples – see Basingstoke and Deane District Council and Derby City Council Stage 3 reports, together with a Stage 4 report for Wycombe Borough Council on **www.uwe.ac.uk/aqm/review/index.html**.
- High quality, authoritative and independent advice throughout the assessment process.
- A thorough understanding of the new air quality standards, objectives and traffic emission factors, together with their implications for the overall review and assessment process.
- Immediate access to comprehensive historic and current data on pollutant concentrations and emissions throughout the UK, derived from the national air quality archive and atmospheric emissions inventory produced by **netcen** for **defra**. Data from your local automatic monitoring station will also provide valuable input.
- A unique multi-model approach that indicates the probabilities of exceedances of the objectives at the detailed stage of assessment, as well as the expected pollutant concentrations; this will therefore provide Three Rivers District Council with all the information necessary to set the boundaries of Air Quality Management Area, if this proves necessary.
- A proven background in the field of air monitoring, having operated or quality managed all of the UK's national air monitoring networks for **defra**.
- A full appreciation of the costs and benefits of the various options for future local air quality monitoring which may be recommended as a result of this study.

OUR APPROACH TO SUCCESSFULLY COMPLETING THE WORK

This work will firstly provide for Three Rivers District Council an 'updating and screening' review (formerly a Stage 1 & 2 assessment under the previous round of review and assessment) of air quality under the Environment Act, 1995. Our approach will be fully compliant and consistent with current LAQM Technical Guidance and Air Quality Regulations- specifically, LAQM.TG (03), the Air Quality Regulations (2000) and subsequent amendments in 2002.

The 'updating and screening' assessment will include:

- DMRB modelling to predict the likely concentrations of nitrogen dioxide and PM_{10}, together with other relevant pollutants, at roadside locations in 2005 (2004 for PM_{10}), and 2010, if required;
- A thorough review of industrial and other sources for all the pollutants of concern in the Air Quality Strategy in the Three Rivers District region. This will utilise screening tools recommended in the **defra** guidance.

Optionally- depending on the results of the initial assessment- we would be happy to provide a 'detailed' review of air quality (formerly a Stage 3 assessment from the previous round of review and assessment).

This latter study would include:

- Dispersion modelling for areas identified at the screening stage as requiring further assessment;
- An indication of whether Air Quality Strategy (2002) objectives will be exceeded in Three Rivers District;
- An indication of where these would be exceeded, together with information on the magnitude and geographical extent of any exceedance area;
- Advice on whether additional monitoring is required and, if so, recommendations on the appropriate action to take. This will be provided from the same team of **netcen** personnel responsible for quality assurance of **defra**'s national automatic air monitoring networks;
- Advice on declaring an air quality management area (if needed).

TIMESCALES FOR THE WORK

netcen normally require 8 weeks from the receipt of necessary input data - as specified in this proposal - to complete a full 'updating and screening' assessment. However, it may be possible to complete the work more rapidly, depending on staff availability. We would be happy to discuss this further with Three Rivers District Council.

2 Technical proposal: our approach to Three Rivers District Council's air quality review and assessment

Three Rivers District Council has requested information about the modelling services **netcen** can provide, to ensure they comply with the requirements of the next round of air quality review and assessment.

This section of the proposal contains details of **netcen**'s modelling services for review and assessment. Three Rivers District Council will be aware that the form of the review and assessment process has changed in this round for 2003. Accordingly, **defra** has recently issued new guidance to support the amended review and assessment process. The information contained in this proposal reflects our current best determination of the work that will need to be completed at each stage of the process.

Our approach to the review and assessment process for Three Rivers District Council will be fully compliant and consistent with current LAQM Technical Guidance and Air Quality Regulations- specifically, LAQM.TG (03), the Air Quality Regulations (2000) and subsequent amendments in 2002.

2.1 REVIEW AND ASSESSMENT

2.1.1 Changes to the current round of air quality review and assessment

Defra has changed the way the air quality review and assessment process is being completed. In the last round of review and assessment, the reviews were carried out in three stages. All three stages of review and assessment could prove necessary, and every authority was expected to undertake at least a first stage review and assessment of air quality in their authority area. The complexity and detail required in a review depended on the risk of failing to achieve air quality objectives.

The general principles utilised previously are being carried forward into this current round of review and assessment. However, there are now to be two stages rather than three. These stages are:

1. An 'updating and screening' assessment - equivalent to a combined Stage 1 and 2 under the old procedures- and

2. A 'detailed' assessment, equivalent to the previous Stage 3.

The proposed timescales for completion of this work appear tight: the screening assessments now need to be completed as soon as possible, and the detailed assessment by April 2004. Three Rivers District Council will need to complete a further review and assessment and develop an Action Plan if there is a significant risk of failing any of the air quality objectives in the UK Air Quality Strategy. This Action Plan may need to be supported by additional modelling and monitoring.

2.1.2 Implications of recent changes in the vehicle emission factors to the results of previous assessments

Defra has recently updated the key vehicle emission factors utilised in the review and assessment process.[1] The key implication of this is that emissions of NO_x from vehicles in 2005 may be higher

[1] The new set of emission factors appears on the NAEI website (www.naei.org.uk/emissions/index.php). This has been approved by defra and DTLR for use in emissions and air quality modelling, following consultation of the TRL Report "Exhaust Emission Factors 2001: Database and Emission Factors" by TJ Barlow, AJ Hickman and P Boulter, TRL, September 2001"

than previously expected. As a result, air quality management areas may have to be declared where none had existed before; moreover, pre-existing air quality management areas may increase in size. The exact implications for any area will depend on the vehicle fleet mix and age profile. Forecast emissions of most pollutants (including CO and VOCs) will be largely unaffected by the new factors. However, there will be significant changes to forecast NO_x emissions. Additionally, the degree of change will vary according to the base year chosen for the calculations. As a rule of thumb, the following generalisations are helpful:

- Forecast emissions of NO_x in 2005 from road transport may increase by anything up to 36% when calculated using the new factors, with the main change being to the performance of Euro 1 and 2 diesel vehicles. This also means that the relative importance of NO_x emissions from other sources (such as industry) may have previously been overestimated.

- Authorities may have substantially underestimated 2005 NO_2 roadside concentrations. Away from roadsides, however, the difference is likely to be less marked.

- Overall, estimated emissions of PM_{10} in 2004 are likely to remain broadly similar using the new factors. But, within this total, emissions of PM_{10} from petrol vehicles in 2004 are likely to decrease by as much as 58%, whilst emissions from diesel vehicles of all types are likely to increase by as much as 34% when calculated using the new emission factors. This may have significant implications for the targeting of transport measures in AQMA action plans.

2.1.3 Desktop studies and modelling to complete the air quality review and assessment

The 'screening' stage predictions provided by **netcen** will rely on nomograms ('look up' charts) and screening models (such as an updated version of DMRB). The 'detailed' stage will require the use of a range of more complex validated atmospheric dispersion models developed by -or available to- **netcen**.

2.1.4 Road traffic modelling

In the 'updating and screening' stage, the air quality effects of traffic will be modelled using the latest version of the Design Manual for Roads and Bridges (DMRB) screening model. If further assessment for roads is required under a 'detailed' assessment, however, then other dispersion modelling approaches will be used. These will predict the concentrations of NO_2, and PM_{10} if necessary, from traffic emissions and determine whether exceedances of the air quality objectives are likely in 2004/2005.

The detailed dispersion modelling must be supported with automatic nitrogen dioxide monitoring (and if necessary, PM_{10}) from Three Rivers District Council's monitoring station, and from local temporary studies, if required. NO_2 diffusion tube data will also be used within the assessment, following appropriate correction for laboratory bias. We are experts in this area, because of our experience in co-ordinating and managing **defra**'s national diffusion tube monitoring network. If additional monitoring proves to be necessary following the 'screening and updating' assessment, **netcen** would be happy to support or provide this, as part of our overall service.

The modelling will also consider the following factors:

- Complex junction geometry;
- Vehicle speed and queue lengths at traffic lights;
- Fleet composition, particularly the proportion of Heavy Diesel Vehicles;
- How close the nearest sensitive receptors are to the roads modelled.

netcen can offer a unique range of models for detailed assessments, which are applicable to the complete range of source types and spatial scales. If appropriate, we will be able as part of the detailed assessment to offer a powerful new modelling methodology for assessing air quality impacts in street canyons; this model is based on Computational Fluid Dynamics (CFD) and is unique to **netcen**. Our overall modelling capability for detailed assessments is described more fully in Appendix 2.

2.1.5 Industrial modelling

In the 'screening' stage, industrial point sources will be modelled using the screening tools recommended in the recently published guidance issued by **defra** – 'Review and Assessment: Technical Guidance LAQM.TG (03).

If further assessment is required in the 'detailed' assessment, then the downwind concentrations of pollutants will be predicted using an advanced atmospheric dispersion model, ADMS V3.1. This model, widely utilised by **netcen**, is well proven and validated in this application.

2.1.6 Defining the probability and spatial magnitude of exceedences

In the 'detailed' assessment, and in addition to identifying any exceedances, **netcen** will quantify the magnitude and probability of any predicted exceedance. We will also determine the geographical extent of any exceedance area. This approach will enable Three Rivers District Council to judge the correct size and location of an Air Quality Management Area (AQMA), if this proves necessary.

The output from the model will be presented in a variety of forms, including mapped results at various geographical scales. The highest resolution mapped data will be presented on OS LandLine™ electronic maps. The concentration contours on these maps will be derived from concentrations that have been predicted using a maximum resolution (grid size) of 10m. - This will allow exceedences to be determined and displayed to the scale of an individual house. **netcen** recognises the importance of providing such high-resolution data for possible use by Environmental Health and Planning Departments of the Council.

Figure 1 shows an example of the high-resolution output of our modelling approach, taken from a Stage 3 Air Quality Review and Assessment of South Lanarkshire. The figure shows modelled annual mean concentrations of NO_2 close to a junction of the M74. The modelled concentrations are from road traffic travelling in complex terrain including flyovers. With our robust and comprehensive approach to statistically quantifying the probability of exceedances, only one map will be required to present exceedences of both annual and hourly objectives for NO_2.

2.1.7 Source apportionment

Where the Detailed Assessment identifies exceedances of objectives, key source apportionment information will also be calculated. This will:

- Confirm to what extent predicted exceedances- for example of NO_2 or PM_{10}- are due to road traffic or other sources;
- Determine the extent to which different vehicle types are responsible for the emission contributions to NO_2 and PM_{10} at selected locations within Three Rivers District where the highest concentrations may be experienced.

2.1.8 Option for assessment against 2010 Objectives

The statutory requirement on local authorities for the next round of review and assessment is to assess against the 2004 objective for PM_{10} and the corresponding 2005 criterion for NO_2. However, it has been announced by **defra** that it intends to introduce into regulation the proposed 2010 objectives (that for PM10 being more stringent than for 2004); these changes will bring the UK into line with the EU limit values. The new guidance provides the basic methodology for undertaking review and assessment using the new objectives.

The new objectives are not yet in regulation. Moreover, precise arrangements and requirements are likely to be different for authorities in Scotland. A local authority cannot therefore- at this stage- declare an AQMA for a 2010 proposed objective; however, it may like to be aware of possible exceedences for planning purposes. **netcen** therefore includes in this proposal (Section 4) budgetary estimates to cover optional additional model runs and plot drawings within the 'updating and screening' assessment, as well as for the subsequent 'detailed' assessment, should this be required.

2.1.9 Model Verification

Model verification is important in order to ensure high quality and robust predictions. Accordingly, the modelling undertaken by **netcen** for the purposes of 'detailed' assessment will be verified against measurements from continuous monitoring data, where these are available and appropriate. Year-on-year variations in background concentrations will be estimated and confidence limits for the best estimated predicted concentration calculated. Our experience has shown that such verification provides a useful tool for successful 'detailed' assessments.

2.1.10 Data sources

Data required for the 'screening' assessment is summarised in the checklist in Appendix 1. The accuracy and reliability of any assessment is critically dependent on the quality of the data used. For both 'screening' and 'detailed' stages, we will utilise all appropriate available local data, and support this where necessary with corresponding data from national sources. In particular, **netcen** will provide and use:

- Emissions estimates from the National Atmospheric Emissions Inventory in order to estimate background concentrations of NO_x, PM_{10} and other pollutants in the UK Air Quality Strategy;
- National air quality measurements from the UK national archive;
- Results from previous local air quality and modelling studies undertaken for Three Rivers District Council by **netcen**.
- Meteorological data suitable for use with the ADMS atmospheric dispersion model will also be obtained from the Meteorological Office.

netcen will need to receive and review updated information from Three Rivers District Council on:

- Local traffic flow data;
- Local emissions and stack parameter data for point sources;
- Local information on fugitive sources;
- Local monitoring data
- Maps of the district in electronic format suitable for use in a Geographical Information System (GIS).

Receipt of these local data is necessary before the 'screening' assessment can commence. These data will support the assessment, and will be used to predict concentrations at the locations of the nearest sensitive receptors. Typically, these will include residential housing, schools, hospitals or other susceptible location types. Further details of the models to be used in the 'detailed' assessment are included in Appendix 2.

We will need electronic map data for the Three Rivers District area. OS LandLine data is normally required for this purpose. A department within the Local Authority, such as the planning department, normally holds this data. The local authority licence number for these data is usually required for quotation within the report, to comply with your licence agreement.

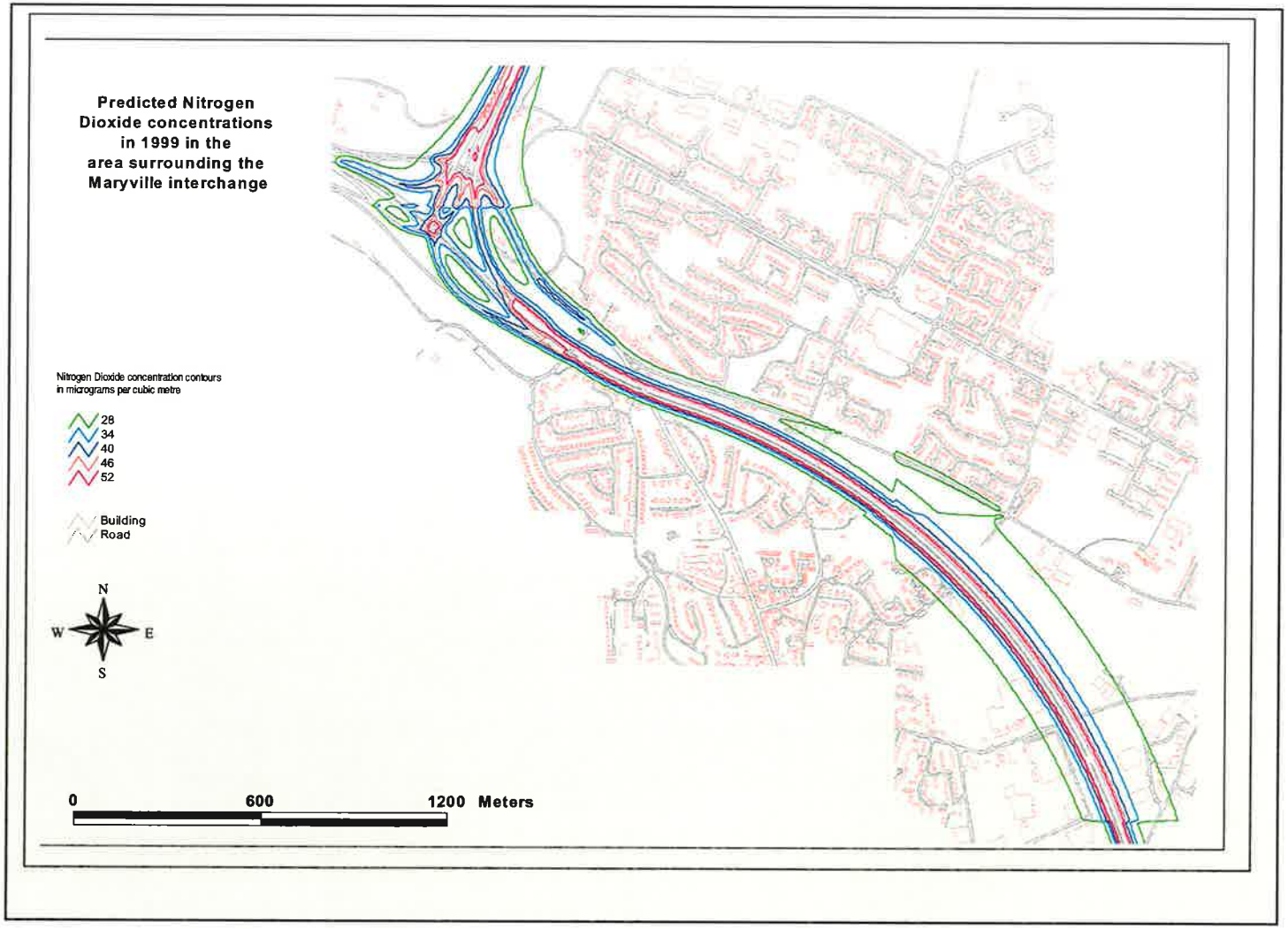
2.1.11 Deliverables

The contents of the 'updating and screening' and the 'detailed' report have been specified by **defra**, and we will ensure that the reports written fully comply with their requirements. Table 1 overleaf summarises the key elements of the work that will be completed by **netcen** in the 'screening' and the 'detailed' study.

2.1.12 Support in the Assessment Appraisal Process

netcen will manage the process of seeking comment from independent assessors on behalf of Three Rivers District Council; we will also provide feedback on reasonable comment from the assessment, should this prove necessary and appropriate.

Figure 1: ***Detail of modelled concentrations of NO_2 in part of South Lanarkshire (please note that exceedences at individual houses can be predicted)***



(Please note this map may not be reproduced owing to copyright restrictions).

Table 1. Summary of services and content to be provided by netcen for 'updating and screening' and 'detailed' reports

Work area	'Screening' report	'Detailed' report
• A clear introductory discussion of each pollutant, including their sources and effects	✓	✓
• An examination of existing local, regional and national air quality data	✓	✓
• Identification of relevant emissions sources	✓	✓
• An evaluation of air quality in Three Rivers District relating to the current Air Quality Strategy for England and Wales	✓	✓
• An evaluation of likely exceedances of the Air Quality Strategy standards/objectives in 2005 and other relevant years	✓	✓
• Summary of the 'screening' modelling results		✓
• Clear maps showing the concentrations of the modelled pollutants and the relevant receptors		✓
• Tabulated results of the calibrated and verified dispersion modelling work – receptors exposed to concentrations above the air quality objectives in regulation		✓
• The magnitude and geographical extent of any exceedance area		✓
• Probabilities of any exceedances of the air quality objectives explained in plain English		✓
• Suggestions made for area(s) that should be declared as an Air Quality Management Area (AQMA)		✓
• Recommendations for future assessment and monitoring work required to support 'detailed' or further assessment	✓	✓
• An executive summary	✓	✓
• All main data included in Appendices of the report	✓	✓
• Report and any maps in electronic format	✓	✓

If requested by Three Rivers District Council, electronic copies of the contour plots can also be supplied and the data presented in a form that is suitable for input to a geographical information system (GIS). There is no extra charge for this. The report can be made available in electronic format, including a format that will allow the report to be presented on an Internet site. There is no extra charge for this.

2.2 CUSTOMER LIAISON

Our experience shows that effective ongoing dialogue with the customer is a key success factor in the review and assessment process. We therefore aim to:

- Maintain close working contacts with Three Rivers District Council throughout the period when the review and assessment reports are being written and monitoring is being undertaken;
- Discuss and agree with you the local data to be used in your review and assessment, together with a timescale for their timely provision;
- Provide clear explanation of the full process and technical activities undertaken to produce the final report.
- Provide a draft of the report for comment and discussion prior to finalisation.

3 Management Proposal

3.1 PROJECT MANAGEMENT

netcen has a highly experienced team of Project Directors, Managers and Technical Consultants responsible for our review and assessment services for Local Authorities. We can call on over 500 man-years of in-house air quality experience in monitoring, inventories and modelling, and have undertaken Stage 1,2,3 and 4 assessments for over 100 Authorities. We are very familiar with **defra**'s requirements and – as an organisation- we were extensively involved in the recent revision of the guidelines. An experienced Project Director- Geoff Dollard- will have overall responsibility for this work and will ensure that it fully meets the needs of Three Rivers District Council.

The nominated Project Manager for this work is Jim McGinlay, who will manage the work on a day-to-day basis, with particular emphasis on ensuring appropriate ongoing liaison with Three Rivers District Council and other **netcen** team members. Jim has extensive experience in air quality assessment, and is currently managing Review & Assessments for several local authorities.

3.2 PROJECT TEAM

This project draws on a range of skills from within **netcen**. Specialist technical input will be provided by John Abbott, John Watterson, Jim McGinlay, and Melanie Hobson, all of whom have extensive experience in (ADMS) air dispersion modelling, and are currently undertaking Review and Assessments for a number of local authorities. If required, other experienced personnel may also be utilised, subject to availability.

Curriculum vitae for these staff are provided in Appendix 3.

3.3 PROJECT PLAN

The idealised overall schedule required to meet the statutory reporting requirements for the 2003/2004 review and assessment is summarised below:

MONTH	Feb 03	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan 04	Feb	Mar	Apr
Updating & Screening															
U&S Reports				*											
Agree Schedule for DA						*									
Detailed Assessment															
Detailed Report														*	

However, in practice the assessment process cannot be commenced before the receipt of necessary data (as specified in Appendix 1) from Three Rivers District Council. We will commence the assessment on receipt of these data and complete the work within 8 weeks. We would be happy to further discuss this schedule with Three Rivers District Council. A simplified project plan for the updating and screening process is shown below:

Updating and Screening

Week	1	2	3	4	5	6	7	8
Data collection		*						
Assessment				*				
Modelling				*				
Analysis								
Preparation of report								
Delivery of Report								

* Review points

Similarly, it is envisaged that 'detailed' assessments would typically be completed 12 weeks after receipt of all the required data, following the schedule outlined below. If a detailed assessment were required, the actual schedule would be discussed and agreed with the Council following completion of the 'updating and screening' assessment.

Detailed Assessment

Week	1	2	3	4	5	6	7	8	9	10	11	12
Data collection		*										
Assessment							*					
Modelling							*					
Analysis												
Preparation of report												
Delivery of Report												

* Review points

3.4 QUALITY ASSURANCE

AEA Technology plc operates a comprehensive Quality Management System based on the requirements of BS EN ISO 9001:1994. The Quality Management System is defined in the AEA Technology plc Quality Manual and its supporting procedures and working instructions.

AEA Technology plc is committed to Continuous Improvement. The European Foundation for Quality Management model has been used in an independent benchmark assessment. Annual assessments are carried out to confirm progress.

AEA Technology plc's Quality Management arrangements have been assessed by Lloyds Register Quality Assurance against the requirements of the BS EN ISO 9000 series and a corporate certificate has been awarded, certificate number LRQ 0944198. The numerous constituent parts of AEA Technology have been assessed separately by LRQA against the appropriate part of ISO 9000 and certificates with specific scopes awarded. AEA Technology **netcen** has been awarded certificate number 0944198/E.

Following recent external quality audit, AEA Technology Environment has been recommended for certification to ISO 9000:2000.

AEA Technology Environment's Environmental Management System has been assessed by Lloyd's Register and the auditors have awarded approval to ISO 14001:1996.'

The calibration of calibration gas mixtures, and the on-site audit of analyser performance, are covered by **netcen**'s scope of accreditation to ISO17025 (calibration laboratory no 0401).

4 Commercial Proposal

4.1 CONTRACT DETAILS

For Contractual purposes, your contract will be placed with AEA Technology plc whose registered address is Building 329 Harwell, Didcot, Oxfordshire OX11 0QJ. The work will be undertaken by **netcen**, an operating division of AEA Technology.

The terms of our Agreement for the 'updating and screening' assessment are attached in Appendix 4. If you wish to commence with this work, please sign both copies and return one copy to us at the address provided on the agreement.

4.2 PRICES

netcen offers to undertake the following options outlined for the fixed prices specified below. All work to be undertaken shall be subject to contract.

Activity	Detail of Work	Price (£) excludes VAT
Task 1	**'Screening' review and assessment report**	£3,750
Task 2	**Additional 2010 option within the 'Updating and Screening' review and assessment report**	£500

Prices for the subsequent 'detailed' assessment- if required- cannot be estimated before Task 1 has been completed. Accordingly, the prices for Tasks 3 and 4 provided below should be considered as budgetary estimates for guidance; these do not constitute an offer to supply these services. On completion of the screening assessment, we would be happy to provide a formal quotation and final fixed prices. Any work carried out in connection with Tasks 3 and 4 would be subject to a separate agreement.

Phase	Detail of Work	Price range (£) excludes VAT
Task 3	**'Detailed' review and assessment report**	£5,000 – £8,000
Task 4	**Additional 2010 option within the 'Detailed' review and assessment report**	£1000 - £2000

On some occasions, we are requested to undertake additional work that has not been included in the above price. Should we be required to undertake any additional work outside the agreed scope/programme of work outlined above, this will be charged for at a day rate to be agreed, or will be subject to a further agreement.

4.3 PROPOSAL VALIDITY

This proposal is valid for until 30th September 2003.

4.4 INVOICING

The amount of the invoice will depend on the work that Three Rivers District Council wishes to commission (see table above). The invoice(s) will normally be submitted after the relevant portion of the work is complete or quarterly in arrears. However, we are happy to discuss precise invoicing arrangements to meet the needs of individual authorities.

Our payment terms are 28 days from the date of AEA Technology's invoice.

4.5 NUMBER OF COPIES OF THE FINAL REPORT

Two copies of the final report with colour diagrams will be provided. If required, the report can be provided in electronic format on CD; there is no charge for this.

Additional copies of the final report can be provided but, owing to the costs associated with colour photocopying, extra copies will be charged for at £20 each (for updating and screening report) or £35 each (for detailed assessment report).

4.6 CONTACT DETAILS – TECHNICAL AND COMMERCIAL

All correspondence relating to this project should be forwarded to Dr Geoff Dollard at the Culham address below.

Technical Contact	Commercial Contact
Dr Geoff Dollard	**Mrs Daryl Field**
Project Director (Local Authorities) **netcen** AEA Technology plc E5/30 Culham Abingdon Oxfordshire OX14 3ED	Commercial Manager **netcen** AEA Technology plc E5/1.32 Culham Abingdon Oxfordshire OX14 3ED
Tel: 01235 46 3094 Fax: 01235 46 3005 Email: geoff.dollard@aeat.co.uk	Tel: 01235 46 3102 Fax: 01235 46 3006 Email: daryl.a.field@aeat.co.uk

4.7 TIMESCALES

netcen estimates that the work for the 'screening' assessment will be completed by 31st October 2003, providing that all the necessary input data is received from Three Rivers District Council by no later than 1st September 2003. Although every endeavour will be made to complete the programme within the required deadlines, **netcen** cannot be held responsible for any delays caused by the late delivery of input data necessary for the assessment process.

5 Our Organisation's Experience

netcen is the UK's national centre of air quality services and expertise. We have designed, operated and quality assured all the national air monitoring networks. We also compile the UK national emission inventory, operate the national air quality information service to the public and have an extensive capability in dispersion modelling, source measurement and abatement across all major emission sectors. Our work is recognised world-wide, and our services valued by customers including the European Commission, World Bank, Asian Development Bank, World Health Organisation and United Nations.

We have been working with Local Authorities throughout the UK for over 40 years. We co-operate and provide training for authorities participating in national monitoring networks, assist many authorities through the highly successful air monitoring Calibration Club, and are market leaders for Air Quality Review and Assessment. This long-standing partnership with Local Government has given us unique insight into your needs, problems and constraints; it also enables us to offer services that are:

- *Balanced in design and implementation;*
- *Locally sustainable in the long term;*
- *Appropriate to local needs and resources;*
- *Flexible and adaptable to local conditions and circumstances;*
- *Technically authoritative, defensible and totally reliable;*
- *Fully consistent with national and international requirements;*
- *Provide excellent value for money*

In relation to the current review and assessment proposal, **netcen** offers considerable real-world experience, both in the requirements of the Air Quality Strategy and in its practical implementation within local authorities. **netcen** has worked very closely with **defra** in:

- *Providing of air quality data in support of the National Air Quality Strategy*
- *Preparation of guidance for local authorities*
- *Review of the work of all "first phase" authorities*
- *Training for local authorities*
- *The assessment of applications for Supplementary Credit Approval.*

In addition, through a series of ongoing training seminars on Air Quality Review and Assessment that we are undertaking with CIEH, we have existing contacts with the Environmental Health Officers responsible for local air quality in over 150 authorities in England. We have recently undertaken Stage 1, 2, 3 and 4 review and assessments and action plans for a wide range of individual local authorities. Through the national calibration club, we also work closely with many authorities to support their air monitoring effort, enhance data quality and disseminate information to public and local stakeholders.

We are happy to provide practical, reliable and authoritative assistance in all stages of the Review and Assessment process, including Action Plans.

A selection of our recent experience relevant to this proposal is provided overleaf.

1. Local Authority Stage 1, 2, 3 and 4 Review and Assessment

netcen has undertaken reviews and assessments and providing modelling results for over 100 local authorities, including Epping Forest, Derby, Liverpool, Oxford, King's Lynn, South Lanarkshire, Stevenage, Basingstoke, Selby, Mansfield, Rugby, Erewash, Essex, Christchurch, Aylesbury, Vale of White Horse, Christchurch, Braintree, Aylesbury, Blackburn and Darwin, Blackpool, Burnley, Chorley, Fylde, Hyndburn, Preston, Ribble Valley, Rossendale, South Ribble, West Essex and Wyre. We have also presented results and conclusions from R&A to the public and to Members of Council during consultation.

2. Assisting defra to draft Local Authority Guidance on R and A

This work covered:

- *Monitoring for Air Quality Reviews and Assessments*
- *Review and Assessment: Pollutant Specific Guidance.*
- *Technical Guidance LAQM.TG(03)*

3. The Local Authority Calibration Club

netcen has assisted over 60 Authorities in their air monitoring programmes, helping bring these programmes up to national standards, enhancing data quality, managing and disseminating monitoring results through a range of media and web platforms.

4. Development of Air Quality Action Plans for Local Authorities

Sheffield City Council and Rotherham Metropolitan Borough Council
We developed the action plan in partnership with Sheffield and Rotherham Councils, and the Stockholm Environment Institute. Problems in the area concern exceedances of the annual mean NO_2 standard along the M1 and in Sheffield City Centre.
Thurrock Borough Council
In late 2002, we reviewed the draft action plan developed at Thurrock Borough Council, making recommendations for changes and necessary additions.
London Borough of Hillingdon
We are currently working with Hillingdon to develop their action plan. The largest problems in the Borough are linked to Heathrow Airport, the M4 and A40.

Action plans also currently under way also include those for **Liverpool** and **Erewash**

5. Management and quality assurance of national air quality networks for defra:

We have designed and established all of the UK's national air monitoring networks. We continue our involvement today through the management or quality assurance of these programmes:

- *The Automatic Urban Network*
- *The Automatic Rural Network*
- *The Automatic Hydrocarbons Monitoring Network*
- *The Smoke and Sulphur Dioxide Monitoring Networks*
- *The Acid Deposition Monitoring Networks*
- *The Toxic Organic Micropollutants Monitoring Network*
- *The Rural Ozone Monitoring Network*
- *The National Nitrogen Dioxide Diffusion Tube Survey*

Much of this work involves direct liaison, co-operation with and training of local authority site operators.

6. Dispersion Modelling for defra, Environment Agency, Local Authorities and private sector

netcen has undertaken dispersion modelling projects for this diverse customer-base, using a variety of models including ADMS, the USEPA suite of models such as ISC, CALINE, and in-house Gaussian models. We have:

- *Supported defra during the review of the National Air Quality Strategy;*
- *Undertaken predictive modelling for many local authority air quality review and assessment programmes;*
- *Supported the Heathrow Terminal 5 planning application;*
- *Undertaken numerous environmental impact assessments for proposed developments including incinerators and other industrial plant, road links and bypasses, commercial development.*

7. Provision of Air Pollution Monitoring and Emissions Inventory Helplines

These comprehensive support and advisory service services for Local Authorities are provided as part of air quality review process commissioned by **defra**.

8. Training Courses in Air Quality Review and Assessment

In association with CIEH, **netcen** has run over 30 training seminars on the implementation of Air Quality Management and the practicalities of Review and Assessment. Over 180 local authorities have attended these seminars, which are planned to continue during 2003.

9. UK Air Quality Information Service

netcen is tasked by **defra** to disseminate comprehensive data on current and historic air quality, as well as daily forecasts to the public through a free telephone service, Teletext and the national air quality archive at www.airquality.co.uk

10. UK Atmospheric Emission Mapping and Forecasting - defra

We have developed national-scale models of atmospheric pollutants for application in support of a cost of compliance assessment for the National Air Quality Strategy. Our background pollution maps of the UK are widely utilised by Government for domestic and international policy development, as well as for Article 5 assessments under various EC Directives. These base maps can also provide invaluable baseline inputs to the review and assessment process.

11. UK National Atmospheric Emissions Inventories - defra

netcen developed and is responsible for operating the UK's National Atmospheric Emissions Inventory (NAEI). This major national and international data resource covers the broad range of major urban, greenhouse, toxic and photochemical air pollutants over national and local scales. The NAEI is available on the Internet (www.naei.org.uk) and provides the UK input to many European and international emission assessment and policy development programmes.

12. Assistance with "First Phase" Local Authorities

netcen has prepared many local authority air quality data summaries, advised "first phase" authorities in their work in developing the air quality review and summarised the work of all these authorities for **defra**.

13. Assessment of Applications for Supplementary Credit Approval

netcen assisted **defra** (through technical input and advice) to assess local authority applications for SCA for the purchase of monitoring equipment and emissions inventory calculations.

Appendices

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Appendix 1	**Data Checklist**
Appendix 2	**Further details on the models to be used in the review and assessment**
Appendix 3	**Curricula Vitae**
Appendix 4	**Terms and conditions**

Appendix 1
Data Checklist

Air Quality Review and Assessment - Updating and Screening Assessment Data Requirements

Please review the checklist below and tick where the emissions sources identified are relevant to your local authority. Then return the checklist to **netcen** along with as much of the data indicated as possible. Please provide all data in electronic format, where possible.

Item	Local authority to identify	Data Required	Relevance to Local Authority? (✓)
A	Previous review and assessment reports (stages 1-4)	Copies of all previous reports. Please indicate last stage reached	1 / 2 / 3 / 4
B	Any other reports on air quality since the last stage	Copies of all previous reports. Please indicate purpose, if not for review and assessment of air quality	
C	New monitoring data since last stage of review and assessment for the district/borough, and any data obtain for adjacent boroughs for NO_2 .	Data for: • Carbon monoxide • Benzene • 1,3-butadiene • Lead • Nitrogen dioxide • Sulphur dioxide • PM_{10} Delete above as appropriate	
D	Land Line GIS data for the borough or district, ideally in ArcView format, if not as an *.ntf* file	Land Line GIS data for the borough or district	
Section A – Roads			
E	Traffic data for the district or borough. For each stretch or road the following data are required: • AADT (annual average daily traffic) flows, or if not available as an alternative (18 hour flows, peak hour) along with the relevant statistical conversion factor for each road • Speed data or, if not available, speed limits • Traffic growth factor for future years • Junction queue lengths • Junction turning count information • Vehicle type split, at least as HDV/LDV	Identify and provide traffic data indicated. Need to consider roads AND JUNCTIONS with AADT flows over 10,000veh/day. An individual road at a junction may have a flow of less than 10,000 AADT, but the total flow through the junction may exceed 10,000 vehicles/day. In case of doubt, please consult **netcen** or the Technical Guidance LAQM.TG (03).	

Item	Local authority to identify	Data Required	Relevance to Local Authority? (✓)
F	Narrow congested streets meeting *all* the criteria below: • Residential properties close to the kerb (within 5m); *and* • Average traffic speeds are <=50kph; *and* • Carriageway is less than 10m wide; *and* • AADT > 10,000 veh/day based on measured or modelled data, if possible	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	
G	Busy streets where people may spend 1 hour or more close to traffic (most likely along streets of shops, pubs, bars and cafes) meeting *all* the following criteria: • Members of the public may be exposed for 1 hour or more within 5m of the kerb; and • AADT > 10,000 veh/day	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	
H	Roads with high flows of buses and/or HGVs (>=20%) e.g. bus-only streets or roads leading to industrial estates, quarries or freight terminals, and meeting the following criteria: • Public exposure within 10m (20m major conurbation of 2 million people); and • HDV flows are >2,000 veh/day AADT	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	
I	Roads with AADT flows > 10,000 veh/day which have experienced large (>25%) increases in flows, or where traffic data improvements have revealed roads to have much larger flows than previously thought (>25%)	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least))	
J	New Roads constructed or proposed since the last Review and Assessment. Has an air quality impact assessment been undertaken for the new road? Does the new road have AADT > 10,000 veh/day or has it increased flows on other roads?	Identify and provide traffic data (flows, speeds, vehicle type split (HDV/LDV at least)). Provide copies of air quality assessments undertaken	

Item	Local authority to identify	Data Required	Relevance to Local Authority? (✓)
Section B - Other Sources			
K	Bus stations.	Provide information on daily movements	
L	Petrol stations with annual throughput of over 2000 m^3 of *petrol* (ignore diesel) and with busy roads nearby (>30,000 veh/day). Ignore stations with Stage 2 recovery systems installed.	Identify and provide information on petrol throughput. Are Stage 2 recovery systems likely to be installed?	
M	Major fuel storage depots (petrol only)	Identify and provide information on petrol throughput	
N	Industrial emissions sources, which are new since the last review and assessment, were omitted in last review and assessment, or have had a significant increase (>=30%) in emissions since last review and assessment, in district or in neighbouring your districts, if known (Part B/A2/ LA-APPC). Also advise of Part A/A1 and mineral processes if known. Do any air quality impact assessment reports exist on the new/altered emissions sources?	Identify and provide emissions data in tonnes per year for pollutants identified above in C, and information on number and height of stacks, Provide copies of any air quality impact assessment reports available	
O	Airports with a throughput of 5 million passengers per year and/or 500,000 tonnes of freight (freight-only flights) in 2005 or 2010 and possible public exposure within 1000m of the site boundary.	Identify, providing data on passenger numbers in 2005 and 2010, freight in tonnes per year, and nearest location of possible public exposure	
P	Significant areas of domestic solid fuel (coal, anthracite, wood or smokeless fuel) use (significant areas are 500m by 500m with at least 50 houses using these fuels). If not known, are any such areas suspected to exist from local authority experience?	Identify and provided details	

Item	Local authority to identify	Data Required	Relevance to Local Authority? (✓)
Q	Fugitive dust sources such as: • Quarries and opencast mines • Landfills • Handling of dusty cargo e.g. at ports • Industrial sites with unpaved haul roads, processing plant and materials handling Only consider above sources where public exposure is possible within 1000m of the source (nor site boundary). For above sites, have dust nuisance complaints been received by the local authority, or does visual inspection suggest significant fugitive dust during site visits?	Identify, provide details of activity, if known, and identify nearest potential location of public exposure	
R	Boiler plant (>5 $MW_{thermal}$) that burn coal or fuel oil	Identify and provide details	
S	Ports with more than 5,000 shipping movements per year	Identify and provide details of numbers of shipping movements	
T	Locations where diesel rail locomotives are regularly stationary for 5 minutes or more (e.g. at signals, goods loops, depots or stations) and: • Potential for public outdoor exposure within 15m of locomotives; and • There are more than 2 occasions per day where locomotives are stationary with engines running for more than 15 minutes?	Identify and provide details of numbers of movements, if known	

Appendix 2

Further details on the models to be used in the review and assessment

CONTENTS

A 2.1	**Models used to predict the impact of emissions from road traffic in the 'detailed' assessment**
A 2.2	**New Computational Fluid Dynamic Model for assessing traffic impacts in street canyons**
A 2.3	**Modelling industrial sources in the 'detailed' assessment**

Further details on the models to be used in the review and assessment process.

This part of the proposal contains further technical detail on the modelling approach to predicting concentrations in the 'detailed' assessment of nitrogen dioxide, and PM_{10}, if required, from traffic and industrial sources in Three Rivers District.

2.1 Models used to predict the impact of emissions from road traffic

The air quality impact from roads in the 'detailed' assessment will be calculated using our proprietary urban model. There are two parts to this model:

1. ***The Local Area Dispersion System (LADS) model.*** This model calculates background concentrations of oxides of nitrogen and PM_{10} on a 1 km x 1 km grid. The estimates of emissions of oxides of nitrogen and PM_{10} for each 1 km x 1 km area grid square will be obtained from the 1999 National Atmospheric Emission Inventory disaggregated inventory, projected forward to 2000 and 2005 using factors in the **defra** Technical Guidance.

2. **The *DISP model.*** This model is a tool for calculating atmospheric dispersion using a point-source kernel. Estimates of emissions from vehicles will be calculated using the latest emission factors. The dispersion kernels for the DISP model are derived from model runs using ADMS V3.1.

This advanced two-component model can take account of multiple sources, building effects, complex terrain, and street canyon environments; it is suitable for modelling road traffic emissions as defined in "Review and assessment: Selection and Use of Dispersion Models, LAQM.TG3 (00)", and in the Technical Guidance LAQM.TG (03).

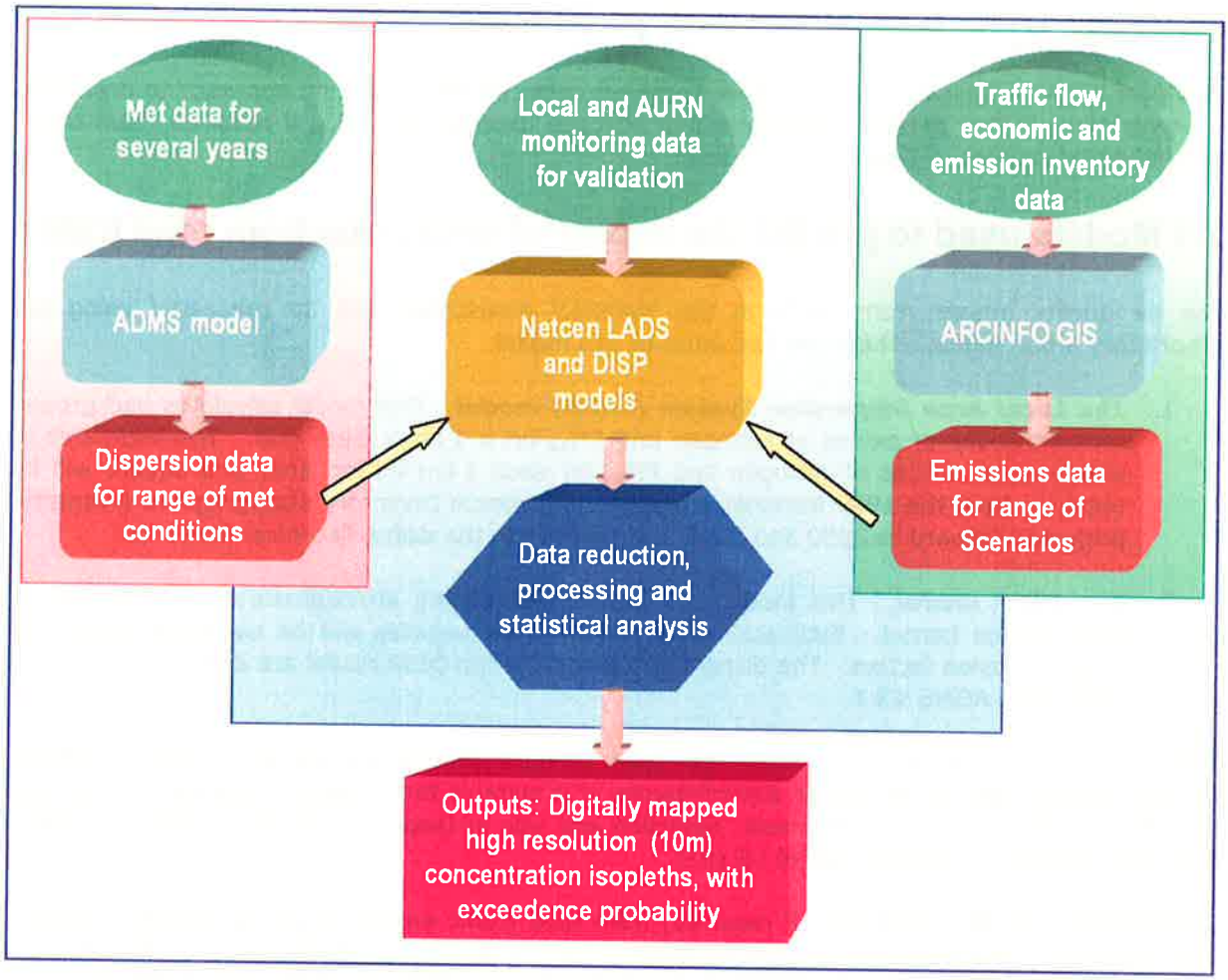
Concentrations of NO_2 (and PM_{10} if required) from road traffic emissions will be assessed using a high-resolution approach, with air quality being modelled at 10 m intervals along all of the roads assessed. This high spatial resolution is recommended in LAQM.TG3 (00) and in the Technical Guidance LAQM.TG (03). In addition, significant point source emissions will be combined with the road traffic impact to give an overall prediction.

The model will be run for the current and 2005 case (and 2004 if PM_{10} modelling is required). In addition, existing monitoring data will be utilised to assess current air quality against the national air quality standards and objectives, according to government guidance. However, a 'detailed' review and assessment will require that a quantification of the magnitude of the exceedance be undertaken through automatic monitoring.

In addition to total concentrations of NO_2, concentrations of primary PM_{10} (from traffic emissions alone) will also be predicted from the modelling if required.

Figure 2 overleaf shows the schematic view of our modelling approach.

Figure 2- Schematic of our netcen multi-component approach to 'detailed' assessment models for Local Authorities



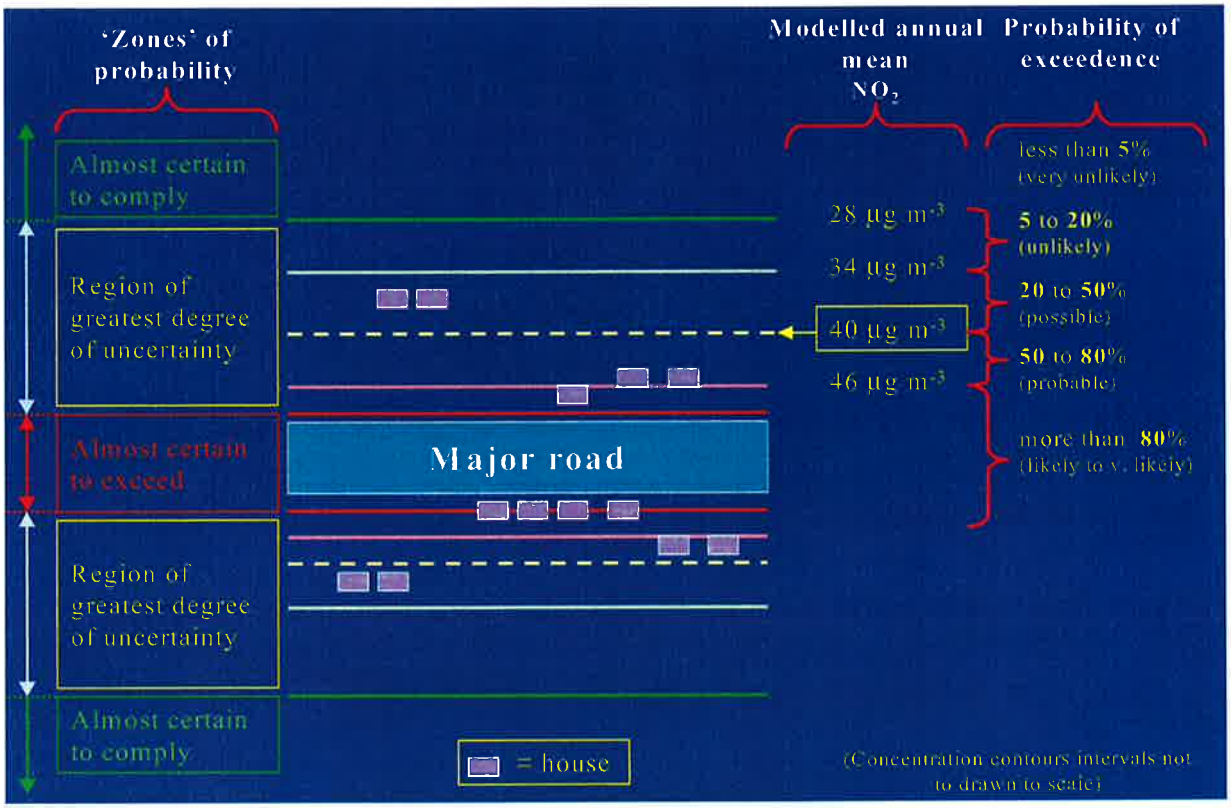
This overall modelling approach has been used in a number of Stage 3 and 4 studies that netcen has previously completed; it has also been approved and accepted by **defra**.

The benefits of our **netcen** modelling approach are that it:

- Utilises ***high quality modelling*** with a range of tested and validated models and model extensions.
- Provides a ***statistical assessment of public exposure to exceedances*** of current and proposed air quality objectives and
- Also offers ***transparent interpretation*** of their implications.
- Allows ***rapid sensitivity testing of the effects of various transport options***, such as 'low emissions zones' - new model runs will take hours, not days;
- Ensures ***consistency of prediction*** so there are no discontinuities between predictions of pollutant concentrations between adjacent areas modelled;
- Provides ***clear mapping outputs,*** allowing personal exposure and geographical areas of exceedance to be easily visualised and assessed.

A stylised example of the relationship between the concentrations of NO_2 and the probability of exceeding the annual mean objective, in this case for the concentrations predicted from road traffic, is shown overleaf in Figure 3.

Fig 3. Conceptual example of concentrations of NO_2 and associated uncertainties of exceeding the annual mean objective of 40 µg m^{-3}



Our modelling approach allows the probability of exceedances of both the annual and hourly objectives for NO_2 to be assessed from predictions of the annual mean alone. Table 2 below shows an example of how our modelling approach will allow us to calculate the ranges of concentrations of NO_2 that can be associated directly with probabilities of exceedances of the short and long-term air quality objectives. This example has been derived from our Stage 3 air quality review and assessment of South Lanarkshire.

Table 3. Example presentation of the probability of exceedances of the annual and hourly objectives for nitrogen dioxide

Description	Chance of exceeding objective	Confidence limits for the modelled annual average concentrations (µg m^{-3})	
		Annual average objective	Hourly average objective
Very unlikely	Less than 5%	< 28	< 39
Unlikely	5 to 20%	28 to 34	39 to 52
Possible	20 to 50%	34 to 40	52 to 67
Probable	50 to 80%	40 to 46	67 to 81
Likely	80 to 95%	46 to 55	81 to 94
Very likely	More than 95%	> 52	> 94

2.2 New FDS Street Canyon Model for assessing traffic impacts in street canyons

The FDS Street Canyon Model is being offered by **netcen** to UK Local Authorities for the first time. This sophisticated model is based on advanced computational fluid dynamics simulation methods, and has been extensively validated by the model developers- the US National Institute of Standards and Technology- using a wide range of direct measurement and wind tunnel experiments. Like the traffic models described in the previous section, this model's performance should always be validated by comparison with local measurement.

FDS-3 utilises dispersion kernels derived for the principal wind directions using the US National Institute of Standards and Technology Large Eddy Simulation (Computational Fluid Dynamics) model. The dispersion kernels are applied to calculate roadside concentrations for each hour of the modelled year: annual average concentrations are then calculated from the hourly concentrations.

The model is particularly applicable for assessing traffic impacts on air quality in areas where the buildings create a "street canyon" effect that hinders the effective dispersion of pollutants released from the motor vehicles. The DISP model described previously does not take full account of such street canyon effect. Accordingly, FDS 3 is recommended and will provide better predictions in such circumstances.

FDS-3 is more complex and computer-intensive than the traffic models described previously, particularly when large areas of roadway are to be covered. In consequence, our prices for assessments using this model can be higher than those that do not utilise this technique. However, our use of FDS-3 has shown it to be optimal for use in assessing traffic pollution 'hotspots' in street canyon environments.

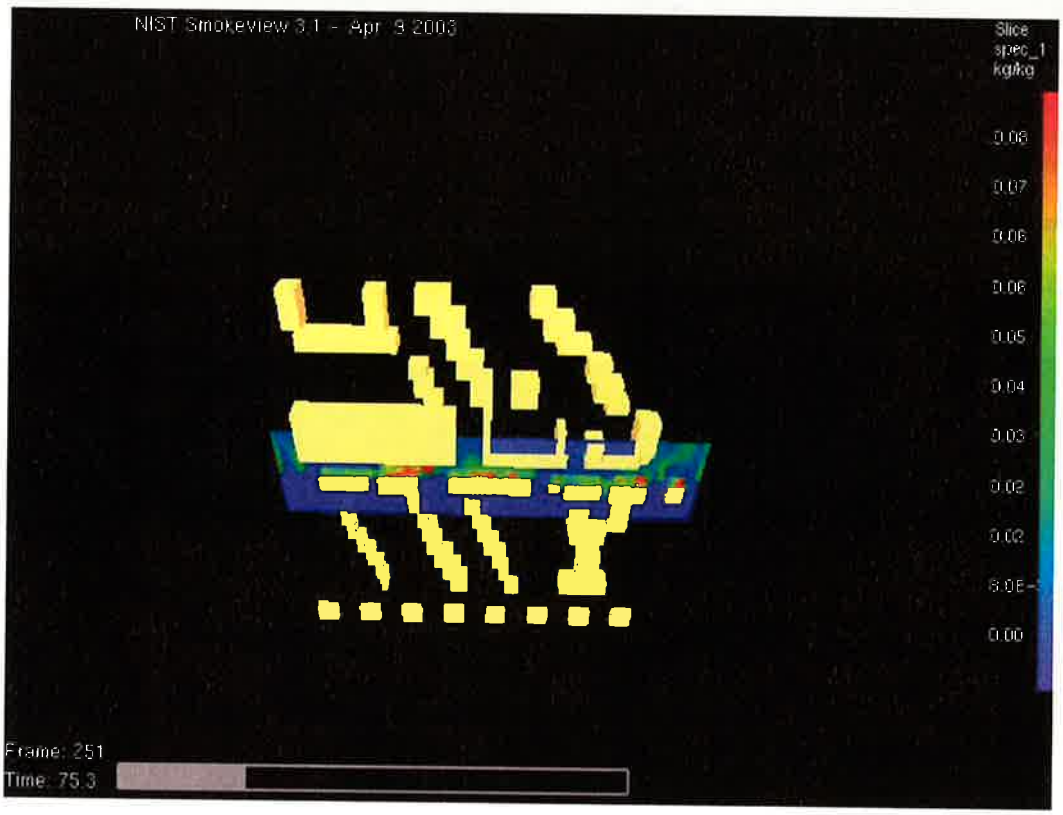


Figure 4 3-D Output from the FDS-3 Street Canyon Model showing surrounding road and building topography in great detail

Figure 5 Example of real-world usage of the FDS-3 Street Canyon Model for a Detailed Assessment undertaken in Norwich

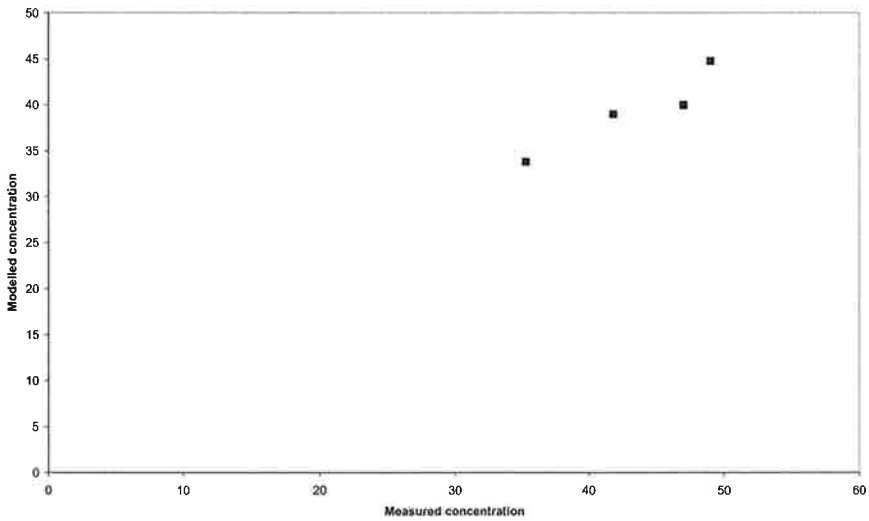


Figure 6 Comparison of measured and modelled street canyon NO_2 concentrations in Norwich

2.3 Modelling industrial sources in the 'detailed' assessment.

If required, dispersion modelling will be carried out for point sources in the area that failed to meet the 'screening' assessment. The impact of these industrial (or other) sources on ground level pollutant concentrations will be predicted using the dispersion model ADMS v3.1. The model will be set up to provide concentrations over the relevant averaging periods for the pollutant of concern.

Appendix 3
Curricula Vitae

CONTENTS

Geoff Dollard
John Abbott
John Watterson
Jim McGinlay
Melanie Hobson

netcen

netcen is an operating division of AEA Technology plc

Dr. Geoff Dollard

Qualifications BSc PhD Liverpool
Year of birth 1952
Nationality British

KEY SKILLS

- Air Pollution Science and Assessment
- Surface Exchange Processes
- Project Management

CAREER HISTORY

1998 - Present

Technical Director, Air Quality Group, netcen, AEA Technology Environment. Technical direction of 90 staff involved in the operation of all UK air monitoring activities, including national, ambient monitoring networks; emissions monitoring from industrial point sources and specialist measurement of particles and volatile organic compounds in air.

Additionally responsible for the UK National Air Quality Archive and national dissemination of Air Quality Data via the press, TV and internet. Direct support to UK Government (defra) for provision of analysis and advice in support of development of environmental policy.

Management of Atmospheric Modelling and Assessments Programmes, Evaluating Formation and Fate of Air Pollutants on the Regional and Local Scale; assessments of environmental impacts of pollutant emissions. Managing teams providing technical guidance and policy support to defra in area of Review and Assessment. Personal project work on developing a surface flux model for ozone deposition. On behalf of defra in support of policy development in UNECE activity to move from AOT 40 based assessments of ozone vegetation impacts in Europe, to flux based assessments.

1994-1998

Department Manager; Atmospheric Measurements and Processes. (50 members of staff), National Environmental Technology Centre

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Active work in the management and operation of all the defra automatic pollution monitoring networks. The Group was the focal point for National and International data dissemination activities, principally through the management of the National Air Quality Archive and Network Data Dissemination Unit to generate air pollution forecasts. Teams also focussed on fundamental mechanisms relating to the atmospheric chemistry and physics of pollutants in the troposphere and surface exchange processes through dry and wet deposition of gases and particles.

1989-1994: Section Leader, Atmospheric Processes Section, Environmental Assessment Department, AEA Technology, Harwell. Management of research contracts for Department of Environment, MAFF in area of Acid Rain, Photochemical Pollutants, Climate Change and specific gaseous pollutants. Project Manager for set-up and operation of the UK Network for automatic measurement of hydrocarbon pollutants across the UK.

1983-1989 Research Scientist; Modelling and Assessments Group. Studies on the transport and deposition of acidifying pollutants and photochemical oxidants.

1980-1983 Post Doctoral Research Fellow; University of Nottingham, Department of Environmental Physics. Managing a project utilising micrometeorological methods to investigate and make the first reported measurements of the deposition of pollutants through interception of cloud and fog water droplets by vegetation, (Occult Precipitation).

1974-1977 Post Doctoral Research fellow; Norwegian Forestry Research Institute, (University of Aas) Norway. Field and wind tunnel investigations on the dry deposition of sulphur dioxide and sulphur aerosols to forest trees. Part of the Norwegian National Acid Rain Study Programme (SNSF Project).

1974-1978 Post Graduate research into the deposition and uptake of heavy Metals by woody plant species.

PROFESSIONAL ACTIVITIES AND MEMBERSHIP OF EXPERT GROUPS

- Member of UK Photochemical Oxidants Review Group, 1992-1998.
- Member of UK Review Group on the Impact of Nitrogen Deposition in Terrestrial Ecosystems (INDITE) sub group of fluxes.
- Member of UK Quality of Urban Air Review Group, 1992-1997.
- Co-ordinator of CEC research programme on measurement of natural hydrocarbon emissions from vegetation.
- Consultant to European Commission DGXI Framework Directive.
- Consultant to Joint Research Centre at ISPRA on Sampling Volatile Organic Compounds.
- Consultant to Greek Ministry of Environment (via the organisation DEMOCRITOS) on automatic, network sampling of Volatile Organic Compounds.
- Consultant to the State of San Paulo, Brazil. Institution appraisal of the State Environmental Research Organisation (CETESB) December 1996.
- Project Director for PHARE Topic Centre Link on Air Quality. April 1997-1998.

SELECTION OF PUBLICATIONS

- 65 published papers including approximately ten papers on vegetation uptake and cycling of metals, ten papers on deposition processes and over 25 papers on other aspects of tropospheric chemistry/monitoring. Contributions to a series of PORG, QUARG, INDITE and critical loads/levels reports.

netcen

netcen is an operating division of AEA Technology plc

John Abbott

Qualifications BSc (Hons) Chemical Engineering
Year of birth 1952
Nationality British

KEY SKILLS

- Materials handling
- Health impact assessment
- Air quality modelling
- Air quality impact assessment
- Emission assessment
- Assessment and technical support of IPC/IPPC and Planning applications
- Expert witness

SELECTION OF RECENT PROJECT EXPERIENCE

2003 Environment Agency – Peer Review of risk modelling for dioxin releases. Review and testing of model algorithms used in the Environment Agency's risk assessment model for dioxins and PCBs.

2002 G L Hearn – Air quality assessment for Surrey Quays development.

2002 Environment Agency – Assessment of the uncertainties in acid deposition modelling.

2001 Octagon Motorsport – assessment of the impacts of proposed developments at Silverstone for F1 British Grand Prix

2001 Surrey County Council - Independent expert - assessment of environmental statements for proposed EFW developments in the county.

2001 First Renewables - assessment of environmental and health impacts as part of the IPPC and planning application for a proposed Coppice wood fired Power Station in Yorkshire

2000- Shanks Waste Services - Assessment of environmental and health impacts from the operation of landfill gas engines and flares at Ruabon landfill site. Calculation of dioxin and furan intake by local residents through contamination of air, soil and water. Presentation of evidence as expert witness at Public Inquiry.

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2000- Severn Waste - Assessment of air quality and health impacts from North Worcestershire Integrated Waste Management Facility at Kidderminster. Assessment of heavy metal deposition. Assessment of dioxin and furan intake by local residents. Assessment of the extent of contamination by heavy metals and dioxins and furans of processed sugar at adjacent beet processing plant.
2000-Crawley Borough Council - Assessment of dust impacts from aggregate handling plant on proposed residential development.

2000-Dudley Metropolitan Borough Council - Assessment of fume and odour emissions from foundry operations. Expert witness for the prosecution of foundry operator.

2000- Environment Agency - Assessment of impact of accidental release of dye powder from waste disposal operations. Expert witness for the prosecution of the plant operator.

1998-2001 Local Air Quality Review and Assessment. I advised the DETR on the preparation of Pollutant Specific Guidance for Review and Assessment. I am responsible for technical guidance of **netcen's** assessment team who have carried out approximately 25 Stage 2 and 15 Stage 3 Review and Assessments for Local Authorities. I have prepared Stage 3 assessments for Epping Forest District Council, Oxford City Council. Blackpool Borough Council.. Presentation to Council members. Preparation and presentation of courses on Stage 2 and Stage 3 methods to Chartered Institute of Environmental Health.

1998- Environment Agency - Impact of loss of FGD at Drax power station on air quality. Drax power station is one of three large power stations in a group in Yorkshire. The emissions from the power stations were modelled to provide predictions of sulphur dioxide concentrations in the area under a range of operating scenarios. The concentrations were compared with National Air Quality Strategy objectives and other health risk criteria in order to help decide whether Drax could be allowed to operate temporarily without FGD. The modelling results were used to develop EA approach on Drax authorisation.

1999 S Grundon Colnbrook Waste to Energy plant. Technical support to the production of the environmental Statement. Including dispersion modelling studies of waste incinerators and comparison with National Air Quality Strategy objectives and other health risk criteria. The project team has successfully obtained planning and IPC Authorisation for the development.

1999 Lindsey Oil Refinery. Dispersion modelling studies of particulate emissions from an oil refinery complex. The work was carried out in support of a change to the refinery's authorisation to emit to air, and built upon previous work and models to ascertain the reasons for plume visibility and odour effects.

1999 Rochester Cement Works. Dispersion modelling studies of particulate emissions from Rochester cement works to ascertain the cause of local complaints. Modelled concentrations were compared with air quality objectives.

1999 Portobello Wastewater Treatment works and CHP. Dispersion modelling studies were carried out to investigate the dispersion of oxides of nitrogen and odour from a wastewater treatment works. The model results were presented at a planning inquiry.

1999 Scottish Power stations. Dispersion modelling studies were undertaken for three large Scottish power stations. The model predictions were compared with monitoring data. *Operational strategies were developed for the power stations to ensure that the pattern of emissions from the power stations achieved the air quality strategy objectives while meeting the operational demand.* Coastal fumigation and complex terrain effects were investigated.

1999 Mersey Docks. Dispersion modelling studies in support of an Environmental Statement for a Ro-Ro terminal on Mersey Docks. Modelling took account of emissions from vehicle parks, local industrial sources, roads and ships.

1999 Leamington Spa Old Town. Emissions from foundries, roads, a railway and a bus depot were modelled to determine the potential air quality climate around a proposed new housing and light industrial development.

1996-1999 - Department of the Environment Transport and the Regions- Development of National Air Quality Strategy for sulphur dioxide. Development of model for predicting the impact of sulphur dioxide emissions from large point sources and area sources on concentrations at 1 km resolution across the UK. The modelling has been used to create UK pollutant maps for sulphur dioxide .The maps have been used to inform the development of UK National Strategy.

1995-1996 - Northern Ireland Department of the Environment. Modelling studies to investigate the effect of alternative strategies to improve smoke and sulphur dioxide concentrations in Belfast, Londonderry and Newry.

1994-North East Emergency releases from chemical plant - dispersion modelling. An accidental release of a heat transfer fluid to the atmosphere had led to some concern from local residents and a number of complaints. Dispersion modelling was used to estimate the likely impact concentrations and the likely risk to health.

1994 Baldock by-pass - A dispersion model was used to predict the impact on air quality of alternative new road schemes on behalf of the local authority.

1996/7. Department of Transport- Emergency planning exercises for oil and chemical spills at sea.

1996 Coventry and Solihull Municipal Waste Incinerator- assessment of air quality impact of a fire.

1994 Manchester airport second runway- air quality modelling studies and surrounding roads.

1995 M1 Widening- air quality modelling studies.

1994 Heathrow Express Extension- modelling of emissions from roads around Paddington railway station.

1994 Heathrow Terminal 5- modelling of construction emissions - modelling of dispersion of emissions from car parks at Heathrow airport.

1996/7 Bournemouth hospital clinical waste incinerator- provision of air quality impact advice.

1995 KITE Project- investigations of the air quality effects of the application of advanced transport telematics to road systems in Southampton

1996 Dudley Municipal Waste Incinerator- air quality and radiological impact assessment.

1996 UK National Air Quality Strategy- assessment of the least cost of implementation of proposed standards for sulphur dioxide

1997 Runway Capacity in the South East- air quality impact assessment of future airport developments

1997, 1998 Urban Wastewater Treatment Directive- Portobello, Lewes, Worthing and Newhaven Schemes - Odour nuisance assessment

1998- Braintree and Old Leake Sewage Works- Odour nuisance assessment

1998- Redditch and Stoke Sewage works- Odour emission assessment
1998- North-west- Odour nuisance assessment of rendering plant
1998- Mucking Landfill -Odour nuisance assessment of landfill
1998- Reprotech- Odour nuisance assessment of waste disposal plant and landfill on behalf of the Environment Agency
1997/8- Premier Environmental- Odour and health impacts of waste disposal plant on behalf of the Environment Agency
1998-Oxfordshire- Odour nuisance assessment of chicken farms
1998- North London- Odour nuisance assessment of CHP unit
1996 Gatwick Airport- Odour emission assessment, analysis of odour complaints
1997- Humberside Refinery- Odour nuisance assessment
1997- South Coast- Pharmaceutical plant odour nuisance and health impact assessment
1997- East coast -Foundry odour nuisance assessment;
1996- East Midlands- Foundry odour and smoke nuisance assessment;
1996- East coast- Aircraft spray facility odour assessment
1998- Environment Agency- Impact of a fire at a disused waste disposal facility on air quality

CAREER HISTORY

1994-Date : AEA Technology **netcen**: Independent Expert and Project manager for air quality impact assessment. Responsible for the technical, managerial and financial control of air quality impact assessment projects. Projects included:
- urban modelling of smoke and sulphur dioxide;
- modelling of nitrogen oxides, carbon monoxide and hydrocarbons from vehicles and aircraft;
- air quality impact assessment from Energy from Waste facilities.

1988-1993 : Project manager (Grade 7) for onshore marine pollution and bulk solids handling projects. Responsible for the technical, managerial and financial control of projects concerned with the clean-up and modelling of coastal marine pollution and with bulk solids handling. Projects included:
- clean-up of oil spills from beaches;
- estuarine modelling;
- computerized information system for beach clean-up;
- satellite remote sensing of oil spills;
- silo design;
- powder testing;
- vapour cloud modelling;
- cargo stability;
- health and safety at enclosed wastewater treatment works.

1981-1988 Senior Scientific Officer (Project Leader) in the Materials Handling Division. Responsible for the technical control of projects concerned with the safe design of bulk materials handling systems. Projects included:
- dust explosion prevention and protection;
- prevention of fires and explosions in dryers;
- aerated silo design;
- silo design;
- powder testing;
- beltweighing;
- bulk solids consultancy.

1980-1981 Higher Scientific Officer (Technical Officer) in the Materials Handling Division.

Responsible for the technical control of research into errors in beltweighing.

1978-1980 Scientific Officer in the Materials Handling Division. Responsible for experiments in beltweighing.

SELECTION OF PUBLICATIONS

John Abbott. Prevention of fires and explosions in dryers. Institution of Chemical Engineers,1990.

C.Schofield and J.A.Abbott. Guide to dust explosion prevention and protection, Part 2-Ignition prevention, containment, inserting , suppression and isolation. Institution of Chemical Engineers, 1988.

John Abbott. Recommendations for beltweighing. WSL Report LR 648 (MH),1986.

John Abbott. Control of ignition sources, inerting and containment. British Materials Handling Board Seminar on Dust Explosions-Assessment, Prevention and Protection. London, 1989.

John Abbott. Beltweighing Research at Warren Spring Laboratory. British Society for Strain Measurement, International Conference, London, 1989.

J.A.Abbott, P.L.Bransby, R.Clark and W.T.Lee. Belt weighing test facility at Warren Spring Laboratory. Bulk solids handling, 1(2),239-243,1981.

J.A.Abbott. Beltweighers-Sources of error and recommended practice. Institution of Mechanical Engineers seminar on the control and measurement of bulk solids,1984.

J.A.Abbott. The effect of idler misalignment and belt stiffness on beltweighing errors. Bulk solids handling, 6(1), 121-128,1986.

J.A.Abbott. The effect of conveyor belt mistracking on beltweighing errors, 9(1), 107-117, 1989.

J.A.Abbott. British Materials Handling Board Survey of dust fires and explosions in the United Kingdom 1979-1984. Warren Spring Laboratory Report LR 597 (MH).

J.A.Abbott. Survey of dust fires and explosions in the United Kingdom 1979-1984. Europex Newsletter, 8, 4-10, 1988.

J.A.Abbott. Bulk solids storage methods. Factory Equipment News, 1986.

J.A.Abbott. Alignment Experiments: one part of the troughed belt weighing research programme at Warren Spring Laboratory. Weightech 2 conference, Harrogate 1981.

J.A.Abbott and D Tookey. Clean-up of oil spills from soft sediments. 1993 Oil spill conference. Tampa.

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John Watterson

Qualifications BSc, PhD
Year of birth 1964
Nationality British

KEY SKILLS

- Local Authority Air Quality Review and Assessment for transport derived pollutants
- Chartered Institute of Environmental Health training for Local Authorities
- Air quality modelling
- Project management
- Knowledge of environmental behaviour and fate of gaseous pollutants, particulate matter, radionuclides and organic compounds

SELECTION OF PROJECT EXPERIENCE

1999 - CIEH Training. Helped develop and deliver training courses to a wide range of representatives from local authorities. The courses covered many aspects of Stage 2 and Stage 3 Air Quality Review and Assessments.

1998 - Local Authority Air Quality Reviews. Completed ten Stage 2 air quality reviews and one Stage 3 review. Some sections were designed for a non-technical audience and therefore the reports produced had to be readable and clearly presented.

1997 - 1999 Environmental Sampling after a Chemical Accident. Have managed a substantial project to produce guidance and sampling protocols for use after a range of chemical accidents for the Department of the Environment, Transport and the Regions (DETR). Involved collating and interpreting data from a wide range of sources including databases, the scientific literature and from working groups and face-to-face visits. Designing a manual that was easy to read and use was a key part of the task.

1998 - Compilation of EU dioxin exposure and health data. Completed a review of the fate and transport and modelling of dioxins in the European Union as part of this large work programme, involving international collaborators. Participated in a one day workshop to discuss the outcome of the study.

1994 - Interpretation of data from the UK TOMPs network. Assisted in the interpretation of data from the UK Toxic Organic Micropollutants (TOMPS) Network. Co-author of several reports.

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1994 - 1995 Experimental programme to determine significance of deposition pathways of PCDD/Fs to vegetation. Managed programme of work to determine significance of deposition pathways (wet and dry) and transfer of PCDD/Fs associated with soil on to vegetation. Author of two reports for the DoE summarising the work.

1992 - 1995 Resuspension close to the Chernobyl nuclear power plant. Participated in a multi-national team to assess the level of resuspension of radioactivity contaminated land within 30 km of the Chernobyl plant. One output from the work programme allowed an assessment of magnitude of the off-site transport of radionuclides from the site.

1995 - 1997 Effect of food preparation on the radionuclide content of food. Managed a laboratory study to assess the reduction in levels of radionuclides in commonly eaten foods following a variety of cooking techniques.

1996 - 1997 Uptake of Chernobyl radiocaesium into upland vegetation. Managed a field measurement programme and interpreted data from a 10 year field measurement programme to determine the soil-to-plant transfer of radiocaesium into vegetation and recommended countermeasures to reduce the caesium levels in the vegetation.

CAREER HISTORY

1996 - present	**Senior Consultant, Environmental Quality department, AEA Technology Environment.**
1994 - 1996	**Consultant, Emissions Monitoring and Abatement Department, AEA Technology.**
1990 - 1994	**Environment and Energy and Consultancy Services, AEA Technology.**
1989 - 1990	**Health Physics and Medical Division, Harwell Laboratory.**

PROFESSIONAL ACTIVITIES AND MEMBERSHIP

- Member of a working group advising on the standardised sampling strategy for human exposure biomonitoring following chemical contamination accidents. Working group run by the Health and Safety Executive and National Focus.
- Member of the UK Department of the Environment RADREM TESC (Radioactivity Research and Environmental Monitoring Committee, Terrestrial Environment Sub-Committee) which reviews current UK research into aspects of the behaviour of environmental radioactivity and recommends areas for future research.

SELECTION OF PUBLICATIONS

- Third Stage Air Quality Review for Basingstoke and Deane Borough Council, South Lanarkshire, and Hereford.
- First and Second Stage Air Quality Reviews for Basingstoke and Deane Borough Council, Aylesbury Borough Council, Christchurch District Council, Epping Forest Borough Council, Poole Borough Council, Isle of Wight, East Dorset District Council and Taunton Deane Borough Council.
- Watterson *et al.* (1999) Environmental Sampling Following a Chemical Accident. Guidance produced for the Department of the Environment, Transport and the Regions (DETR).
- Several reports for the Department of Environment Transport and the Regions interpreting results from the Toxic Organic Micropollutant network and reports on metal speciation and sources of metals for the National Atmospheric Emissions Inventory (NAEI).
- Coleman, P.J., Nicholson, K.W., Rose, C.L., Watterson, J.D., Ambidge, P. and Fernandes. (1996) Monitoring of dioxins and furans in environmental media. AEAT-18380031/REMA-152.

- Branson, J., Coleman, P., Donovan, B., Nicholson, K., Watterson, J. and Jones, K., Halsall, C. and Le, R. (1997) Results from the Toxic Organic Micropollutants (TOMPS) network: 1991 to 1995. AEAT-1643/16419146/Issue 1.
- Abbott, J.A., Baker, S.J., Coleman, P.J., Dyke, P.H., Haines, J. and Watterson, J.D. (1997) A study of dioxins and trace metals in soil around four municipal waste incinerators in Hampshire. Parts 1 and 2. AEAT-1575.
- Watterson, J. D. and Nicholson, K. W. (1991) Dry deposition of particulate materials to food crops). In: *Proceedings of the American Association for Aerosol Research conference*.
- Pomeroy, I. R., Nicholson, K. W., Watterson, J. D. and Branson, J. R. (1993) Interception of particulate materials by food crops. AEA-EE-0452, Harwell Laboratory, Oxon OX11 ORA.
- Watterson, J. D. and Nicholson, K.W. (1993) Retention of particulates by crops of wheat and lettuce. AEA-EE-0466, Harwell Laboratory, Oxon OX11 ORA.
- Kashparov, V. A., Protsak, V. P., Yoschenko, V. I., and Watterson, J. D. (1994) Inhalation of radionuclides during agricultural work in areas contaminated as a result of the Chernobyl reactor accident. *Journal of Aerosol Science,* **25**, 761-766.
- Contamination of surfaces by resuspended material (Experimental collaboration project 1). International scientific collaboration on the consequences of the Chernobyl accident (1991-1995). European Union report EUR 16527 EN.
- Watterson, J. and Nicholson, K.W. (1996) Change in radionuclide content of crops as a result of food preparation. *J. Radiol. Prot.*, **16**, 191-200.
- Watterson, J. and Nicholson, K.W. (1996) Dry deposition and interception of 4-22 μm diameter particles to a lettuce crop. *J. Aerosol. Sci.*, **27**, 759-767.

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Jim McGinlay

Qualifications MSc Environmental Science, BA (Hons) Chemistry
Year of birth 1967
Nationality British

KEY SKILLS

- Air quality review and assessment for local authorities
- Air quality impact assessment of industrial and transportation schemes
- Air quality monitoring using a range of automatic and non-automatic instrumentation
- Air quality modelling of industrial and transportation sources
- Preparation of air quality and impact assessment reports
- Experience in contaminated land site assessment, water quality assessment and EIA co-ordination

SELECTION OF PROJECT EXPERIENCE

2003 European Commission – Participated in the mid-term evaluation of the LIFE programme of the European Commission. Included participation in 2-day seminar in Valencia, Spain in order to meet the Spanish LIFE representatives and beneficiaries of the programme, in order to obtain feedback on the functioning of the programme, evaluate performance thus far, and recommend changes, where necessary.

2002 - 2003 Various UK Local Authorities – Review and Assessment of air quality at Updating and Screening stage (including Bracknell Forest Borough Council, Vale of White Horse District Council), and more detailed assessments (including Stage 4 assessments for Three Rivers District Council and Herefordshire Council).

2002 Wiltshire County Council – Stage 3 air quality impact assessment of the proposed Westbury bypass, Wiltshire

2002 Highways Agency – Stage 3 air quality, contaminated land, geology and soils, and water quality impact assessments and project co-ordination for the proposed upgrade of Rookery Crossroads, A14, Bury St Edmunds

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2001 – 2002 – Highways Agency/Various County Councils – Stage 2 and Stage 3 environmental impact assessments of various proposed new road schemes within the UK (Mereoak Roundabout Reading, Wylye Valley and Harnham Relief Roads, Salisbury). General environmental co-ordination and specialist studies in ground and surface water impact assessment, air quality and contaminated land

1999 – 2001 Kings Cross London Underground Redevelopment – EDM (Environmental Design Management) input to this major infrastructure project. Oversaw preparation and submission of applications for Environment Agency consents under Schedule 15 (Part III) of the CTRL Act 1996.

2000 – Rail Link Engineering (RLE) – Seconded to RLE from Ove Arup and Partners to update contaminated land risk assessments along the line of Stage 2 of the Channel Tunnel Rail Link in Kent and East London

1997 – 2002 Various Clients – Phases 1 and 2 site assessments of industrial premises, manufacturing facilities and redevelopment sites for due diligence, pre-acquisition and redevelopment purposes in UK and in Spain (Ibérica de Asientos, Valladolid, and Ferreteria Vazcaína, Durango, Spain; Ditton Manor Park, Slough; Baltic Exchange, City of London; Chiswick Park, London; Thamesmead Parks, London)

1997 – 2000 Welsh Office – Undertook air quality impact assessment Stages 1 and 2 of the proposed M4 Relief Road, Newport, South Wales. Included management of air monitoring sampler network, establishment and operation of automatic monitoring station, and DMRB graphical screening of impact of new route

1997-2000 Blue Circle Cement – Undertook assessment of the impact of a proposed quarrying and cement production operation at Snodland, Kent. Included management of sampler-based and automatic dust monitoring network, and fugitive dust modelling using the US-EPA-approved code FDM

1999 Holliday Pigments, Hull – Air quality impact assessment of emissions from a pigment factory on ground level sulphur dioxide concentrations before and after installation of FGD facilities. Design of compliance air monitoring network

1997 – 2000 Enron – Air quality impact assessment of a number of proposed new CCGT power stations in UK and overseas for environmental statements and in support of (then) IPC applications or equivalent, using dispersion modelling including ADMS and ISC

1997 – 1998 Dublin Port Tunnel – Air quality impact assessment of this major road tunnel development proposal in Dublin using CALINE and PAL codes

1997 – 2000 Various Clients – Air quality impact assessment of a wide variety of traffic generating development proposals such as supermarkets, shopping centres, commercial and residential developments using DMRB screening methodology and CALINE modelling, and sampler-based air quality monitoring

1995 – 1997 DoE - Established Local Authority Support Service for Air Quality Monitoring on behalf of the (then) Department of the Environment (DoE) including a telephone helpline

1995 – 1997 DoE - Support role on Quality Assurance/Control contract for DoE's Automatic Urban Monitoring Network (AUN); Validation of air quality data from AUN. Conducted performance review of first 4 years of operation of DoE's national Enhanced Urban Network

1995 – 1997 – DoE - Updated and assisted with publication of "Air Pollution in the UK" and DoE Air Quality Archive Internet pages

1995 – 1997 – DoE/EU DGXIII - Wrote and published handbooks and manuals on air quality monitoring for DoE and the European Commission DGXIII. Participated in EMMA project funded by the European Commission's LIFE programme, providing input regarding ambient air quality monitoring systems

1995 – 1997 – Environmental Protection Agencies of Ghana and Shanghai, China - Co-ordinated training on air monitoring for overseas customers

CAREER HISTORY

2002-current:	AEA Technology National Environmental Technology Centre: Senior Air Quality Scientist
2001-2002:	RPS Group: Senior Environmental Consultant
1997-2001:	Arup Environmental: Environmental Consultant
1995-1997:	AEA Technology National Environmental Technology Centre: Air Quality Scientist

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Melanie Hobson

Qualifications	MSc Environmental Technology, Imperial College BSc Environmental Sciences, University of East Anglia, Norwich
Year of birth	1974
Nationality	British

KEY SKILLS

- Air quality review and assessment
- Developing emission estimates and inventories
- Road transport policy support work
- Odour modelling and assessment

SELECTION OF PROJECT EXPERIENCE

- 2000 - 2003 Local Authority Air Quality Review & Assessments. Completed three Stage 4, eight Stage 3 reviews and ten Stage 2 air quality reviews.
- Provide training to the UK Chartered Institute of Environmental Health on air quality.
- 2001 Environmental Impact assessment of a flare stack in Qatar in the Middle East. Different burning scenarios were modelled to assess the impact of the proposed stack on local air pollutant concentrations.
- 2001 - Environmental Impact Assessment of the re-development of Derby town centre. Dispersion modelling was used to predict the air quality impact of the proposed development in the town centre.
- 2000 - 2002 - Co-author of the 1999 & 2000 UK National Atmospheric Emissions Inventory Report.
- Member of government wide atmospheric emission projections working group.
- 2002 - Secretariat for CEN European Working Group 19 on Emission Monitoring Strategy

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- 2002 - Production of an interactive workshop for Shell to lead the user through the tasks involved in an environmental impact assessment.
- 2001 - Assessment of odour from a cocoa plant. Estimated the impact of various operating scenarios on local odour concentrations. This required dispersion modelling to be carried out to predict ground level concentrations at receptor locations.
- 2001 - Assessment of odour control from an animal incinerator and knackers yard. Odour emissions were measured from these two sites and then dispersion modelling was used to quantify the impact each was having on the local environment and therefore where abatement was most needed.
- 2001 – Assessment of odour from a composting site. Measured and assessed odours and volatile organic compounds from this site.
- 2001 - Assessment of the emissions of pollutants from animal pyres arising from the foot and mouth outbreak.
- 2001 / 2002 - Olfactometry analysis for various customers
- 2002 - Involved in a project developing emission estimates of fluorocarbons (HFCs, PFCs & SF6)
- 2002 - Environmental advice to the railway industry. This project involved updating current environmental information and providing both a spreadsheet model and report.
- 2002 Assessing the impact of bio-fuels on evaporative emissions from petrol cars and motorbikes. Different scenarios were analysed to assess the impact of bio-fuel penetration of the fleet in 12 European countries.
- 2002 / 3 - Air Quality Review and Assessment Emissions helpdesk.

CAREER HISTORY

2000 - present	Air Quality Consultant, Environmental Quality Group, AEA Technology, Culham, Oxfordshire.
1997	Research Assistant, Global Environmental Issues Group, ICF Consulting, Washington DC, USA. Carrying out research and writing reports on greenhouse gas emissions and mitigation strategies for the US EPA.

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Appendix 4
Terms and conditions

CONTENTS

Fixed price agreement

Agreement

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netcen is an operating division of AEA Technology plc

Telephone: 01235 463554
Facsimile: 01235 463005

netcen Reference: **netcen**/ED48139/Issue 2

AEA Technology plc ("AEA Technology") whose registered office is at 329 Harwell, Didcot, Oxfordshire OX11 0QJ, United Kingdom (Registered in England and Wales, number 3095862), acting through its operating division **netcen,** hereby offers to undertake the programme of work ("the Work") for **Three Rivers District Council** ("the Customer") of *Three Rivers House, Northway, Rickmansworth, WD3 1RL* (Registered Office or other address).

Telephone Number: 01923 776611 Facsimile Number: 01923 727181

AEA Technology estimates that the Work for the 'screening' assessment will be completed by 31st October 2003 provided that all necessary input data is received by 1st September 2003. AEA Technology's charges for the Work will be £3,750 Sterling for Task 1 and an optional £500 Sterling for Task 2 - 2010 PM10 assessment (plus VAT where applicable) **Please delete the optional Task if not required.**

Invoices will be issued on completion of each relevant phase or quarterly in arrears.

This offer, which expires on 30th September 2003, may be accepted by the Customer by returning a signed and dated copy of this document (including invoicing address and VAT number where applicable) to Clare Aston at **netcen**, Building E5, Culham, Abingdon, Oxon., OX14 3ED.

The Customer's acceptance shall be subject to the Conditions overleaf.

THE WORK Air Quality Review and Assessment – As outlined in **netcen's** proposal from Jim McGinlay, dated 20th August 2003 (reference: **netcen**/ED48139/Issue 2)
THE CUSTOMER'S INVOICING ADDRESS (if different from above) .... For the attention of:..... THE CUSTOMER'S VAT NUMBER (if applicable):.....

AUTHORISATION

Signed..... On behalf of the AEA Technology

Name DR JACQUIE BERRY

Position DIRECTOR NETCEN

Date 20/08/03

Signed..... On behalf of the Customer

Name.....

Position.....

Date.....

Environment/03/218(Issue 1)

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CONDITIONS

LAW	1	Acceptance of this offer constitutes an Agreement made in England and subject to the laws of England and the sole jurisdiction of the courts of England between the Customer and AEA Technology.
PAYMENT	2	The Customer shall pay in Sterling the charges made by AEA Technology in respect of the Work within twenty-eight (28) days of the submission of any invoice by AEA Technology. Such payment to AEA Technology shall mean that payment exclusive of any taxes and duties chargeable thereon by any central government, local government or statutory body whatsoever, all of which taxes and duties shall be paid by the Customer.
INFORMATION	3	Unless specified to the contrary in the Work, all relevant information resulting from the Work shall be described in a written report, which shall be sent to the Customer. Subject to Clause 6 hereof, the Customer shall have the right to use such information for any purpose.
LIABILITY	4	AEA Technology makes no warranty or representation that the use of any information arising from the Work will not infringe the rights of third parties but, if any of AEA Technology's employees whilst engaged on the Work become aware of any apparent infringement, AEA Technology will inform the Customer.
	5 (a)	AEA Technology shall be liable for any loss or damage suffered by the Customer only insofar as such loss or damage is attributable to negligent acts or negligent omissions of AEA Technology's employees or agents in the performance of the Work.
	(b)	AEA Technology accepts no responsibility for the use made of any information, materials or equipment arising from the Work either by the Customer or by any third party who has obtained any of the said information, materials or equipment directly or indirectly from the Customer, except to the extent that AEA Technology can be shown to have been negligent in providing such information, materials or equipment.
	(c)	AEA Technology's total liability to the Customer under this Agreement, in tort (including negligence), under statute or otherwise in respect of such loss or damage shall be limited to one hundred thousand pounds (£100,000) Sterling or five times the total payment made to AEA Technology under this Agreement, whichever sum is the greater. This limitation excludes liability for personal injury or death, which under statute will remain unlimited.
PUBLICITY	6	Either party shall have the right to make general references to the Work in press releases or promotional materials, but shall not include any detailed results of the Work without the written consent of the other, which consent shall not be unreasonably delayed.
CONFIDENTIALITY	7 (a)	Subject to the provisions of Clause 3 hereof, each party shall take all reasonable measures to keep confidential for the period of seven (7) years next following the date of acceptance of this offer all information which is received from the other party under this Agreement and which is specified by the disclosing party to be confidential at the time of disclosure or which may come to one party's knowledge or is disclosed to it as a result of visiting the premises of the other party.
	(b)	This obligation shall not apply to information which either at the time of disclosure or after disclosure is published or generally available to the public other than through a breach hereof or information already in the receiving party's possession at the time of receipt and which was not acquired directly or indirectly from the disclosing party or information acquired by the receiving party in good faith from a third party.
THIRD PARTY RIGHTS	8	Nothing in this Agreement confers or purports to confer on any third party any right or benefit under 'The Contracts (Rights of Third Parties) Act 1999' to enforce any terms of this Agreement.
CUSTOMER'S PROPERTY, INFORMATION ETC.	9	As soon as practicable after acceptance of this offer, the Customer shall arrange, free of charge and risk to AEA Technology, the delivery to AEA Technology of any samples, equipment, materials and/or information ("Customer's Property") required by AEA Technology in order to carry out the Work. On completion of the Work, the Customer's Property shall be treated as detailed in the Work or, if no provision is made in the Work, the Customer's Property shall be retained by AEA Technology for the period of two (2) months next following the completion of the Work, during which time the Customer may make arrangements for their collection. Should the Customer not make such arrangements, AEA Technology shall be entitled to dispose of the Customer's Property at the Customer's expense.
DELAYS, ACCESS AND SAFETY	10	AEA Technology shall not be considered in default in the performance of its obligations under this Agreement to the extent that the performance of such obligations is prevented or delayed by any cause beyond its reasonable control. Such cause shall include but shall not be limited to, denied access to the premises where the Work is being undertaken, the Customer's failure to ensure such premises are safe in accordance with all relevant Health and Safety legislation, the Customer's failure to provide information in the format detailed or other such Customer property required by AEA Technology in the timescales indicated in the Work. AEA Technology shall charge the Customer for any additional fees associated with any such delays.
CUSTOMER'S ORDER	11	Unless specifically agreed otherwise in writing by the Customer and AEA Technology, the terms contained in any purchase order or any other form of contract document issued by the Customer to AEA Technology shall not apply in any way whatsoever to the performance of the Work except for the purposes of specifying the Customer's contract reference number(s) and the Customer's relevant invoicing address(es).
TERMINATION	12	Either party may terminate this agreement giving the other 30 days written notice of termination. The customer agrees to pay AEA Technology for any reasonable costs incurred for work completed prior to the termination date.