

# London Atmospheric Emissions Inventory (LAEI) 2008

## User Guide

London Atmospheric Emissions Inventory 2008

**MAYOR OF LONDON**

**London Atmospheric Emissions Inventory 2008**



Designed and compiled (January 2010) by


 **AEA**



**LONDON**



January 2010

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	<p>AEA Central House 14 Upper Woburn Place London WC1H 0JN</p> <p>t: 0870 190 3478 f: 0870 190 5545</p> <p>AEA is a business name of AEA Technology plc</p> <p>AEA is certificated to ISO9001 and ISO14001</p>	
<b>Author</b>	Name	Julius Mattai, Agnieszka Griffin & Carlos Martinez
<b>Approved by</b>	Name	Julius Mattai
	Signature	
	Date	29 January 2010

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Public Liaison Unit  
Greater London Authority  
City Hall  
The Queen's Walk  
London SE1 2AA  
United Kingdom  
Fax: 020 7983 4057  
Email: [mayor@london.gov.uk](mailto:mayor@london.gov.uk).

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Use the contact details below for LAEI 2008 **technical support**:

Julius Mattai  
Principal Consultant  
LAEI 2008 Project Team  
AEA  
Central House, 14 Upper Woburn Place  
London WC1H 0JN  
United Kingdom  
Phone: 0870 190 3478  
Email: [julius.mattai@aeat.co.uk](mailto:julius.mattai@aeat.co.uk)  
<http://www.aeat.com>



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## 1. An overview of the London Atmospheric Emissions Inventory

### 1.1. What is the London Atmospheric Emissions Inventory 2008 (LAEI 2008)?

The LAEI 2008 is a Microsoft® Access database of geographically referenced datasets of emissions sources and information about the location, rates of emissions and estimates of the quantity of specific pollutants emitted into the air within and around the Greater London area (i.e., within the M25 motorway<sup>1</sup> ring) in the 2008<sup>2</sup> base year, with forward and backward projections to 2011 & 2015 and 2006 & 2004, respectively.

The LAEI 2008 emission estimates are predominantly based on the “bottom up” methods outlined in the LAEI 2008 Emissions Estimation Methodology Manual, which can be found on the LAEI 2008 CD-ROM. Where insufficient local data existed, a combination of some of the “bottom up” and “top down” methodologies and datasets developed by the AEA Emissions Inventory Team for the compilation of the 2007 regional and sub-regional emissions inventories and the United Kingdom (UK) National Atmospheric Emissions Inventory (NAEI) 2007<sup>3</sup>, have been used. The NAEI is generally based on a combination of both “bottom up” and “top-down” source specific data and the annually released “top down” energy data such as those presented in the Digest of United Kingdom Energy Statistics (DUKES), published by the UK Department of Business, Innovation and Skill (DBIS).

The LAEI 2008 is the latest version of the LAEI series released by the Greater London Authority (GLA). Since its establishment in 2000, the GLA has updated and released seven versions (i.e., including the current version, LAEI 2008) of the LAEI: LAEI 1999, released in October 2001 and February 2002; LAEI 2001, released in October 2003; LAEI 2002, released in February 2005; LAEI 2003, released in July 2006; LAEI 2004, released in February 2008; LAEI 2006, released in March 2009; and the current LAEI 2008, released in February 2010.

### 1.2. Uses of the LAEI 2008

The LAEI 2008 could be used for the following purposes:

- To assess the relative significance of the different emission sources in Greater London, including their spatial and temporal distributions, in order to identify the specific emission sources that could be targeted if reductions in atmospheric emissions are required.
- In conjunction with other air quality tools such as air quality monitoring data, modelled air quality data and maps, meteorological data, air quality targets and

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<sup>1</sup> The M25 motorway is a 117 miles (188 km) orbital motorway which encircles Greater London, except for the tolled Dartford Crossing (A282) where it crosses the River Thames to the east of London.

<sup>2</sup> The 2008 base year (and in some cases 2007) is the most recent year for which adequate and reliable datasets were available at the time (September 2009-December 2009) the LAEI 2008 was compiled.

<sup>3</sup> The NAEI can be found at: <http://www.naei.org> - The NAEI is a "top down" inventory in which national data is allocated to smaller areas on the basis of the resident population and other appropriate indicators of regional activity. However, it contains some "bottom up" data such as on individual power stations and large industrial plants. The LAEI 2008 is a "bottom up" inventory in which local data is used to compile an inventory of local emissions. However, the LAEI and the NAEI are, to a certain degree, complementary.

guidelines tools, to assist in assessing the effectiveness of the London Mayor's Air Quality Strategy (MAQS).

- To provide an input to both UK and Greater London policy-making with respect to atmospheric pollution abatement and controls.
- To provide an input to atmospheric dispersion models and assist in the interpretation of ambient air quality measurements.
- For general public information.

### 1.3. Pollutants estimated in the LAEI 2008

The LAEI 2008 contains emission estimates for eight key and six subsidiary pollutants that largely correspond to those considered in the UK National Air Quality Strategy (NAQS). The eight key pollutants covered in the LAEI 2008 are:

- Oxides of nitrogen ( $\text{NO}_x$ )<sup>4</sup>
- Sulphur dioxide ( $\text{SO}_2$ )
- Carbon monoxide ( $\text{CO}$ )
- Non-methane volatile organic compounds (NMVOC)
- Carbon dioxide ( $\text{CO}_2$ )
- Benzene
- 1,3-butadiene
- Particulate matter less than 10 micrometres ( $\mu\text{m}$ ) aerodynamic diameter ( $\text{PM}_{10}$ ).

The subsidiary pollutants covered in the LAEI 2008 are:

- Methane ( $\text{CH}_4$ )
- Particulate matter less than 2.5 micrometres ( $\mu\text{m}$ ) aerodynamic diameter ( $\text{PM}_{2.5}$ )
- Nitrous oxide ( $\text{N}_2\text{O}$ )
- Total suspended particulates (TSP)
- Black smoke
- Polycyclic aromatic hydrocarbons (PAH).

For the subsidiary pollutants, the quality of available information does not allow complete coverage of all possible emission sources. Therefore, estimates of these subsidiary pollutants are included in the LAEI 2008 only where appropriate data and information are available.

### 1.4. Spatial and temporal scopes of the LAEI 2008

Geographically, the **Greater London area** covers only the 32 London boroughs and the City of London, whilst the **LAEI area** covers the Greater London area and the area lying between the M25 motorway and the Greater London area boundary (see [Figure 1](#)). The total areas covered by the Greater London and the LAEI are approximately 1,604  $\text{km}^2$  and 2,466  $\text{km}^2$ , respectively.

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<sup>4</sup> Nitrogen dioxide ( $\text{NO}_2$ ) and nitric oxide ( $\text{NO}$ ) are both oxides of nitrogen and are collectively referred to as oxides of nitrogen ( $\text{NO}_x$ ). All combustion processes produce some  $\text{NO}_x$  emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. This reaction is thought to be responsible for the majority of  $\text{NO}_2$  originating in London. Only nitrogen dioxide is associated with adverse effects upon human health.

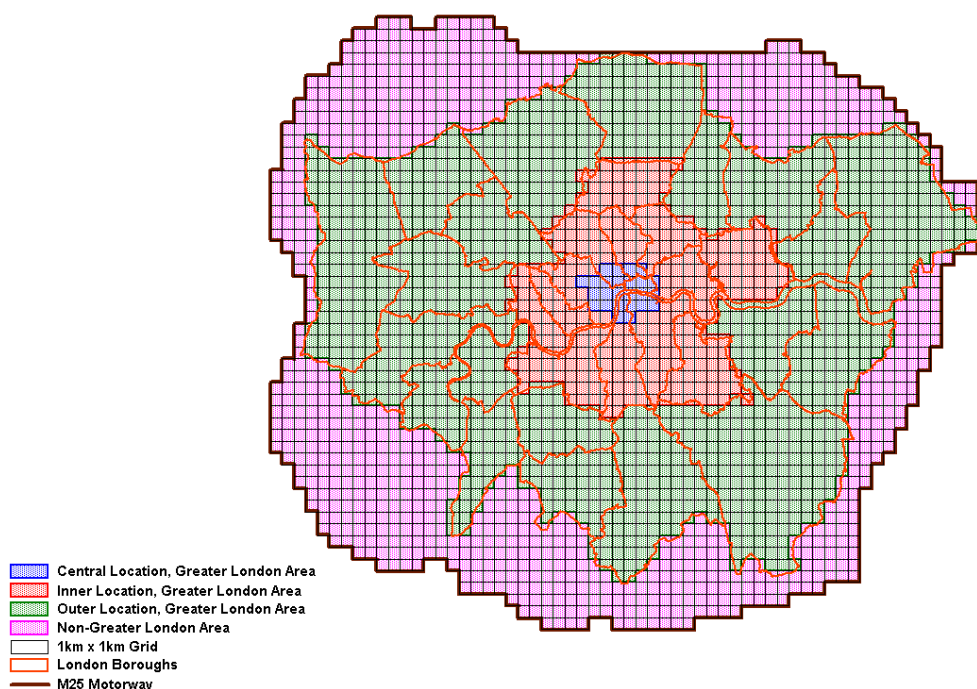


The UK Ordnance Survey (OS) 1-kilometre squared ( $1\text{-km}^2$ ) grids are used for spatially allocating the final emission estimates across the Greater London and LAEI areas. Final emission estimates are allocated to each  $1\text{-km}^2$  grid, therefore all details about emission variations from points, linear and polygon features (i.e., emission sources) within each  $1\text{-km}^2$  grid are lost through spatial aggregation. There are 2,466 and 1,604  $1\text{-km}^2$  grids covering the entire LAEI area and the Greater London area, respectively.

For reporting and presentation purposes, the LAEI 2008 area is geographically divided into two sub-areas:

- The **Greater London** area, which includes the 32 London boroughs and the City of London.
- The **Non-Greater London** area, which is the area that lies between the Greater London area boundary and the M25 motorway, including parts of 19 Districts in the Counties of Kent, Surrey, Berkshire, Buckinghamshire, Hertfordshire and Essex.

**Figure 1: London Atmospheric Emissions Inventory 2008 study area**



*Source: OS data © crown copyright. All rights reserved (GLA) (LA100032379) (2010)*

All geographical divisions and London borough boundaries within the LAEI 2008 are based on the "jagged" boundaries of the OS  $1\text{-km}^2$  grids. Therefore, the digital boundaries of the London borough referred to within this report do not exactly coincide with the actual OS administrative boundaries of the London boroughs. In other words, the digital boundaries of the London borough referred to within this report are the closest approximations to the geographically accurate OS administrative boundaries of the London boroughs.

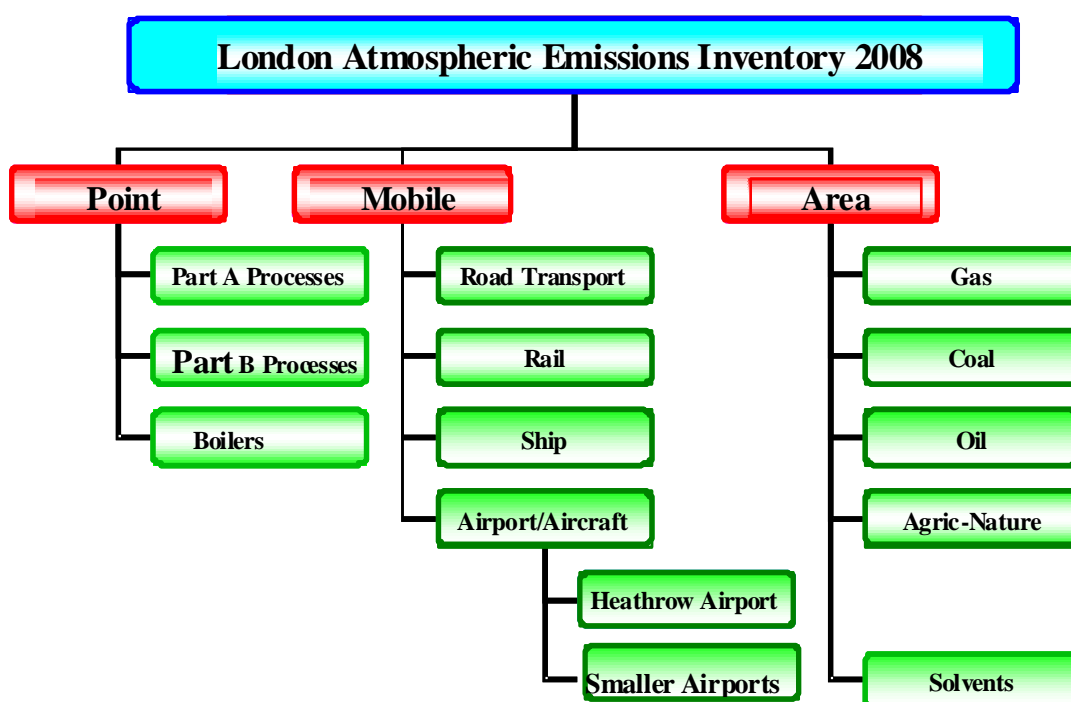
The  $1\text{-km}^2$  grids that make up the London boroughs are mutually exclusive (that is, each  $1\text{-km}^2$  grid belongs to no more than one London borough) and collectively exhaustive (that is, every  $1\text{-km}^2$  grid within the Greater London area belongs to a London

borough). When a 1-km<sup>2</sup> grid falls in more than one London borough, the London borough with the largest share of the 1-km<sup>2</sup> grid's area gets the entire value of the 1-km<sup>2</sup> grid.

### 1.5. Emission sources categorisation in the LAEI 2008

The emission sources in the LAEI 2008 are grouped into three *main emission source categories* (see Figure 2), based on the characteristics of the emission sources. Each of the main emission sources are further sub-categorised into various *emission source subcategories*, based on the nature of the emission sources:

Figure 2: Categorisation of emission sources in the LAEI 2008



**Point** emission source category includes stationary emission sources identified individually due to the quantity or nature of their atmospheric emissions. In the LAEI 2008, the point emission source category is divided into three *emission source subcategories*:

- Part A Processes (large industries regulated by the Environment Agency)
- Part B Processes (smaller industrial processes regulated by the local authorities)
- Boilers (large industrial boiler plants).

**Mobile** emission source category includes emission sources along a defined line. It includes all on-road mobile sources (these are vehicles operated on the streets and highways, such as motorcycles and cars) and non-road mobile sources (consisting of all vehicles and equipment not routinely operated on streets and highways, such as trains, ships and aircrafts). In the LAEI 2008, the mobile emission sources category is divided into four *emission source subcategories*:

- Road transport
- Rail traffic
- Ships
- Airports and aircrafts

**Area** emission source category encompasses a large number of diverse emission sources - everything from bakeries and breweries to domestic heating systems and degreasing operations. Area emission source category includes facilities whose individual emissions do not qualify them as point sources (individually they emit smaller quantities of pollutants. However, collectively they can release significant quantities of pollutants). This category also includes those emissions sources for which datasets do not exist to locate the emissions any more specifically. In the LAEI 2008, the area emission sources category is divided into five *emission source subcategories*:

- Gas (domestic, industrial-commercial consumption and gas leakage)
- Oil (domestic and commercial oil combustion)
- Coal (domestic and commercial combustion)
- Agriculture-nature (agricultural activities and natural occurrences)
- Solvents-buildings (solvents and solvent-processing buildings).

### 1.6. What is new in the LAEI 2008

The following significant improvements have been incorporated into the LAEI 2008 time:

- The LAEI 2008 now provides improved and integrated links to both MapInfo Professional files (i.e., \*.tab) and ESRI ArcGIS® shapefiles (i.e., \*.shp) files to ensure users benefit from the mapping, visualisation and querying functionality offered by this GIS applications.
- *MS Excel PivotTable and PivotChart Reports functionality*: The LAEI 2008 now embeds interactive data analysis functionality (i.e., PivotTable and PivotChart reports from Microsoft Excel) for graphically summarising, displaying and analysing trends in total emissions estimates for 2004, 2006, 2008, 2011 and 2015. This functionality assists users in assessing the trend and magnitude of meaningful changes in emissions over the past years. Methodological changes and refinements to the LAEI 2008 estimation methodologies have been retrospectively applied ("back-calculation") to the LAEI 2006 and LAEI 2004 emission estimates (only PM<sub>10</sub> and NO<sub>x</sub>) to enable consistent and meaningful comparisons over time.
- The Sewage emissions source subcategory (reported as an area source in the previous versions of the LAEI prior to the LAEI 2008) has now been removed from the Area Sources category and is now reported as a point source under the Part A Processes subcategory in the LAEI 2008. Sewage treatments emissions in the LAEI 2008 were obtained from the UK Environment Agency's Pollution Inventory for the 2007 base year.
- Air emissions from the Agricultural-Natural emission source subcategory have been expanded to encompass the following: Agricultural (i.e., soils, livestock, domestic gardens, animal incineration, agriculture and land use) and Natural-Other (i.e., forests, bonfire night, fireworks and accidental fires - dwellings and other buildings, forests, straw and vegetation) activities.

## 1.7. Availability of the LAEI 2008

The LAEI 2008 is available from the Air Quality Team, Environment Group, Greater London Authority (GLA), on a CD-ROM as a "zipped" (i.e., compressed) folder (LAEI\_2008.zip) that contains all the necessary files and the actual LAEI 2008 Microsoft® Access database that are needed to fully utilise the LAEI 2008. A user guide (**LAEI 2008 User Guide**) that provides clear and comprehensive information on how to copy and use the LAEI 2008 accompanies the CD-ROM.

The "unzipped" (decompressed) LAEI\_2008 folder must be copied to a suitably named directory/folder on your PC or network and it contains all the necessary files (including the GIS maps in MapInfo® Professional, ESRI ArcGIS®, Microsoft® Excel, Microsoft® Word and Adobe Acrobat® Reader file formats) needed to fully utilise the LAEI 2008. The LAEI\_2008 folder also contains the actual LAEI 2008 database (**LAEI\_2008.mdb**), which was developed using the Microsoft® Access 2002 database management system (DBMS).

### **Important!**

*Because the LAEI 2008 uses the Microsoft® Access 2002 application as its database management system (DBMS) you MUST have Microsoft® Access 2000 or later installed on your PC or else you will NOT be able to use the LAEI 2008 database (i.e., the LAEI\_2008.mdb file) and its user-friendly interfaces to easily and quickly navigate and query the underlying LAEI 2008 emission datasets.*

*The LAEI 2008 was created using Access 2002 and do not need to be converted for use with Office Access 2007. You can open the LAEI 2008 (\*.mdb file format) and modify data and object design in Office Access 2007 (\*.accdb file format) - compatibility mode is automatically on when you open a file that was saved in the old file formats and most functionality in the LAEI 2008 (old versions of Access) is available in Office Access 2007, with some exceptions. When the Office 2007 program is in compatibility mode, it will be indicated in the document title bar. Please note that because of some inbuilt security functionality in Access 2007 and the way Access 2007 is installed, the LAEI 2008 may encounter some technical problems.*

## 1.8. Price of the LAEI 2008

The GLA provides the LAEI 2008 to London boroughs (as part of assisting London boroughs to implement their air quality works) and other users free of charge. Requests for the LAEI 2008 CD-ROM must be made to the Greater London Authority:

Public Liaison Unit  
Greater London Authority  
City Hall  
The Queen's Walk  
London SE1 2AA  
United Kingdom  
Fax: 020 7983 4057  
Email: [mayor@london.gov.uk](mailto:mayor@london.gov.uk) or [laei@london.gov.uk](mailto:laei@london.gov.uk)

For **technical support**, please use the contact details below.

Julius Mattai  
Principal Consultant  
LAEI 2008 Project Team  
AEA  
Central House  
14 Upper Woburn Place  
London WC1H 0JN  
United Kingdom  
Phone: 0870 190 3478  
Email: [julius.mattai@aeat.co.uk](mailto:julius.mattai@aeat.co.uk)  
<http://www.aeat.com>

## 2. How to copy the LAEI\_2008 folder to your PC or Network

Before copying the "zipped" **LAEI\_2008** folder from the LAEI 2008 CD-ROM to your PC or network, you should be familiar with the Windows environment. It is assumed that you know how to use Windows Explorer to locate folders and files on a CD-ROM and on hard drives (local and/or network), create folders, move and copy folders and files, expand and collapse directory trees, and are familiar with the basic functionality in Microsoft® Office suites.

The "zipped" **LAEI\_2008** folder provided on the LAEI 2008 CD-ROM is **NOT** an executable file (that is, it is not a file in a format that your PC can directly execute). Therefore, you must copy the **LAEI\_2008** folder in the same way you copy any other conventional folder/file for the Windows operating system.

### 2.1. System requirements for the LAEI 2008

In order to copy and use the LAEI 2008 in its entirety, your PC system must meet the following basic requirements:

- Pentium 11 processor or higher (recommended);
- Windows 2000/XP Professional/NT 4.x or later;
- At least 2 Gigabyte (GB) of free hard disk space on your PC or network;
- At least 256 Megabytes (MB) RAM on your PC (512 MB RAM recommended);
- SVGA with higher screen resolution (1024 x 768 pixels recommended) and higher colour (24 bit recommended);
- Microsoft® Access 2002 or later and Microsoft® Excel 2002 or later;
- Adobe Acrobat® Reader; and
- A Geographic Information Systems (GIS) application – MapInfo® Professional version 7 or later and/or ESRI ArcGIS 9.0 or later.

### 2.2. How to copy the LAEI\_2008 folder to your PC

1. Use My Computer or Windows Explorer to locate a suitable hard drive (local or network, e.g., C:\ or S:\) with enough free space (at least 2 GB) and create a new folder. Rename the newly created folder as "**GLA\_LAEI\_2008**".
2. Insert the LAEI 2008 CD-ROM into your computer's CD/DVD-ROM drive (e.g., D:\). The operating system should detect the LAEI 2008 CD-ROM. Use My Computer or Windows Explorer to locate the "zipped" **LAEI\_2008** folder on the LAEI 2008 CD-ROM in your PC's CD/DVD-ROM drive.<sup>5</sup>
3. Right-click the "zipped" **LAEI\_2008** folder and select the 'Extract All...' option from the pop-up menu (note that there might be slight variations to the pop-up menu options depending on the type of decompression tools installed on your PC). The Unzip window or the Extraction Wizard will open and then simply follow the Wizard's instructions.

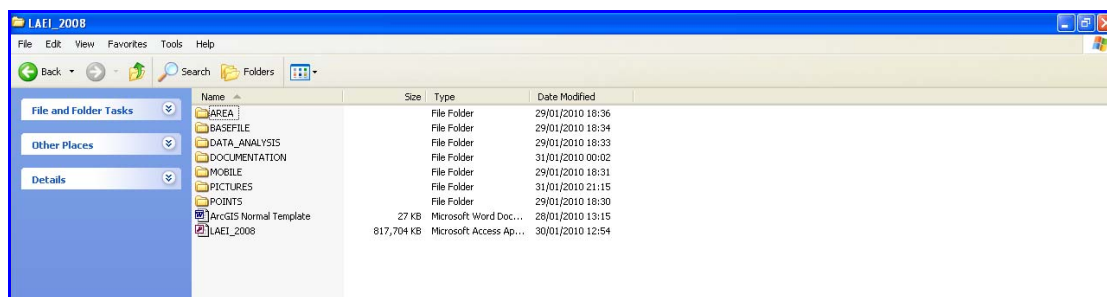
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<sup>5</sup> The "zipped" **LAEI\_2008** folder is in a compressed form; therefore, it must be decompressed before using it. The most popular decompression tool is WinZip, an easy-to-use program that can be downloaded from the Internet. In addition, some Windows systems (e.g., Windows Vista, Windows XP Professional, Windows 2000 Professional) allow you to open compressed files in Windows Explorer.



4. Make sure the "Unzip to Folder" destination folder is the "GLA\_LAEI\_2008" folder you created in Step 1. You can also use the Browse options to locate the "GLA\_LAEI\_2008" folder.
5. After the LAEI\_2008 folder has been extracted or decompressed, click the "Close" or "Finish" button to exit the Unzip window or Extraction Wizard.
6. Locate the **GLA\_LAEI\_2008** folder (earlier created in Step 1) to access the decompressed version of the LAEI\_2008 folder (now without the .zip extension). Open the **LAEI\_2008** subfolder in the **GLA\_LAEI\_2008** folder and make sure it contains all of the files needed to fully use the LAEI 2008. The content of the **LAEI\_2008** folder should now look exactly as depicted in [Figure 3](#)- six subfolders and the **LAEI\_2008.mdb** file (Microsoft Access Application). The structural layout and a brief description of the **LAEI\_2008** folder are available in Appendix A. The **LAEI\_2008.mdb** file is the Microsoft® Access database management system that manages all the LAEI 2008 database objects and provides the basic functionality to access other linked applications and the entire LAEI 2008 files.

**Figure 3: Content of the LAEI\_2008 folder**



7. Right-click the **LAEI\_2008** (Type: Microsoft Access Application) file and from the pop-up menu create a shortcut to the **LAEI\_2008** file. Locate the newly created **Shortcut to LAEI\_2008** file and copy it to your PC's desktop by dragging and dropping. Once copied to your PC's desktop, you will see a new icon on your desktop entitled **Shortcut to LAEI\_2008**. You can right-click and rename this icon to "**LAEI 2008**" or anything of your choice. Double-clicking the **Shortcut to LAEI\_2008** icon (or the "**LAEI 2008**" icon if you renamed the Shortcut) on your PC's desktop provides a very easy and convenient method of opening the LAEI 2008 database and it is highly recommended that you use this method to open the LAEI 2008 at all times.

Now that you have copied the **LAEI\_2008** to your PC and created the **Shortcut to LAEI\_2008** icon on your PC's desktop, you are ready to open and use the LAEI 2008 database through its graphical user interfaces (GUI).

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**Note:** You can copy or move the **LAEI\_2008** folder (from the LAEI 2008 CD-ROM or another location) to any other folder/directory or hard disk (local or network) of your choice but you **MUST** ensure that all the seven subdirectories/subfolders and the **LAEI\_2008.mdb** (Microsoft Access Application) file and its shortcut are always copied to the same root directory or folder.

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*Please refrain from renaming the folders and files in the LAEI 2008 as this may lead to serious problems. The names of folders and files in the LAEI 2008 have been programmed using Visual Basics for Applications (VBA) language to operate as a whole.*

You can copy or move the **LAEI\_2008** file (i.e., the Microsoft Access Application) alone (i.e., without the seven subfolders) to any other folder/directory or hard disk (local or network) of your choice and use the LAEI 2008 database to fully run LAEI 2008 queries; export query results to Excel; view emission totals and reports, etc. However, you will **NOT** be able to access the other important files that are linked with MapInfo® Professional, ArcGIS®, Microsoft® Excel and Adobe Acrobat® Reader applications through the LAEI 2008's friendly graphical user interfaces.

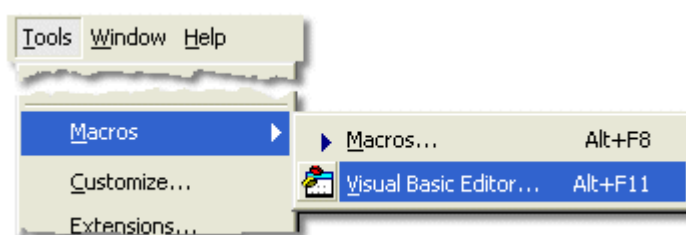
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*To fully benefit from the LAEI 2008, you should be familiar with the basic functionality in Microsoft® Excel and either MapInfo® Professional or ArcGIS® applications.*

### 2.3. Additional steps for ESRI ArcGIS 9.0 or later users ONLY

The LAEI 2008 provides improved and integrated links to the most common Geographic Information Systems (GIS) applications (i.e., MapInfo® Professional and ArcGIS®); ensuring that users benefit from the mapping, visualisation and querying functionality offered by these GIS applications. The LAEI 2008 seamlessly links with MapInfo Professional without this additional step. However, **all ArcGIS 9.0 or later users MUST create a new module in their ArcGIS ArcMap application** as follows:

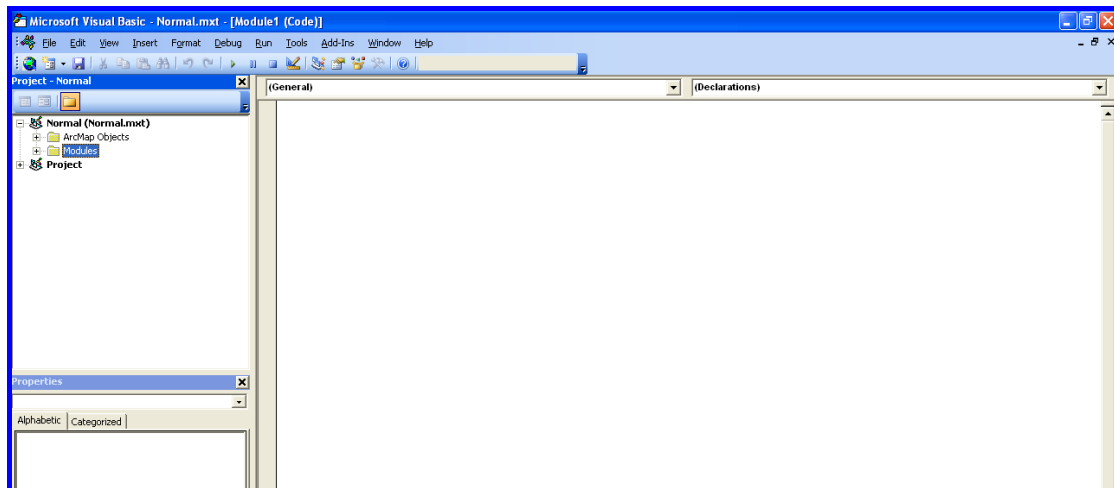
1. Start **ArcGIS** from **Start All Programs – ArcGIS - ArcMap** or from a desktop shortcut
2. Open an existing map document (.mxd) or add layers to the empty (Untitled) map document.
3. Click the **Tools** menu, point to **Macros**, then click **Visual Basic Editor**.



This opens the **Visual Basic Editor** (see [Figure 4](#)). ArcGIS applications come with Visual Basic for Applications and Visual Basic Editor embedded in the applications. The VBA project for the opened document is called **Project** followed by the name of the document in brackets. For example, in ArcMap it is named Project (<name of document>.mxd), and the VBA project for the Normal template is called **Normal (Normal.mxt)**.



Figure 4 Visual Basic Editor in ArcGIS ArcMap



4. In the VBA project explorer window (Click **Project Explorer** from the View menu if not already displayed), expand the Normal (Normal.mxt) node to expose the **ArcMapObjects** and **Modules** nodes.
5. Select the Modules node and then click Modules from the Insert menu to insert a new module. A new Module is added to the Normal.mxt project at the Module node.
6. In the **Properties** window, rename the newly inserted module “Module1” (Figure 5) as “**modLayers**” (see Figure 6 and Figure 7).

Figure 5 Properties window for the “Module1” module

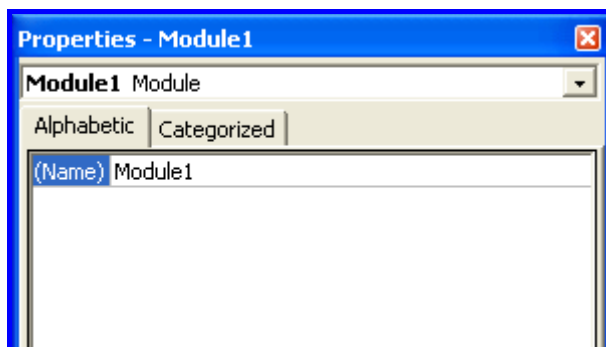


Figure 6 Properties window for the “modLayers” module

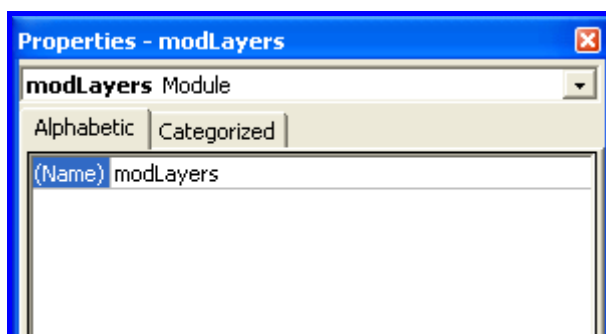
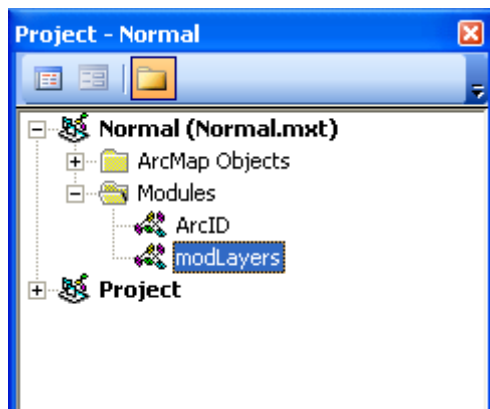
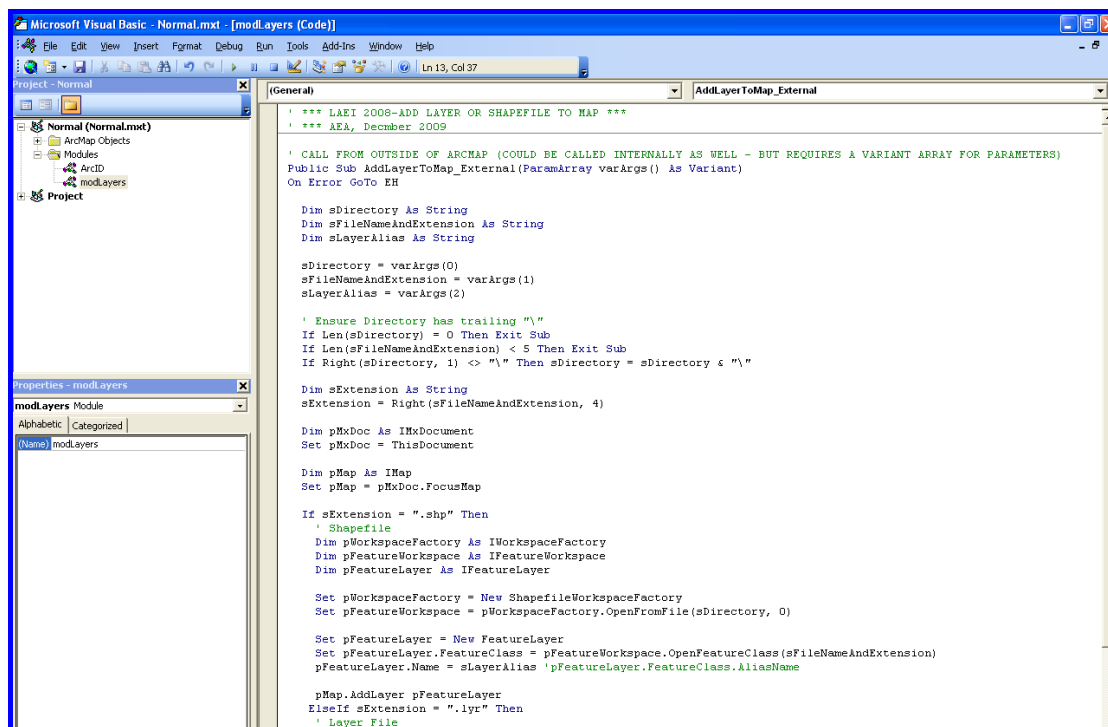


Figure 7 Newly named modLayers module in the Project Explorer window



7. Minimise the Visual Basic Window, navigate to the LAEI\_2008 folder, locate the “ArcGIS Normal Template.doc” file and open it.
8. Select all the texts from the “ArcGIS Normal Template.doc” file, maximize the VBA and open the modLayers module that you created in Step 6.
9. Paste the entire content (i.e., the VBA code) of your clipboard (with the copied text from the “ArcGIS Normal Template.doc” file) into the modLayers module as shown in [Figure 8](#).

Figure 8 The “modLayers” module with the copied code in the VBE window



10. Save **Normal.mxt** while in VBA by clicking **Save** on the Visual Basic Editor.
11. Click the Close button on the Visual Basic Editor and **exit ArcMap**.



### 3. Using the LAEI 2008

Locate and double-click the **Shortcut to LAEI 2008** icon on your PC's desktop to open the **LAEI 2008** database. On opening the LAEI 2008 database, the **LAEI 2008 Welcome Screen** (Figure 9) is displayed for approximately eight seconds, after which it immediately switches to the **Introduction Screen** (Figure 10).

Figure 9: LAEI 2008 Welcome Screen



The Introduction Screen provides a brief description of the LAEI 2008 as well as a disclaimer note for the LAEI 2008.

At the bottom of the Introduction screen are two buttons:

The **Click to ENTER** button – clicking this button opens the **Main Switchboard** (Figure 11), which allows you to enter and navigate the entire LAEI 2008 database.

The **Click to EXIT** button – clicking this button allows you to completely exit the LAEI 2008 database.

The **Main Switchboard** is the key launching pad for the LAEI 2008 database and its objects. For clarity and navigational purpose, the key LAEI 2008 component files are organised into six main groups on the Main Switchboard as follows:

- **User Guide and Methodology Manual**
- **Point Emission Sources**
- **Area emission Sources**

- **Mobile Emission Sources**
  - **Statistical summaries and Trends**
  - **Background maps and Road Traffic Datasets**
- 
- ❑ The **Exit LAEI 2008** button – enables you to exit the LAEI 2008 database but leaves the Microsoft Access® application running in the background.
  - ❑ The **Quit Microsoft Access** button - enables you to completely exit both the LAEI 2008 database and the Microsoft® Access application at the same time.

Figure 10: Introduction Screen

London Atmospheric Emissions Inventory (LAEI) 2008

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**London Atmospheric Emissions Inventory 2008**

The London Atmospheric Emissions Inventory (LAEI) 2008 is a database of geographically referenced datasets of atmospheric emissions sources and information about the location, rates of emissions and estimates of the quantity of specific pollutants - oxides of nitrogen, sulphur dioxide, carbon monoxide, methane, non-methane volatile organic compounds, carbon dioxide, benzene, 1,3-butadiene and particulate matter less than 10 micrometre aerodynamic diameter - emitted within and around the Greater London area.

Based on their characteristics, emission sources in the LAEI 2008 are grouped into three major emission source categories: Point (i.e., stationary emission sources identified individually due to the quantity or nature of their atmospheric emissions), Mobile (i.e., emission sources along a defined line) and Area (i.e., facilities whose individual emissions do not qualify them as point sources - individually they emit smaller quantities of pollutants, however, collectively they can release significant quantities of pollutants). The base year for the LAEI 2008 is the 2008 calendar year (the most recent year for which complete and reliable datasets were in most cases available). Emission estimates for the base year were used, together with a set of assumptions and models of the future situation, to project emission estimates for the years 2011 and 2015. The LAEI 2008 covers a total of 2,466 square kilometres, which includes the 32 London boroughs and the City of London (i.e., the Greater London area) and some parts of 19 districts in the counties of Kent, Surrey, Berkshire, Buckinghamshire, Hertfordshire and Essex, which lie between the M25 motorway and the Greater London area boundary. The UK Ordnance Survey's 1km2 National Grid is used as the geographical unit for spatial analysis and to allocate emission estimates across the LAEI area.

The LAEI plays a fundamental role in the development, implementation, monitoring and evaluation of the London Mayor's Air Quality Strategy (MAQS) and its policies. The LAEI is used to assist London boroughs in discharging their Local Air Quality Management (LAQM) responsibilities under the Environment Act 1995, assess the relative contribution and spatial/temporal distributions of atmospheric emission sources to track emission trends, develop air quality strategies and policies and assess progress, and as input to atmospheric dispersion models.

The London Atmospheric Emissions Inventory 2008 (LAEI 2008) may be reproduced by those organisations it is given to by the Greater London Authority (GLA) in whole or part for study and training purposes and for assessing emissions for the purpose of air quality modelling and/or air quality management reporting subject to the inclusion of an acknowledgement of the source. Reproduction for other purposes requires the written permission of the Environment Group - Policy and Partnerships Directorate, Greater London Authority, City Hall, The Queen's Walk, London SE1 2AA. While reasonable efforts have been made to ensure the contents of the LAEI 2008 are factually correct, the GLA does not accept responsibility for the accuracy or completeness of the content of the LAEI 2008 and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the content of the LAEI 2008. The London Atmospheric Emissions Inventory and the London Atmospheric Emissions Inventory logo are not trademarks. All other trademarks used and/or mentioned in the LAEI 2008 are the property of their respective owners, that is: MapInfo® Professional is a registered trademark of MapInfo Corporation, ArcGIS® is a registered trademark of Environmental Systems Research Institute (ESRI) Inc, and Microsoft® is a registered trademark of Microsoft Corporation.

Click to ENTER

Click to EXIT

The six main groups (with their corresponding buttons) on the Main Switchboard provide users with options to display specially designed forms when clicked.

- ❑ The **User Guide and Methodology Manual** button – enables you to access the **LAEI 2008 Documentation** form (Figure 12), which provides access to two important LAEI 2008 documents - "*LAEI 2008 User Guide*" and "*LAEI 2008 Emissions Estimation Methodology Manual*", which are available in Adobe® (\*.pdf) file format; so you must have Adobe® Acrobat® Reader installed on your PC in order to view and print them. The LAEI 2008 Documentation form also provides access to two buttons – "Which pollutants?" and "Which Geographic Area?" – providing background information on the type of pollutants covered in the LAEI 2008 and the geographic scope of the LAEI 2008, respectively.

Figure 11: Main Switchboard Form

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## London Atmospheric Emissions Inventory 2008

Based on their characteristics, emission sources in the LAEI 2008 are grouped into three major emission source categories:

**Point Sources:** include stationary emission sources identified individually due to the quantity or nature of their atmospheric emissions. These are large regulated industrial processes (Part A processes); smaller regulated industrial processes (Part B processes) and large commercial boiler plants.

**Area Sources:** includes a large number of diverse emission sources whose individual emissions do not qualify them as point sources (individually they emit smaller quantities of pollutants), however, collectively they can release significant quantities of pollutants. These are agricultural and natural sources; sewage treatment plants, solvents, and domestic and industrial/commercial gas, oil and coal use sources.

**Mobile Sources:** includes emission sources along a defined line. These are all on-road vehicles (e.g., cars, motorcycles, buses, etc) operated on streets and highways and non-road vehicles (e.g., trains/railways, ships/marine vessels, and aircrafts/airports).

To continue, click on a button below!

- User Guide and Methodology Manual
- Point Emission Sources
- Area Emission Sources
- Mobile Emission Sources
- Statistical Summaries and Trends
- Background Maps and Road Traffic Datasets
- Exit LAEI 2008
- Quit Microsoft Access

Figure 12: LAEI 2008 Documentation Form

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## London Atmospheric Emissions Inventory 2008

Which Pollutants? Which Geographic Area?

### LAEI 2008 DOCUMENTS

Please take time and read these documents. Click a link below to view the relevant LAEI 2008 document.

Click a button below to access the relevant document

- LAEI 2008 User Guide
- LAEI 2008 Emissions Estimation Methodology Manual

[Return to the Main Switchboard](#)

- ❑ The **Point Emission Sources** button – enables you to access the **Point Emission Sources** Form (Figure 13), which displays information about point emissions sources. A point emission source is an emission from a single point; it is typically a large stationary source with relatively high emissions. In the LAEI 2008, the point emission sources are *Boilers*, *Part A Processes* and *Part B Processes*.
- ❑ The **Area Emission Sources** button – enables you to access the **Area Emission Sources** Form (Figure 14), which displays information about area emissions sources. An area emission source is an emission that is assumed to be distributed over an area that cannot be estimated on a more detailed level. It is generally emissions released from a number of vents and/or leaks from buildings, natural and agricultural activities or in an uncontrolled manner. It also includes background emissions from a variety of small sources that are aggregated at 1km<sup>2</sup> level. In the LAEI 2008, the area emission sources are *Gas*, *Coal*, *Oil*, *Agriculture-nature* and *Solvents-buildings*.

Figure 13: Point Emission Sources Form

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**London Atmospheric Emissions Inventory 2008**

EMISSIONS FROM POINT SOURCES - PART A PROCESSES, 2008

1. Select a Point Source:  
 These are 'prescribed processes' that require authorisation from the Environment Agency under the Environmental Protection Act 1990.

2. Select a Year:

3. Click the button below to export the 2008 Part A Processes data (gridded at 1km x 1km resolution) to Excel.

Pollutants:	Emissions (tonne/yr):
SO2:	891
NOx:	2,511
CO:	2,276
CO2:	5,678,583
NMVOC:	62
Benzene:	0
1,3-Butadiene:	0
PM10:	14
Methane:	19,462

Documents for Part A Processes.

Methodology:

Data Workbooks:

Mapped Datasets:

Mapped Datasets:

- ❑ The **Mobile Emission Sources** button – enables you to access the **Mobile Emission Sources** Form (Figure 15), which displays information about mobile emissions sources. A mobile emission source is an emission along a defined line. In the LAEI 2008, the mobile emission sources are *Road Transport*, *Rail*, *Ships* and *Airports* (and their related activities).

Figure 14: Area Emission Sources Form

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## London Atmospheric Emissions Inventory 2008

ATMOSPHERIC EMISSIONS FROM AREA SOURCES - GAS (DOMESTIC) USE IN 2008

1. Select an Emission Source:

Gas

Emissions from domestic and industrial gas use (excluding that already accounted for under Point Emission Sources) and emissions from leakages on the gas distribution system.

2. Select a Sector:

Domestic

3. Select a Year:

2008

4. Click the button below to export the 2008 Gas (Domestic sector) data (gridded at 1km<sup>2</sup> resolution) to Excel.

Documents for Gas Emissions

Methodology: Adobe (\*.pdf) Format

Data Workbooks: MS Excel (\*.xls) Format

Mapped Datasets: MapInfo (\*.tab) Format

Mapped Datasets: ArcGIS (\*.shp) Format

Close Form

Pollutants:	Emissions (tonne/yr):
SO <sub>2</sub> :	0
NO <sub>x</sub> :	14,272
CO:	6,354
CO <sub>2</sub> :	10,600,110
NM/VOC:	457
Benzene:	41
1,3-Butadiene:	0
PM <sub>10</sub> :	103
Methane:	103

Figure 15: Mobile Emission Sources Form

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## London Atmospheric Emissions Inventory 2008

EMISSIONS FROM MOBILE SOURCES - AIRPORT, 2008

1. Select an Emission Source:

Airport

Gridded emissions data from London Heathrow and all other Smaller Airports (i.e., London City, Battersea, Duggin Hill, Denham, Elstree, Lippits Hill, Northolt and Stapleford Airports) combined.

2. Select a Year:

2008

3. Click the button below to export the 2008 Airport data (gridded at 1km x 1km resolution) to Excel.

Documents for Heathrow and all other Smaller Airports can be accessed by clicking on the 'Detailed Airport Emissions' button below

Methodology: Adobe (\*.pdf) Format

Data Workbooks: MS Excel (\*.xls) Format

Mapped Datasets: MapInfo (\*.tab) Format

Mapped Datasets: ArcGIS (\*.shp) Format

Click on the button below to view detailed emissions data for Heathrow and City Airports.

Detailed Airport Emissions ...

Close Form

Pollutant:	Total Emissions (tonne/yr):
SO <sub>2</sub> :	320
NO <sub>x</sub> :	4,424
CO:	5,119
CO <sub>2</sub> :	1,225,824
NM/VOC:	228
Benzene:	16
1,3-Butadiene:	14
PM <sub>2.5</sub> :	0
PM <sub>10</sub> :	128
Methane:	19



At the bottom of the Mobile Emission Sources form is the **Detailed Road Transport Emissions...** button or **Detailed Airport Emissions...** button - each button enables users to access a special form, **Mobile Emission Sources – Airports Form** (Figure 16) or **Mobile Emission Sources – Road Transport Form** (Figure 17), with detailed emissions data for airports and road transport, respectively. Both the **Mobile Emission Sources – Airports** and **Mobile Emission Sources – Road Transport** Forms are accessible only through the **Mobile Emission Sources** form when it is open and active.

**Figure 16: Mobile Emission Sources – Airport Form**


Atmospheric Emissions from Domestic Airports

EMISSIONS AT LONDON CITY AIRPORT - 2008

1. Select an Airport:  
 Emissions from London City Airport

2. Select a Year:

3. Click the button below to export the 2008 London City data (gridded at 1km x 1km resolution) to Excel.



Pollutant:	Total Emissions (tonne/yr):
SO2:	18
NOX:	151
CO:	465
CO2:	64,636
NM VOC:	176
Benzene:	2
1,3-Butadiene:	2
PM10:	7
Methane:	14

Methodology:

Data Workbooks:

Mapped Datasets:

Mapped Datasets:

Figure 17: Mobile Emission Sources – Road Transport Form

**Mobile Emission Sources - From Road Transport**

**GRIDDED VEHICLE EMISSIONS - TOTAL VEHICLE EMISSIONS (NOX), 2008**

1. Select a Road Transport Emission Source:  
 These are combined gridded emissions from both major and minor roads. Cold starts and evaporative emissions are NOT included.

2. Select a Year:  
 2004, 2006, 2008, 2011 and 2015 Trends

3. Select a Pollutant:  
 ☐ NOx Emissions ☐ PM10 Emissions

4. Click the button below to export the 2008 Total Vehicle Emissions (NOX emissions) data (at 1km x 1km resolution) to Excel.

Click to preview and print the Total Vehicle Emissions Report for all pollutants and vehicle types for the displayed year, grouped by Central, Inner and Outer London.

Total Emissions	
Vehicle Type:	Total Emissions (tonnes/yr)
Motorcycles:	113
Cars:	12,529
Taxis:	684
Buses and Coaches:	5,926
Light Goods Vehicles:	3,525
Rigid HGV:	7,617
Articulated HGV:	7,226
<b>Total (All Vehicles):</b>	<b>37,620</b>

**FUEL USAGE FOR TOTAL VEHICLE EMISSIONS - 2008**

2. Click the button below to export the 2008 Total Vehicle Emissions Fuel Use data (at 1km x 1km resolution) to Excel.

Total Fuel Use	
Vehicle Type:	Fuel Use: (litres/yr)
Motorcycles:	29,681,340
Cars (Petrol):	2,031,766,000
Cars (Diesel):	575,377,000
Taxis:	98,903,210
Buses and Coaches:	242,296,000
LGV (Petrol):	56,737,800
LGV (Diesel):	385,835,900
Rigid HGV:	351,830,100
Articulated HGV:	335,711,600
<b>Total (All Vehicles):</b>	<b>4,108,139,000</b>

- ❑ The **Statistical Summaries and Trends** button – enables you to access the **Emission Totals** Form (Figure 18), which displays information about the relative contributions of the emission sources in terms of emission totals at the 1km<sup>2</sup> grid level.

Displayed at the bottom of the Emission Totals form are four mutually exclusive check boxes to select from:

- The **Statistical Summaries and Trends for the LAEI Area** check box – selecting this option and clicking the **View Selection** button displays the **Statistical Summaries and Trends of Emissions for the LAEI Area** form (Figure 19), which displays the emission totals and other pertinent information for each emission source category and sub-category for the entire 2,466 km<sup>2</sup> area covered by the LAEI 2008.
- The **Statistical Summaries and Trends for Central, Inner and Outer London** check box – selecting this option and clicking the **View Selection** button enables you to open the **Statistical Summaries and Trends for Central, Inner and Outer London** form (Figure 20), which displays the emission totals and other pertinent information for each emission source category and sub-category for the Central, Inner, Outer and Non-Greater London Areas (specified in the *Select a Location* selection box).
- The **Statistical Summaries and Trends for Greater London and Non-Greater London Areas** check box – selecting this option and clicking the

**View Selection** button enables you to open the **Statistical Summaries and Trends for the Greater London and Non-Greater London Areas** form (Figure 21), which displays the emission totals and other pertinent information for each emission source category and sub-category for the Greater London and Non-Greater London Areas (specified in the *Select an Area* selection box).

- The **Statistical Summaries and Trends for London Boroughs** check box – selecting this option and clicking the **View Selection** button enables you to open the **Statistical Summaries and Trends for London Boroughs** form (Figure 22), which displays the emission totals and other pertinent information for each emission source category and sub-category for the London boroughs (specified in the *Select a London Borough* selection box).

Figure 18: Emission Totals Form

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## London Atmospheric Emissions Inventory 2008

TOTAL ATMOSPHERIC EMISSIONS FROM ALL EMISSION SOURCES IN 2008

1. Select a Year:

2. Click to export All Emission Sources data for 2008 to Excel

Pollutants:	Emissions (tonne/yr):
SO <sub>2</sub> :	2,088
NO <sub>x</sub> :	70,780
CO:	73,312
CO <sub>2</sub> :	34,367,860
NM VOC:	66,568
Benzene:	887
1,3-Butadiene:	511
PM <sub>10</sub> :	3,279
Methane:	28,345

Tick an option box below and then click the 'View Selection' button to view statistical summaries of emissions for various geographical areas

☒ Statistical Summaries and Trends for the LAEI Area (i.e., 2,466 1km<sup>2</sup> grid cells)
 ☐ Statistical Summaries and Trends for Central, Inner and Outer London
 ☐ Statistical Summaries and Trends for Greater London and Non-Greater London Area
 ☐ Statistical Summaries and Trends for London Boroughs

**Figure 19: Statistical Summaries and Trends of Emissions for the LAEI Area form**

**Statistical Summaries and Trends of Emissions for the LAEI Area**

1. Select an Emission Source Sub-category:

**Airport**

2. Select a Year:

**2008**

AIRPORT EMISSIONS IN 2008			
Pollutants:	Total Emissions: Airport, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Airport, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	312	2,088	14.9%
NO <sub>x</sub> :	4,346	70,780	6.1%
CO:	4,931	73,312	6.7%
CO <sub>2</sub> :	1,196,379	34,367,860	3.5%
NM VOC:	166	66,568	0.2%
Benzene:	15	887	1.7%
1,3-Butadiene:	13	511	2.5%
PM10:	125	3,279	3.8%
Methane:	14	28,345	0.0%

**Graphical Summary and Trend Analysis**

Select an Option to View

Across Years (2004, 06, 08, 11, 15) in LAEI area:

☒ NO<sub>x</sub> Emissions

☐ PM10 Emissions

Across Years (2004, 06, 08, 11, 15) in GLA area:

☒ NO<sub>x</sub> Emissions

☐ PM10 Emissions

[Click to View Selection...](#)

MOBILE SOURCES EMISSIONS IN 2008			
Pollutants:	Total Emissions: Mobile Sources, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Mobile Sources, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	1,087	2,088	52.1%
NO <sub>x</sub> :	44,789	70,780	63.3%
CO:	50,412	73,312	68.8%
CO <sub>2</sub> :	12,532,160	34,367,860	36.5%
NM VOC:	9,301	66,568	14.0%
Benzene:	592	887	66.8%
1,3-Butadiene:	510	511	99.8%
PM10:	2,610	3,279	79.6%
Methane:	850	28,345	3.0%

[Export Tables to Excel](#) [Print Emission Tables](#) [Close Form](#)

**Figure 20 Statistical Summaries and Trends for Central, Inner and Outer London Form**

**Statistical Summaries and Trends of Emissions for Central, Inner and Outer London Areas**

1. Select a Location:

**Central**

Central Greater London roughly corresponds to the boundary of the old (2003) Central London Congestion Charging Zone (CCZ)  
(Central have been defined based on 1km x 1km grid boundaries (pixelated) rather than the exact geographical boundary of the London CCZ)

2. Select an Emission Source Sub-category:

**Airport**

3. Select a Year:

**2008**

AIRPORT EMISSIONS IN 2008 IN CENTRAL LONDON			
Pollutants:	Total Emissions: Airport, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Airport, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	1	18	2.8%
NO <sub>x</sub> :	4	2,553	0.2%
CO:	8	2,435	0.3%
CO <sub>2</sub> :	1,978	1,475,478	0.1%
NM VOC:	1	4,213	0.0%
Benzene:	0	41	0.1%
1,3-Butadiene:	0	23	0.1%
PM10:	0	112	0.1%
Methane:	0	1,001	0.0%

**Graphical Summary and Trend Analysis**

Select an Option to View

Across Years (2004, 06, 08, 11, 15) in LAEI area:

☒ NO<sub>x</sub> Emissions

☐ PM10 Emissions

Across Years (2004, 06, 08, 11, 15) in GLA area:

☒ NO<sub>x</sub> Emissions

☐ PM10 Emissions

[Click to View Selection...](#)

MOBILE SOURCES EMISSIONS IN 2008 IN CENTRAL LONDON			
Pollutants:	Total Emissions: Mobile, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Mobile, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	17	18	92.3%
NO <sub>x</sub> :	1,323	2,553	51.8%
CO:	1,902	2,435	78.1%
CO <sub>2</sub> :	364,613	1,475,478	24.7%
NM VOC:	419	4,213	9.9%
Benzene:	31	41	74.2%
1,3-Butadiene:	23	23	100.0%
PM10:	89	112	79.3%
Methane:	31	1,001	3.1%

[Export Tables to Excel](#) [Print Emission Tables](#) [Close Form](#)

**Figure 21: Statistical Summaries and Trends for the GLA and Non-GLA Areas Form**

**Statistical Summaries and Trends of Emissions for Greater London and Non-Greater London Areas**

1. Select an Area:  
 The 32 London boroughs and the City of London comprise the Greater London Area.

2. Select an Emission Source Sub-category:

3. Select a Year:

AIRPORT EMISSIONS IN 2008 IN GREATER LONDON AREA			
Pollutants:	Total Emissions: Airport, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Airport, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	305	1,454	21.0%
NO <sub>x</sub> :	4,233	52,948	8.0%
CO:	4,587	58,714	7.8%
CO <sub>2</sub> :	1,175,753	28,466,000	4.1%
NM VOC:	155	56,863	0.3%
Benzene:	14	772	1.9%
1,3-Butadiene:	12	423	2.9%
PM <sub>10</sub> :	124	2,424	5.1%
Methane:	13	24,582	0.1%

**Graphical Summary and Trend Analysis**

Select an Option to View

Across Years (2004, 06, 08, 11, 15) in LAEI area:

☒ NO<sub>x</sub> Emissions

☐ PM<sub>10</sub> Emissions

Across Years (2004, 06, 08, 11, 15) in GLA area:

☒ NO<sub>x</sub> Emissions

☐ PM<sub>10</sub> Emissions

MOBILE SOURCES EMISSIONS IN 2008 IN GREATER LONDON AREA			
Pollutants:	Total Emissions: Mobile, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Mobile, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	855	1,454	58.8%
NO <sub>x</sub> :	29,783	52,948	56.2%
CO:	38,253	58,714	65.2%
CO <sub>2</sub> :	8,716,675	28,466,000	30.6%
NM VOC:	7,118	56,863	12.6%
Benzene:	501	772	65.0%
1,3-Butadiene:	422	423	99.9%
PM <sub>10</sub> :	1,850	2,424	76.3%
Methane:	625	24,582	2.5%

**Figure 22: Statistical Summaries and Trends for London Boroughs Form**

**Statistical Summaries and Trends of Emissions for London Boroughs**

1. Select a London Borough:  
 London borough boundaries within the LAEI 2008 are based on pixelated ("jagged") boundaries of the 1-kilometre squared cells. Therefore, the borough boundaries do not exactly coincide with the actual administrative boundaries of the London boroughs. The 1-km grid cells that make up the borough boundaries are mutually exclusive and collectively exhaustive. The London borough with the largest share of the 1-km grid cell's gets the 1-km grid cell.

2. Select an Emission Source Sub-category:

3. Select a Year:

AIRPORT EMISSIONS IN 2008 IN BARKING AND DAGENHAM			
Pollutants:	Total Emissions: Airport, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Airport, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	0	113	0.0%
NO <sub>x</sub> :	0	1,978	0.0%
CO:	0	1,883	0.0%
CO <sub>2</sub> :	0	3,247,893	0.0%
NM VOC:	0	1,666	0.0%
Benzene:	0	15	0.0%
1,3-Butadiene:	0	8	0.0%
PM <sub>10</sub> :	0	61	0.0%
Methane:	0	221	0.0%

**Graphical Summary and Trend Analysis**

Select an Option to View

Across London boroughs:

☒ NO<sub>x</sub> Emissions

☐ PM<sub>10</sub> Emissions

Across Years: 2008, 2011 and 2015

☒ NO<sub>x</sub> Emissions

☐ PM<sub>10</sub> Emissions

MOBILE SOURCES EMISSIONS IN 2008 IN BARKING AND DAGENHAM			
Pollutants:	Total Emissions: Mobile, 2008 (tonnes/yr)	Total Emissions: From all Sources (tonnes/yr)	Proportion of Emissions: Mobile, 2008 (% of All Emission Sources)
SO <sub>2</sub> :	17	113	15.0%
NO <sub>x</sub> :	591	1,978	29.9%
CO:	671	1,883	35.6%
CO <sub>2</sub> :	170,289	3,247,893	5.2%
NM VOC:	136	1,666	8.1%
Benzene:	9	15	59.4%
1,3-Butadiene:	8	8	100.0%
PM <sub>10</sub> :	40	61	66.0%
Methane:	14	221	6.2%

- ❑ The **Background Maps and Road Traffic Datasets** button – enables you to access the **Background Maps and Road Traffic Datasets** form (Figure 23), which allows you to display several useful GIS maps and the road traffic network that can be used for further spatial analyses or presentational purpose. For example, the 2008, 2008 and 2011 traffic flow data and networks; the LAEI 2,466 km<sup>2</sup> grid; the administrative boundaries of London boroughs; outlines of the central, inner and outer London boundaries can all be assessed from this form.

**Figure 23: Background Maps and Road Traffic Datasets**

The screenshot shows a web browser window titled "London Atmospheric Emissions Inventory (LAEI) 2008 - [Background Maps and Road Traffic Datasets]". The browser's address bar shows the URL "http://www.laei.gov.uk/". The page has a blue header with the text "MAYOR OF LONDON" and "London Atmospheric Emissions Inventory 2008". Below the header, the page is titled "BACKGROUND MAPS AND ROAD TRAFFIC DATASETS". A black box contains a copyright notice: "These maps are reproduced from and/or based on Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. (Greater London Authority) (LA100032379) (2009)." Below this, there is a section "1. Select a mapped datasets:" with a dropdown menu showing "Administrative boundaries of London boroughs". To the right of the dropdown, the text "Administrative boundaries of the 32 London boroughs and the City of London." is displayed. Below this, there is a section "2. Click a button below to open the selected Map in the appropriate GIS application:" with two buttons: "MapInfo (\*.tab) Format" and "ArcGIS (\*.shp) Format". At the bottom right of the form, there is a "Close Form" button.

## 4. General description of a typical LAEI 2008 Form

A typical LAEI 2008 forms have been designed to allow users to easily query the LAEI 2008 underlying emission datasets. Each LAEI 2008 form provides the basic functionality through which the LAEI 2008 emission datasets can be quickly displayed on screen, printed or exported out to a Microsoft® Excel workbook. The export to MS Excel functionality provides users with the opportunity to use MS Excel's data analytical functionality to creatively examine the underlying LAEI 2008 emission datasets in detail.

### 2.4. The customised LAEI 2008 menu bar

The generic Microsoft® Access menu bars and toolbars have been removed from the LAEI 2008 database and replaced with a specially customised **LAEI 2008 menu bar** (Figure 24). The customised LAEI 2008 menu bar is located at the top of each main form and it provides similar functions to all the LAEI 2008 forms. These functions include such things as exiting or closing the LAEI 2008 database, opening other Access databases, and switching between the main LAEI 2008 forms, etc.

Figure 24: Customised LAEI 2008 menu bar



The customised LAEI 2008-menu bar has seven menu buttons that lead to various sub-menu items.

The **File** menu button leads to three submenu items:

- New**
- Open**
- Exit**

The **Navigate** menu button leads to one submenu item:

- Switchboard**

The **Emission Sources** menu button leads to three submenu items:

- Area Sources**
- Points Sources**
- Mobiles Sources**

The **Statistical Summaries** menu button leads to four submenu items:

- Entire LAEI Area**
- GLA and Non-GLA Area**
- Central, Inner and Outer GLA Area**
- London Boroughs**

The **Graphical Summary and Trend Analysis** menu button leads to two submenu items:

- Summaries**
- Trends**

Each Summaries and Trends submenu button leads to two further submenu items:

**NO<sub>x</sub>**

**PM<sub>10</sub>**

Each NO<sub>x</sub> and PM<sub>10</sub> submenu button leads to two further submenu items:

**GLA Areas**

**London Boroughs**

The **Maps and Datasets** menu button leads to one submenu item:

**Background Maps and Road Traffic Datasets**

The **Help** menu button leads to two submenu items:

**Technical Support Information**

**User Guide and Methodology Manual**

### 2.5. Layout of a typical LAEI 2008 form

Figure 25 shows a typical LAEI 2008 form. Each LAEI 2008 form is designed to have a user-friendly and uniform look. At the very top of each form is the form's caption bar, which displays the version of the LAEI (e.g., London Atmospheric Emissions Inventory 2008) followed by "-" and then the name of the currently active form. Immediately below the form's caption bar is the customised LAEI 2008 menu bar. At the top of each form, just below the customised LAEI 2008 menu bar are the generic "Mayor of London" and "London Atmospheric Emissions Inventory 2008" headings.

Figure 25: Layout of a typical LAEI 2008 Form

London Atmospheric Emissions Inventory (LAEI) 2008 - [Point Emission Sources]

File Navigate Emission Sources Statistical Summaries Graphical Summary and Trend Analysis Maps and Datasets Help

Type a question for help

## MAYOR OF LONDON

# London Atmospheric Emissions Inventory 2008

EMISSIONS FROM POINT SOURCES - PART A PROCESSES, 2008

1. Select a Point Source:  
Part A Processes These are 'prescribed processes' that require authorisation from the Environment Agency under the Environmental Protection Act 1990.

2. Select a Year:  
2008

3. Click the button below to export the 2008 Part A Processes data (gridded at 1km x 1km resolution) to Excel.

Documents for Part A Processes.

Pollutants:	Emissions (tonnes/yr):
SO2:	691
NOX:	2,511
CO:	2,276
CO2:	5,678,563
NMVOC:	82
Benzene:	0
1,3-Butadiene:	0
PM10:	14
Methane:	19,462

Methodology Data Workbooks Mapped Datasets Mapped Datasets

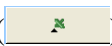
Adobe (\*.pdf) Format MS Excel (\*.xls) Format MapInfo (\*.tab) Format ArcGIS (\*.shp) Format

Close Form



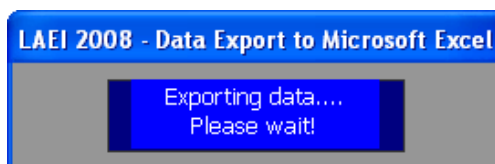
The **Select a [Point] Emission Source** and **Select a Year** selection boxes - show the selection parameters or criteria necessary for querying, displaying and exporting the pertinent emission datasets for the emission source category/sub-category currently displayed in the active form's caption bar. The selection parameters are displayed in selection boxes and they can be selected by clicking the drop-down buttons on the right hand side of the selection boxes to reveal the options for that particular emission source category/sub-category. Each parameter option selected is used by the LAEI 2008 database as a filter to generate queries from the underlying emission datasets tables. All the information displayed on each currently active form is directly dependent upon the parameter(s) selected from the selection boxes for that emission source category. The table on the right of the form displays a summary of total emissions based on the input parameters or criteria selected from the selection boxes. These summarised and tabulated results are dynamic and they change to reflect your choices as you select and change the parameters or criteria from the relevant selection boxes.

The **Close Form** button – enables you to close the currently active form and automatically switch to the Main Switchboard form.

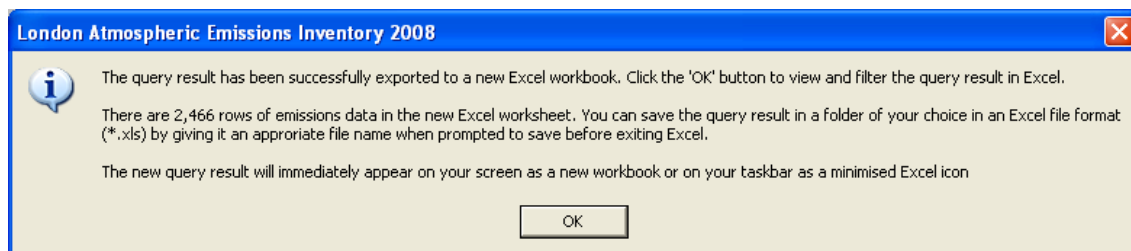
The button with the **Microsoft® Excel logo** () – enables a data export mechanism to a new Microsoft® Excel workbook. In order to create a query and export the results to Excel, first select the parameters (criteria) from the options in the selection boxes on the open form that you wish to base your query on. Each selected parameter from the options available in the selection boxes becomes a "group by" field for the query and the numeric fields in the query are totalled based on the selected parameter. By identifying the parameters of interest to you in the selection boxes, you can analyse the underlying emission datasets in details and at various levels. The summarised query result, based on your selected parameters, can also be viewed on screen in the table on the active form. If you like what you see, you can then click the button with the Microsoft® Excel logo on the active form to export the query result directly to a new Excel workbook. On clicking the button with the Microsoft® Excel logo, a message box similar to the one shown below will appear asking you to confirm your query selection parameters. The content of the message box will vary depending on the parameters you choose from the selection boxes on the active form. Clicking the "Yes" button on the message box shown below will directly export the result of your emissions query to a new Microsoft® Excel workbook.



During the export process to MS Excel, the progress form shown below will appear on your screen and it will disappear once your query result has been successfully exported to an MS Excel workbook.



The LAEI 2008 data export functionality always displays a message box similar to the one shown below informing you about the number of rows<sup>6</sup> in the query results every time the data export mechanism to Excel is successfully implemented.



Clicking the "OK" button on the message box above will immediately display the result of your query on your screen (or on your task bar as a minimised flashing MS Excel icon, which you must activate by clicking). An example of a query result in an Excel worksheet is shown in Figure 26. After exporting and displaying the query result in an MS Excel workbook containing the query result, you can save the relevant MS Excel workbook with an appropriate file name of your choice to a suitable folder on your PC.

**Figure 26: A query result exported from the LAEI 2008 database to a MS Excel workbook**

ID	Easting	Northing	Location	Area	London Boroughs	SO2	NOx	CO	CO2	NMVOC	Benzene	Butadiene
1346	7811	519500	192500 Outer	Greater London Area	Barnet	6.8E-05	0.0048	0.0012	6.284659863	8.2E-05	5.2E-08	
1347	7811	519500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1348	7811	519500	192500 Outer	Greater London Area	Barnet	0	0	0	388	0	0	0
1349	7812	520500	192500 Outer	Greater London Area	Barnet	0.000646	0.045600001	0.0114	59.70429993	0.000779	4.94E-07	
1350	7812	520500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1351	7812	520500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	31	0
1352	7813	521500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1353	7813	521500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1354	7813	521500	192500 Outer	Greater London Area	Barnet	0	0	0	388	31	0	0
1355	7814	522500	192500 Outer	Greater London Area	Barnet	0.013702	0.967199981	0.241799995	1266.359985	0.016523	1.0478E-05	
1356	7814	522500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1357	7814	522500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1358	7815	523500	192500 Outer	Greater London Area	Barnet	0.042941999	3.031199932	0.757799983	3968.76001	0.051782999	3.2838E-05	
1359	7815	523500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1360	7815	523500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	138	0
1361	7816	524500	192500 Outer	Greater London Area	Barnet	0.00068	0.048	0.012	62.84659958	0.00082	5.2E-07	
1362	7816	524500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1363	7816	524500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1364	7817	525500	192500 Outer	Greater London Area	Barnet	0.00034	0.024	0.006	31.42329979	0.00041	2.6E-07	
1365	7817	525500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1366	7817	525500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1367	7818	526500	192500 Outer	Greater London Area	Barnet	0.00204	0.143999994	0.035999998	188.5399933	0.00246	1.56E-06	
1368	7818	526500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1369	7818	526500	192500 Outer	Greater London Area	Barnet	0	0	0	388	0	0	0
1370	7819	527500	192500 Outer	Greater London Area	Barnet	0.00102	0.071999997	0.017999999	94.26989746	0.00123	7.8E-07	
1371	7819	527500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1372	7819	527500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1373	7820	528500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1374	7820	528500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	0	0
1375	7820	528500	192500 Outer	Greater London Area	Barnet	0	0	0	0	0	15	0
1376	7821	529500	192500 Outer	Greater London Area	Enfield	0.00986	0.69599998	0.173999995	911.276001	0.01189	7.54E-06	
1377	7821	529500	192500 Outer	Greater London Area	Enfield	0	0	0	0	0	0	0
1378	7821	529500	192500 Outer	Greater London Area	Enfield	0	0	0	0	0	2	0
1379	7822	530500	192500 Outer	Greater London Area	Enfield	0	0	0	0	0	0	0
1380	7822	530500	192500 Outer	Greater London Area	Enfield	0	0	0	0	0	0	0
1381	7822	530500	192500 Outer	Greater London Area	Enfield	0	0	0	0	0	7	0
1382	7823	531500	192500 Outer	Greater London Area	Enfield	0	0	0	0	0	0	0

The query result is always displayed in an MS Excel worksheet with specific predefined column labels (with MS Excel's Auto Filter function already applied) and rows. The MS

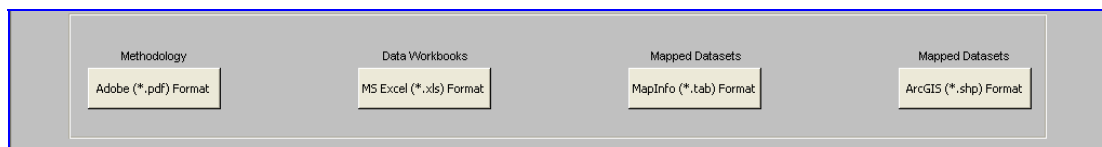
<sup>6</sup> Note: There are only 65,536 rows in each Microsoft® Excel worksheet, except Microsoft Excel 2007 (it contains more than a million rows).

Excel's Auto Filter function is automatically applied to the column labels in the first row of the worksheet to allow users to easily filter the query results. The worksheet columns are characterised by several specific text identifiers (column labels in the first row) that vary depending on the parameters that are used to create the query and the emission source category/sub-category that is queried. The first column in a worksheet is often populated with either the ID values of the 1km<sup>2</sup> grids or the ID values of the Major Roads links. Because different users of the LAEI 2008 require different units of measurement, the LAEI 2008 provides different units of measurement in the column labels of the displayed query results (e.g., for the Road Transport category, the major roads link emissions are expressed as g/km/s but the 1 km<sup>2</sup> grid emissions are expressed as tonnes/annum). The worksheet rows are characterised by several text and numeric values and the number of these rows varies depending on the parameters that are used to query the emission source category/sub-category on a LAEI 2008 form.

Because of Microsoft® Excel's flexibility and compatibility with many different databases and GIS applications (including MapInfo® professional and ArcGIS®), users can statistically and spatially analyse the exported LAEI 2008 emission datasets in various ways using MS Excel's data analytical and MapInfo's/ArcGIS's functionality without corrupting the underlying emission datasets in the LAEI 2008 database.

The **Documents for Part A Processes** (the text displayed varies depending on the emission source category/sub-category selected from the selection box) section – enables users to view the LAEI 2008 files held in various file formats. In this section, there are usually four command buttons (see Figure 27) with the texts "Adobe (\*.pdf) Format", "MS Excel (\*.xls) Format", "MapInfo (\*.tab) Format" and "ArcGIS (\*.shp) Format" embedded into their backgrounds and the texts "Methodology", "Data Workbooks" and "Mapped Datasets" displayed above them respectively. In some instance only two command buttons with the "MapInfo (\*.tab) Format" and ArcGIS (\*.shp) Format" texts are available.

**Figure 27: Command buttons that provide links to various LAEI 2008 files**



All of these buttons provide direct or indirect (through another pop-up form) links to specific files (in the file format of the software application embedded onto the command button) pertaining to the displayed emissions data for a specific emission source category/sub-category. The files that these buttons link to vary depending on the parameters chosen from the selection boxes on the active form.

- ❑ The **"MapInfo (\*.tab) Format"** command button provides a direct link to mapped (gridded<sup>7</sup> and/or line, polygons, points<sup>8</sup>) emissions data in a MapInfo®

<sup>7</sup> Note that 'gridded' mean that emissions data are aggregated at a 1km<sup>2</sup> grid level.

<sup>8</sup> For air quality modelling purposes, raw emissions data have been provided as points, lines (polygons), polygons (regions) or 1km<sup>2</sup> grids (in cases where that data is only available in that format) in both MapInfo® TAB file (MapInfo® Tables) and ArcGIS® Shapefile formats.

TAB file format<sup>9</sup>. Where there is an indirect link to a MapInfo® TAB file, a specially designed pop-up form (Figure 28) opens and displays various buttons for opening the pertinent MapInfo® TAB file in a MapInfo® Professional application. The contents and layout of the specially designed pop-up form that provides direct link to MapInfo® TAB files vary depending on the parameters selected from the selection boxes on the currently active form.

- The "ArcGIS (\*.shp) Format" command button provides a direct or indirect link to mapped (gridded and/or line, polygons, points) emissions data in an ArcGIS® Shapefile format<sup>10</sup>. Where there is an indirect link to an ArcGIS® Shapefile, a specially designed pop-up form (Figure 29) opens and displays various buttons for opening the ArcGIS® Shapefile in the ArcGIS application. The contents and layout of the specially designed pop-up form that provides direct/indirect link to the ArcGIS® Shapefiles vary depending on the parameters selected from the selection boxes on the main form.

Figure 28: An example of a pop-up form that provides direct link to MapInfo® TAB files.

The screenshot shows a window titled "Rail Traffic - MapInfo Maps". Inside, there is a tab labeled "Line Maps - Rail Link-based". Below the tab, there are three buttons, each labeled "MapInfo (\*.tab) Format" and positioned above a year: "2008", "2011", and "2015". A "Close Form" button is located in the bottom right corner of the window.

Figure 29: An example of a pop-up form that provides direct link to ArcGIS® Shapefiles

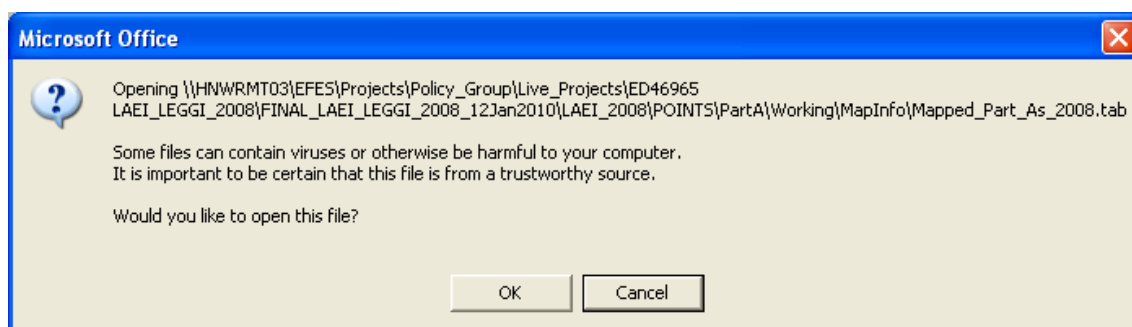
The screenshot shows a window titled "Rail Traffic - ArcGIS Maps". Inside, there is a tab labeled "Line Maps - Rail Link-based". Below the tab, there are three buttons, each labeled "ArcGIS (\*.shp) Format" and positioned above a year: "2008", "2011", and "2015". A "Close Form" button is located in the bottom right corner of the window.

<sup>9</sup> MapInfo® TAB file refers to the set of files for a MapInfo® table in binary form. MapInfo® TAB files are the native format of MapInfo® and they may consist of four to five separate files that share the same name, but have different extensions (.dat, .id, .ind, .map, .tab) and must be kept together.

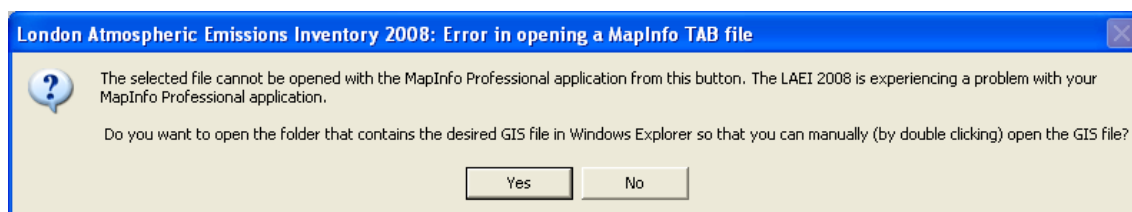
<sup>10</sup> ArcGIS® Shapefile format defines the geometry and attributes of geographically-referenced features in as many as four files that share the same name, but have different file extensions (.shp, .shx, .dbf, .prj, etc) that should be stored in the same folder or project workspace.

A generic Windows message box (Figure 30) with a warning about viruses and their sources is always displayed before opening a MapInfo® TAB file or ArcGIS® Shapefile. This is to inform users that these types of files are able to, and therefore could potentially have viruses. All the LAEI 2008 files on the LAEI 2008 CD-ROM have been fully scanned for any virus with a virus scanner and are safe to use. Clicking the "OK" button opens the appropriate GIS file in the MapInfo® Professional or ArcGIS® application. Clicking the "Cancel" button displays another generic message box (Figure 31 and Figure 32). This is not a technical error per se; but an error-handling routine for situations where a desired GIS file cannot be opened directly using the pertinent GIS application. To completely cancel the operation for directly opening the desired GIS file, click the "No" button on the generic message box shown in Figure 31 and Figure 32.

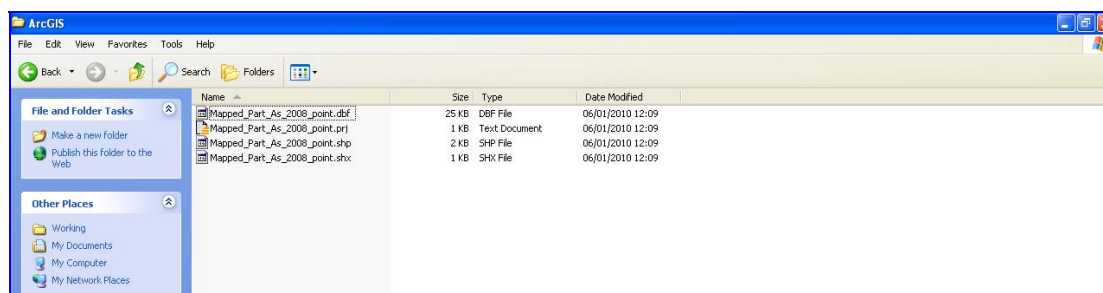
**Figure 30: A warning by Microsoft® Windows OS before opening a GIS file**



**Figure 31: The generic error message box for MapInfo® TAB files**



**Figure 32: A folder with ArcGIS® Shapefiles opened in Windows Explorer**



On the other hand, where clicking the "MapInfo (\*.tab) Format" or ArcGIS (\*.shp) Format" command buttons on a pop-up form does not directly open the desired GIS file in the appropriate GIS application because of an error, a folder containing the desired GIS file will be automatically opened in a Windows Explorer view (Figure 32) if you click the "Yes" button on the message box shown in Figure 31. Clicking the "No" button cancels the entire operation of opening the desired GIS file in a GIS application.



After the content of the folder containing the desired GIS file is opened and displayed in Windows Explorer as shown in Figure 32, you will need to find and open the desired GIS file or group of GIS files to automatically open it/them in the appropriate GIS software application (which must be installed on your PC). To automatically open and display a MapInfo (\*.tab) file from Windows Explorer in a MapInfo® Professional application you can double-click only the desired MapInfo (\*.tab) file with the **.tab** extension. However, to display an ArcGIS® Shapefile from Windows Explorer you must locate the required shapefile via the "ArcGIS (\*.shp) Format" command button and Windows Explorer and open it via the Add Data dialog box of ArcMap or via ArcCatalog functionality in ArcGIS.

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**Note:**

MapInfo® TAB file (MapInfo® Tables) refers to the set of files for a MapInfo® table in binary form. MapInfo® TAB files are the native format of MapInfo® and they may consist of four to five separate files that share the same name, but have different extensions - **.dat**, **.id**, **.ind**, **.map**, and **.tab**. All of these files need to be present and kept together for the table to work. MapInfo® Native Table consists of files with the following extensions:

- .tab:** table structure in ASCII format (required)
- .dat:** table data storage in binary format (required)
- .map:** storage of map objects in binary format (optional)
- .id:** links to the .map file (optional, but required if .map file exists)
- .ind:** data of indexed fields in binary format (optional)

ArcGIS Shapefile defines the geometry and attributes of geographically referenced features in as many as five files that share the same name, but have different file extensions (**.shp**, **.shx**, **.dbf**, **.prj**, **.sbn**, **.ain** etc) that should be stored in the same folder or project workspace. They are:

- .shp:** the file that stores the feature geometry.
- .shx:** the file that stores the index of the feature geometry.
- .dbf:** the dBase file that stores the attribute information of features. When a shapefile is added as a theme to a view, this file is displayed as a feature table.
- .prj:** projection definition file.
- .sbn** and **.sbx:** the files that store the spatial index of the features. These two files may not exist until you perform theme on theme selection, spatial join, or create an index on a theme's Shape field.
- .ain** and **.aih:** the files that store the attribute index of the active fields in a table or a theme's attribute table. These two files may not exist until you perform Link on the tables.

- 
- The "**Adobe (\*.pdf) Format**" command button provides a direct or indirect link to methodology and/or other emissions documents in an Adobe Acrobat® Reader file format (**.pdf**). Where there is an indirect link to an Adobe Acrobat® Reader file, a specially designed pop-up form (Figure 33) opens and displays various buttons for opening the relevant document in an Adobe Acrobat® Reader application. The contents and layout of the pop-up form that provides direct link to an Adobe Acrobat® document vary depending on the parameters selected from the selection boxes on the main form.

Figure 33: A pop-up form that provides direct link to Adobe Acrobat® Reader file (.pdf)

Part A Processes - Adobe (\*.pdf) Format

Part A Processes Emissions Methodology

Adode (\*.pdf) Format

Close Form

- The "MS Excel (\*.xls) Format" command button provides a direct or indirect link to emissions calculations and/or other emissions workbooks in an Excel file format (\*.xls). Where there is an indirect link to an Excel file, a specially designed pop-up form (Figure 34) opens and displays various buttons for opening the relevant file in a Microsoft® Excel application. The contents and layout of the pop-up form that provides direct link to Excel workbooks vary depending on the parameters selected from the selection boxes on the active form.

Figure 34: A pop-up form that provides direct link to Microsoft® Excel files

Part A Processes - Excel Working Files

Part A Processes

MS Excel (\*.xls) Format

2008

MS Excel (\*.xls) Format

2011 and 2015

Close Form

Some LAEI 2008 forms have special command buttons that are self-explanatory from their text captions, which allow users to access other special LAEI 2008 forms. For example, clicking the **Detailed Road Transport Emissions...** or **Detailed Airport Emissions...** command button at the bottom of the **Mobile Emission Sources Form**

provides access to a special pop-up form, the **Mobile Emission Sources – Road Transport Form** (see [Figure 17](#)) or the **Mobile Emission Sources – Airports Form** (see [Figure 16](#)), with detailed emissions data for road transport or airports.

Labels, captions and control tips on all the LAEI 2008 forms have been provided with dynamic and self-explanatory text (texts change depending on the parameters selected in the selection boxes on the active form) to provide user with useful information.

## 2.6. Selection Boxes and Parameters (filter criteria)

All LAEI 2008 forms provide an opportunity to filter the underlying LAEI 2008 emission datasets by choosing one or more **selection parameters (filter criteria)** from any or all **selection boxes** on an active form. Filtering enables users to focus on just the LAEI 2008 emission dataset they want. Each selection box has a drop-down pick list of predefined parameter options that are dependent on other parameters already selected on the active form. Thus, you cannot choose a combination of parameters on a form that returns no records. In fact, the selection box is a convenient way to see how the parameters are related. For each selection box, the user can pick a parameter from the options available in a drop-down list of the selection box. The selected parameter(s) are combined to filter the underlying LAEI 2008 emission datasets down to an interesting set of desired records, e.g., [Part A Processes] emissions in [2008]. The selected parameters stay in effect until the user changes them.

The following are the available selection boxes on the various LAEI 2008 forms:

### 1) **Point Emission Sources Form** (see [Figure 13](#))

- The **Select a Point Source** selection box: - enables users to choose a sub-category (i.e., *Part A Processes*, *Part B Processes*, *Boilers* or *All*) from the Point Emission Sources category.
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008*, *2011* or *2015*) for the Point Emission Sources category.

### 2) **Area Emission Sources Form** (see [Figure 14](#))

- The **Select an Area Source** selection box: - enables users to choose a sub-category (i.e., *Gas*, *Coal*, *Oil*, *Agriculture-Nature*, *Sewage*, *Solvents-Buildings* or *All*) from the Area Emission Sources category.
- The **Select a Sector** selection box: - enables users to choose a sector (i.e., *Agricultural*, *Domestic*, *Industrial*, *Industrial-Commercial*, *Leakage*, *Natural* or *All*) for the sub-category already chosen in the **Select an Area Source** selection box. The types of parameter options available in this selection box depend on the type of parameter option already selected in the **Select an Area Source** selection box.
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008*, *2011* or *2015*) for the Area Emission Sources category.



### 3) Mobile Emission Sources Form (see [Figure 15](#))

- The **Select a Mobile Source** selection box: - enables users to choose a sub-category (i.e., *Road Transport*, *Rail*, *Ships*, *Airport* or *All Mobile Sources*) from the Mobile Emission Sources category.
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008*, *2011* or *2015*) for the Mobile Emission Sources category.

Two sub-forms (**Mobile Emission Sources – Road Transport** and **Mobile Emission Sources – Airports**) are accessible from the Mobile Emission Sources Form through the **Detailed Road Transport Emissions...** or **Detailed Airport Emissions...** buttons which are available only when the Road Transport or Airport parameter options is chosen from the Select a Mobile Source selection box on the Mobile Emission Sources Form.

#### **Mobile Emission Sources – Airports Form** (see [Figure 16](#))

The number and type of selection boxes displayed on this form depends on the airport chosen in the **Select an Airport** selection box. Where a selection box, button or text label does not pertain to the chosen airport, it is invisible.

- The **Select an Airport** selection box: - enables users to choose a particular airport (i.e., *Heathrow* or *City Airport*) of interest to you.
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008*, *2011* or *2015*) for the airport already chosen in the **Select an Airport** selection box.
- The **Select an Airport Emission Source** selection box: - enables users to choose an emission source sub-category (i.e., *Airside Vehicles*, *Landside Vehicles*, *Ground Level Exhausts*, *Elevated Level Exhaust*, *Stationary Sources* or *All*) for the airport already chosen in the **Select an Airport** selection box. The types of emission source sub-category options available in this selection box depend on the airport already chosen in the **Select an Airport** selection box and the year already chosen in the **Select a Year** selection box.

#### **Mobile Emission Sources – Road Transport Form** (see [Figure 17](#))

The number and type of selection boxes displayed on this form depends on the parameter option chosen in the **Select a Road Transport Emission Source** selection box. Where a selection box, button or text label does not pertain to the chosen parameter option, it is invisible.

- The **Select a Road Transport Emission Source** selection box: - enables users to choose a sub-category (i.e., *Minor Roads*, *Major Roads*, *Evaporative*, *Cold Starts* or *Total Vehicle Emissions*) from the Road Transport Emission Sources sub-category.
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008*, *2011* or *2015*) for the Road Transport Emission Sources sub-

category. A similar selection box applies to the Fuel Usage section.

- The **Select a Pollutant** selection box: - enables users to choose a pollutant (i.e., *Benzene, Butadiene, CO, CO<sub>2</sub>, Hydrocarbons (HC), NO<sub>x</sub>, PM<sub>10</sub>, SO<sub>2</sub>, Exhaust PM<sub>2.5</sub>, Primary NO<sub>2</sub>, N<sub>2</sub>O, PAH or Tyre & Brake PM<sub>2.5</sub>*) for the Road Transport Emission Sources sub-category already chosen in the **Select a Road Transport Emission Source** selection box. The types of pollutants options available in this selection box depend on the type of parameter option already selected in the **Select a Road Transport Emission Source** selection box.

#### 4) Emission Totals Form (see [Figure 18](#))

- The **Select a Year**: - enables users to choose an inventory year (i.e., *2008, 2011 or 2015*) for the specially defined category chosen in the **Select an Emission Source to Total** selection box.

**Displayed at the bottom of the Emission Totals form are four mutually exclusive check boxes to select from. Selecting any one of these options and clicking the View Selection button opens the appropriate form.**

**Statistical Summaries and Trends of Emissions for the LAEI Area** form ([Figure 19](#)), which displays the emission totals and other pertinent information for each emission source category and sub-category for the entire 2,466 km<sup>2</sup> area covered by the LAEI 2008.

- The **Select an Emission Source Sub-Category** selection box: - enables users to choose an emission source sub-category (i.e., *Part A Processes, Part B Processes, Boilers, Gas, Coal, Oil, Agriculture-Nature, Sewage, Solvents-Buildings, Road Transport, Rail, Ships or Airport*).
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008, 2011 and 2015*) for the emission source sub-category chosen in the **Select an Emission Source Sub-Category** selection box or for the emission source category chosen in the **Select an Emission Source Category** selection box.
- The **Graphical Summary and Trend Analysis** frame: - Displays four mutually exclusive check boxes to select from. Selecting any one of these options and clicking the "**Click to View Selection**" button opens the appropriate form.

*Across Years (2004, 2006, 2008, 2011 and 2015) in LAEI Area*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Data Analysis of NO<sub>x</sub> Emissions for the GLA and Non-GLA Areas using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Data Analysis of PM<sub>10</sub> Emissions for the GLA and Non-GLA Areas using MS Excel PivotTable and PivotChart Reports**

*Across Years (2004, 2006, 2008, 2011 and 2015) in GLA Area*

**NO<sub>x</sub> Emissions:** Opens the **Interactive Trend Analysis of NO<sub>x</sub> Emissions for GLA and Non-GLA Areas using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions:** Opens the **Interactive Trend Analysis of PM<sub>10</sub> Emissions for GLA and Non-GLA Areas using MS Excel PivotTable and PivotChart Reports**

A PivotTable report is an interactive table that you can use to quickly summarize large amounts of data. You can rotate its rows and columns to see different summaries of the source data, filter the data by displaying different pages, or display the details for areas of interest. A PivotChart report is an interactive chart that you can use to view and rearrange data graphically, in a similar manner to a PivotTable report. A PivotChart report always has an associated PivotTable report in the same workbook, and includes all of the source data from the associated report.

- The **Print Emissions Table** button: - enables users to print the currently displayed information on the form as a report directly to your default printer.
- The **Export Emission Tables to Excel** button: - enables users to directly export the currently displayed tables on the form to a MS Excel workbook.

**Statistical Summaries and Trends for Central, Inner and Outer London** form ([Figure 20](#)), which displays the emission totals and other pertinent information for each emission source category and sub-category for the Central, Inner, Outer and Non-Greater London Areas.

- The **Select a Location** selection box: - enables users to choose a location (*Central, Inner, Outer or Non-Greater London area*) and display its information. The information displayed on this form pertains only to the location chosen in this selection box.
- The **Select an Emission Source Sub-Category** selection box: - enables users to choose an emission source sub-category (i.e., *Part A Processes, Part B Processes, Boilers, Gas, Coal, Oil, Agriculture-Nature, Sewage, Solvents-Buildings, Road Transport, Rail, Ships or Airport*).
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008, 2011 or 2015*) for the emission source sub-category chosen in the **Select an Emission Source Sub-Category** selection box or for the emission source category chosen in the **Select an Emission Source Category** selection box.
- The **Graphical Summary and Trend Analysis** frame: - Displays four mutually exclusive check boxes to select from. Selecting any one of these options and clicking the "**Click to View Selection**" button opens

the appropriate form.

*Across Years (2004, 2006, 2008, 2011 and 2015) in LAEI Area*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Data Analysis of NO<sub>x</sub> Emissions for Central, Inner and Outer London using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Data Analysis of PM<sub>10</sub> Emissions for Central, Inner and Outer London using MS Excel PivotTable and PivotChart Reports**

*Across Years (2004, 2006, 2008, 2011 and 2015) in GLA Area*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Trend Analysis of NO<sub>x</sub> Emissions for Central, Inner and Outer London using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Trend Analysis of PM<sub>10</sub> Emissions for Central, Inner and Outer London using MS Excel PivotTable and PivotChart Reports**.

- The **Print Emissions Table** button: - enables users to print the currently displayed information on the form as a report directly to your default printer.
- The **Export Emission Tables to Excel** button: - enables users to directly export the currently displayed tables on the form to a MS Excel workbook.

**Statistical Summaries and Trends for the Greater London and Non-Greater London Areas** form ([Figure 21](#)), which displays the emission totals and other pertinent information for each emission source category and sub-category. This form displays the emission totals and relative contribution of each emission source category and sub-category for only the area (i.e., *Greater London area* or *Non-Greater London area*) specified in the **Select an Area** selection box.

- The **Select an Area** selection box: - enables you to choose an area (i.e., *Greater London area* or *Non-Greater London area*) and display its information. The information displayed on this form pertains only to the area chosen in this selection box.
- The **Select an Emission Source Sub-Category** selection box: - enables you to choose an emission source sub-category (i.e., *Part A Processes*, *Part B Processes*, *Boilers*, *Gas*, *Coal*, *Oil*, *Agriculture-Nature*, *Sewage*, *Solvents-Buildings*, *Road Transport*, *Rail*, *Ships* or *Airport*).
- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., *2008*, *2011* and *2015*) for the emission source sub-category chosen in the **Select an Emission Source Sub-Category** selection box or for the emission source category chosen in the **Select an Emission**

**Source Category** selection box.

- The **Graphical Summary and Trend Analysis** frame: - Displays four mutually exclusive check boxes to select from. Selecting any one of these options and clicking the "**Click to View Selection**" button opens the appropriate form.

*Across Years (2004, 2006, 2008, 2011 and 2015) in LAEI Area*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Data Analysis of NO<sub>x</sub> Emissions the Greater London and Non-Greater London Areas using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Data Analysis of PM<sub>10</sub> Emissions the Greater London and Non-Greater London Areas using MS Excel PivotTable and PivotChart Reports**

*Across Years (2004, 2006, 2008, 2011 and 2015) in GLA Area*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Trend Analysis of NO<sub>x</sub> Emissions the Greater London and Non-Greater London Areas using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Trend Analysis of PM<sub>10</sub> Emissions the Greater London and Non-Greater London Areas using MS Excel PivotTable and PivotChart Reports**.

- The **Print Emissions Table** button: - enables users to print the currently displayed information on the form as a report directly to your default printer.
- The **Export Emission Tables to Excel** button: - enables users to directly export the currently displayed tables on the form to a MS Excel workbook.

**Statistical Summaries and Trends for London Boroughs** form ([Figure 22](#)), which displays the emission totals and other pertinent information for each emission source category and sub-category for only the London borough (e.g., *Camden, Harrow, Islington* etc) specified in the **Select a London Borough** selection box.

- The **Select a London Borough** selection box: - enables you to chose a London borough (e.g., *Camden, Harrow, Islington* etc) and display its information. The information displayed on this form pertains only to the London borough chosen in this selection box.
- The **Select an Emission Source Sub-Category** selection box: - enables you to choose an emission source sub-category (i.e., *Part A Processes, Part B Processes, Boilers, Gas, Coal, Oil, Agriculture-Nature, Sewage, Solvents-Buildings, Road Transport, Rail, Ships or Airport*).

- The **Select a Year** selection box: - enables users to choose an inventory year (i.e., 2008, 2011 or 2015) for the emission source sub-category chosen in the **Select an Emission Source Sub-Category** selection box or for the emission source category chosen in the **Select an Emission Source Category** selection box.
- The **Graphical Summary and Trend Analysis** frame: - Displays four mutually exclusive check boxes to select from. Selecting any one of these options and clicking the "Click to View Selection" button opens the appropriate form.

*Across London Boroughs*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Data Analysis of NO<sub>x</sub> Emissions for London Boroughs using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Data Analysis of PM<sub>10</sub> Emissions for London Boroughs using MS Excel PivotTable and PivotChart Reports**

*Across Years (2004, 2006, 2008, 2011 and 2015)*

**NO<sub>x</sub> Emissions**: Opens the **Interactive Trend Analysis of NO<sub>x</sub> Emissions for London Boroughs using MS Excel PivotTable and PivotChart Reports**

**PM<sub>10</sub> Emissions**: Opens the **Interactive Trend Analysis of PM<sub>10</sub> Emissions for London Boroughs using MS Excel PivotTable and PivotChart Reports**.

- The **Print Emissions Table** button: - enables users to print the currently displayed information on the form as a report directly to your default printer.
- The **Export Emission Tables to Excel** button: - enables users to directly export the currently displayed tables on the form to a MS Excel workbook.

The layout of information on the four sub-forms mentioned above is very similar. There are two summary tables on each form - the upper summary table (**Sub-category Summary Table**) is based only on the parameters chosen for the emission source **sub-category** (e.g., *Road Transport, Gas, Rail* etc) section while the lower summary table (**Category Summary Table**) is based only on the parameters chosen for the emission source **category** (e.g., *Area, Mobile or Point*) section. The layout of the summary tables on the four **Relative Contribution of Emission Sources** sub-forms is also very similar.



### Sub-category Summary Table

The table heading for the Sub-category Summary Table changes depending on the parameter options chosen in the **Select an Emissions Source Sub-category** selection box and the **Select a Year** selection box. There are four columns in the Sub-category summary table, namely:

**Pollutants**: Displays the eight key pollutants and one subsidiary pollutant (methane).

**Total emissions (tonnes/yr)**: - Displays the total emissions from ONLY the emission source sub-category chosen in the **Select an Emissions Source Sub-category** selection box and the Year chosen in the **Select a Year** selection box. Both the emission source sub-category and the year chosen are displayed in the column heading.

**Total Emissions: All Emission Sources (tonnes/yr)**: - Displays the total emissions from ALL the emission source sub-categories for the Year chosen in the **Select a Year** selection box.

**Proportion of Emission (% of All Emission Sources)**: - Displays the proportion of total emissions from the emission source sub-category chosen in the **Select an Emissions Source Sub-category** selection box as a percentage (%) of the total emissions from ALL the emission source sub-categories for the Year chosen in the **Select a Year** selection box. Both the emission source sub-category and the year chosen are displayed in the column heading.

### Category Summary Table

The table heading for the Category Summary Table changes depending on the parameter options chosen in the *Select an Emissions Source Sub-category* selection box and the *Select a Year* selection box. There are four columns in the Category summary table, namely:

**Pollutants**: Displays the eight key pollutants and one subsidiary pollutant (methane).

**Total emissions (tonnes/yr)**: - Displays the total emissions from ONLY the emission source category chosen in the **Select an Emissions Source Category** selection box and the Year chosen in the **Select a Year** selection box. Both the emission source category and the year chosen are displayed in the column heading.

**Total Emissions: All Emission Sources (tonnes/yr)**: - Displays the total emissions from ALL the emission source categories for

the Year chosen in the **Select a Year** selection box.

**Proportion of Emission (% of All Emission Sources):** -

Displays the proportion of total emissions from the emission source category chosen in the **Select an Emissions Source Category** selection box as a percentage (%) of the total emissions from ALL the emission source categories for the Year chosen in the **Select a Year** selection box. Both the emission source category and the year chosen are displayed in the column heading.

## 5) The Background Map and Road Traffic Datasets (see [Figure 23](#))

The **Select a Mapped Dataset** selection box – enables you to select a GIS file – MapInfo (\*.tab) file and/or ArcGIS (\*.shp) file format - from a useful selection of GIS base maps that could be used for spatial analyses and mapping. Select a map from the options provided in the selection box and then click either the **MapInfo (\*.tab) format** or **ArcGIS (\*.shp) Format** button to open the selected GIS file in the appropriate GIS application. The following GIS files are available to all users:

- Administrative Boundaries of London Boroughs
- Mapped Road Network and 2008 Traffic Flow Data
- Mapped Road Network and 2011 Traffic Flow Data
- Mapped Road Network and 2015 Traffic Flow Data
- Generic 2,466 1km x 1km Grid Cells
- Boundary of the Central London Area
- Boundary of the Inner London Area
- Boundary of the Outer London Area.
- Boundary of the Non-Greater London Area
- Boundary of the Greater London Area.

## 5. The LAEI 2008 folder structure

In this document, the terms folder and directory are used interchangeably. We have used an organisational unit, or container, to organise the LAEI 2008 folders and files into a hierarchical structure (see Appendix A). Folders contain bookkeeping information about files that are, figuratively speaking, beneath them in the hierarchy. You can think of a directory as a file cabinet that contains folders that contain files. The folders/files and directories at any level are contained in the directory above them. To access a file, you may need to specify the names of all the directories above it. You do this by specifying a path. The topmost folder (**LAEI\_2008 folder**) is called the root folder. A folder that is below another folder is called a subfolder. In the LAEI 2008 folder and file structure, subfolders have been labelled sequentially, for example, Subfolder Level 1, Subfolder Level 2 etc. A folder above a subfolder is called the parent folder.



## 6. Technical Support

The two technical issues most likely to be encountered in the LAEI 2008 are:

### 1. Missing reference libraries

Reference libraries are stored as part of the LAEI\_2008.mdb file. Each time you copy the LAEI\_2008 database to a different PC, the new PC should automatically load the reference libraries for which the LAEI\_2008 database was configured. However, in some instances, when the LAEI\_2008 database is copied to a different PC, you may find that the new PC does not load all the reference libraries that were used in compiling the LAEI\_2008 database. If you attempt to run the LAEI\_2008 database on a PC that does not have all the reference libraries for which the LAEI\_2008 database is configured, you may find that your copy of the LAEI\_2008 database doesn't operate properly. For example, if you try to click the **"Click to Enter"** button on the **Main Switchboard** after successfully copying the LAEI\_2008 folder from the CD-ROM to your PC, you may get an error saying that this function is not available. This message is misleading; it is usually caused by missing reference libraries, which were not automatically loaded by your PC.

You can check for missing reference libraries in the LAEI\_2008 Access database by doing the following.

1. From the Windows Explorer view, locate the LAEI\_2008.mdb file (it should be within the LAEI\_2008 folder) and highlight it without clicking. Holding down the [Shift] key on your keyboard, press the [Enter] key or double-click the LAEI\_2008.mdb database. The LAEI\_2008 database should now open in the database design view, exposing all the LAEI\_2008 MS Access objects (i.e., tables, queries, forms, macros, reports and modules etc).
2. From the left-hand panel, click the Modules object and then select the *LAEI\_StartUpCode* module from the module list in the right-hand panel. With the *LAEI\_StartUpCode* module selected, click [Code] from the [View] menu; the LAEI\_2008 Password dialog box will open for you to a password<sup>11</sup>; input the correct password and the Visual Basic development window should now open exposing the VBA codes behind the modules in the LAEI\_2008 database.
3. With the Visual Basic development window open, select the **[Reference]** command from **[Tool]** on the menu bar. Microsoft Access opens the Reference dialog box similar to that shown in [Figure 35](#). Note that the list you see in [Figure 35](#) will vary with your PC system – various applications install different reference libraries. [Figure 35](#) shows exactly a list of the nine reference libraries for which the LAEI\_2008 database was configured.
4. Scroll down the list and make sure the following 13 reference libraries are checked in you Reference dialog box.
  - Visual Basic for Applications
  - Microsoft Access [10.0] Object Library

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<sup>11</sup> Contact the GLA Air Quality Team for the required password.

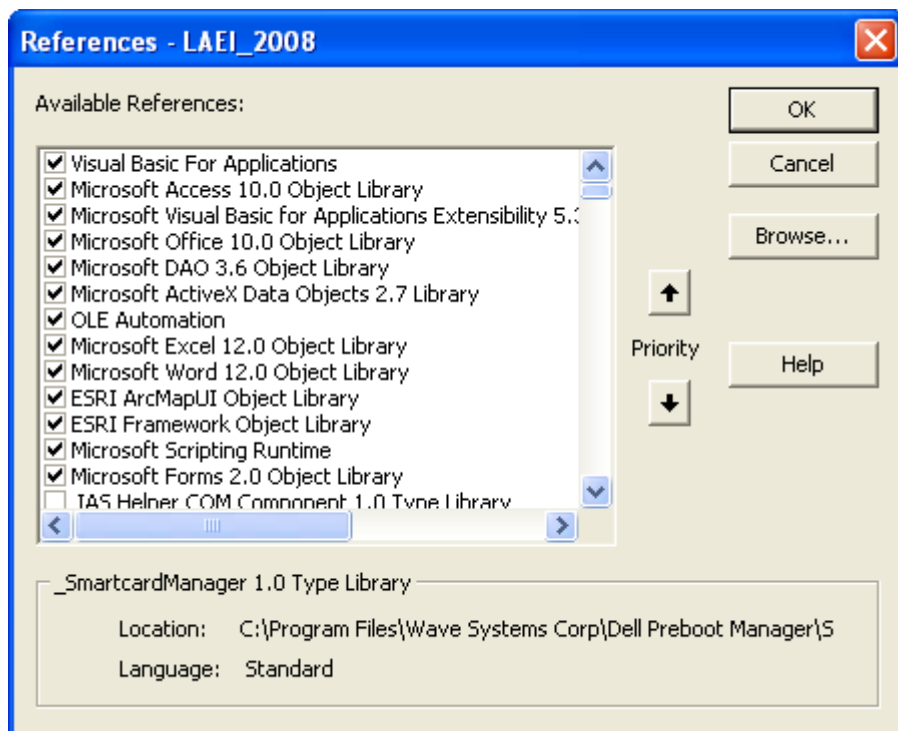
- Microsoft Visual Basic for Applications Extensibility [5.3]
- Microsoft Office [10.0] Object Library
- Microsoft DAO [3.6] Object Library
- Microsoft ActiveX Data Objects [2.7] Library
- OLE Automation
- Microsoft Excel [12.0] Object Library
- Microsoft Word [12.0] Object Library
- ESRI ArcMapUI Object Library
- ESRI Framework Object Library
- Microsoft Scripting Runtime
- Microsoft Forms 2.0 Object Library

Note that the numbers in the squared the brackets (e.g., Microsoft Office [9.0] Object Library) will vary depending on the version of the MS Office applications installed on your PC system. This is not an error but an application version difference.

A checked box represents a currently loaded object library on your system. You can check for missing references from the References dialog box (in [Figure 35](#)). If a reference library is missing, it appears on the list as checked but with the word **MISSING** in front of the name. Often, a missing reference library keeps MS Access from working with the other valid reference libraries such as Visual Basic.

For your copy of the LAEI\_2008 to function correctly, you must make sure that all the 13 libraries (as shown below in [Figure 35](#)) are ticked in your Reference dialog box, if they are not already checked.

Figure 35: References dialog box



5. To fix the problem, uncheck the MISSING references and ensure that you've checked all the 13 libraries shown above in your Reference dialog box, if they are not already checked.
6. Click OK to close the References dialog box.
7. Click Save in the Visual Basic Editor. Your copy of the LAEI\_2008 should now function correctly.

## 2. "Segmentation Violation" error

A "Segmentation Violation" error sometimes occurs when a user tries to open an LAEI 2008 shapefile in an ESRI ArcView 3.x application from the LAEI 2008 user interface. The causes of the segmentation violation error in ArcView are varied. ESRI's technical notes cite problems with hardware and software compatibility. There are also instances where data can cause this problem. This error has been around a long time, however, and occurs on all platforms with many configurations. The segmentation violation often occurs when adding a theme to a view. The most likely cause of this error is that a data file has become corrupted.

After a Segmentation Violation occurs, ArcView is in an unstable state, so you should quit ArcView 3.x and then restart it. We were fully aware of the problems involved in opening ESRI ArcView 3.x's shapefiles through the LAEI 2008's GUI and we had concerns about its compatibility with the LAEI 2008 data structure on different PCs. Unfortunately, there was very little we could do hence we provided the option of exposing the pertinent shapefiles in Windows Explorer so that users can access the shapefiles as they did with the previous versions of the LAEI.

Using ArcGIS 9.x does not lead to segmentation violations. With ArcView 3.x, you will need to manually open a LAEI 2008 shapefile via the ArcView 3.x interface if clicking on the ArcView button from the LAEI 2008 interface starts the ArcGIS application but does not automatically load the shapefile. Unfortunately, we cannot work out why both ArcView 3.x does not automatically load and open the LAEI 2008 shapefiles. MapInfo® Professional has no problems in opening the LAEI 2008 GIS files by clicking on the appropriate buttons from the LAEI 2008 interfaces. So if possible, try using MapInfo® Professional and/or ArcGIS 9.x to access the LAEI 2008 GIS files.

For **technical support**, please contact:

Julius Mattai  
Principal Consultant  
LAEI 2008 Project Team  
AEA  
Central House, 14 Upper Woburn Place  
London WC1H 0JN  
United Kingdom  
Phone: 0870 190 3478  
Email: [julius.mattai@aeat.co.uk](mailto:julius.mattai@aeat.co.uk)  
<http://www.aeat.com>

## **APPENDIX A**

### **The London Atmospheric Emissions Inventory 2008 File Structure**

**Table 1: Schematic layout of the LAEI 2008 file structure**

Root Folder	Subfolder Level 1	Subfolder Level 2	Subfolder Level 3	Subfolder Level 4	Subfolder Level 5	File Type	
LAEI 2008							
	AREA						
		Word Document				.pdf	
		Working					
			ArcGIS				Shapefiles, .shp
			Excel				MS Excel, .xls
			MapInfo				MapInfo .tab
	BASEFILE						
		ArcGIS				Shapefiles, .shp	
		MapInfo				MapInfo .tab	
	DOCUMENTATION					.pdf	
	DATA_ANALYSIS						MS Excel, .xls
	MOBILE						
		Roads					
			Gridded				
				ArcGIS			Shapefiles, .shp
				Mapinfo			MapInfo .tab
			Word Document				.pdf
		Aircraft					
			ArcGIS				Shapefiles, .shp
			Mapinfo				MapInfo .tab
			City Airport				
				Word			.pdf
				Working			
						ArcGIS	

Root Folder	Subfolder Level 1	Subfolder Level 2	Subfolder Level 3	Subfolder Level 4	Subfolder Level 5	File Type		
					Excel	MS Excel, .xls		
				MapInfo	MapInfo .tab			
			Heathrow					
				Word			.pdf	
				Working				
					ArcGIS		Shapefiles, .shp	
					Excel		MS Excel, .xls	
					MapInfo		MapInfo .tab	
		Ship						
			Word			.pdf		
			Working					
				ArcGIS		Shapefiles, .shp		
				Excel		MS Excel, .xls		
				MapInfo		MapInfo .tab		
		Rail						
			Word			.pdf		
			Working					
				ArcGIS		Shapefiles, .shp		
				Excel		MS Excel, .xls		
				MapInfo		MapInfo .tab		
	PICTURE							
	POINTS							
		Boilers						
			Word			.pdf		
			Working					
				ArcGIS		Shapefiles, .shp		
				Excel		MS Excel, .xls		
				MapInfo		MapInfo .tab		

Root Folder	Subfolder Level 1	Subfolder Level 2	Subfolder Level 3	Subfolder Level 4	Subfolder Level 5	File Type	
		Part A Processes					
			Word				.pdf
			Working				
				ArcGIS			Shapefiles, .shp
				Excel			MS Excel, .xls
				MapInfo			MapInfo .tab
		Part B Processes					
			Word				.pdf
			Working				
				ArcGIS			Shapefiles, .shp
				Excel			MS Excel, .xls
				MapInfo			MapInfo .tab
	LAEI_2008					MS Access, .mdb	







