What's New in ADMS-Urban, ADMS-Roads and ADMS-Airport 5.0.1?

February 2022

ADMS-Urban, ADMS-Roads and ADMS-Airport 5.0.1 are the latest general releases of CERC's state of the art models for the dispersion of pollutants in urban areas. Most notably, this version includes a major new option for modelling flyovers, i.e. roads elevated above local ground level, using a more advanced approach than the one used for standard elevated road sources. This version also includes the latest UK emission factors from EFT 11.0.

This document contains details of the new features and model corrections implemented since the previous version of ADMS-Urban, ADMS-Roads and ADMS-Airport (version 5, March 2020). Also contained in this document are instructions for installing ADMS-Urban, ADMS-Roads and ADMS-Airport 5.0.1.

Installation

Before installing ADMS-Urban / ADMS-Roads / ADMS-Airport 5.0.1

In this release, ADMS-Urban, ADMS-Roads and ADMS-Airport are installed using a single installation process. Therefore, if you have previous versions of any of these models installed on your computer, they will need to be uninstalled before installing any of the new versions.

Log on to your computer as Administrator, and uninstall any previous versions of ADMS-Urban, ADMS-Roads and ADMS-Airport by selecting **Programs and features** from the Windows Control Panel.

Installing ADMS-Urban / ADMS-Roads / ADMS-Airport 5.0.1

If you have not already done so, log on to your computer as Administrator.

ADMS-Urban / ADMS-Roads / ADMS-Airport 5.0.1 will have been supplied by download link. Extract the downloaded *.zip* file to a local directory. In Explorer, browse to this directory and double-click on the file '*setup.exe*'.

Follow the instructions on the screen. Further details are given in Section 2.2 of the ADMS-Urban / ADMS-Roads User Guide, a copy of which can be found in the installation files in *.pdf* format.

You should also have been provided with a new licence file, which is required in order to run the model. To install the licence, copy the file (*ADMS-Urban.lic / ADMS-Roads.lic / ADMS-Airport.lic*) to the directory in which the model is installed.

The first time that you launch the model after installation, it is important that you are connected to the internet so that your licence can be registered.

Note that the installation procedure automatically puts a generic shortcut to ADMS-Urban, ADMS-Roads and ADMS-Airport on your desktop. The first time you double-click on this shortcut, a screen similar to that shown in Figure 1 will be displayed.
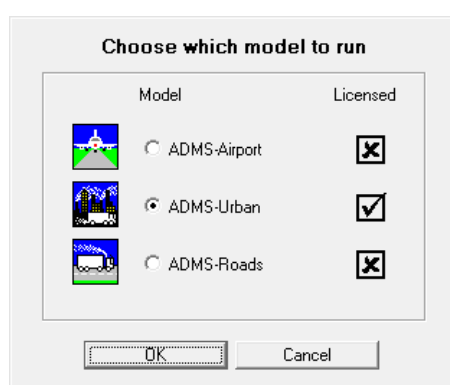

Figure 1 – Model selection screen

Select the appropriate option and click **OK**. (Subsequently, if you are using more than one of ADMS-Urban, ADMS-Roads and ADMS-Airport on your computer, then this generic shortcut will launch the most recently used model.)

You can also set up specific shortcuts to ADMS-Urban, ADMS-Roads and ADMS-Airport by browsing to the *\Support\Shortcuts* sub-directory under the model install directory in Explorer, copying the relevant shortcut and pasting it, for example, on to your desktop.

New versions of the GIS links you require (ArcGIS, MapInfo) can be installed by following the instructions in the ADMS-Urban / ADMS-Roads User Guide.

New Features

1. It is now possible to model flyovers, i.e. roads elevated above local ground level, using a more advanced approach that limits the downward spread of pollutants over the elevated road surface. For more details regarding this new flyovers option, please refer to Appendices A and B of this document.

2. The UK EFT v11.0 emission dataset has been added for the calculation of road traffic emissions. For details relating to the new emission factors themselves, including differences between the current and previous datasets, please refer to the [Defra website](#)[1]. For details of the way in which the new datasets have been included in version 5.0.1, please refer to Appendix C of this document. Note that in keeping with the guidance on usage the 2031 to 2050 England (not London) emission factors have not been included.

Minor Changes

3. The minimum valid value for surface sensible heat flux (FTHETA0) in the meteorological input data has been changed from -100 W/m^2 to -200 W/m^2.

4. A third party issue has been circumvented that could cause road sources in the Mapper to be displayed with the incorrect width and thus take up the entire map view.

5. An issue has been fixed which meant that if a source was using a time-varying emission factor of zero for a particular pollutant on a given met line, an emission factor of zero could also be applied to other pollutants for that met line even if the actual emission factor was non-zero.

6. An issue has been fixed in which on-screen or .fac file time-varying emission factors designed to apply only to the 2D grid source were also applied to the 3D grid source.

7. A correction has been made to prevent a spurious warning message being issued when using on-screen time-varying emission factors and the daylight saving time option.

8. An issue has been fixed that could lead to NO_2 grid disaggregation errors when modelling chemistry and using a 2D grid source if NO_2 was selected as an output pollutant more than once in the output table and the first entry preceded any NO_X entry.

9. An issue has been fixed that could cause the model to crash when using the urban canopy flow option if all urban canopy effected cells used the 'no displacement' solution.

10. An issue has been fixed that could cause a model crash if running with the 'source exclusion by emission rate' and spatial splitting options together and source-oriented

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[1] https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

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grids were being used.

11. An issue has been fixed that could cause an allocation error if multiple line/area/volume sources are modelled and the release from one of them is too dense.

12. A correction has been made to ensure that only output points within the truncation region are written to the netCDF file for runs using spatial splitting with output point truncation and the comprehensive output file option.

13. Source licence limits now apply after any source truncation/exclusion options have been processed. Error messages are now also more descriptive if licence limits are exceeded, reporting the number included in the run as well as the maximum permitted number.

14. An issue has been fixed that could on rare occasions lead to NaN values being written to the .grd file when using the Interpolator's Natural Neighbour contour gridding method in the 2-D Output Plotter.

15. An issue has been fixed that could on rare occasions lead to a terminating error when using the Interpolator's Natural Neighbour contour gridding method in the 2-D Output Plotter.

16. An issue with the Windrose Plotter has been fixed in which *.pro* or *.met* files with extensions that were not all lowercase were not recognised by the utility.

APPENDIX A   Flyovers

The standard approach to modelling an elevated line/road source in Gaussian type dispersion models such as ADMS-Urban / ADMS-Roads / ADMS-Airport is to allow material to disperse freely through the source itself (**Figure A.1 (a)**). In reality, the downward dispersion of vehicular emissions on an elevated road will only occur once the material has been advected past the downwind edge of the road. The new flyovers model option accounts for this by limiting the downward spread of the plume during its traversal over the road surface (**Figure A.1 (b)**). The vertical concentration distribution at a given downwind distance is then described by two adjoining half-Gaussian functions with the same amplitude (to ensure continuity in the concentrations) but different standard deviations. A more detailed technical summary is provided in APPENDIX B.

(a) Standard elevated road source

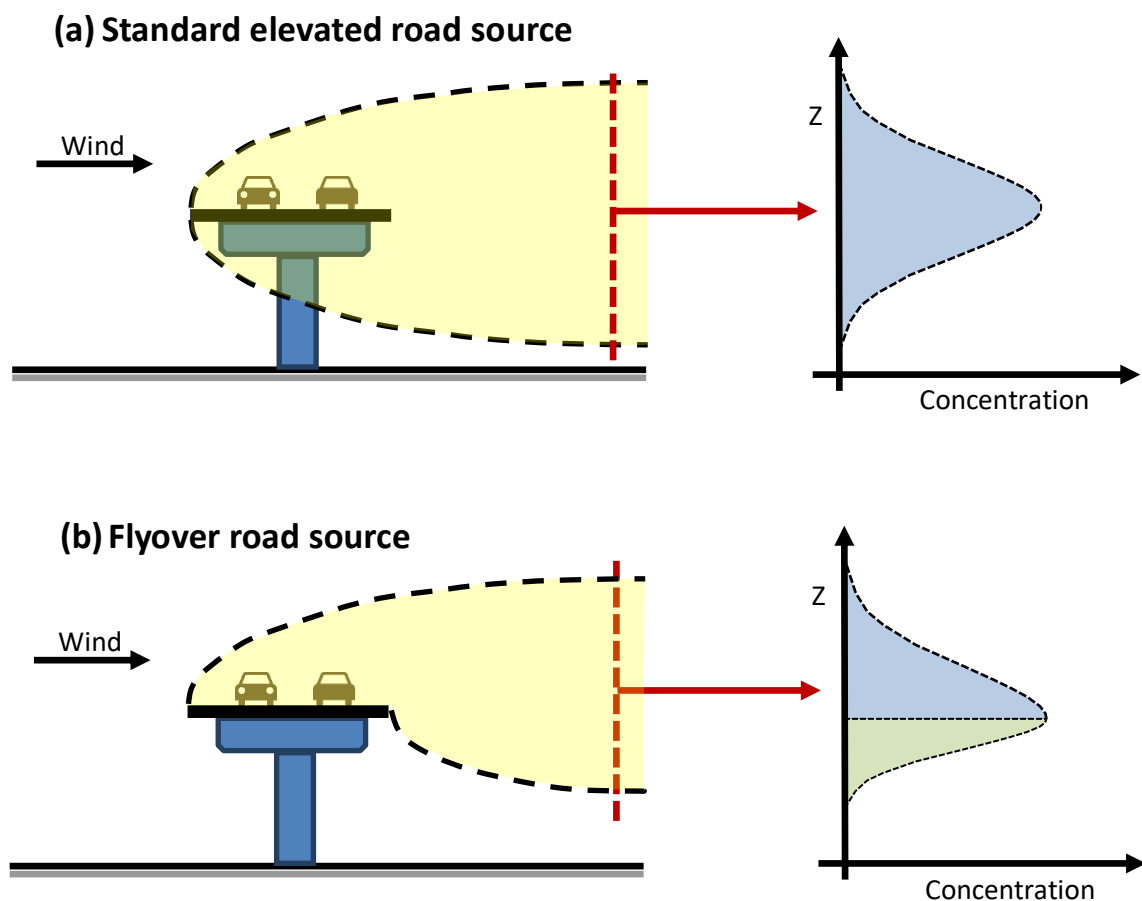**(b) Flyover road source**

Figure A.1 Schematic of modelling approach for (a) a standard elevated road source and (b) a flyover road source.

To use the flyovers option, first create a *.uai* file or edit the existing *.uai* file (as described in Section 3.1.8 of the ADMS-Urban / ADMS-Roads User Guide) so that the **Flyovers** option (keyword FLYOVERS) is enabled, as shown in **Figure A.2**.
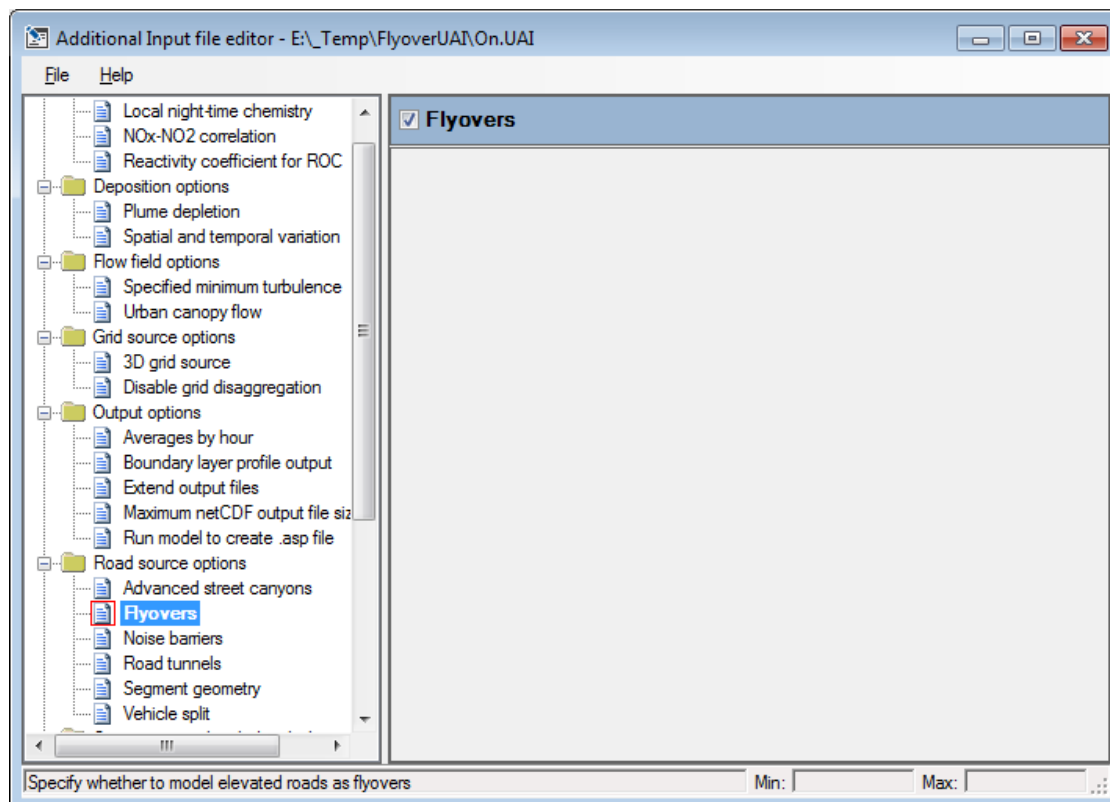
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Figure A.2 The **Flyovers** section enabled in the **Additional Input file editor**

The model will then use the flyovers approach for any road source that satisfies all the following criteria:

- has a positive **Elevation of road (m)** value in the **Source** screen of the interface

- has a **canyon height (m)** value of zero in the **Source** screen of the interface

- is not already being modelled as either an advanced canyon road source or a road tunnel source

Note that a flyover road source can still be used in combination with the **Noise barriers** option. In this case, dispersion from the raised source at height H_s that affects concentrations on the non-road side of the barrier (refer to Section 10.8 of the ADMS-Urban / ADMS-Roads User Guide) uses the standard elevated road approach.

APPENDIX B Technical Summary of flyovers

When an elevated road source is modelled as a flyover, the downward vertical plume spread, σ_z, is held constant at h_0, the initial road source mixing height (1 m), until the plume is advected past the downwind edge of the elevated road surface. It then proceeds to grow as it would have done from the source for a standard elevated road.

Recall that concentrations downwind of a source in ADMS-Urban / ADMS-Roads / ADMS-Airport (henceforth referred to as 'ADMS') are calculated as:

$$C = \frac{Q}{U} g(y) f(z), \tag{1}$$

where Q is the source strength, U is the wind speed (at the mean plume height), and $g(y)$ and $f(x)$ are the Gaussian (in non-convective conditions) transverse and vertical concentration distribution functions, respectively, that both satisfy:

$$\int_{y=-\infty}^{y=+\infty} g(y)\, dy = \int_{z=-\infty}^{z=+\infty} f(z)\, dz = 1. \tag{2}$$

For flyover road sources, we split $f(z)$ into two piecewise continuous functions, $f_-(z)$ and $f_+(z)$, above and below the plume centreline height z_p:

$$f(z) = \begin{cases} f_-(z), & \text{for } z < z_p \\ f_+(z), & \text{for } z \geq z_p \end{cases}, \tag{3}$$

subject to the following two constraints:

$$\int_{z=-\infty}^{z=z_p} f_-(z)\, dz + \int_{z=z_p}^{z=+\infty} f_+(z)\, dz = 1, \tag{4}$$

$$f_-(z_p) = f_+(z_p). \tag{5}$$

Using the Heaviside function, $f(z)$ can be written as:

$$f(z) = f_-(z)\left(1 - \mathrm{H}(z - z_p)\right) + f_+(z)\mathrm{H}(z - z_p). \tag{6}$$

While the above is suitable for an isolated source (without reflections), a road source in ADMS has reflections off the ground and (in the presence of an inversion at $z = h$) off the boundary layer, and the above equation is thus modified to:

$$f(z) = f_-(z)\left(1 - \mathrm{H}(z - z_p)\right) + f_+(z)\mathrm{H}(z - z_p) + f_-(-z) + f_+(2h - z). \qquad (7)$$

Note that no Heaviside function is applied to the last two terms because every point within the boundary layer will receive contributions from both reflections. In the absence of an inversion, the last term is dropped.

We use half Gaussian functions for $f_-(z)$ and $f_+(z)$, which have the same amplitude (in order to satisfy Eq. (5)) but different standard deviations (i.e. vertical spreads), $\sigma_{z_{f-}}$ and $\sigma_{z_{f+}}$, which are taken to be:

$$\sigma_{z_{f+}}\Big|_x = \sigma_z|_x$$

$$\sigma_{z_{f-}}\Big|_x = \begin{cases} h_0, & x \leq x_r \\ \sigma_z|_{x - x_r}, & x > x_r \end{cases} \qquad (8)$$

where $\sigma_z(x)$ is the vertical spread (at a downwind distance of x from the upwind edge of the road) used by ADMS in its standard configuration and x_r is the distance to the downwind edge of the road. The amplitude, a, of $f_-(z)$ and $f_+(z)$ is obtained by solving Eq. (4):

$$a\left(\int\limits_{z=-\infty}^{z=z_p} \exp\left(\frac{-(z - z_p)^2}{2\sigma_{z_{f-}}^2}\right)dz + \int\limits_{z=z_p}^{z=+\infty} \exp\left(\frac{-(z - z_p)^2}{2\sigma_{z_{f+}}^2}\right)dz\right) = 1$$

$$\Rightarrow a = \frac{2}{\sqrt{2\pi}(\sigma_{z_{f-}} + \sigma_{z_{f+}})} \qquad (9)$$

The full equation for $f(z)$ thus becomes:

$$\begin{aligned} f(z) = \frac{2}{\sqrt{2\pi}(\sigma_{z_{f-}} + \sigma_{z_{f+}})}\Bigg[&\exp\left(\frac{-(z - z_p)^2}{2\sigma_{z_{f-}}^2}\right)\left(1 - \mathrm{H}(z - z_p)\right) \\ &+ \exp\left(\frac{-(z - z_p)^2}{2\sigma_{z_{f+}}^2}\right)\mathrm{H}(z - z_p) + \exp\left(\frac{-(z + z_p)^2}{2\sigma_{z_{f-}}^2}\right) \\ &+ \exp\left(\frac{-(z - 2h + z_p)^2}{2\sigma_{z_{f+}}^2}\right)\Bigg]. \end{aligned} \qquad (10)$$

In stable/neutral conditions, $z_p = z_s + h_0$, where z_s is the height of the road source. In convective conditions, the standard vertical concentration distribution function is itself two piecewise continuous half Gaussian functions with $z_p = z_s + h_0 + \widehat{w}t$ and standard deviations above and below this height of $\sigma_{z_+}(x) = \frac{\sigma_{w+}\sigma_z}{\sigma_w}$ and $\sigma_{z_-}(x) = \frac{\sigma_{w-}\sigma_z}{\sigma_w}$, respectively, where σ_w is the vertical component of turbulence, t is the travel time from the source, and $\widehat{w}$, σ_{w+} and σ_{w-} are as defined in the ADMS Plume/Puff Spread and Mean Concentration Module Technical Specification document (P10/01). Eq. (8) in convective conditions thus becomes:

$$\sigma_{z_{f+}}\Big|_x = \frac{\sigma_{w_+}\sigma_z}{\sigma_w}\Big|_x$$

$$\sigma_{z_{f-}}\Big|_x = \begin{cases} h_0 \dfrac{\sigma_{w_-}}{\sigma_w}\Big|_0, & x \leq x_r \\[2ex] \dfrac{\sigma_{w_-}\sigma_z}{\sigma_w}\Big|_{x-x_r}, & x > x_r \end{cases}$$

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APPENDIX C   Traffic emission factors

The information in this appendix replaces the equivalent sub-sections in Section 3.2.1 of the ADMS-Urban / ADMS-Roads 5.0 User Guide.

The ADMS-Urban / ADMS-Urban / ADMS-Airport database of traffic emission factors

ADMS-Roads, ADMS-Urban and ADMS-Airport contain a range of emission factor datasets. These are summarised in **Tables 1**, **3** and **4**.

For studies within the UK, the most up-to-date emission factors to use are the UK EFT v11.0 datasets and the UK DMRB IAN 185/15 dataset.

The Chinese MoT 2006 emission factor dataset is only appropriate for estimating emissions from roads in China. Any further details of this dataset will therefore be omitted from the discussions below.

In order to use the emission factor datasets contained within ADMS-Roads, ADMS-Urban or ADMS-Airport to estimate emissions from roads, activity data in terms of vehicle counts are required. In addition, the emissions vary for different types of roads. Details are given below.

All emission factor datasets included within the model contain emissions for the following pollutants:

- NO_x Total oxides of Nitrogen (given as "NO_X as NO_2" – please refer to Appendix B of the ADMS-Urban / ADMS-Roads User Guide for further information)

- PM_{10} Particulates with a maximum diameter of 10 µm

- $PM_{2.5}$ Particulates with a maximum diameter of 2.5 µm

All emission factor datasets apart from EFT v11.0, 10.1, 9.0, 8.0 and UK DMRB IAN 185/15 contain emissions for CO (carbon monoxide).

All emission factor datasets apart from UK DMRB IAN 185/15 contain emissions for VOC (Volatile Organic Compounds (hydrocarbons, excluding methane)).

Only the EFT v11.0, 10.1, 9.0 and 8.0 datasets contain emissions for NO_2. This is because the source data for other datasets do not include these emissions. For details of how to include NO_2 emissions in a particular model run, please refer to the ADMS-Urban / ADMS-Roads User Guide.

The PM_{10} and $PM_{2.5}$ emissions within the EFT v11.0, 10.1, 9.0, 8.0 and 7.0 datasets are total emission values, i.e. they are the sum of exhaust, brake and tyre wear and road abrasion.

The most recent EFT v11.0, 10.1 datasets and the UK DMRB IAN 185/15 dataset include emissions for a range of years up to 2030. All datasets include emissions for a range of speeds. The EFT v11.0, 10.1 and 9.0 datasets include emissions for a range of road gradients for heavy goods vehicles, from -6% to 6% in steps of 2%; emissions will be interpolated for

gradients between these values, but not extrapolated (i.e. emissions are capped at the ±6% values). A summary is given in **Tables 1** to **4**.

The source data for the UK DMRB IAN 185/15 dataset gives emissions for a small number of speed-band categories, each associated with a different level of congestion. For consistency with other datasets, the emission dataset in the model includes a range of speeds; the emissions for each speed are taken from the appropriate speed-band in the source data. Refer to Highways Agency (2015) for more details.

Traffic count data can be categorised in a number of different ways. The simplest categorisation is in terms of light duty and heavy duty vehicles only. More detailed categorisations, such as including the number of buses and taxis, may be available. **Tables 5** and **6** gives the vehicle categories for each emission factor dataset included in the model.

In some cases it is more appropriate to use an emission factor dataset with a more detailed vehicle categorisation (e.g. UK EFT v11.0 (6 VC)), for example, when considering bus lanes separately, or doing source apportionment studies. In other cases, the simple light and heavy duty vehicle categorisation is sufficient. However, it is useful to remember that changing the classification of the traffic counts will change emissions and this may have a significant effect on the modelled concentrations. For detailed emissions modelling studies, such as the investigation of a Low Emission Zone, the use of an external emissions tool such as EMIT may be appropriate.

Dataset name (as displayed in the interface)	Suggested usage of dataset	Reference	Dataset name (to be used when importing)	Years	Speeds (km/hr)			Gradient (%)			Number of vehicle categories (Tables 5 and 6)	Number of road types (Table 7)
					Minimum	Maximum	Increment	Minimum	Maximum	Increment		
UK EFT v11.0 (2 VC)	For all new projects where the regulator requires the use of the EFT, and the traffic data are simply categorised into light and heavy duty vehicles.	EFT v11.0 (2021), EFT v6.0.1 (2014) *	EFT v11.0 (2 VC)	2018-2030	5	140	1	-6	6	2	2	16
UK EFT v11.0 (6 VC)	For all new projects where the regulator requires the use of the EFT, and the traffic data is binned into the six vehicle counts specified in **Table 5**.		EFT v11.0 (6 VC)	2018-2030	5	140	1	-6	6	2	6	16
UK EFT v11.0 (7 VC)	For all new projects where the regulator requires the use of the EFT, and the traffic data is binned into the seven vehicle counts specified in **Table 5**.		EFT v11.0 (7 VC)	2018-2030	5	140	1	-6	6	2	7	16
UK EFT v11.0 (8 VC)	For all new projects where the regulator requires the use of the EFT, and the traffic data is binned into the eight vehicle counts specified in **Table 5**.		EFT v11.0 (8 VC)	2018-2030	5	140	1	-6	6	2	8	16
UK DMRB IAN 185/15 (2 VC)	For all new projects where the regulator requires the use of the DMRB.	Highways Agency (2015)	UK DMRB IAN 185/15	2011-2030	5	140	1**	N/A			2	7

Table 1 – Summary of newer emission factor datasets for the UK. * The VOC emission factors are derived from the UK EFT v6.0.1 dataset. ** The source data gives emissions for a small number of speed-band categories, see Highways Agency (2015).

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Dataset name (as displayed in the interface)	Suggested usage of dataset	Reference	Dataset name (to be used when importing)	Years	Speeds (km/hr)			Gradient (%)			Number of vehicle categories (Tables 5 and 6)	Number of road types (Table 7)
					Minimum	Maximum	Increment	Minimum	Maximum	Increment		
UK EFT v10.1 (2 VC)	These datasets should only be used for old projects that require consistency between emission factors. Any new modelling studies should use a newer dataset.	EFT v10.1 (2020), EFT v6.0.1 (2014) *	EFT v10.1 (2 VC)	2018-2030	5	140	1	-6	6	2	2	16
UK EFT v10.1 (6 VC)			EFT v10.1 (6 VC)	2018-2030	5	140	1	-6	6	2	6	16
UK EFT v10.1 (7 VC)			EFT v10.1 (7 VC)	2018-2030	5	140	1	-6	6	2	7	16
UK EFT v10.1 (8 VC)			EFT v10.1 (8 VC)	2018-2030	5	140	1	-6	6	2	8	16
UK EFT v9.0 (2 VC)		EFT v9.0 (2019), EFT v6.0.1 (2014) *	EFT v9.0 (2 VC)	2017-2030	5	140	1	-6	6	2	2	16
UK EFT v9.0 (6 VC)			EFT v9.0 (6 VC)	2017-2030	5	140	1	-6	6	2	6	16
UK EFT v9.0 (7 VC)			EFT v9.0 (7 VC)	2017-2030	5	140	1	-6	6	2	7	16
UK EFT v9.0 (8 VC)			EFT v9.0 (8 VC)	2017-2030	5	140	1	-6	6	2	8	16

Table 2 – Summary of older emission factor datasets (part 1). * The VOC emission factors are derived from the UK EFT v6.0.1 dataset.

Dataset name (as displayed in the interface)	Suggested usage of dataset	Reference	Dataset name (to be used when importing)	Years	Speeds (km/hr)			Number of vehicle categories (Tables 5 and 6)	Number of road types (Table 7)
					Minimum	Maximum	Increment		
UK EFT v8.0 (2 VC)	These datasets should only be used for old projects that require consistency between emission factors. Any new modelling studies should use a newer dataset.	EFT v8.0 (2017), EFT v6.0.1 (2014) [+]	EFT v8.0 (2 VC)	2015-2030	5	140	1	2	16
UK EFT v8.0 (6 VC)			EFT v8.0 (6 VC)	2015-2030	5	140	1	6	16
UK EFT v8.0 (7 VC)			EFT v8.0 (7 VC)	2015-2030	5	140	1	7	16
UK EFT v8.0 (8 VC)			EFT v8.0 (8 VC)	2015-2030	5	140	1	8	16
UK EFT v7.0 (6 VC)		EFT v7.0 (2016), EFT v6.0.1 (2014) and Highways Agency (2003) [*]	EFT v7.0 (6 VC)	2013-2030	5	140	1	6	16
UK EFT v7.0 (7 VC)			EFT v7.0 (7 VC)	2013-2030	5	140	1	7	16
UK EFT v7.0 (8 VC)			EFT v7.0 (8 VC)	2013-2030	5	140	1	8	16
UK EFT v7.0 (8 VC)			EFT v7.0 (8 VC)	2013-2030	5	140	1	8	16
UK EFT v6.0.1 (2 VC)		EFT v6.0.1 (2014) and Highways Agency (2003) [**]	EFT v6.0.1 (2 VC)	2008-2030	5	140	1	2	16
UK EFT v6.0.1 (6 VC)			EFT v6.0.1 (6 VC)	2008-2030	5	140	1	6	16
UK EFT v6.0.1 (7 VC)			EFT v6.0.1 (7 VC)	2008-2030	5	140	1	7	16
UK EFT v6.0.1 (8 VC)			EFT v6.0.1 (8 VC)	2008-2030	5	140	1	8	16
UK EFT v5.1 (2 VC)		EFT v5.1 (2012) and Highways Agency (2003) [**]	EFT v5.1 (2 VC)	2008-2030	5	140	1	2	16
UK EFT v5.1 (6 VC)			EFT v5.1 (6 VC)	2008-2030	5	140	1	6	16
UK EFT v5.1 (7 VC)			EFT v5.1 (7 VC)	2008-2030	5	140	1	7	16
UK EFT v5.1 (8 VC)			EFT v5.1 (8 VC)	2008-2030	5	140	1	8	16

Table 3 – Summary of older emission factor datasets (part 2). [+] The VOC emission factors are derived from the UK EFT v6.0.1 dataset. [*] The VOC emission factors are derived from the UK EFT v6.0.1 and emission factors for CO are derived from the Highways Agency (2003) dataset. [**] Emission factors for CO are derived from the Highways Agency (2003) dataset.

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Dataset name (as displayed in the interface)	Suggested usage of dataset	Reference	Dataset name (to be used when importing)	Years	Speeds (km/hr)			Number of vehicle categories (Tables 5 and 6)	Number of road types (Table 8)
					Minimum	Maximum	Increment		
UK EFT v4.2 (2 VC)	These datasets should only be used for old projects that require consistency between emission factors. Any new modelling studies should use a newer dataset.	EFT v4.2 (2010) and Highways Agency (2003)[*]	EFT v4.2 (2 VC)	2006-2025	5	120	1	2	6
UK EFT v4.2 (6 VC)			EFT v4.2 (6 VC)	2006-2025	5	120	1	6	6
UK DMRB 1999	These datasets have been superseded by the DMRB IAN 185/15 dataset and should not be used for new modelling studies.	Highways Agency (1999)	DMRB 1999	1996-2025	5	130	5	2	1
UK DMRB 2003		Highways Agency (2003)	DMRB 2003	1996-2025	5	130	5	2	3
Chinese MoT 2006	This dataset should only be used for modelling studies within China.	ADMS-EIA (2010)	Chinese MoT 2006	n/a[**]	5	100	1	3	10

Table 4 – Summary of older emission factor datasets (part 3). [*] Emission factors for CO are derived from the Highways Agency (2003) dataset. [**] The Chinese MoT 2006 dataset is not categorised by year, but by road type.

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Dataset	Vehicle categories	Vehicle category name (in the interface)	Vehicle category description	Vehicle category name (to be used when importing)	Vehicle cross sectional area (m^2)
UK EFT v11.0 (2 VC) **UK EFT v10.1 (2 VC)** **UK EFT v9.0 (2 VC)** **UK EFT v8.0 (2 VC)** **UK EFT v7.0 (2 VC)** **UK EFT v6.0.1 (2 VC)** **UK EFT v5.1 (2 VC)** **UK EFT v4.2 (2 VC)** **UK DMRB IAN 185/15**	2	Light duty vehicle	Any vehicle < 3.5t	light duty vehicle	4
		Heavy duty vehicle	Any vehicle ≥ 3.5t	heavy duty vehicle	16
UK EFT v11.0 (6 VC) **UK EFT v10.1 (6 VC)** **UK EFT v9.0 (6 VC)** **UK EFT v8.0 (6 VC)** **UK EFT v7.0 (6 VC)** **UK EFT v6.0.1 (6 VC)** **UK EFT v5.1 (6 VC)** **UK EFT v4.2 (6 VC)**	6	Car	Passenger car < 3.5t	car	4
		Taxi ('black cab')	London taxi < 3.5t	taxi	4
		LGV	Light goods vehicle < 3.5t	LGV	8
		Motorcycle	Motorcycle / moped < 3.5t	motorcycle	2
		HGV	Heavy goods vehicle ≥ 3.5t	HGV	16
		Bus	Bus / coach ≥ 3.5t	bus	12
UK EFT v11.0 (7 VC) **UK EFT v10.1 (7 VC)** **UK EFT v9.0 (7 VC)** **UK EFT v8.0 (7 VC)** **UK EFT v7.0 (7 VC)** **UK EFT v6.0.1 (7 VC)** **UK EFT v5.1 (7 VC)**	7	Car	Passenger car < 3.5t	car	4
		Taxi ('black cab')	London taxi < 3.5t	taxi	4
		LGV	Light goods vehicle < 3.5t	LGV	8
		Motorcycle	Motorcycle / moped < 3.5t	motorcycle	2
		Rigid HGV	Rigid heavy goods vehicle ≥ 3.5t	rigid HGV	16
		Articulated HGV	Artic heavy goods vehicle ≥ 3.5t	artic HGV	16
		Bus	Bus / coach ≥ 3.5t	bus	12
UK EFT v11.0 (8 VC) **UK EFT v10.1 (8 VC)** **UK EFT v9.0 (8 VC)** **UK EFT v8.0 (8 VC)** **UK EFT v7.0 (8 VC)** **UK EFT v6.0.1 (8 VC)** **UK EFT v5.1 (8 VC)**	8	Petrol car	Petrol passenger car < 3.5t	petrol car	4
		Diesel car	Diesel passenger car < 3.5t	diesel car	4
		Taxi ('black cab')	London taxi < 3.5t	taxi	4
		LGV	Light goods vehicle < 3.5t	LGV	8
		Motorcycle	Motorcycle / moped < 3.5t	motorcycle	2
		Rigid HGV	Rigid heavy goods vehicle ≥ 3.5t	rigid HGV	16
		Articulated HGV	Artic heavy goods vehicle ≥ 3.5t	artic HGV	16
		Bus	Bus / coach ≥ 3.5t	bus	12

Table 5 – Summary of emission factor datasets by vehicle category (part 1).

CERC

Dataset	Vehicle categories	Vehicle category name (in the interface)	Vehicle category description	Vehicle category name (to be used when importing)	Vehicle cross sectional area (m^2)
Chinese MoT 2006	3	Light duty vehicle	Any vehicle < 3.5t	Chinese LDV	4
		Medium duty vehicle	Any vehicle ≥ 3.5t and < 12t	Chinese MDV	8
		Heavy duty vehicle	Any vehicle ≥ 12t	Chinese HDV	16

Table 6 – Summary of emission factor datasets by vehicle category (part 2).

CERC

Dataset	No. of road types	Road type name (in the interface)	Road type description	Road type name (to be used when importing)
UK EFT v11.0 UK EFT v10.1 UK EFT v9.0 UK EFT v8.0 UK EFT v7.0 UK EFT v6.0.1 UK EFT v5.1	16	London (central)	Roads in central London (excluding motorways)	London (central)
		London (inner)	Roads in inner London (excluding motorways)	London (inner)
		London (outer)	Roads in outer London (excluding motorways)	London (outer)
		London (motorway)	Motorways in London	London (motorway)
		England (urban)	Roads in urban areas in England outside London (excluding motorways)	England (urban)
		England (rural)	Roads in rural areas in England outside London (excluding motorways)	England (rural)
		England (motorway)	Motorways in England	England (motorway)
		Scotland (urban)	Roads in urban areas in Scotland (excluding motorways)	Scotland (urban)
		Scotland (rural)	Roads in rural areas in Scotland (excluding motorways)	Scotland (rural)
		Scotland (motorway)	Motorways in Scotland	Scotland (motorway)
		Wales (urban)	Roads in urban areas in Wales (excluding motorways)	Wales (urban)
		Wales (rural)	Roads in rural areas in Wales (excluding motorways)	Wales (rural)
		Wales (motorway)	Motorways in Wales	Wales (motorway)
		Northern Ireland (urban)	Roads in urban areas in Northern Ireland (excluding motorways)	NI (urban)
		Northern Ireland (rural)	Roads in rural areas in Northern Ireland (excluding motorways)	NI (rural)
		Northern Ireland (motorway)	Motorways in Northern Ireland	NI (motorway)
UK DMRB IAN 185/15	7	London (central)	Roads in central London (excluding motorways)	London (central)
		London (inner)	Roads in inner London (excluding motorways)	London (inner)
		London (outer)	Roads in outer London (excluding motorways)	London (outer)
		London (motorway)	Motorways in London	London (motorway)
		Urban (not London)	Roads in UK urban areas outside London (excluding motorways)	Urban (not London)
		Rural (not London)	Roads in UK rural areas outside London (excluding motorways)	Rural (not London)
		Motorway (not London)	UK motorways outside London	Mway (not London)

Table 7 – Summary of EFT v10.1, v9.0, v8.0, v7.0, v6.0.1 and v5.1 and DMRB IAN/185/15 emission factor datasets by Road type.

CERC

Dataset	Number of road types	Road type name (in the interface)	Road type description	Road type name (to be used when importing)
UK EFT v4.2	6	Urban (not London)	Roads in UK urban areas outside London (excluding motorways)	Urban (not London)
		Rural (not London)	Roads in UK rural areas outside London (excluding motorways)	Rural (not London)
		Motorway (not London)	UK motorways outside London	Mway (not London)
		Urban (London)	Roads in London	Urban (London)
		Rural (London)	*	Rural (London)
		Motorway (London)	Motorways in London	Mway (London)
UK DMRB 2003	3	Urban	Roads in UK urban areas (excluding motorways)	Urban
		Rural	Roads in UK rural areas (excluding motorways)	Rural
		Motorway	UK motorways	Motorway
UK DMRB 1999	1	All roads	All roads	All roads
Chinese MoT 2006	10	100% Pre	100% Pre-Euro Chinese vehicles	C MoT 2006_0
		100% EU 1	100% Euro 1/I Chinese vehicles	C MoT 2006_1
		100% EU 2	100% Euro 2/II Chinese vehicles	C MoT 2006_2
		80% Pre, 20% Euro	80% Pre-Euro and 20% Euro 1/I Chinese vehicles	C MoT 2006_3
		60% Pre, 40% Euro	60% Pre-Euro and 40% Euro 1/I Chinese vehicles	C MoT 2006_4
		40% Pre, 60% Euro	40% Pre-Euro and 60% Euro 1/I Chinese vehicles	C MoT 2006_5
		15% Pre, 70% Euro 1, 15% Euro 2	15% Pre-Euro, 70% Euro 1/I and 15% Euro 2/II Chinese vehicles	C MoT 2006_6
		60% Euro 1, 40%	60% Euro 1/I and 40% Euro 2/II Chinese vehicles	C MoT 2006_7
		40% Euro 1, 60%	40% Euro 1/I and 60% Euro 2/II Chinese vehicles	C MoT 2006_8
		20% Euro 1, 80%	20% Euro 1/I and 80% Euro 2/II Chinese vehicles	C MoT 2006_9

Table 8 – Summary of emission factor datasets by Road type (pre-EFT v5.1). * The 'Rural (London)' category is specified in the source data, so the emissions have been included, but it is not clear what road type this is appropriate for.

The traffic fleet on different roads varies. For example, the fleet in an urban area is likely to have a lower proportion of HGVs than on a motorway. Further, the fleet may vary geographically. For example, the London fleet of vehicles differs from that in other urban areas.

In order to represent the variation of the fleet correctly on different roads, the model includes a **Road type** classification. The different classifications are summarised in **Table 7** for the EFT v11.0, 10.1, v9.0, v8.0, v7.0, v6.0.1 and v5.1 datasets and the UK DMRB IAN 185/15 dataset and in **Table 8** for all other datasets.

The CO emissions for the EFT datasets have been derived from the Highways Agency (DMRB 2003) dataset, as the EFT does not contain CO emissions. CO emissions have not been included with the EFT v11.0, 10.1, v9.0 and v8.0 datasets.

The "Taxi ('black cab')" emissions for non-London regions for the six, seven and eight vehicle category EFT v8.0, v7.0, v6.0.1 and v5.1 datasets have been taken to be the same as the London emissions for these vehicles, as these EFT versions do not contain taxi emissions for non-London regions[2]. As London does not have any rural route types, non-London rural route types have the same taxi emissions as urban route types. Note that the latest versions of EFT, EFT v11.0, 10.1 and v9.0, do contain taxi emissions for all regions.

Non-London rural taxi emissions are the same as non-London urban taxi emissions for all pollutants, despite taxi CO emissions from DMRB 2003 having separate factors for urban and rural route types. This is to ensure all pollutants are consistent between the two route types.

Changing between traffic emissions datasets

It is possible to change between emission factor datasets. This may be appropriate, for example, when updating a model file to use the most up-to-date traffic emission factors available.

*It is only possible to change between emission factor datasets that use the same number of vehicle categories if road sources have already been defined (for details of vehicle categories, refer to **Table 5**).*

In order to update a model file to use a different emission factor dataset, select the '...' button next to **Dataset:** in the **Calculation of road traffic emissions** section of the **Source** screen. The screen shown in **Figure 3** will be displayed.

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[2] This assumption may be overly optimistic for taxis outside London; within London, taxis must comply with TfL's taxi emissions strategy.
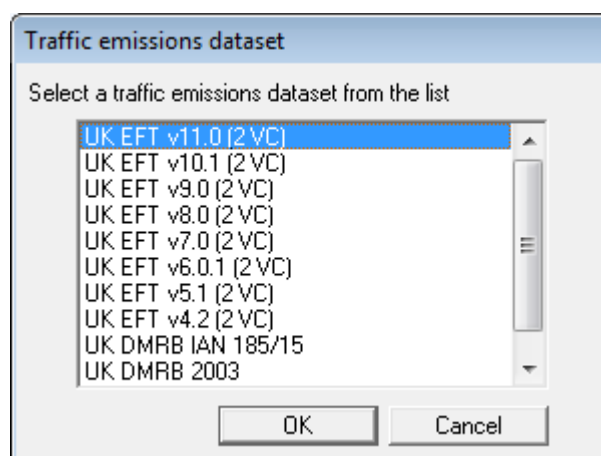
Figure 3 – The **Traffic emissions dataset** screen

Select a new emission factor dataset and then click **OK**. This will open the screen shown in **Figure 4**.
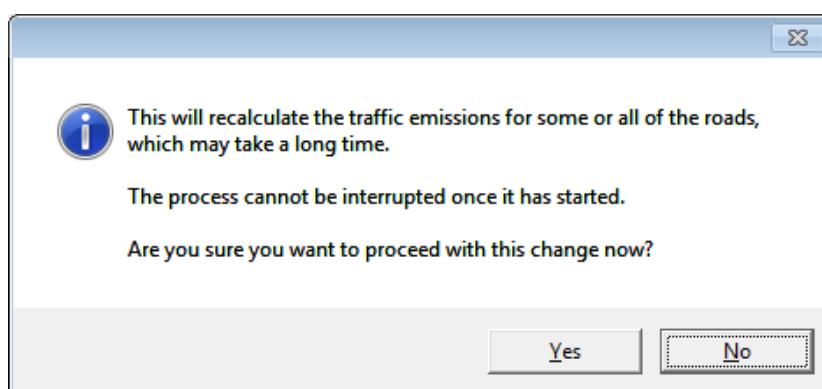

Figure 4 – Warning message when the traffic dataset is changed.

Click **Yes** to proceed.

Some datasets use different road types (for details of the road types associated with each dataset, please refer to **Tables 7** and **8**). Therefore, when changing between datasets, you may be prompted to select an alternative **Road type**, as shown in **Figure 5**.
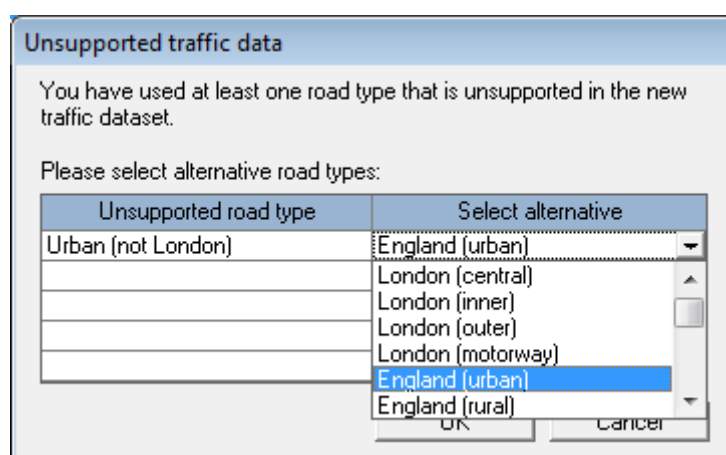

Figure 5 – Dialogue box displayed when the dataset is changed

Once a new **Road type** has been selected, click **OK**. The emission factor dataset and **Road type** will be changed for all roads included in the model file. Any new roads will use the current emission factor dataset displayed in the **Source** screen.

When changing between datasets which contain different pollutants you may wish to add or remove pollutants to ensure consistency with the current dataset. Refer to the paragraph on *Entering traffic flow data* for more details.

The EFT v11.0, 10.1, v9.0 and 8.0 datasets are the only datasets containing emission factors for NO_2. When changing to the EFT v11.0, 10.1, v9.0 or v8.0 dataset for existing road sources, any user-defined emissions of NO_2 will be overwritten with values calculated using the EFT emission factors. If there are no user-defined emissions of NO_2, you may wish to add NO_2 as an emission pollutant when changing to the EFT v11.0, 10.1, v9.0 or v8.0 dataset.