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Latest model release: version 5.0.1, Feb 2022

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## News

### Software releases

ADMS-Urban and ADMS-Roads version 5.0.1 were released in February 2022. This version is a minor update which includes a new option for modelling flyovers, the latest UK emission factors (EFT 11) and is fully supported on Windows 11.

EMIT 3.9 was released in July 2022. This release provides an option to create 3D gridded emissions for ADMS-Urban along with additional road traffic emission factors from COPERT for pollutants not in EMIT's EFT dataset: specifically CO<sub>2</sub>, CH<sub>4</sub>, Benzene, Butadiene, B[a]P, CO, N<sub>2</sub>O, NH<sub>3</sub>, SO<sub>2</sub>, and VOC. The EFT dataset includes NO<sub>x</sub> and PM factors.

Development work on ADMS 6, the latest version of our 'industrial' model, is nearing completion and this version will be released this autumn. New features include advances in the modelling of buildings and complex terrain and an upgraded Mapper commensurate with that in ADMS-Urban.

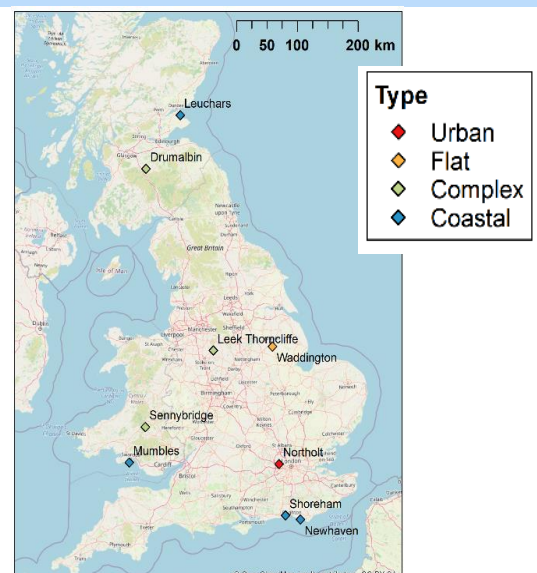
### ADMS User Group meetings

The 2022 ADMS-Urban & ADMS-Roads User Group Meeting will take place on 17 November and will be held in person at IET Birmingham: Austin Court, and online. [Tickets are available to book now](#). The draft agenda will be published soon.

The 2021 ADMS User Group Meetings were held online on 24 and 25 November due to COVID-19, but there was still the usual mix of talks by CERC and guest speakers containing news, tips and case studies. The presentations are available to [download](#) from the CERC website User Area.

### How does modelled meteorology affect dispersion modelling?

CERC are currently investigating the use of Numerical Weather Prediction (NWP) meteorological data in atmospheric dispersion modelling, funded by the UK Atmospheric Dispersion Modelling Liaison Committee ([ADMLC](#)). Following an initial review of NWP models and providers, NWP data from two models and three suppliers are being evaluated in comparison with measurement data at a range of sites across Great Britain, including sites with complex and coastal terrain as shown in the map. The influence of meteorological model resolution in relation to any local complex terrain modelling will also be investigated. In the latter stages of the project the UK Health Security Agency ([UKHSA](#)) will investigate the use of NWP data in probabilistic accident consequence assessments, using the [PACE](#) suite of models and the [Met Office NAME](#) model.



CERC assesses Low Traffic Neighbourhoods in Lambeth and Southwark



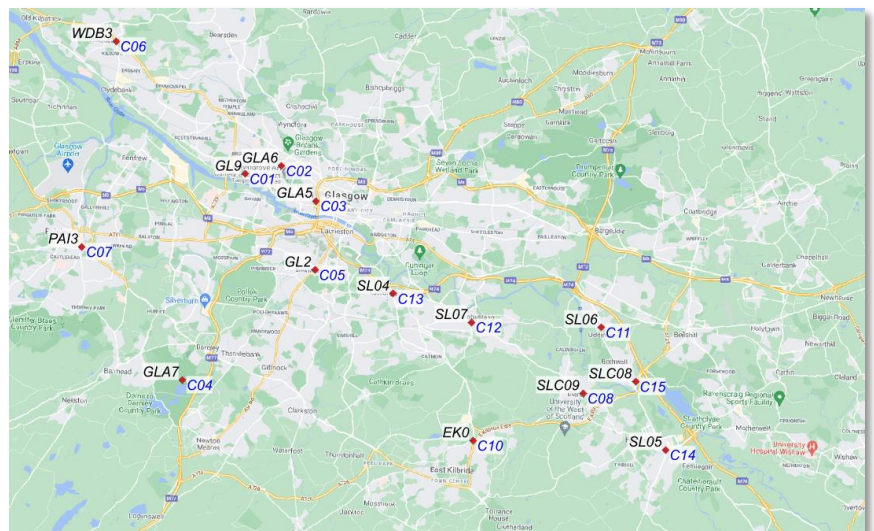
At the 2021 ADMS User Group Meeting, CERC presented on air quality assessments of [Low Traffic Neighbourhoods](#) (LTNs), focusing on schemes in Lambeth and Southwark. Many LTNs were introduced as part of an emergency transport response to the Covid-19 pandemic to make streets safer for walking and cycling. Consultations are ongoing to convert some

temporary schemes to permanent ones. CERC are evaluating [five schemes](#) in Lambeth and the [Walworth](#) and [Dulwich](#) schemes in Southwark. The modelling uses CERC's ADMS-Urban dispersion model and emissions inventory tool [EMIT](#), compiling an inventory from local traffic data and [London Atmospheric Emissions Inventory](#) data. High-resolution pollution maps were generated for scheme areas and detailed output at sensitive receptors, such as schools and hospitals. The LTN impacts were assessed using [EPUK](#) and [IAQM significance criteria](#) and local mortality burden calculations.

COP26: Verifying Glasgow's CO2 emissions using ADMS-Urban and measurements

Researchers from CERC, [University of Cambridge](#) and [ACOEM](#) have collaborated on a project to verify CO<sub>2</sub> emissions across greater Glasgow by combining measurements and ADMS-Urban modelling.

Since 2021, fifteen [AQMesh](#) pods and two LI-COR reference-grade instruments have been measuring CO<sub>2</sub> at 1-minute resolution. ADMS-Urban has been applied to calculate hourly CO<sub>2</sub> concentrations at the measurement sites using NAEI gridded emissions and DfT traffic flows, and allowing for the effects of street canyons. Hourly background CO<sub>2</sub> has been calculated from hourly baselines of the 1-minute AQMesh measurements calculated by the University of Cambridge team.



CERC researchers have applied [Bayesian based inversion techniques](#) to combine the ADMS-Urban-modelled CO<sub>2</sub> concentrations with hourly averaged AQMesh and LI-COR CO<sub>2</sub> measurements. The differences between the original and inversion-verified emissions provide an indication of the accuracy of the original emissions inventory.



## CERC launches MAQS-Health coupled air quality modelling system

This ambitious project, led by CERC, has developed a world-leading coupled air quality modelling system 'MAQS-Health' spanning national to urban street scales. The system can be used to assess national and local policies, and for personal exposure and health impact modelling at national to local scales.

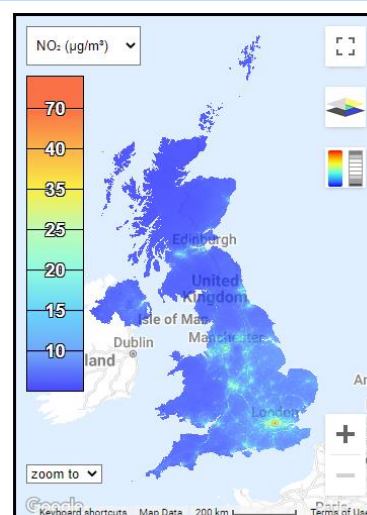
The system is flexible, linking the most advanced regional chemical transport models available to a new street-scale dispersion model, ADMS-Local, and to CERC's widely used ADMS-Urban model. ADMS-Local is efficient, calculates concentrations at street-scale with allowance for local chemical reactions, and accounts for complex urban layout, including street canyons. The system's verification module enables easy validation of predictions against measurements. The project has successfully trialled the system across different regions of the UK with several different regional models and ADMS-Local. They have demonstrated a UK-wide capability using [Defra \(PCM\)](#) background maps and ADMS-Local.

The project team combined CERC's experts in software development and dispersion modelling, and regional modelling experts from the universities of Birmingham, Edinburgh, Hertfordshire and Lancaster. The team worked closely with the [Met Office](#), and liaised with government, academic and commercial stakeholders throughout. The MAQS coupled system, including ADMS-Local, and the verification system are available for research.

## National street-scale modelling with Defra background maps

CERC have used the Multi-model Air Quality System (MAQS) coupled modelling system, developed under the [MAQS-Health](#) project, to model annual average air pollutant concentrations at street-scale resolution across the UK. Defra annual average [background maps](#) of NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> at 1 km resolution generated from the Pollution Climate Mapping (PCM) system were used as the regional input to the system. The local modelling was based on major road emissions provided under the parallel [DUKEMS](#) project, combined with generic street canyon data and urban canopy data derived from [Local Climate Zone](#) data. Hourly meteorological data from the [WRF](#) model were supplied by the UK Centre for Ecology and Hydrology ([UKCEH](#)).

Preliminary results from this proof-of-concept modelling can be explored on the CERC [website](#), as shown in the image.



## Defra 2021 Air Quality Model Intercomparison Exercise

[Defra](#) commissioned CERC, in partnership with modelling teams from the [Met Office](#), the [UK Centre for Ecology and Hydrology](#) (UKCEH), the [Environmental Research Group](#) at [Imperial College London](#) and [Ricardo](#), to carry out an intercomparison study between models that have the potential to be used for [Defra's compliance reporting commitments](#). CERC's role was to undertake the model evaluation. Models were configured to calculate pollutant concentrations over the whole of the UK, for 2018, at a sufficiently high resolution to allow quantification of air quality at background and roadside locations.

CERC assessed the formulations of the meteorological, chemistry and pollutant dispersion components of the modelling systems. Modelled concentrations were evaluated in comparison with hourly measured data from over 400 monitors from multiple networks, using CERC's Model Evaluation Toolkit to assess a wide range of short- and long-term metrics. The metrics associated with Air Quality Directive reporting were derived from each model dataset and compared. Common themes were identified including data quality and availability, calibration approaches and potential for future development. CERC's final project report is currently being prepared for publication by Defra and will inform Defra's modelling strategy for the future.



## Training Information

### Discount on CERC training courses

A 10% discount applies to scheduled CERC training courses, if purchased at the same time as a software annual licence or support renewal. This discount also applies to one-day refresher courses. Training must be booked within 12 months of purchase.

### Upcoming training courses

Our training courses focus on giving users the knowledge and expertise to

| Course     | Sep 22  | Nov 22  | Feb 23 | Mar 23 | Apr 23 | May 23 | Jun 23 |
|------------|---------|---------|--------|--------|--------|--------|--------|
| ADMS-Roads | 27 - 28 | 29 - 30 | 7-8    | 21-22  | -      | 2-3    | 20-21  |
| ADMS-Urban | -       | -       | 21-22  | -      | 4-5    | 16-17  | -      |

efficiently apply CERC software to real-life air quality problems. CERC holds regular online courses, which are extremely successful. Courses can also be customised to particular user requirements.

For more information on specific courses and dates and prices, visit the CERC website [www.cerc.co.uk/training](http://www.cerc.co.uk/training) or [contact CERC](#).

## Modelling Tips

### Modelling advanced street canyon features

The ADMS-Urban and ADMS-Roads Advanced Canyon option can be used to model the dispersion of pollutants in a variety of street configurations.

Features such as balconies, walkways and curved noise barriers which overhang the street can be taken into account using the *FracCovered* parameter. This is the fractional plan-view area of the street canyon that is covered by overhanging features and is a value between 0 and 1. Increasing the covered fraction leads to lower wind speeds inside the canyon, which affects the within-canyon concentrations.

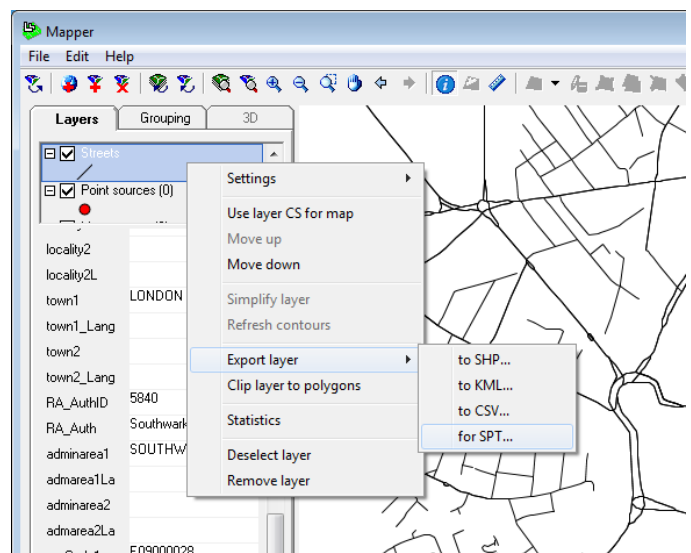
The model takes into account the dispersion of pollutants through gaps in the canyon walls using a porosity parameter, which is calculated from the entered building length, *BuildLength\_N*, and the total road length. The impact of semi-permeable barriers, such as trees, can therefore be modelled as advanced canyons with reduced values of *BuildLength\_N*. The *FracCovered* value can also be used to account for the level of overhang of the canyon. Sensitivity tests may be required to determine the most appropriate values to use.

See Sections 4.2 and 10.8.2 of the ADMS-Urban User Guide, or Sections 4.2 and 10.7.2 of the ADMS-Roads User Guide for more details.

### Exporting layers in .spt format

When using the Mapper, if you select a layer in the Mapper legend and right-click with the mouse you will see a long list of actions you can take on the layer. For vector layers, as opposed to raster layers, you can choose to Export them in a choice of formats. One of the export options introduced in ADMS-Urban 5 (and in ADMS 6 when released) is 'for SPT...'

This can be extremely useful when data you need to import has been supplied in a vector format such as an ESRI shape. Add the layer to the Mapper and export 'for SPT'. Details on how to do this are in Section 5.12.2 of the Mapper User Guide.



### Viewing large file layers in the Mapper

The Mapper can display many formats of geospatial data. See Section 5.5 of the Mapper User Guide for more details.

There is a threshold of 100,000 lines of data, after which the attributes are reduced. Similarly, you will find the number of items displayed will be limited to the first 500,000. If you find yourself wanting to view much larger files you must edit the product interface's initialisation file (ADMS.ini or ADMS-Urban.ini). The required settings are found under the **[MapperInterface]** section. To increase the number of lines of data with full attributes, increase the limit for **FileLayerAutofieldThreshold** and to increase the number of items displayed, increase the limit for **FileLayerItems**.

```
[MapperInterface]
mnuHUserGuide=%InstallDir%\Documents\Mapper User Guide.p
MapperName=Mapper
ContourButtonTooltip=10049
ContourButtonStatusLine=10050
SyncCSWithParent=True
BackgroundMap=C:\Program Files (x86)\CERC\ADMS-Urb\Data\
AttributeUnitsEPSG=9001
SnapToLayer=True
DisplayNorthArrow=True
UseSurferGrid=False
GeometryLowerBound=1
FileLayerAutofieldThreshold=100000
GridInterpolatorMethod=5
ReuseContourConfigFile=False
FileLayerItems=500000
CSVExportNameField=name
NumExtractedPoints=500000
```

An extract of the file ADMS-Urban.ini

### Mapper vs ArcMap and ArcPro

We recommend using the Mapper rather than the CERC ArcGIS links for its ease-of-use and integration with CERC products. The ADMS ArcGIS link can be used with ADMS 5, ADMS-Urban and ADMS-Roads from ArcMap. It is no longer being developed by CERC and it will not be updated to work with ESRI ArcPro.

| ADMS ArcGIS link feature          | Mapper capability | Notes for Mapper  |
|-----------------------------------|-------------------|---|
| Add sources                       | ✓                 | Supports add, edit & delete. Edit includes rotation, translation and simplification. Allows panning whilst editing. |
| Add receptor points               | ✓                 |   |
| Define model output grid          | ✓                 | Supports add, edit & delete. Edit includes translation  |
| Add contour plot                  | ✓                 |   |
| Import ADMS output                | ✓                 | Simply drag-drop the file onto the legend. Does not require shape file generation                                   |
| Clip to boundary                  | ✓                 | Clip to lines or polygons. Create a shape file or directly export points to an ASP file                             |
| Report max values                 | ✓                 | Use layer statistics, which is much more powerful   |
| Save shape file with aliases      | ✓                 | Also saves the Mapper layer settings  |
| Adjust transparency               | ✓                 |   |
| Save current symbology as default | ✓                 | Save layer settings either as default or for the current session  |

The ADMS emissions inventories are deprecated. We no longer support export to this format, although ADMS-Urban/Roads/Airport do still support import from them. However, they do not support all the features of the current source types and we recommend SPT files are used instead.

The ADMS emissions inventory link can be used with ADMS-Urban/Roads/Airport from ArcMap. It is no longer being developed by CERC and it will not be updated to work with ESRI ArcPro.

### Contacting the helpdesk



The CERC helpdesk is on hand to provide model support. Contact us:

- From the ADMS-Urban or ADMS-Roads interface, select Help, Email CERC
- Email [help@cerc.co.uk](mailto:help@cerc.co.uk)
- Phone +44 1223 357773

### Recent Publications

Mazzeo A, Zhong J, Hood C, Smith S, Stocker J, Cai X and Bloss WJ, 2022: *Modelling the Impact of National vs. Local Emission Reduction on PM<sub>2.5</sub> in the West Midlands, UK Using WRF-CMAQ*. Atmosphere, vol. 13, issue 3, 377, DOI: 10.3390/atmos13030377. [Article online](#)

O'Neill J, Seaton M, Johnson K, Stocker J, Patel R, Van Poppel M and Carruthers D, 2022: *Modelling the influence of road elevation on pollutant dispersion*. Air Quality, Atmosphere and Health, DOI: 10.1007/s11869-022-01198-9. [Article online](#) [Full-text access \(view only version\)](#)

Peters DR, Popoola OAM, Jones RL, Martin NA, Mills J, Fonseca ER, Stidworthy A, Forsyth E, Carruthers D, Dupuy-Todd M, Douglas F, Moore K, Shah RU, Padilla LE and Alvarez RA, 2022: *Evaluating uncertainty in sensor networks for urban air pollution insights*. Atmos. Meas. Tech., vol. 15, pp. 321–334, DOI: 10.5194/amt-15-321-2022. [Article online](#)

Seaton M, O'Neill J, Bien B, Hood C, Jackson M, Jackson R, Johnson K, Oades M, Stidworthy A, Stocker J and Carruthers D, 2022: *A Multi-model Air Quality System for Health Research: Road model development and evaluation*. Environmental Modelling and Software, DOI: 10.1016/j.envsoft.2022.105455. [Article online](#)

Stocker J, Johnson K, Forsyth E, Smith S, Gray S, Carruthers D and Chan PW, 2022: *Derivation of High-Resolution Meteorological Parameters for Use in Airport Wind Shear Now-Casting Applications*. Atmosphere, vol. 13, issue 2, 328, DOI: 10.3390/atmos13020328. [Article online](#)

Yuan L, Popoola OAM, Hood C, Carruthers D, Jones RL, Sun HZ, Liu H, Zhang Q and Archibald AT, 2022: *Improving NO<sub>x</sub> emission estimates in Beijing using network observations and a perturbed emissions ensemble*. Atmos. Chem. Phys., vol. 22, issue 13, pp. 8617–8637, DOI: 10.5194/acp-22-8617-2022. [Article online](#)

Zhang X, Stocker J, Johnson K, Fung YH, Yao T, Hood C, Carruthers D and Fung JCH, 2022: *Implications of mitigating ozone and fine particulate matter pollution in the Guangdong-Hong Kong-Macau Greater Bay Area of China using a regional-to-local coupling model*. GeoHealth, vol. 6, issue 3, e2021GH000506, DOI: 10.1029/2021GH000506. [Article online](#)

Biggart M, Stocker J, Doherty RM, Wild O, Carruthers D, Grimmond S, Han Y, Fu P and Kotthaus S, 2021: *Modelling spatiotemporal variations of the canopy layer urban heat island in Beijing at the neighbourhood scale*. Atmos. Chem. Phys., vol. 21, pp. 13687–13711, DOI: 10.5194/acp-21-13687-2021. [Article online](#)

Padilla LE, Ma GQ, Peters D, Dupuy-Todd M, Forsyth E, Stidworthy A, Mills J, Bell S, Hayward I, Coppin G, Moore K, Fonseca E, Popoola OAM, Douglas F, Slater G, Tuxen-Bettman K, Carruthers D, Martin NA, Jones RL and Alvarez RA, 2021: *New methods to derive street-scale spatial patterns of air pollution from mobile monitoring*. Atmospheric Environment, 118851 [Article online](#)

Zhong J, Hood C, Johnson K, Stocker J, Handley J, Wolstencroft M, Mazzeo A, Cai X and Bloss WJ, 2021: *Using Task Farming to Optimise a Street-Scale Resolution Air Quality Model of the West Midlands (UK)*. Atmosphere, vol. 12, no. 983, DOI: 10.3390/atmos12080983. [Article online](#)

A comprehensive list of all our publications may be found on the [publications](#) section of our website.

## Products and Services

CERC has been developing world-leading air dispersion and complex flow modelling solutions since 1985. Our consultancy team was established to apply our expertise to a wide variety of applications for a diverse client base.

### Other software solutions



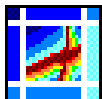
#### ADMS 5

Local scale air quality modelling for industrial sources



#### GASTAR

Modelling emergency releases of dense gases



#### ADMS-Urban Regional Model Link

Automated nesting of ADMS-Urban within a regional air quality model



#### FLOWSTAR-Energy

Modelling wind energy and airflow at high spatial resolution for wind farm planning and other airflow-related applications



#### ADMS-Airport

Urban scale modelling with detailed treatment of aircraft emissions



#### ADMS-STAR

Short-term accidental release modelling

For custom-made software solutions, see [www.cerc.co.uk/research](http://www.cerc.co.uk/research) or [email CERC](mailto:info@cerc.co.uk).

### Consultancy services



Our consultancy services include:

- Air quality assessments, e.g. odours, LAQM, planning and permitting
- Specialised modelling, e.g. dioxins, accidental releases, wind energy
- Compilation of emissions inventories and forecasting for large urban areas
- Project support and review services
- Research with complex atmospheric flows and air quality

For more details, see [www.cerc.co.uk/consultancy](http://www.cerc.co.uk/consultancy) or [email CERC](mailto:info@cerc.co.uk).