DESIGN MANUAL FOR ROADS AND BRIDGES

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THE HIGHWAYS AGENCY

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Air Quality

Summary: This Advice Note gives guidance on the assessment of the impact that road projects may have on local regional air quality. It includes a calculation method to estimate local pollutant concentrations and regional emissions for air including those for carbon. Where appropriate, this advice may be applied to existing roads.

REGISTRATION OF AMENDMENTS

Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

3. PROCEDURE FOR ASSESSING IMPACTS

Introduction

3.1 DMRB 11.1.1 sets out the aims and objectives of environmental assessment. The overall objective is to define the depth of assessment necessary to enable informed decision-making at as early a stage of the project as possible. This necessitates a 'fit-for-purpose' assessment method and relies on four 'Assessment Levels':

- scoping;
- simple;
- detailed; and
- mitigation/enhancement and monitoring.

3.2 For air quality, each assessment level has two components. The first is for local air quality, that is, estimation of pollutant concentrations that could change as a result of the proposals (nitrogen dioxide, oxides of nitrogen, fine particles (PM_{10})), carbon monoxide, benzene and 1,3-butadiene) at specific locations. These concentrations are compared with the air quality criteria set to protect human health or vegetation, as appropriate. Both construction and operational effects should be considered for local air quality. The second component is for the regional impact assessment and examines the change in emissions of a range of pollutants (oxides of nitrogen, particles, carbon monoxide, hydrocarbons and carbon) as a result of operation of the scheme as these can have impacts on the regional, national or international scale. The two components may require different assessment levels. Both components are intended to be consistent with Department of the Environment, Food and Rural Affairs (Defra's) Technical Guidance on Local Air Quality Management (LAQM) and the National Atmospheric Emissions Inventory[11] (NAEI) and this guidance should be referred to as required. An Excel spreadsheet[12] is available to carry out the DMRB local and regional air quality calculations at the simple assessment level.

3.3 Throughout the assessment process consideration should be given to the minimisation of any negative impacts of the project on air quality. Information on how this can be achieved is provided in this guidance note under the section on Mitigation/Enhancement and Monitoring. If at any stage of the assessment process, it becomes apparent that there is likely to be a new exceedence or a worsening of an existing exceedence of a mandatory EU limit value, then the Overseeing Organisation must be notified immediately. Mitigation measures should then be developed and discussed with the Overseeing Organisation.

3.4 The results and a summary of the worksheets from the local air quality appraisal prepared for the Appraisal Summary Table using the Transport Appraisal Guidance (as described in web-TAG for England[13], STAG for Scotland[14] and WelTAG for Wales[15]) gives a very useful indication of the overall change in air quality and should be included in the reports prepared for this environmental assessment. Care should be taken to ensure that an entirely consistent message is being delivered in the air quality environmental assessment and the reporting strands of the TAG appraisal, or where differences become apparent that they are fully explained.

Assessment Scenarios

3.5 The assessment should be carried out using traffic data for the "Do-Minimum" (without the scheme) and "Do-Something" (with the scheme) scenarios, for the opening year and possibly for a further future year. The worst year in the first 15 years from opening needs to be assessed. The base case should also be assessed.

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[11] Available at **http://www.naei.org.uk**

[12] Available at **http://www.highways.gov.uk –** search for "air quality spreadsheet"

[13] Available at **http://www.webtag.org.uk**

[14] Available at **http://www.transportscotland.gov.uk**

[15] Available at **http://new.wales.gov.uk/splash.jsp?orig=/** – available in draft, advice on its application should be sought from the Overseeing Organisation.

3.6 For local air quality, this will be the opening year and possibly a later year if more stringent air quality criteria come into effect at a later date. The earlier years tend to be worst for local air quality as vehicle emissions are set to decrease in the future due to increasingly stringent vehicle emission legislation. Cumulative effects from other projects may also need to be considered as discussed in DMRB 11.2.5 as this could result in a large increase in traffic in a year after the opening year. In addition, the existing year (base case) should also be assessed so that model results can be verified with monitoring data. If construction is expected to last for more than six months, then traffic management measures and the effect of the additional construction vehicles should also be assessed as an additional scenario although this may need to be a qualitative assessment where details of traffic flows are not available.

3.7 For regional impacts, the scenarios for assessment are the opening year and design years, both for the Do-Minimum and Do-Something scenarios and the base case. Carbon emissions are expected to decrease between 2005 and 2020 due to increased vehicle efficiency and the use of biofuels but this will be offset to some extent by traffic growth.

3.8 The air quality assessment should be based on the most likely forecast traffic flows.

Reporting

3.9 At each reporting stage as discussed in DMRB 11.2.6, a report describing the assessment is needed. This should contain:

(i) a network diagram indicating roads affected by the proposals, together with information, either on the diagram on in tabular form, for existing year, and future year Do-Minimum and Do-Something traffic flows and speeds;

(ii) a constraints map for local air quality showing:

- which roads will be affected by the proposals;
- the 200 m boundary of roads affected by the proposals with properties and Designated Sites shown;
- boundaries of Air Quality Management Areas (AQMAs) and Designated Sites (see para 3.13);
- Air Quality Strategy objectives and limit value exceedence areas without the proposals and a comment on whether these are likely to deteriorate or improve with the scheme and if known, the exceedence areas with the proposals;

(iii) assessment of any existing air quality monitoring data or monitoring data collected as part of the scheme design;

(iv) a description of the methodology used for any modelling and the verification of the approach used;

(v) results of any future year modelling and a description of that work;

(vi) results of the TAG appraisal for local air quality;

(vii) an outline of further work, either modelling or monitoring, to be carried out at the next stage;

(viii) identification of potential mitigation for any exceedences and what effect it is likely to have;

(ix) for the regional assessment, the total and change in emissions expected with and without the proposals.

Assessment Level – Scoping

3.10 The principles of scoping are described in detail in DMRB 11.2.4. In summary, scoping seeks to decide which environmental topics are to be examined in environmental impact assessments and environmental assessments and how much effort should be expended – either a simple or detailed assessment. Scoping can be an ongoing activity that is re-activated at key stages in the project planning process as new information or available alternatives are narrowed to a preferred approach to the project.

Local Air Quality

3.11 The objective of this scoping exercise for local air quality is to indicate whether there are likely to be significant impacts associated with particular broadly-defined routes or corridors, as developed by the design organisation and the Overseeing Organisation. The steps to be taken are as follows:

3.12 Obtain traffic data for the Do-Minimum and Do-Something scenarios for the years to be assessed. Identify which roads are likely to be affected by the

proposals. Affected roads are those that meet any of the following criteria:

- road alignment will change by 5 m or more; or
- daily traffic flows will change by 1,000 AADT or more; or
- Heavy Duty Vehicle (HDV) flows will change by 200 AADT or more; or
- daily average speed will change by 10 km/hr or more; or
- peak hour speed will change by 20 km/hr or more.

3.13 Identify on an appropriate map (typically 1:25,000 or 1:10,000 scale) all existing and planned properties where people might experience a change in local air quality, near the affected roads. Particular attention should be paid to the locations of the young, the elderly and other susceptible populations, such as schools and hospitals. In addition, areas likely to experience higher-than-average pollution concentrations, such as tunnel portals, roundabouts and junctions, should be identified. Also identify any nature conservation sites (Designated Sites) and their characteristics. The Designated Sites that should be considered for this assessment are those for which the designated features are sensitive to air pollutants, either directly or indirectly, and which could be adversely affected by the effect of local air quality on vegetation within the following nature conservation sites: SACs (SCIs or cSACs), SPAs, pSPAs, SSSIs and Ramsar sites. Sites designated for geological purposes need not be assessed. Further information on Designated Sites is given in Annex F. Only properties and Designated Sites within 200 m of roads affected by the project need be considered.

3.14 If none of the roads in the network meet any of the traffic/alignment criteria or there are no properties or relevant Designated Sites near the affected roads, then the impact of the scheme can be considered to be neutral in terms of local air quality and no further work is needed.

3.15 If any roads are affected by the proposals and have relevant properties or Designated Sites nearby, then examine the available monitoring data and LAQM reports for the area likely to be affected by the project. If an AQMA has been declared for the pollutants of interest, the LAQM report should be carefully studied to identify the boundaries of the AQMA, where the actual Air Quality Strategy objective exceedence area is within the AQMA and whether the EU limit values are likely to be met at relevant properties in the relevant year. Identify areas where it is likely that air quality will improve or deteriorate as a result of changes to traffic flows and traffic speed, or as a result of reduced congestion or queuing times, due to the proposals.

3.16 The judgement of someone with relevant air quality expertise should be used to identify possible locations alongside affected roads and new roads where there may be exceedences of the Air Quality Strategy objectives or limit values. If such locations are identified then undertake a few calculations for the pollutants of concern using the 'Local' application of the DMRB Air Quality Screening Method spreadsheet for the 'worst' affected properties and identify the extent of mitigation required. The instructions for using the spreadsheet are provided in Annex D. The worst affected properties are those that are likely to have the highest pollution concentrations or the largest increases in pollution due to the proposals. The aim of this screening assessment is to quickly identify impacts on a small sample of properties early in the assessment, so that any potential problems are identified. If the proposals are likely to cause a new exceedence of a limit value or a worsening of an expected exceedence, check the calculations and assumptions made and liaise with the Project Team and Overseeing Organisation immediately.

3.17 Determine whether there is sufficient monitoring data already available or whether further monitoring should be undertaken. Measured concentrations, whether from a scheme survey or from existing monitoring, will be needed to verify the model results and to establish a firm baseline. Prepare a brief for further monitoring if needed remembering to include a background monitoring site and to co-locate any passive samplers with a continuous analyser. The extent and complexity of the monitoring will depend upon the size of the project and the risk of exceeding the air quality criteria. Diffusion tubes should be deployed for nitrogen dioxide as a minimum, as these can give a large spatial coverage which will be needed to verify the model results. In complex cases for very major projects and where time permits, a continuous analyser may also be required but this will be rare. Advice on air quality monitoring techniques, monitoring locations, model output verification procedures and application are contained within Defra's Technical Guidance on LAQM.

3.18 If the proposals are expected to alter traffic or road alignment as set out in 3.12 and there are relevant

properties or Designated Sites near the affected roads but no exceedences are identified from the monitoring data, LAQM reports or from the few DMRB screening calculations, then prepare a brief for a simple assessment.

3.19 If the monitoring data or the few DMRB screening calculations indicate that an exceedence of an Air Quality Strategy objective or EU limit value is likely or if the proposals cannot be assessed properly using the DMRB screening method, prepare a brief for the detailed assessment.

Regional Impacts

3.20 For the scoping stage of the regional assessment, identify roads that are likely to be affected by the proposals. Affected roads are those that are expected to have:

- a change of more than 10% in AADT; or
- a change of more than 10% to the number of heavy duty vehicles; or
- a change in daily average speed of more than 20 km/hr.

3.21 If no roads meet these criteria, then it is not necessary to undertake any calculations. However, a qualitative assessment should be made as to whether the project is likely to have a marginal improvement or marginal deterioration in emissions based on the change in distance travelled with the scheme.

3.22 If any roads are likely to be affected by the proposals, then the scoping assessment should recommend that a simple assessment is carried out. An estimate should be made of the change in distance travelled with the scheme in the opening and design years as this will be linked to the change in emissions.

Assessment Level – Simple

3.23 This activity is based on the assembly of data and information beyond that which is readily available. It should enable an understanding to be reached as to the effect of the project or to reach an understanding of the likely effect that identifies the need for a detailed assessment. A simple assessment would be sufficient if it established confidently that the forecast environmental effect would not be a fundamental issue in the decision making process.

3.24 If the scoping assessment indicates that a simple assessment is needed, then the following steps should be followed for local and regional impacts.

Local Air Quality

3.25 Revise as necessary the maps produced during the scoping stage for the various options under consideration, to take account of any project changes and further traffic information. Estimate the number of properties in 50 m bands from the road centre to 200 m from the road centre for each road expected to be affected by the proposals.

3.26 Estimate pollutant concentrations at a wide range of properties that are likely to be affected by the proposals. This should include those that are likely to have the highest concentrations, those that are likely to have the largest changes in concentrations (either decrease or increase), those that are representative of large numbers of properties and those that house the young, the elderly and other susceptible populations. Estimates should be made for a base year and should, where possible, include nearby monitoring locations. The estimates should be made using the 'Local' application of the DMRB Screening Method. The instructions for using the spreadsheet are provided in Annex D.

3.27 Compare the base year model results with measured concentrations and adjust the modelled results as necessary. Care needs to be taken when doing this as it is not straightforward; advice is given in Defra's Technical Guidance on LAQM. The adjusted modelled concentrations should then be compared with the air quality criteria.

3.28 If any of the air quality criteria are estimated to be exceeded with the project in any of the years in which they apply, further calculations should be carried out to determine the first year in which the criteria would be achieved. Furthermore, a detailed assessment will be required.

3.29 If a Designated Site has been identified as likely to be affected by the proposals, NO_x concentrations and nitrogen deposition rates should be calculated within the site. Further guidance is given in Annex F and in summary involves:

1) Calculating annual average NO_x concentrations in the Designated Site(s) in a transect up to 200 m away from each of the affected roads within or near the Designated Sites. The calculations should be carried out for the opening

ANNEX D USING THE DMRB SCREENING METHOD

D1 The Road Network

D1.1 For an assessment of exposure at a particular receptor, the roads included in the calculation should be all those expected to make a significant contribution to pollution at the receptor location in question. In practice, roads more than 200 m away from the receptor can be excluded. The selection of roads can often be made using a large-scale map, together with basic traffic flow data. Where there is uncertainty as to the likely impact of roads in the area, a site inspection is recommended.

D2 Road Type

D2.1 A road type definition must be given for each road included in the assessment. The DMRB Screening Method has been configured with three broad road categories. These are:

Category A	=	All motorways or A-roads
Category B	=	Urban roads which are neither motorways nor A-roads
Category C	=	Any other roads

D2.2 Where the user has information on the composition of the traffic, this should be used in preference to the default values. In this case, the road type definition is not appropriate (labelled category 'D').

D3 Traffic Data

D3.1 Traffic characteristics must be specified for each road in the network under consideration. The revised DMRB Screening Method allows the traffic to be described in two ways.

- In terms of the AADT flow and the proportion of light-duty and heavy duty vehicles (defined respectively as those vehicles with a gross vehicle weight below and above 3.5 tonnes). Depending on the assessment year and road type, the model will refer to a database to derive a more detailed composition for each broad vehicle type. The resulting subdivision will give the national average composition with respect to type (car, light goods vehicle, bus, coach, rigid lorry or articulated lorry), size (engine capacity or weight), fuel (petrol or diesel) and the emission standard.

- Where local traffic classification data are available, these should be used in preference, as it is possible for the local traffic composition to differ significantly from the national average. Data should be given as individual percentages of cars, light goods vehicles, buses/coaches, rigid lorries and articulated lorries. Because it is not simple to observe many of the other variables used in the detailed classification (such as fuel type or emission standard), the model again performs that subdivision using national data.

D3.2 Vehicle emission rates are calculated as a function of average speed. The highest emissions are normally associated with slow speed, congested driving conditions, with the lowest emissions during steady speed operation at an average speed of around 60-80 km/h. The DMRB Screening Method uses annual average vehicle speed as an input parameter. Where no information is available on average speeds and no estimate can be made, then the speed limit may be used as a default. However, given that changes in average speed may have significant impacts on the estimated rates of emission, sensitivity tests using various speeds should be carried out to determine if detailed investigation of the speed is warranted.

D4 Definition of Road Links

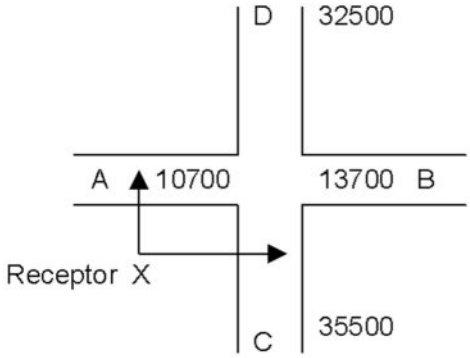
D4.1 The road network within the study area should be divided into sections where traffic conditions (flow, composition and average speed) are reasonably homogeneous. The road network should be divided into as few continuous roads as possible to avoid overestimation by including contributions separately from different parts of the same road. This is often true even when a road is not straight or is interrupted by a roundabout, crossroad or other feature. There will be situations where a short section of road is not part of a longer continuous road and it must be considered as a separate contributor. The data necessary for each link are essentially those described above, but there are slight differences in the approaches for local and regional assessments.

- For local assessments, it is necessary to consider the traffic characteristics at the point nearest to the receptor. Thus, for example, the average speed over a whole link is likely to be higher than that on the same link, but near to a roundabout. If the receptor is close to the roundabout, the lower, localised average speed should be used. This applies to all other traffic data. It is also necessary to specify the distance between the receptor and the centre of each link.

- For regional assessments, which take into account each link in its entirety, the average properties should be used. The length of the link is also required.

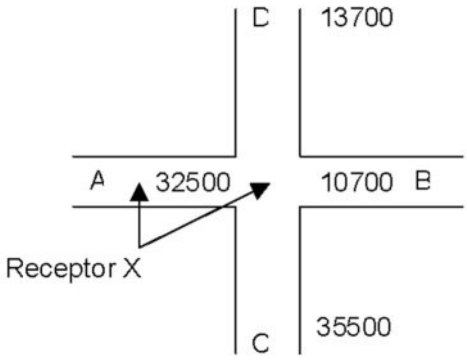
D4.2 The network and network link divisions made are to be shown on a map, with traffic data for each link shown. The principles of road link definition for local assessments are illustrated in the examples given below.

Example 1:



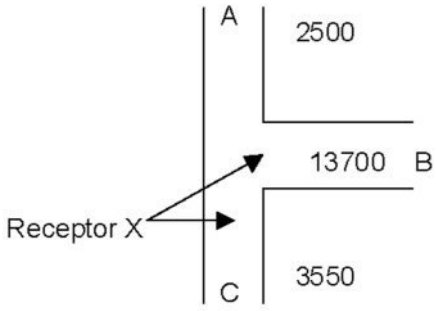
This simple network should be divided into 2 links, AB and CD. For the receptor at X, the distances would be as shown by the arrows. The traffic flows (and other data) would be those on the arms of the crossroad nearest to X. Thus, for link AB, the appropriate flow would be 10,700 and for CD 35,500.

Example 2:



This is the same network as for Example 1, but now it has been assumed that the major flow of traffic takes the route AC. Because road designations are based on homogeneous traffic characteristics rather than geometry, the two links in this case are AC and BD. The closest position to the receptor on link BD is now at the centre of the crossroad, as shown. This point is common to both arms of the link, so the traffic data should be the average, rather than that specific to either of them. Thus, the appropriate flow would be 12,200.

Example 3:



Again, this simple network reduces to two links. On the basis of the traffic flows, arms A and C are most similar (a difference of 10,500 compared with a difference of 11,300 between A and B). The continuous link is therefore designated AC, with the remaining arm, B, becoming the second link. The arrows show the closest distances between the links and the receptor. The appropriate flow for Link AC is 35,500 because the receptor is closer to arm C than arm A. That for link B would be 13,700.

D5.2 While the mapped background concentrations may be directly appropriate for most urban situations, for which several monitoring sites have been used for verification, there are few measurements available for rural locations. An analysis of the rural background concentrations allocated to individual grid squares containing road links indicates that they may be unduly influenced by the road. It is then inappropriate to add a second contribution from the road. Where this issue is considered significant, it is recommended that concentrations are used derived from the average background concentration up to four grid squares away from either side of the road where there are no other significant sources of pollution.

D6 Preparation of Input Tables

D6.1 The data assembled in the way described above should now be assembled into tables in preparation for their input to the spreadsheet. There are small differences between the tables for local impact assessment and those for regional impact assessment.

I. For local assessments data should be provided for each link under the headings shown in Figure D1, and include the distance from the link to the receptor in addition to the traffic flow and composition details. One such table is needed for each receptor location to be evaluated, and for each year under consideration.

II. For regional impact assessments most of the necessary data are identical, but since this evaluation is not made with respect to any individual location, the distance to receptor column is replaced by the link length (Figure D2). An option is also provided to give a title to each link (the street name, for example). This may be helpful in identifying the contributions made by particular parts of the network.

Link number	Distance from link centre to receptor (m)	Traffic flow & speed			Traffic composition						
					Vehicles <3.5t GVW			Vehicles >3.5t GVW (HDV)			
		AADT (combined) veh/day	Annual average speed (km/h)	Road type (A,B,C,D)	% cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV

Figure D1 Input Data for Local Assessment

Link number	Link title	Link length (km)	Traffic flow & speed			Traffic composition						
						Vehicles <3.5t GVW			Vehicles >3.5t GVW (HDV)			
			AADT (combined) veh/day	Annual average speed (km/h)	Road type (A,B,C,D)	% cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV

Figure D2 Input Data for Regional Assessment

D7 Instructions for Spreadsheet Operation

D7.1 The DMRB Screening Method Spreadsheet was developed in Microsoft Excel 97, but is compatible with more recent versions of Excel.

D7.2 The method is contained in a multi-sheet spreadsheet, with five of these sheets immediately accessible by the user. These sheets are as follows:

I. **Title:** This is the title page of the spreadsheet, indicating the version number of the method and the release date.

II. **Local:** This is the sheet to be used for inputting data for the assessment of local air quality in relation to both road project appraisal and local authority review and assessment.

III. **Local output:** This sheet presents the results of the assessment of local air quality. The concentrations of pollutants are stated as annual means, and according to the metrics specified in the air quality criteria. In addition, a table is included to show the contribution of each separate link to the annual mean concentrations estimated for a receptor point.

IV. **Regional:** This is the sheet to be used for inputting data for the regional impact assessment of road projects on road transport emissions.

V. **Regional output:** This sheet presents the results of the regional assessment of the impact of road projects on road transport emissions.

In addition to these five sheets, a sixth sheet, entitled *Calc*, is visible whenever any calculations are being made by one of the macros. This sheet is not visible at any other time.

In order to assist the user, comments are linked to some of the cells to provide definitions and details of the required input data. The presence of a comment is indicated by a red triangle in the top right-hand corner of a cell.

Method for Assessment of Local Air Quality

D7.3 The procedure in the Screening Method spreadsheet for the assessment of local air quality involves seven steps. These steps are highlighted on the *Local* sheet, and are as follows:

Step 1 Enter the receptor name and number ('1' for first receptor, '2' for second, and so on). Up to 20 different receptors can be assessed (one at a time), with each one requiring a unique identification number. If the results for a specified receptor number are already present on the **Local** output sheet, the program will ask for a different receptor number.

Step 2 Enter the assessment year (between 1996 and 2025).

Step 3 Enter the number of links to be assessed for the current receptor. Up to 15 different links can be assessed. In most cases, carriageways on the same road must not be entered separately. Where the two carriageways are grade separated, or take different routes, they should be assessed individually.

Step 4 Enter the background concentrations which are relevant to the locality of the assessment for the assessment year. If there is no requirement to assess a particular pollutant, a zero can be entered as the background value. A result will still be presented for the pollutant on the Local output sheet, but this can be ignored.

Step 5 Enter the distance and traffic data for each link. The number of links specified here must match that defined in Step 3, and the following input data are required:

- The distance in metres from the link centre to the receptor. The minimum distance allowed is 2 m.
- The combined annual average total daily traffic flow (AADT).
- The annual average traffic speed in km/h. This must be between 5 km/h and 130 km/h.
- The road type

  Enter either 'A', 'B', 'C' or 'D' in upper case or lower case, but not a mixture of both. If information on the traffic composition on the link is not available, enter either 'A', 'B', or 'C', where:

  A = Motorways or A-roads

  B = Urban roads which are neither motorways nor A-roads

  C = All other roads

  When a valid entry is made, the cell shading will change to light grey to indicate which type of traffic composition must be used (see below).

  Where information on actual traffic composition is available from classified counts, this may be used in place of the pre-set traffic compositions by entering 'D' in the road type cell. If 'D' is entered in a cell, the cell shading will change to dark grey.

- The traffic composition

  If either 'A', 'B', or 'C' has been entered in the road type cell, then only the total percentages of heavy-duty vehicles (HDVs) and light-duty vehicles (LDVs) need to be entered in the appropriate light grey cells. The dark grey cells must be left blank.

  If 'D' has been entered in the road type cell, the percentage of vehicles in each of the following five classes must then be entered:

  i. passenger cars;

  ii. light goods vehicles;

iii. buses and coaches;

iv. rigid heavy goods vehicles (>3.5 tonnes gross vehicle weight);

v. articulated heavy goods vehicles (>3.5 tonnes gross vehicle weight).

The appropriate values are entered in the corresponding dark grey cells. The light grey cells must be left blank.

Step 6 Click on 'CALCULATE' . During the calculation a message will appear on the screen to indicate the percentage of the calculation which has been completed. When the calculation has been completed, a 'RUN COMPLETE' message appears, and the results for the current receptor can then be viewed on the **Local output** sheet. If only one receptor is to be assessed, the procedure ends at this point. The **Local output** sheet displays the details of the current receptor (name, number, and assessment year), the predicted concentrations for the receptor.

The results for CO, benzene, 1,3-butadiene, NO_x, NO_2 and PM_{10} are presented as annual mean concentrations[32]. For PM_{10} the number of days with concentrations above 50 mg/m^3 is also given.

Step 7 In some assessments, there may be a need to look at several receptors. If this is the case, the results for the current receptor can be stored on the Local output sheet by pressing the STORE RESULTS FOR THIS RECEPTOR button on the Local sheet. Enter data for the next receptor by overwriting the input data already present, or start from scratch by pressing the CLEAR INPUT DATA button.

Method for Regional Impact Assessment

D7.4 The regional impact assessment method involves five steps. These steps are highlighted on the **Regional** sheet, and are as follows:

Step 1 Enter the identifying name for the assessment.

Step 2 Enter the assessment year (1996-2025).

Step 3 Enter the number of links to be assessed. Up to 1,000 different links can be assessed.

Step 4 Either:

Enter the data for each link. The number of links specified here must match that defined in Step 3, and the following input data are required:

- Title of the link (optional).
- Length of the link in km.
- Combined annual average total daily traffic flow (AADT).
- Annual average traffic speed in km/h. This must be between 5 km/h and 130 km/h.
- Road type defined in the same way as in the local air quality assessment.
- Traffic composition defined in the same way as in the local air quality assessment.

Or:

Import the link data as an Excel spreadsheet or a tab-delimited text file. In order to import link data, click on the IMPORT LINK DATA (.xls or .txt) button. This will open the 'Data File to Import' dialogue box. Locate the data file and click on 'Open'. In order to be imported correctly the data file must be in the following format:

[32] For CO the air quality criteria are for a running 8-hour mean of 10 mg/m^3. However, as there is no strong relationship between the CO annual mean and the running 8-hour mean it is not possible to calculate the latter from the annual mean with a high degree of confidence. Therefore, only the annual mean value is reported. The NO_2 criteria are defined in terms of both the annual mean of 40 $\mu g/m^3$, and the number of exceedences of a 1-hour mean of 200 $\mu g/m^3$. Whilst the annual mean NO_2 value is calculated, the number of exceedences of the hourly standard cannot be calculated from the annual mean with a high degree of confidence. Therefore, as with CO, only the annual mean NO_2 value is reported.