GUIDANCE NOTES NO. 1

Guidelines for the Environmental Assessment of Road Traffic

INSTITUTE OF
ENVIRONMENTAL
ASSESSMENT

Guidelines for the Environmental Assessment of Road Traffic

F. W. CUPIT (Printers) LTD.
The Ropewalk, 23 Louth Road,
Horncastle, Lincs., LN9 5ED
Telephone: (0507) 522339
Fax: (0507) 525438

Printed on Savannah Natural Art
Savannah Natural Art contains 60% bagasse pulp, residue from the sugar cane industry which would otherwise be burned as waste. The balance is oxygen bleached soft wood fibre.

Contents

Contents

Preface

These Guidelines were commissioned by the Institute of Environmental Assessment and undertaken by a Working Party comprised of representatives from local authorities, universities, consultants and developers.

In alphabetical order the Working Party members are:

Mr Alan Brooks, Fairhurst & Partners

Ms Fiona Brown, Halcrow Fox and Associates

Dr Tim Coles, Institute of Environmental Assessment

Mr Colin Eastman, JMP Consultants Limited (Chairman)

Mr Keith Hargest, Rendel Planning

Mr John Hilton, Milton Transport Management Limited

Dr Peter Hopkinson, Department of Environmental Science, University of Bradford

Professor Tony May, Institute for Transport Studies, University of Leeds

Mr Alex Macaulay, Central Regional Council

Mr Ron Parry, Tarmac Quarry Products Limited

Dr Miles Tight, Institute for Transport Studies, University of Leeds.

The production of these Guidelines was principally funded by the Rees Jeffreys Road Fund and this enabled Dr Peter Hopkinson initially of the Institute for Transport Studies, University of Leeds, to prepare the original draft of the document. Copies of a draft of the document were circulated widely and the working party would like to record its thanks for the many helpful comments that were received. Any views expressed in these Guidelines are the views of the Working Party members and do not necessarily reflect the views of the organisation which they represent.

A BACKGROUND

1 Aims of the Guidelines

"We have a moral duty to look after our planet and hand it on in good order to future generations. That does not mean trying to halt economic growth. We need growth to give us the means to live better and healthier lives. But growth has to respect the environment. And it must be soundly based so that it can last. We must not sacrifice our future well-being for short-term gains, nor pile up environmental debts which will burden our children".

This Common Inheritance, (DoE, 1990)

Background

1.1 With these words the Secretary of State introduced the Government's White Paper on The Environment in September 1990. The paper was a reflection of the growing concern amongst the general public, businesses and government that the environment needed to be protected from many of the bad practices that have occurred in the past.

1.2 Economic growth and the developments that go with it are important components in the formulation for the creation of a better environment, yet on occasions it is these very same developments which have the potential for producing further harm.

1.3 It was these concerns, and the need to control the environmental effects of development, that led the European Community to establish the need for environmental assessments to be undertaken for major new developments.

1.4 The basic guidelines for these assessments originated with Directive 337, issued by the European Community in 1985 (EC, 1985), which were then confirmed in a set of regulations published by the Department of the Environment (DOE, 1988). While these regulations indicate the issues that are to be considered, they do not provide guidance as to how the assessments should be undertaken.

1.5 In the four years since 1988, over 800 formal Environmental Statements have been published and many more environmental assessments have been undertaken for schemes that fall outside of the Annex 1 and Annex 2 schedules established by the legislation. These Annexes list the type of projects for which formal Environmental Statements are to be prepared. Examples are given overleaf:

Typical projects for which guidelines are applicable:	
Typical Projects Listed Within Annex 1 and Annex 2 Schedules (1)	*Other Projects*
Coal Mining	*Superstores*
Power Stations	*Retail Parks*
Quarrying	*LargeBusiness Parks*
Waste Disposal Sites	*Major Leisure Parks Major*
Urban Regeneration Projects	
(1) The inclusion of projects within Annex 1 and Annex 2 frequently depends upon the size and intensity of the development.	

1.6 Reviews of published statements carried out by Manchester University (DoE 1991a) and the Institute of Environmental Assessment (IEA, 1991) indicate a great deal of criticism has been levelled at the standard and content of many of the environmental statements produced. To improve the standard of environmental assessments and their associated statements, the Institute of Environmental Assessment (IEA) is publishing a series of guidelines on "best current practice" covering a range of topics of particular relevance. These Guidelines are specifically designed to cover the aspects of road traffic associated with major new developments.

1.7 The reviews indicate that many of the published environmental statements give insufficient consideration to the effects of traffic. For many projects, most of the detrimental environmental effects usually result from "on-site" operations. Good design, operating procedures and mitigating techniques can reduce the impact of the development on the local environment; e.g. smoke filters on chimneys, earth mounds to reduce the noise and visual impact, water sprays to reduce dust from quarries, etc. As traffic is largely external to the site, and generally brings the impacts closer to people, it is much more difficult to provide fully effective mitigation. Often the end result is that, once all the on-site mitigation and control systems have been put in place, off-site traffic remains the greatest unresolved environmental issue.

1.8 In 1983 the Department of Transport (DoT) published its Manual of Environmental Appraisal (MEA) (DoT, 1983) which contained guidelines on how the environmental impact of new inter-urban trunk roads should be carried out. This was followed in 1986 by the Scottish Office publication (STEAM) which set out equivalent guidelines to be used in Scotland (SDD, 1986). Although these guidelines were principally designed for inter-urban roads, it has become common practice to use these approaches to provide the environmental assessment of most road schemes. DoT's guidance (DoT, 1988) is that the process set out in MEA meets with requirements of the EC Directive. The whole process of the environmental assessment of trunk roads was reviewed by the Standing Advisory Committee on Trunk Road Assessment (SACTRA, 1992). This review will undoubtedly lead to revisions in the way that the Government will wish to undertake such work in the future

since a general acceptance of the basic recommendations has already been given by Government (DTp, 1992). The MEA is being revised and is due to be republished at about the same time that this document is published.

1.9 The MEA, to which frequent reference will be made in these Guidelines, deals exclusively with the impact of new road schemes. It was not designed to give advice on how to produce an Environmental Statement for traffic associated with a new development. These Guidelines are designed to fill this gap.

Scope of Guidelines

1.10 The Guidelines are for the assessment of the environmental impact of road traffic associated with major new developments, irrespective of whether the sites are to be subject to formal Environmental Statements or not. These guidelines are not designed to be applied to projects such as new trunk roads or railways for which separate and already established procedures exist. The Guidelines are only designed to be applied to off-site traffic impacts, although on-site impacts will also need to be considered as part of the overall assessment.

1.11 The purpose of these Guidelines is to provide the basis for a systematic, consistent and comprehensive coverage for the appraisal of traffic impacts for a wide range of development projects. It is believed that these Guidelines will prove to bring a significant benefit to the design of the project by indicating, at an early stage, potential problems and possible solutions. These Guidelines are not intended to be exhaustive nor a reference for the very detailed or specific problems that occur in assessing the environmental impact of traffic. The Guidelines are intended to complement professional judgement and the experience of trained assessors. The environmental impact of traffic will vary project by project and case by case. The experience and expertise of the assessor will remain of prime importance in conducting an environmental assessment. Moreover, the process and practice of environmental assessment is evolving rapidly, as is legislation and guidance on the environmental impact of traffic. There is therefore, a continual requirement to monitor and update procedures. The structure of the Guidelines is intended to mirror the activities necessary to undertake an Environmental Assessment. Sections 2 and 3 cover the analysis which needs to be undertaken to define and understand the environmental and traffic issues affecting any particular development. Section 4 explains how the various issues can be assessed. Section 5 deals with alternatives and mitigation techniques which can be used to reduce the environmental impact. Finally Section 6 covers the important area of the presentation of the Environmental Statement.

1.12 The assessment of impacts from individual projects cannot be expected to take account of the regional or global environmental effects that arise from the accumulation of many individual projects. Whilst a project-specific environmental assessment should aim to identify potential cumulative effects, it is felt that these can only be considered at a policy or programme level undertaken by central or local government.

1.13 However, it needs to be recognised that the wider environmental assessment of polices and programmes are rarely carried out. The recently published "Policy Appraisal and the Environment" paper (DOE,

1991b) sets out some guidelines, but it will take some time before such appraisals become common practice.

1.14 In some projects the level of traffic to be attracted by a development may be so large, or so significant, that there may be a requirement to construct a new or improved road. There may also be the need to improve access arrangements and sight lines for operational and safety reasons. These guidelines are not principally designed to assess the impact of such works and the assessor is advised to consider existing procedures, such as the Department of Transport's Manual of Environmental Appraisal, modified as appropriate.

The Environmental Assessment Process

1.15 The environmental assessment process should be a continuous activity running throughout the planning and design stages of a project. It would be wrong for the process to be designed solely to produce an Environmental Statement aimed at justifying the final set of proposals. This would underplay the benefits that could be achieved by the continuous dialogue and interplay that should occur between the different sections of the project team and between the project team and outside agencies.

1.16 The Environmental Statement should be a detailed statement of the significant effects of how the final design for the development will interact with the environment.

Summary

- These Guidelines are being published in order to encourage a more comprehensive and consistent approach to assessing the environmental impacts of traffic from major new developments.
- Traffic issues need to be considered in greater depth than has often been the case as, unlike many of the other impacts, it is more difficult to produce effective mitigation.
- The Guidelines are not designed as an assessment approach for new transport infrastructure, such as improved highways or railways, as established procedures already exist.
- Individual projects are unlikely to have an effect on regional or global macro environmental effects.
- An accumulation of individual developments may create a more significant environmental effect on a regional or global basis. This should be assessed as part of a wider appraisal.
- Environmental appraisals should form an integral part of the project planning and design exercise.
- These Guidelines are intended to complement professional judgement and the experience of trained assessors.
- These Guidelines could be used to assess all developments irrespective of whether an Environmental Statement is being produced as a legal requirement or on a voluntary basis.

B ANALYSIS

2 Environmental Issues

Environmental Impacts

2.1 The easiest and perhaps most useful way to ensure the comprehensive coverage of the environmental impacts arising from changes in traffic levels is to provide a check-list of potential impacts arising from developments in general. In producing such a check-list for traffic-related impacts it is possible to refer to a number of sources such as attitudinal surveys, examples of current practice or reviews of legal requirements. All of these sources have been used in producing the recommended check-list set out in Table 2.1. For comparison purposes the table lists, in column 1, the impact headings that are included within the EC Directive, and, in column 2, the impact headings contained within the environmental impact list of the DoT's Manual of Environmental Appraisal (MEA). The MEA is currently being used for the assessment of new trunk roads in England whereas for schemes in Scotland the Scottish Traffic and Environmental Appraisal Manual (STEAM) is the required procedure.

2.2 Column 3 sets out the recommended list of environmental impacts which could be considered as potentially significant whenever a new development is likely to give rise to changes in traffic flows. An assessor may consider that other impacts ought to be included in particular circumstances, in which case inclusions should be at the discretion of the assessor.

2.3 The list in column 3 differs from those in columns 1 and 2 in a number of ways, namely:

- the recommended list does not include the "soil", "water" or "climate" headings given within the EC Directive list because effects on these are normally unlikely to be significant when considering traffic from an individual development
- the recommended list does not include the "effects on agriculture", "disruption due to construction", "view from road" and "driver stress" impacts from the MEA list, as these generally relate to new road construction rather than marginal changes in traffic flow
- the recommended list includes a number of impact headings not specifically included in the other lists, but which are either included routinely by some assessors or considered to be potentially important. These are:

  (i) night time noise (only briefly referred to in the MEA)

  (ii) vibration

  (iii) driver severance and delay

  (iv) pedestrian severance and delay

  (v) pedestrian amenity

  (vi) accidents and safety

  (vii) hazardous and dangerous loads

  (viii) dust and dirt.

Checklist of Environmental Effects Table 2.1

EC DIRECTIVE	MEA	IEA GUIDELINES
- Humans	- Traffic noise	- Noise
		- Vibration
	- Visual impact	- Visual Impact
	- Community severance	- Severance
	- Effects on agriculture	
	- Disruption due to construction	
	- Pedestrians and cyclists	- Driver delay
		- Pedestrian delay
		- Pedestrian amenity
	- View from road	
	- Driver stress	
		- Accidents and safety
		- Hazardous loads
	- Air pollution	- Air pollution
		- Dust and dirt
- Flora	- Ecological impacts	- Ecological Impact
- Fauna		
- Soil		
- Air		
- Water		
- Climate		
- Material assets	- Heritage and conservation areas	- Heritage and conservation areas
- Cultural heritage		

It is noted that items (iii) and (vi) of the above list would normally be included within the DoT's cost-benefit analysis for a new road scheme (COBA) and be repeated within the Appraisal Framework. It is, however, proposed that these effects should be identified separately in environmental assessments.

2.4 It is likely that for many developments some of the impacts listed in column 3 of Table 2.1 will not be widely relevant. For example, most developments will not result in increases in the number of movements of hazardous/dangerous loads. It should, however, be the responsibility of those undertaking the assessment to demonstrate why specific impact headings have been excluded from more detailed consideration and the Environmental Statement should include a paragraph to that effect.

Affected Parties

2.5 At an early stage, it is useful to identify particular groups or locations which may be sensitive to changes in traffic conditions. The following check-list identifies groups and special interests which should be considered, but others could be added if the assessor considered it appropriate.

Affected groups and special interests

- people at home
- people in work places
- sensitive groups including children, elderly and disabled
- sensitive locations, eg hospitals, churches, schools, historical buildings
- people walking
- people cycling
- open spaces, recreational sites, shopping areas
- sites of ecological/nature conservation value
- sites of tourist/visitor attraction

2.6 In drawing up a list of key interests, it is recommended that the assessor should consult widely with the Local Planning and Highway/ Road Authorities, representative bodies and affected groups. The assessor will be able to gain much valuable information and back-ground from current Development Plans and other documents. All such references should be clearly indicated in the Statement.

2.7 The assessor may find it helpful to plot the location of these key groups on a map. Such a technique is valuable in presenting large amounts of information succinctly and clearly.

2.8 In preparing an Environmental Statement it is considered that the documentation should enable significantly affected people, parties or interests to be able to identify the "worst" environmental impact that might reasonably be expected, in addition to how they would be affected by the average or typical condition. This issue is returned to in paragraph 3.10 of these Guidelines. "Worst" environmental impacts are likely to include the effect of "greatest change" as well as "highest impact".

2.9 The Environmental Statement should also indicate how frequently the "worst" conditions are likely to occur. The Environmental Statement must, therefore, be locationally defined and be specific in terms of effect. For instance, 18 hour average noise levels, which might be used in the comparison of alternative road schemes, have little meaning to local residents being affected by increased quarry traffic or traffic being attracted to a Superstore on a Saturday afternoon.

Summary

- Table 1 contains the recommended list of traffic related impacts that should be considered within an Environmental Statement.
- If potential impacts are small or non-existent the Statement should say so rather than ignore them. Other impacts should be added if relevant.
- Potentially affected groups or interests should be identified early in the process.
- Consultations should be held with Statutory Authorities, representative bodies and affected groups to draw up the list of affected interests.
- The Statement should identity the "worst" environmental impact that might reasonably be expected in addition to average or typical conditions.
- "Worst" environmental impact is likely to include the effect of "greatest change" as well as "highest impact".
- The Statement should identify how frequently the "worst" conditions are likely to occur.

3 Traffic Issues

Traffic Impact

3.1 The impact of traffic is dependent upon a wide range of factors. These include:

- volume of traffic
- traffic speeds and operational characteristics
- traffic composition (e.g. percentage of heavy goods vehicles).

3.2 The perception of changes in traffic by humans, and the impact of traffic changes on various ecological systems will also vary according to such factors as:

- existing traffic levels
- the location of traffic movements
- the time of day
- temporal and seasonal variation of traffic
- design and layout of the road
- land-use activities adjacent to the route
- ambient conditions of adjacent land-uses.

3.3 Clearly different types of development will attract different levels and types of traffic and, hence, different environmental impacts. The same type of development with the same traffic attraction may, however, produce a different environmental impact in one location from another, dependent upon traffic levels on the affected routes and the adjacent land-uses. This makes the environmental assessment of traffic changes particularly complex, and the development of overly prescriptive methodologies of little use to assessors. This complexity however, should not be an excuse for the production of a Statement that fails to make explicit the methodologies used, nor deal with the inherent uncertainties of the assessment.

3.4 The assessment of the environmental impacts of traffic requires a number of stages, namely:

- determination of existing and forecast traffic levels and characteristics
- determining the time period suitable for assessment
- determining the year of assessment
- identifying the geographical boundaries of assessment

These points are detailed below.

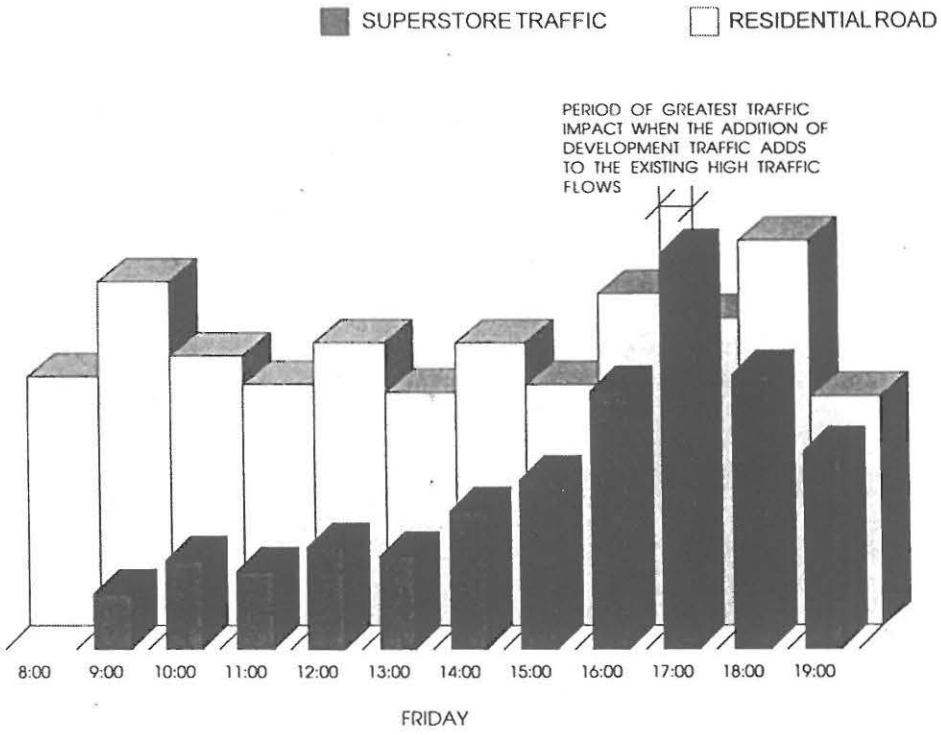
Determination of Traffic Levels

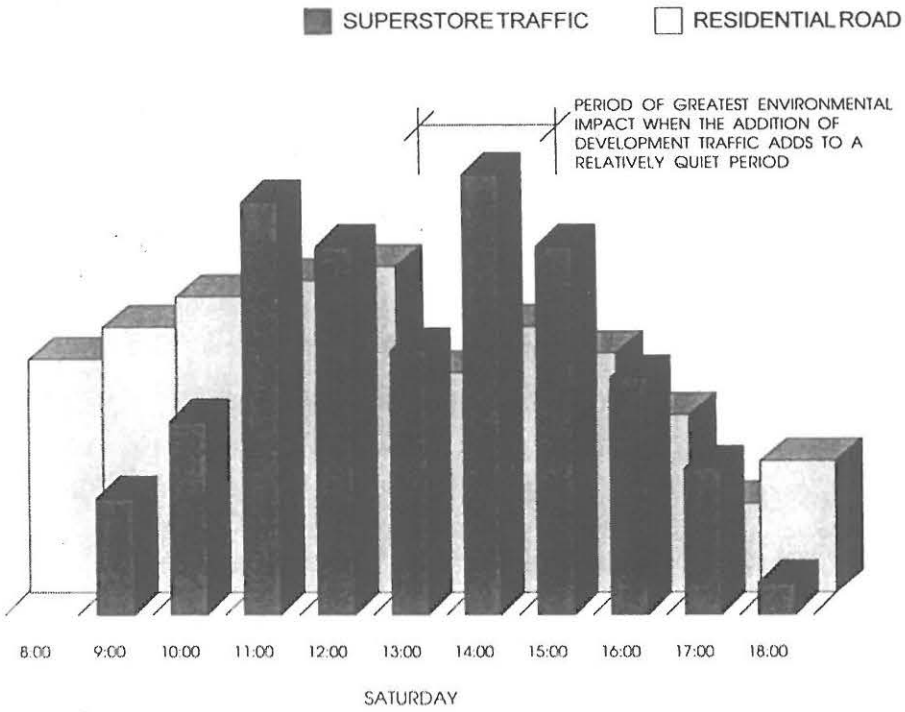
3.5 It is not the intention of these Guidelines to set down procedures for the estimation of base-line traffic conditions or the changes in traffic flow that will arise from a new development. Guidance on such procedures is currently being formalised by a Working Party co-ordinated by the Institution of Highways and Transportation.

3.6 The traffic impact assessment should produce estimates, not only of the traffic being attracted to the development, but also the projection of traffic volumes along key routes leading to the site. Estimates of heavy goods vehicles movements should be provided separately.

Figure 3.2

EXAMPLE 2
A new food superstore attracts upto 200 vehicles an hour at peak time along a residential road





3.9 For many impacts, such as noise or severance, it is considered that average or total daily traffic flows provide insufficient information for any real understanding of the environmental effects, and the analysis needs to be presented for much more specific time periods.

3.10 The detailed assessment of impacts is therefore likely to concentrate on the period during which the absolute level of an impact is at its peak, as well as the hour at which the greatest level of change is likely to occur. Special attention should also be given to periods which may be considered to be especially sensitive, such as night-time noise.

Year of Assessment

3.11 Some developments may pass through a number of stages in their lifetime, during which time the volume and type of traffic may be different leading to different environmental impacts. For example, traffic attracted during the construction phase is likely to be different from the operational phase and different again from a de-commissioning phase (where this is necessary). An environmental assessment may, therefore, need to address each of these stages as a separate set of impacts (see Figure 3.3. as an example).

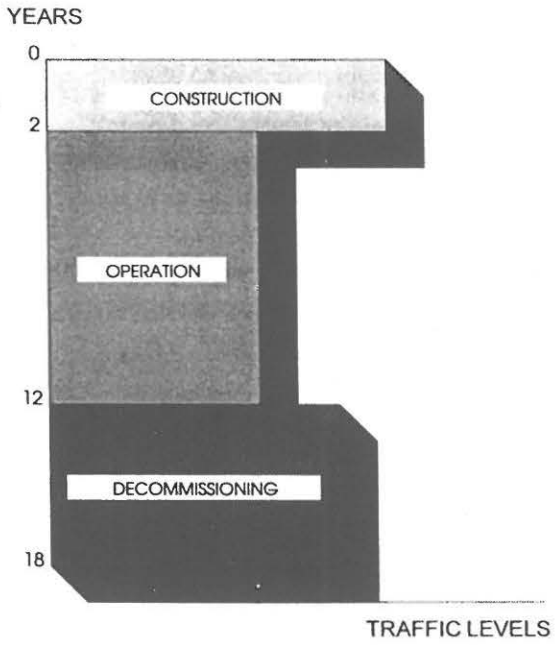
Figure 3.3

EXAMPLE OF PHASED DEVELOPMENT PHASING

STAGE 1
2 Years construction, average 250 vehicles per day, mostly employees but some very large machinery

STAGE 2
10 Years operation, 100 lorries per day plus 100 other vehicles

STAGE 3
6 Years decommissioning, 200 lorries per day plus 50 other vehicles

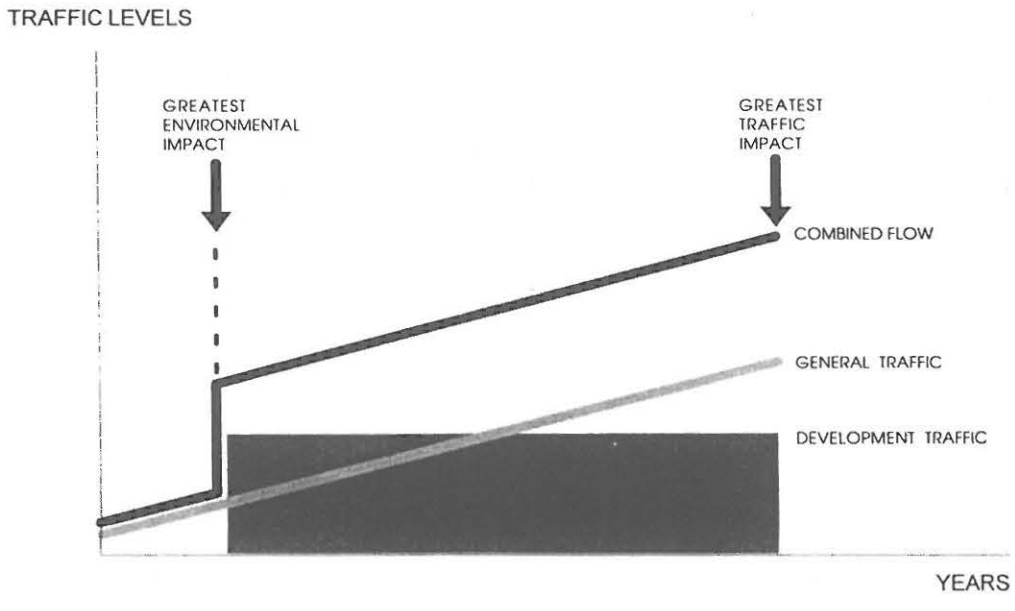


3.12 Different traffic forecasts may have to be produced for each stage, which may also require the estimation of the changing patterns of general traffic levels in order to provide estimates of different base-line conditions. It will also be necessary to make an assumption with regard to other proposed developments and forecasted changes in the highway network that could occur over the time period. These assumptions will need to be based on best judgement taken in consultation with the Local Planning Authority. Any changes in ambient environmental characteristics should also be taken into account.

3.13 As stated previously, a traffic engineer may be principally interested in evaluating a situation when traffic flows are at their greatest. This may involve looking at a period some time in the future when traffic from the development is added to traffic flows on the surrounding network which has itself increased due to natural traffic growth. Such a situation clearly presents the critical traffic pattern, but the natural increase of traffic will generally have the effect of diluting the environmental impact of a development. The greatest environmental change will generally be when the development traffic is at the largest proportion of the total flow. (See example in Figure 3.4). It is therefore recommended that the environmental assessment should be undertaken at the year of opening of the development or the first full year of its operation. For a phased development it may be necessary to consider the first year of each phase.

Figure 3.4

ENVIRONMENTAL AND TRAFFIC IMPACTS FROM A NEW DEVELOPMENT



Geographical Boundaries of Assessment

3.14 An important prerequisite of the environmental assessment is to determine the geographical boundaries of the assessment. This is not an easy task. For example, different projects will give rise to different levels of traffic attraction and vary in the geographical extent of their traffic and environmental impact. If a project attracts only a small number of additional trips which take place on routes already heavily trafficked, then it is unlikely that there will be a need for a detailed environmental assessment of traffic. On the other hand, a single lorry movement arising at a works may be perceived as a source of nuisance when it takes place at 05.00 in the morning. Judgements will inevitably be required to define the geographical boundaries of the assessment. Such judgements will tend to be based upon a combination of experience and implicit assumptions, however, it is important that these assumptions are made explicit in the Statement.

3.15 To assist the assessor it is suggested that two broad rules-of-thumb could be used as a screening process to delimit the scale and extent of the assessment. The rules are described and justified in the following paragraphs:

Rule 1	**include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%)**
Rule 2	**include any other specifically sensitive areas where traffic flows have increased by 10% or more.**

Rule 1

3.16 Traffic forecasting is not an exact science and the accuracy of projections is open to debate. It is generally accepted that accuracies greater than 10% are not achievable. It should also be noted that the day-to-day variation of traffic on a road is frequently at least some + or -10%. At a basic level, it should therefore be assumed that projected changes in traffic of less than 10% create no discernible environmental impact. The cumulative effect of a number of developments attracting less than 10% of additional traffic may need to be assessed at a broader strategic or policy level.

3.17 Previous research has identified that the most discernible environmental impacts of traffic are noise, severance, pedestrian delay and intimidation (Hedges, 1978). Generally, people cannot perceive a change in noise nuisance for changes in noise levels of less than 3 dB(A); such change requires a doubling or halving in the level of traffic. Recent research (Baughan and Huddart, 1992) is tending to suggest that this threshold is likely to be reduced to 1dB(A). At low flows, increases in traffic of around 30% can double the delay experienced by pedestrians attempting to cross a road (DoT, 1983). Whether this is significant in absolute terms requires further consideration (see 3.19). Severance and intimidation are, however, much more sensitive to traffic flow and the Department of Transport, in its MEA, has assumed that 30%, 60% and 90% changes in traffic levels should be considered as "slight", "moderate" and "substantial" impacts respectively.

3.18 It should be noted that the Department of Environment suggests, in Policy Planning Guidance Note 13 (DOE, 1988), that increases in traffic of 5% are likely to be considered as significant by the Department of Transport. The context of such a statement relates to the operational and capacity criteria of highway and not its environmental impacts. It is recommended that the criteria set out in these paragraphs are more relevant to the assessment of environmental impacts and hence the higher thresholds are more relevant.

3.19 Other environmental impacts, (eg. pollution, ecology, etc.) are less sensitive to traffic flow changes, and it is recommended that, as a starting point, a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment. Where there are major changes in the composition of the traffic flow, say a much greater flow of HGV's,a lower threshold may be appropriate. An example of the sensitivity of environmental conditions to changes in traffic flow is illustrated below.

A major new industrial plant attracts 150 vehicles per hour. The traffic follows a single route to reach the major highway network. An initial indication of environmental impact is tabulated below.

Road	Flow (vehicles/hour)				Severance	Noise	Link to be assessed
	Base	Development	Total	% Increase	Impact (1)	Impact	under "Rule 1"
A	150	150	300	100%	Substantial	Perceivable	Yes
B	400	150	550	40%	Slight	Not Perceivable	Yes
C	800	150	950	19%	Less slight	Not Perceivable	No

(1) As defined by DTp.

(Key: A - Access Road, B - Local Distributor, C - Main Road)

Rule 2

3.20 The assessor should include any other link or location where it is felt that specific environmental problems may occur. If these guidelines have been followed the assessor would already have compiled a list of potentially affected group and special interests (paragraph 2.4) and this would be the starting point. Locations would include accident black-spots, conservation areas, hospitals, links with high pedestrian flows, etc. Normally it would not be appropriate to consider links where traffic flows have changed by less than 10% unless there are significant changes in the composition of traffic, eg. a large increase in the number of heavy goods vehicles.

Summary

- The environmental impact of traffic will be dependent upon existing conditions and adjacent land uses as well as changes in traffic levels.
- Assessments should consider the period (possibly the hour) at which the impact is greatest and the period at which the impacts exhibit the greatest change.
- Peak environmental impacts may well occur at times other than the "peak hour", and traffic assessments may need to be undertaken for a number of time periods.
- Environmental Assessments may need to be undertaken separately for different phases in the life of the project.
- Assessment should be undertaken in the year of opening (or first year of a phase) when, generally, the perceived environmental impact is at its greatest. As a guide, highway links should be separately assessed when:

  - traffic flows have increased by more than 30%

  or - other sensitive areas are affected by traffic increases of at least 10%

  or - HGV flows have increased significantly.

C ASSESSMENT

4 Determining the Magnitude and Significance of Environmental Impacts

4.1 Having identified which environmental impacts are to be considered, and the highway links which need to be included within the analysis, the next stage of the assessment is to quantify the magnitude of the environmental impact and to identify the level of significance that such change may have. This may have been partially undertaken as part of the process of identifying the geographic area of assessment but this exercise will need to be completed in more detail. The process will require the determination of the change in the physical level of an impact, and estimation of the number of people exposed to the change. This will require the definition of both base-line conditions and estimation of conditions for the appropriate year of assessment (see 3.11 - 3.12).

4.2 The assessment of impacts will need to determine both the change in magnitude of the impacts as well as their absolute levels. In the preceding section it was suggested that detailed environmental impact studies will normally only be triggered where road links experience a change in traffic of greater than 30%, or more than 10% where the links contain sensitive interest.

4.3 The determining factors which need to be taken into account when assessing the impact of traffic will vary for each type of impact. In the case of noise, for example, traffic volume, the percentage of heavy goods vehicles and the distance from the road will be major factors. During night-time periods peak noise events may also require careful consideration. In the case of pedestrian fear and intimidation, the speed and size of vehicles and width of pavement will be important. It would be good practice to set out the key factors which are to be considered for each impact at the initial stages of the assessment.

4.4 Certain environmental impacts are easier to quantify and measure than others. Traffic noise for example has been researched extensively and reliable techniques have been developed for measuring and predicting noise levels from known traffic data. For other impacts such as severance, where the factors contributing to the problem are poorly

understood and more subjective, there are currently no proven or reliable techniques. The assessment of certain impacts may therefore depend more upon description and judgement than any commonly agreed method. However, even where impacts are well studied, the methods of assessment are in a state of evolution. There may therefore be a number of alternative assessment methods; where this occurs the assessor should provide reasons, simply stated, for the actual choice of method.

4.5 A critical feature of an environmental assessment is determining whether a given impact is significant. Having quantified the magnitude of the impact (i.e. the level of change) there are various ways of interpreting whether or not this is considered significant. For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources. Those preparing the Environmental Statement will need to make it clear how they have defined whether a change is considered significant or not.

Noise

4.6 Existing and forecast traffic noise levels are greatly influenced by the volume of traffic, percentage of heavy goods vehicles and distance from the source. Given the logarithmic relationship between noise levels and traffic volume, the higher the existing level of traffic, the greater the increase in traffic which is required to produce a given noise change. Typically, a halving or doubling of flow produces a 3dB(A) change in noise level. Where existing flows are high, incremental traffic flow increases (except for the largest types of development) are unlikely to produce noticeable changes in perception, although they may exacerbate existing noise problems.

4.7 Road traffic noise may require two separate considerations: day-time and night-time noise. For free flow conditions the standard procedure, adopted by DoT and most other assessors, is to estimate base-line and future noise levels using the procedures set out in the Calculation of Road Traffic Noise (CRTN) (DoT, 1988b). This approach uses the L10 dB(A) index, which corresponds to the arithmetic mean of the noise level exceeded for 10% of the time, for a given time period; typically one hour or 18 hours.

4.8 It is considered that the calculation of an 18 hour noise level provides an insufficient guide as to the potential impact of many developments. Values expressed in terms of hourly levels for the peak condition, or the hour at which the greatest change occurs, are likely to provide a more useful picture of the potential impacts.

4.9 As a starting point CRTN offers a helpful, widely used and generally reliable approach to the prediction of road traffic noise levels. Wherever the traffic flow is low or intermittent, such as occurs during night-time conditions or on some rural roads, the L10 index may not be a reliable indicator of community nuisance. Similarly, where traffic flows are congested, CRTN is generally not an accurate prediction of noise levels.

4.10 The Department of Environment has recently published (DOE, 1991) a draft Planning Policy Guidance Note (PPG) on Planning and Noise. The draft PPG recognises that traditionally, different indices have been used to described noise from different sources and limits have been set over different time periods. This has caused confusion, and a move towards consistency is being promoted by expressing all noise in terms of LAeq over the 16 hour period 0700-2300 (or 2300-0700 for night time).

The Department of Environment is recommending that the expression of noise levels should be in terms of LAeq over a 16 hour period, 0700-2300. The value is to be assumed to be assessed at a point 10m away from a building at a height of 1.2-1.5m.

An approximate conversion between LAeq and LA10 as estimated from CRTN is given by:

i) LAeq 16 hour approximately equivalent to LA10 18 hour - 2dB

ii) facade levels should be assumed to be 3dB higher than levels measured 10m away from the building

For high traffic flow roads a one hour LA10 level is generally 1dB higher than an average 18 hour value but this could change with the nature of the traffic.

4.11 It needs to recognised, however, that there are currently no acknowledged means of predicting traffic noise directly in terms of LAeq apart from a relationship with LA10. Also the relationship between noise and people's perception of nuisance has not been well established in terms of LAeq. Hence, although DoE is promoting the use of noise exposure categories in terms of LAeq the current basis for the calculation of traffic noise needs to continue to be CRTN.

4.12 The MEA identifies two thresholds for defining the significance of noise level changes resulting from new trunk road provision. These are an absolute threshold of 18 hour L10 of 68 dB(A) and a change of + or - 3 dB(A). The former threshold is used in the determination of the eligibility of properties for noise insulation. The latter has been generally regarded as the change in noise level which results in a minimum perceptible change in disturbance.

4.13 Whilst these thresholds provide a useful starting point they should not be considered as definitive. Although the 68 dB(A) standard has been adopted in noise insulation legislation it should not be regarded as the only significant threshold. The standard was developed to apply only to residential properties and does not reflect impacts that occur outside of the property, whether that be in the garden or pedestrians walking along the footway.

4.14 It should also be noted that the 3dB(A) threshold is based upon studies which have measured human response to steady state conditions of freely flowing traffic. Evidence has shown that where people experience a change in noise level, particularly where the noise changes in character due for instance to the increase in the number of heavy goods vehicles, the reported change in nuisance is far greater than would be predicted from the steady state model (Griffiths et al,

Driver Delay

4.32 Within the assessment of a new highway, the valuation of delays or benefits occuring to road users is included in the transport economic evaluation of the scheme. No such economic evaluation is generally undertaken for a single new development, so it is important that these effects should be specifically identified within the environmental assessment.

4.33 Traffic delays to non-development traffic can occur at several points on the network surrounding the site including:

- at the site entrance where there will be additional turning movements
- on the highways passing the site where there is likely to be additional traffic and the flow might be affected by additional parked cars
- at other key intersections along the highway which might be affected by increased traffic
- at side roads where the ability to find gaps in the traffic may be reduced, thereby lengthening delays.

4.34 Values for delay due to these elements can be determined by the use of the Department of Transport's computerised junction assessment packages (e.g. ARCADY for roundabouts, PICADY for priority junctions and OSCADY for traffic signalised intersections) or other suitable programs. Each package produces estimates of vehicle time and delay through the junction and hence, by testing each intersection for the base-line condition and with the development, it is possible to estimate increased vehicle delays. These delays are only likely to be significant when the traffic on the network surrounding the development is already at, or close to, the capacity of the system.

Pedestrian Delay

4.35 Changes in the volume, composition or speed of traffic may affect the ability of people to cross roads. In general, increases in traffic levels are likely to lead to greater increases in delay. Delays will also depend upon the general level of pedestrian activity, visibility and general physical conditions of the site.

4.36 The Manual of Environmental Appraisal sets out a predictive method for determining the mean delay experienced by pedestrians for different types of crossing for different levels of traffic flow (Goldschmidt, 1976). This method provides a useful approximation for determining the likely levels of pedestrian delay at different traffic levels.

4.37 The MEA does not suggest any thresholds for judging the significance of absolute or actual changes in levels of delay. Various thresholds have been suggested over the years (GLC 1975, Headicar 1979), although these have not been based upon any clearly defined empirical investigations. More recently, work (HFA, 1990) has suggested a lower threshold of 10 seconds delay and an upper threshold of 40 seconds delay which, for a link with no crossing facilities, equates to the lower threshold of a two-way flow of about 1400 vehicles per hour. Given the range of local factors and conditions which can influence pedestrian delay, it is not considered wise to set down any thresholds but instead it is recommended that assessors use their judgement to determine whether pedestrian delay is a significant impact.

4.38 In order to determine the number of pedestrians crossing the road, or walking along pavements it is recommend that sample counts be

taken, either using video or manual methods. Recent work (TRRL, 1991) relating to pedestrian movements both along and across the highway, has shown that three 20 minute sample counts undertaken during the morning peak, morning and afternoon off-peak can be used to achieve a reliable grossing-up of daily flows.

Pedestrian Amenity

4.39 The term pedestrian amenity is included in the MEA. It is broadly defined as the relative pleasantness of a journey, and is considered to be affected by traffic flow, traffic composition and pavement width/ separation from traffic. This definition also includes pedestrian fear and intimidation, and can be considered to be a much broader category including consideration of the exposure to noise and air pollution, and the overall relationship between pedestrians and traffic. The MEA suggests that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled.

Fear and Intimidation

4.40 A further impact traffic may have on pedestrians is fear and intimidation. The impact of this is dependent on the volume of traffic, its HGV composition, its proximity to people or the lack of protection caused by such factors as narrow pavement widths. Whilst this danger has been recognised as an important environmental impact for many years, there are no commonly agreed thresholds for estimating levels of danger, or fear and intimidation, from known traffic and physical conditions.

4.41 In the absence of commonly agreed thresholds, recent work (HFA 1990) which put forward thresholds for fear and intimidation based upon an earlier study (Crompton and Gilbert, 1976) can be useful. These thresholds define the degree of hazard to pedestrians by average traffic flow, 18 hour heavy vehicle flow and average speed over an 18 hour day in miles/hour. It is considered that thresholds, set out below, could be used as a first approximation of the likelihood of pedestrian fear and intimidation, although other factors need to be included, e.g. proximity to traffic, pavement widths. Whilst most of these factors can be quantified there will be a need for judgement to be exercised in determining the degree of fear and intimidation. Special consideration should be given to areas where there are likely to be particular problems such as high speed sections of road, locations of turning points and accesses. Areas exposed to higher than average levels of school children, the elderly or other vulnerable groups should be separately identified. The movement of hazardous loads will heighten people's perception of fear and intimidation and if this is likely to occur it should be noted.

Example of Fear and Intimidation

Degree of hazard speed	*Average traffic flow over 18 hour day vehicle/hour*	*Total 18 hour heavy goods vehicle flow*	*Average over 18 hour day mile/hour*
Extreme	*1800 +*	*3000 +*	*20 +*
Great	*1200-1800*	*2000-3000*	*15-20*
Moderate	*600-1200*	*1000-2000*	*10-15*

Source: Crompton (1981)

Note: The traffic components can be weighted to give an overall score of fear and intimidation corresponding to particular combinations of ttraffic flow, speed and composition.

Accidents and Safety

4.42 The assessment of existing link road accident rates can be obtained from Highway Authority records. If such information is not readily available, reference could be made to national statistics. From knowing the expected increase in vehicle-kms on different classes of road, it will be possible to make an initial simple statistical assessment of the likely increase or decrease in the number of accidents resulting from changes in traffic flows and composition. Where a development is expected to produce a change in the character of the traffic (e.g. HGV movements on rural roads), then data on existing accident levels may not be sufficient. Professional judgement will be needed to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents, e.g, junction conflicts. The assessor may find it valuable to refer to the Institution of Highways and Transportation publication on the safety auditing of highways (IHT, 1990).

Hazardous Loads

4.43 Some developments may involve the transportation of dangerous or hazardous loads by road and this should be recognised within any Environmental Statement. Such movements should include specialist loads which might be involved in the construction or decommissioning phases of the development, in addition to movements associated with the operation of the establishment.

4.44 The Environmental Statement needs to clearly outline the estimated number and composition of such loads. Where the number of movements is considered to be significant, the Statement should include a risk or catastrophe analysis to illustrate the potential for an accident to happen and the likely effect of such an event. The extent of such analysis would clearly have to reflect the nature of the product being distributed. For instance, much more detail would be required for a scheme that involved the transportation of nuclear products than for one that involved the delivery of petroleum.

4.45 In the absence of more specific information a basic estimate of the

risk of a vehicle being in an accident can be determined from national accident records (DoT, 1991) which can give values of accidents per million vehicle kilometres. Further factors could then be applied to provide estimates of the likelihood that any accident would result in a spillage or leak of toxic material.

4.46 Where it is considered that there is a risk that an accident could occur a separate analysis should be undertaken which describes the potential environmental effect of any spillage and the recovery procedures that would be adopted.

4.47 It needs to be remembered that the analysis is likely (hopefully!) to produce very small probabilities which, when considered over the life of the development, should still produce very low numbers. Once the summed probability exceeds 0.5 over the life of the development, there is a greater than 50% chance that an accident will occur.

4.48 Where a site is likely to involve significant movement of hazardous loads, discussions should be held with the local emergency services and the Health and Safety Executive (HSE). The HSE will be able to give guidance on acceptability criteria for major hazard accidents.

Example

An establishment receives one delivery of highly toxic material a day over the 30 year life of the development. The material is carried in flasks designed (and tested) to withstand a collision at 70mph and a fall onto hard ground of in excess of 10m. On the journey to the site the load travels across two viaducts with a total length of 200m where the fall is greater than 10m.

- *The accident risk to the vehicle is taken at 2 per 100 million vehicle/kms (this being the accident rate for serious or fatal accidents involving HGVs).*
- *The probability of an accident occurring at the viaduct is therefore $0.2 \times 2 \times 10^{-8}$ or 4×10^{-9}.*
- *The number of journeys across the viaduct in 30 years is 6×10^{3} (based on 200 working days a year).*
- *Hence, risk of accidents occurring at a location where spillage is possible is 2.4×10^{-5}.*

At this level of risk it is considered that no further catastrophe analysis needs to be undertaken.

Air Pollution

4.49 The volume of traffic, its speed and operating characteristics (e.g. stationary, accelerating), and distance from the source are major factors influencing kerbside air pollution levels.

4.50 Some local authorities may have records of air pollution levels for certain streets. This can provide a useful source of information. Where such values are already recognised to be high, special consideration will need to be given to the area in the assessment.

4.51 The DoT's Manual of Environmental Appraisal provides a graphical screening method for estimating the level of carbon monoxide for given traffic flows, with correction factors to be applied for different speeds. The speed correction factor rises sharply with declining speed below 40km per hour, and therefore caution should be taken when using the method for estimating carbon monoxide levels in congested conditions.

In heavily congested conditions, where it is suspected that air quality standards may be breached, then consultation with the local authority is recommended. This may lead to a requirement for new measurements. As an example, a flow of 1,000 vehicles per hour, with an average speed of 40km per hour, would be estimated to give a one-hour concentration of 2.4 ppm at 10m from the centre of the road. If the speed was to drop to 20km per hour the concentration would increase to 4.6 ppm. Carbon monoxide concentrations are taken to be proportional to traffic flow and hence a doubling of flow, would double that carbon monoxide concentration level.

4.52 The MEA provides an air quality standard for carbon monoxide as the basis for denoting significant air pollution impacts. The DTp recognises that an air pollution problem exists once an 8 hour average concentration of 9 ppm or a 1 hour peak concentration of 35 ppm occurs at least once a year. A trigger point of 4 ppm, annual average one hour concentration in any of the first 15 years after opening, is recommended in the MEA as the level at which a more in-depth air quality report would normally be required. The MEA currently provides best practice although these are currently the subject of further review in response to new regulations on catalytic converters.

4.53 The measurement and prediction of other airborne emissions from mobile sources is complex, and no simple models exist for situations where air quality problems are likely to occur. Expert advice should be sought where more detailed investigations are considered necessary.

4.54 Where air quality is judged to be a problem, a more detailed analysis needs to be carried out and an estimate of the number of people likely to be exposed to those conditions should be made.

Dust and Dirt

4.55 Dust and dirt created by traffic can be a problem arising from the operations of certain types of development, notably quarrying and the transport of quarried materials. The impact of dust and dirt will depend, to a large extent, upon the management practices undertaken on site, e.g. washing-down of wheels and sheeting. There are no simple formulas to predict the level of dust and dirt which might arise from vehicle movements. Description of the number of lorry movements, prevailing wind direction and experience of similar developments, elsewhere, either locally or nationally, will be useful background information on which to base an informed judgement. It should be noted that problems with dust and dirt are unlikely to occur at distances greater than 50m from the road.

4.56 The number of properties, or sites, e.g. SSSI's, likely to be affected by dust and dirt should be identified.

Ecological Effects

4.57 The assessment will need to consider the effect of any additional traffic on the ecology of the area. Whilst not intending to downgrade the importance of ecology it is considered that significant effects will only rarely occur. The two most important causes of any impact are likely to arise from chemical spillage (referred to in paragraph 4.44 et al) or from the removal of hedgerow and habitats as part of any highway improvement scheme.

4.58 Where ecological effects are likely to be important, reference should be made to the Guidelines document currently being prepared by the IEA.

Heritage and Conservation Areas

4.59 The assessment of the full set of impacts described in the preceding paragraphs will need to draw particular attention to any areas of conservation and heritage value, (including both the man-made and natural environment which might be affected). This may require the assessment to be more detailed in the vicinity of such areas. Particular importance should be given to any noise intrusion on both the settings and the feature of any area, and any increase in severance between the main feature and its setting with particular concern for pedestrian movement.

Summary

- The Assessment of environmental impact involves the prediction of the magnitude of the impact and a judgement regarding its significance.
- The full range of impacts, as set out in this section should be considered.
- Where an impact is considered to be insignificant for a particular development, this should be stated.
- Current "best practice" should be used to determine the magnitude and significance of each impact. The Statement should clearly identify the methodology adopted and the source of any basic data.

5 Alternatives and Mitigation

Alternatives

5.1 The EC Directive suggests that an Environmental Statement should outline alternative sites, where they have been considered and any mitigation measures that have been applied to reduce the impact of any development. This is not an easy topic and reviews of recently published Statements indicate that these issues are generally poorly covered.

5.2 It needs to be recognised that, although it is generally possible to examine and compare alternative alignments for a highway route, such alternatives do not exist for many developments. For instance, a quarry needs to be located where the material exists, and an urban re-development takes place on land within the ownership of the developer. Commercial decisions relating to the price and availability of land are other issues for which, in many cases, it would be unreasonable for a developer to discuss in public. In such instances, the consideration of alternative sites would generally be inappropriate.

5.3 Where it has been possible to consider a range of sites, the Environmental Statement should include a summary of the impacts of each case, and the reason for selecting the preferred site should be stated.

Mitigation

5.4 The distinction between the mitigation of adverse environmental effects and the design of an "environmentally friendly" development in the first place is difficult to make. For instance, in designing the construction of a new trunk road so that it lies slightly beneath the ground level of the surrounding land, and therefore using the extracted material to provide earth mounding, may be considered good environmental practice (a recent example is the M40 around Oxford). In such circumstances, it is considered inappropriate to produce an Environmental Statement that, in the first place, sets out the effect of the road without the mounding and then separately establishes the environmental benefits of the moundings. Similarly, current good practice requires quarries to wash down vehicles before they leave the site, and to cover the load if there is the risk of excessive dust. Again, it would seem inappropriate to evaluate a development without the inclusion of such treatments and then to separately evaluate the treatments.

5.5 One of the key benefits that should arise from an Environmental Assessment being undertaken as part of the design team process is that environmental considerations should be included from the outset and hence residual problems are likely to be less. It is, therefore, recommended that the design teams should be encouraged to include positive environmental designs from the outset. It would be appropriate, within the section of the Statement relating to mitigation, to identify and list those elements that have been specifically included on environmental grounds but no assessment of each element needs to be included.

5.6 Prior to the finalising of the design of the development, the project team should be asked these questions:

- can the remaining impacts be avoided?
- can the impacts be further reduced?
- can the impacts be off-set?

The answers must relate to "reasonable cost solutions" but such questions may lead to further modifications of the design and also might indicate a number of potential mitigation measures which do need to be considered within this section of the Statement.

5.7 When considering traffic impacts, it is likely that these mitigation measures would be off-site, i.e. outside of the "red line area" of the planning application, and are therefore measures that a Planning Authority may wish to stipulate as "conditions" to a planning application by means of Section 106 Agreement (Section 50 Agreements in Scotland).

5.8 Measures designed to reduce the off-site traffic impacts are numerous and could entail:

- specified routing of traffic to sites, particularly construction traffic, heavy goods vehicles and hazardous loads
- restrictions on the hours of operation of the site (normally designed to restrict night-time and weekend operations)
- restriction of the movement of goods vehicles at particular times of the day, e.g. 0800-0900 and 1500-1600 hours to reduce the impact on school children
- restriction on the size of vehicles
- provision of noise barriers or insulation for affected properties
- widening footways
- installing street lighting
- installing "traffic calming" measures.

The mitigation measures should be considered as a complete package.

5.10 A commitment from the developer and/or the operator to these forms of measures should form an important part of the Statement.

Summary

- The consideration of alternative locations should be included where this is appropriate.
- The design team should be aiming to produce an "environmentally friendly" design from the outset. Mitigation measures should therefore be applied to those impacts which cannot be designed out in the initial proposals.
- The assessor should be encouraged to identify in the Statement measures included within the design which were specifically included for environmental reason, but separate assessments of each measure are not required.
- Mitigation measures are likely to be those that a planning authority might wish to include as planning "conditions".

D PRESENTATION

6 Presentation of the Environmental Statement

6.1 The Environmental Statement is the communication of the results undertaken in the assessment. It is important that it is laid out clearly with technical terms defined. Graphical presentations should be included where appropriate. The report should include clear section headings, full references and contain a non-technical summary.

6.2 It is important that the Statement is an impartial assessment of the environmental impacts of the development and is not a best case report in favour of the proposal. All impacts, whether positive or negative, should be detailed. In addition, all assumptions made within the process of the environmental assessment should be detailed, and methods used to assess any environmental effects explained clearly.

6.3 Frequently within an Environmental Statement the traffic issues may form one part, or an appendix, of the overall report. In this way traffic noise is considered as a part of "traffic" and not part of "noise". Issues such as site description, description of the development and presentation formats will have been described elsewhere.

6.4 The communication of the results of the environmental assessment within the Statement is one of the most important aspects. Various reviews of the quality of Environmental Statements have found a wide range in the quality and detail of the Assessment. The following problems have been identified:

i) lack of information/data on which to check or calculate different environmental impacts

ii) little or no justification or rationale for identification of environmental impacts

iii) little or no explanation for choice of methods used to assess environmental impacts

iv) little or no assessment of alternative sites or routes

v) lack of organisation, e.g. headings, to denote identification, prediction, significance, mitigation aspects of project

vi) poor attention to presentational quality, e.g. maps, summary tables, etc.

6.5 Lack of attention to assessing significance of impacts.

It is thus recommended that:

i) headings should be used consistently to separate the identification, measurements, significance and mitigation elements of the assessment

ii) summary tables with large-sized numerals should be strongly encouraged

iii) the use of maps and annotation should be promoted to show the geographical extent of problems.

6.6 A non-technical summary is required. Readers may include members of the public who have no specialist knowledge in any of the fields considered, thus a glance at the summary should be all that is required to discover the likely environmental impacts from the development.

6.7 Having produced the basis of an Environmental Statement the assessor may like to review the contents and depth of the analysis against general criteria which have been established by the Institute of Environmental Assessment (IEA, 1991). These are reproduced in an Annex to these Guidelines.

6.8 The guidelines contained in this report offer recommendations for good practice. In preparing these guidelines, the Working Party has consulted widely. Not everyone will agree with all the recommendations. Some people have examples of good practice which have been over-looked and new methods are evolving all the time. Nevertheless it is considered that there are a number of key requirements for a road traffic environmental assessment which all assessors need to consider. To assist those commissioning, undertaking or reviewing an Environmental Statement a series of questions are set out below as a checklist. If the question cannot be answered from the Environmental Statement or has not been considered in the environmental assessment process then it is likely the process and reporting of the assessment is deficient.

Checklist

- ✓ Has the proposed site been described?
- ✓ Has the proposed development been described?
- ✓ Have the base-line traffic and environmental condition(s) been described?
- ✓ Have all relevant effects been included?
- ✓ Have the reasons for excluding an effect been justified?
- ✓ Has a checklist of possible affected groups/interests been presented?
- ✓ Has the assessment made explicit the boundaries of the assessment, both spatially and temporally and have the assumptions been made explicit?
- ✓ Has a description of the possible effect of each relevant environmental impact for each affected group/interest been presented?
- ✓ Have existing and projected traffic levels and characteristics been presented?
- ✓ Has the year of assessment been clearly defined and is the reason for its selection stated?
- ✓ What time periods are being used for assessment; peak traffic hour, average, worst hour?
- ✓ Have the methods for predicting the magnitude of individual impacts been described and has the method been justified?
- ✓ Is there sufficient information presented to check the calculation of each impact?
- ✓ Have the magnitude of impacts been predicted for all relevant locations?

- ✓ What levels of uncertainty are associated with any predictions and have these been made explicit?
- ✓ How are the significance of individual impacts to be assessed? What methods and assumptions have been used and have these been stated?
- ✓ Have practicable mitigation measures to avoid, reduce or offset adverse effects been considered?
- ✓ Have these measures been listed and any recommendations justified?
- ✓ Are any alternative sites that have been considered reported on?
- ✓ Is the environmental statement clearly presented, e.g. contents page, use of headings, clear tables and diagrams, high quality maps?
- ✓ Are technical annexes included or available?
- ✓ Is a non-technical summary available/included?

Summary

- ○ The Environmental Statement is the written presentation of the results of the Assessment.
- ○ The Statement should be a "fair" interpretation of the impact and should not be biased in favour of the developer.
- ○ The Statement should be clearly laid out and should include graphical presentation and maps whenever possible.
- ○ A simple non-technical summary must be included.

References

Baughan, C and Huddart, L (1992), Effect of changes in Exposure to traffic noise, PTRC summer meeting.

Boon, P. (1990), Environmental Impact Assessment and the Water Industry : Implications for Nature Conservation. Proceedings. TWEM Meeting. Cambridge March.

BRE (1990), Damage to Structures from Ground-Bourne Vibration, Digest 353.

Buchanan (1963), Traffic in Towns. HMSO.

Crompton, D H (1981), Pedestrian Delay, Annoyance and Risk, Imperial College.

Crompton and Gilbert (1976), Imperial College.

DOE (1988), Environmental Assessment Circular 15/88, HMSO, London (Welsh Office Circular 23/88; Scottish Office Environment Department Circular 13/88).

DOE (1988), Highway Consideration in Development Control. PPG13.

DOE (1990), This Common Inheritance. HMSO.

DOE (1991a), Monitoring Environmental Assessment and Planning. C Woods, C Jones, EIA Centre, University of Manchester. HMSO.

DOE (1991b), Policy Appraisal and the Environment. HMSO.

DOE, Consultation Draft PPG on Planning and Noise.

DoT (1983), Manual of Environmental Appraisal.

DoT (1988a), Environmental Assessment Under EC Directive (HD/18/88)

DoT (1988b), Calculation of Road Traffic Noise. HMSO, London.

DoT (1991) Road Accidents Great Britain, 1990. HMSO.

DoT (1992), The Government's Response to the SACTRA Report. HMSO.

EC (1985), Council Directive of 27th June 1985 on the assessment of the effects of certain public and private projects on the environment. Official Journal of the European Communities L175: 40-48.

GLC (1975), An Approach to the Environmental Assessment of Traffic. Environmental Studies Group (unpublished).

Goldschmidth, (1976), Pedestrian Delay and Traffic Management SR356 TRC.

Griffiths, I.D., and Raw, G.J. (1986), Community and Individual Responses to Changes in Traffic Noise Exposure. Journal of Sound and Vibration 111(2), 209-217.

Headicar, P. (1979), West Yorkshire Transportation Studies. The Environmental Assessment of Road Traffic. TEC February.

Hedges, B., Morton-Williams, C. and Fernando, J. (1978), Road Traffic

and the Environment SCPR, London.

HFA, (1989), Bury St Edmunds Conservation Development and Traffic study.

HFA et al (1990), Assessment methodology Report, The West London Assessment Studies, (HMSO).

IEA (1991), Environmental Assessment: Experience to Date, Coles T F and Tarling J P.

IHT (1990) Guidelines for the Safety Audit of Highways, The Institution of Highways and Transportation.

Lee, N., and Colley, R. (1990), Reviewing the quality of Environmental Statements. Occasional Paper 24, Department of Planning and Landscape, University of Manchester.

SACTRA (1992), Assessing the Environmental Impact of Road Schemes, HMSO.

Scottish Development Department (1986) Scottish Traffic and Environmental Appraisal Manual (STEAM).

TRL (1990) Traffic Induced Vibration in Buildings, RR246

TRL (1991a), The Appraisal of Community Severance. Contractors Report 135. Clark, J.M. and Hutton, B.J.

TRL (1991b), The Estimation of Pedestrian Numbers. Contractors Report 239. May, A.D., Hopkinson, P.G., and Turvey, I.G.

ANNEX - IEA REVIEW STANDARDS

The Institute Revew Criteria are based on Lee N & Colley R (1990), Reviewing the Quality of Environmental Statements, Occasional Paper 24, Department of Planning and Landscape, University of Manchester.

The review criteria provide a basis on which the quality of an environmental statement may be reviewed. The criteria are focused on reviewing against a best practice standard rather than the minimum legal requirements, issues such as 'alternatives' are therefore included. A review should be conducted by two people independently, grading each section in accordance with the grading scheme provided and producing an overall grade for the environmental statement as a whole. The two individuals should then discuss their findings and gradings and come to a concensus view of the quality of the environmental statement.

Institute Review Grades

A Excellent, no tasks left incomplete

B Good, only minor omissions and inadequacies

C Satisfactory despite omissions and inadequacies

DParts are well attempted, but must as a whole be considered just unsatisfactory because of omissions and/or inadequacies

E Poor, significant omissions or inadequacies

F Very poor, important tasks poorly done or not attempted

N/A Not applicable. The review topic is not applicable or relevant in the context of this statement

Institute Review Criteria

1 Description of the development, the local environment and the baseline conditions

1.1 Description of the development

The purpose and objectives of the development should be explained. The description of the development should include the physical characteristics, scale and design as well as quantities of material needed during construction and operation.

1.2 Site description

The area of land affected by the development should be clearly shown on a map and the different land uses of this area clearly demarcated. The affected site should be defined broadly enough to include any potential effects occurring away from the construction site (eg dispersal of pollutants, traffic, changes in channel capacity of water courses as a result of increased surface run off etc).

1.3 Residuals

The types and quantities of waste matter, energy and residual materials

and the rate at which these will be produced should be estimated. The methods used to make these estimations should be clearly described, and the proposed methods of treatment for the waste and residual materials should be identified. Waste should be quantified wherever possible.

1.4 Baseline conditions

A description of the environment as it is currently and as it could be expected to develop if the project were not to proceed. Some baseline data can be gathered from existing data sources, but some will need gathering and the methods used to obtain the information should be clearly identified. Baseline data should be gathered in such a way that the importance of the particular area to be affected can be placed into the context of the region or surroundings and that the effect of the proposed changes can be predicted.

2 Identification and evaluation of key impacts

2.1 Identification of impacts

The methodology used to define the project specification should be clearly outlined, including details of consultation with expert bodies (eg Planning Authority, HMIP, NRA, NCC, Countryside Commission etc) and the public, and reference to panels of experts, guidelines, checklists, matrices, previous best practice examples of environmental assessments on similar projects ((whichever are appropriate). Consideration should be given to impacts which may be positive or negative, cumulative, short or long term, permanent or temporary, direct or indirect. The logic used to identify the key impacts for investigation and for the rejection of others should be clearly explained. The impacts of the development on human beings, flora and fauna, soil, water, air, climate, landscape, material assets, cultural heritage, or their interaction, should be considered.

2.2 Prediction of impact magnitude

The size of each impact should be determined as the predicted deviation from the baseline conditions, during the construction phase and during normal operating conditions and in the event of an accident when the proposed development involves materials that could be harmful to the environment (including people). The data used to estimate the magnitude of the main impacts should be clearly described and any gaps in the required data identified. The methods used to predict impact magnitude should be described and should be appropriate to the size and importance of the projected disturbance. Where possible, estimates of impacts should be recorded in measurable quantities with ranges and/or confidence limits as appropriate. Qualitative descriptions where necessary should be as fully defined as possible (eg "insignificant means not perceptible from more than 100m distance").

2.3 Assessment of impact significance

The significance of all those impacts which remain after mitigation should be assessed using the appropriate national and international quality standards where available. Where no such standards exist, the assumptions and value systems used to assess significance should be justified and the existence of opposing or contrary opinions acknowledged.

3 Alternatives and mitigation

3.1 Alternatives

Alternative sites should have been considered where these are practicable and available to be developed. The main environmental advantages and disadvantages of these should be discussed in outline, and the reasons for the final choice given. Where available, alternative processes, designs and operating conditions should have been considered at an early stage of project planning and the environmental implications of these outlined.

3.2 Mitigation

All significant adverse impacts should be considered for mitigation and specific mitigation measures put forward where practicable. Mitigation methods considered should include modification of the project, compensation and the provision of alternative facilities as well as pollution control. It should be clear to what extent the mitigation methods will be effective. Where the effectiveness is uncertain or depends on assumptions about operating procedures, climatic conditions etc, data should be introduced to justify the acceptance of these assumptions.

3.3 Commitment to mitigation

Clear details of when and how the mitigation measures will be carried out should be given. When uncertainty over impact magnitude and/or effectiveness of mitigation over time exists, monitoring programmes should be proposed to enable subsequent adjustment of mitigation measures as necessary.

4 Communication of results

4.1 Presentation

The report should be laid out clearly with the minimum amount of technical terms. An index, glossary and full references should be given and the information presented so as to be comprehensible to the non specialist.

4.2 Balance

The environmental statement should be an independent objective assessment of environmental impacts not a best-case statement for the development. Negative impacts should be given equal prominence with positive impacts and adverse impacts should not be disguised by euphemisms or platitudes. Prominence and emphasis should be given to predict large negative or positive impacts.

4.3 Non technical summary

There should be a non technical summary outlining the main conclusions and how they were reached. The summary should be comprehensive, containing at least a brief description of the project and the environment, an account of the main mitigating measures to be undertaken by the developer, and a description of any remaining or residual impacts. A brief explanation of the methods by which these data were obtained and an indication of the confidence which can be placed in them should also be included.