Strategic Environmental Assessment of Local Implementation Plans: Mitigation

by C Treleven & S Simmons

UPR SE/139/04

UNPUBLISHED PROJECT REPORT

Centre for Sustainability at TRL Limited

UNPUBLISHED PROJECT REPORT UPR SE/139/04

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Version: Final

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1 Introduction

The purpose of this report is to assist London Boroughs with the Strategic Environmental Assessment (SEA) of their Local Implementation Plans. This report should be read together with the Advice Note prepared by C4S/TRL for London Boroughs in September 2004.

In order to help Boroughs with the Strategic Environmental Assessment of Local Implementation Plans, C4S/TRL has also written advice reports on:

- Sources of baseline data for stage A;
- Problems and opportunities of relevance to SEAs for LIPs;
- SEA objectives for stage A;
- Scoping report template;
- Selecting and documenting alternatives;
- Significance criteria;
- Environmental Report.

These additional documents can be found at; http://www.sea-info.net/sea_lips.htm

At the time of completing this document, the authors are unaware of any transport plan SEA Environmental Reports that have been completed and made available in the UK. Readers of this report are advised to check the internet for environmental reports, as they become available during December 2004 and 2005.

The intention of this supplementary advice is to show Boroughs ways of designing mitigation that will form part of an effective SEA. This document also makes specific reference to various parts of the SEA Regulations. The SEA Regulations are 'Statutory Instrument SI2004 No.1633', see the reference at the end of this document. However, when in doubt, Boroughs' own legal departments should be consulted for advice on the minimum steps that a Borough needs to take in order to satisfy the SEA Regulations.

2 Background

2.1 What the SEA Regulations require

The SEA Regulations set down minimum requirements with which Boroughs conducting an SEA of an LIP must comply.

Regulation 12(1) requires the production of an 'Environmental Report', as part of an SEA. In the case of London Boroughs, the Environmental Report is due to be produced in time to accompany the draft LIP when it goes out for public consultation in January 2005.

Regulation 12(3) and Schedule 2 specify what information must be included in the Environmental Report. Paragraph 7 of Schedule 2 specifies that the Environmental Report must contain a description of:

'*The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme.*'

2.2 What is mitigation?

The term 'mitigation' encompasses several approaches. Three of these are specified in paragraph 7 of Schedule 2 of the SEA Regulations. These are prevention, reduction or offsetting of the significant adverse effects on the environment that have been identified.

In this document, the term 'mitigation' will be used with reference to the complete hierarchy of approaches to addressing significant adverse effects. These approaches are listed in sub-sections 2.2.1-2.2.4 below. In addition, sub-sections 2.2.5 and 2.2.6 examine the role of enhancement and further information collation as 'mitigation'.

2.2.1 Avoidance or prevention

This approach to dealing with negative effects involves modifying the alternative options for the LIP. Alternative LIP options should already have been considered in the SEA. Some options will probably have been discounted either on environmental, social, economic or feasibility grounds.

There is a presumption therefore that the alternatives that remain are the best options. However, it is possible that one or more elements of an alternative can be refined further, in the light of significant adverse environmental effects.

In an extreme case, an examination of the significant adverse environmental effects might lead to the realisation that one or more alternatives must be discarded entirely.

2.2.2 Reduction

Once all alternative options or approaches to avoiding an effect have been examined, then mitigation should examine ways of reducing the scale/importance of the effect.

This approach to mitigation is common in project EIA and focuses on the use of specific measures to reduce impacts of a development. SEA however deals with the larger scale, involving programmes and plans, rather than individual projects. At the level of SEA, mitigation could focus on timing or phasing of LIP measures to reduce adverse effects. An example would be re-timing of all maintenance works outside of peak periods, to reduce carbon dioxide emissions associated with congestion.

2.2.3 Offsetting or compensation

This approach to mitigation is used where opportunities are not available to either avoid or reduce the adverse effect.
Compensation can refer purely to financial recompense. However, it can also include the ability to offset the adverse effect by providing an equal or greater compensation in a form related to the environmental effect.

While mitigation measures should generally be directed towards the resource being affected or the action causing the effect, the concept of "no-net loss" may be an appropriate mitigation measure in response to cumulative effects[1]. No-net loss requires that any resource disturbed from its pre-action condition be "replaced" with an equivalent, to ensure that sustainable use of the resource is maintained. This principle will not be appropriate for resources which are unique or irreplaceable.

At the level of the LIP, opportunities for financial compensation as a form of mitigation may be limited. However, it may be possible to employ offsetting. This might be particularly useful where adverse cumulative effects are predicted to occur due to interactions with other plans and programmes, which are beyond the control of the Borough.

2.2.4 Remediation

Remediation is used where an adverse effect is unavoidable, but the long term effects can be reduced by restoring the affected area to its original state.

This form of mitigation is often used in association with enhancement, in order to improve an area. Due to the scale and type of measures and approaches in LIPs it is unlikely that there will be many opportunities to use this type of mitigation.

2.2.5 Enhancement

Although not strictly a measure to mitigate an adverse effect, enhancement is an opportunity to improve the environment.
Enhancement could be successfully used in LIPs in order to improve communities, if measures and approaches can be combined. For example, a program of street works might be extended to include the removal of unnecessary street railings and obstacles. This would enhance the setting of historic buildings or areas.

2.2.6 Further information

The assessment of plans and programmes involves adapting to and dealing with a higher degree of uncertainty than traditional project level assessment.
Although the overall effects of the LIP have been assessed, there may be a degree of uncertainty as to the anticipated effects of specific projects or measures on the ground. As such, the application of one of the above mitigation responses may only be possible when more detailed information is available. Therefore, in some circumstances, a mitigation approach might be to specify the need to conduct further assessments at the measure/scheme level.

[1] Cumulative effects are those caused by the LIP in combination with other plans/programmes

3 Mitigation for SEA of LIPs

3.1 Introduction

The SEA Regulations require mitigation for any significant adverse effects arising from the LIPs. It is possible that an LIP may have few significant adverse effects. This is because of the nature of LIPs, which are constrained by the requirements of the Mayor's Transport Strategy, and responsibilities of other bodies for large scale infrastructure works.

Where significant adverse effects do arise from LIP strategies/approaches, the mitigation will look different to mitigation for project EIA. As with the collation of information and the assessment of effects, SEA is conducted at a high level. This is the level of the overall LIP. As such it is neither possible nor reasonable for the SEA to examine mitigation at the level of individual measures and sites. See also Appendix A.

As a consequence, the requirement and opportunity to develop specific mitigation will be relatively limited. This is in itself an important finding. It helps Boroughs decide the level of resources that they must commit to devising mitigation measures during the SEA, in comparison to the resources required for other parts of the process.

3.2 Opportunities for mitigation

The opportunities for mitigation should follow the 'mitigation hierarchy', which is shown in the central column of table 3.1 below. The initial focus should be on avoiding adverse effects wherever possible. Mitigation is therefore dependent on the alternative approaches for the LIP that have been selected so far.

Table 3.1 provides details of the forms that SEA mitigation could take for LIPs.

Table 3.1: Example forms of mitigation

Possible approach	Mitigation hierarchy	Examples
Changes to the alternative LIP options	Avoidance/Prevention	Adding, deleting or refining LIP alternative approaches and options to address specific elements that cause significant adverse effects.
Completely new alternative LIP options	Avoidance/Prevention	Use of stakeholders, other than transport planners, to examine solutions to adverse effects e.g. Health Trusts, NGOs
Design objectives, or the setting of guidelines for how to implement transport measures	Reduction	Requirement for sub contractors to have an Environmental Management System (e.g. maintenance contractors)
	Reduction	Construction Management Plans for new infrastructure works

	Offsetting / Compensation	Establishment of no net loss principle
Proposals for changes to future plans and programmes	Avoidance/Prevention	Suggestion to change elements of other future Borough plans or programmes e.g. Land use plans. Also examine suggestions for changes to other Borough or TfL plans/programmes e.g. timings and phasing of works to avoid cumulative effects on the Strategic Road Network
Proposals for changing existing policies, plans or strategies	Enhancement	Alterations to existing maintenance plans or design manuals to incorporate environmental enhancements
Requirements for further assessments	Further information collation prior to individual mitigation measures being implemented at project level.	Environmental impact assessments or voluntary appraisal for certain projects Additional surveys where uncertainty exists over potential effects.

Source: Adapted from DfT 2004

3.3 Feasibility of mitigation

When developing approaches to mitigation, it is also helpful to identify priorities. Prioritising mitigation approaches and measures helps explain and justify to readers of the Environmental Report, as well as decision makers, the importance of certain mitigation measures.

Enhancement has been discussed in the mitigation hierarchy. However, the feasibility of conducting enhancement will be dependent on funding allocations.

The presentation of mitigation measures in the Environmental Report should focus upon the following aspects:

- Mitigation and enhancement measures that must be implemented, since they performed a key role in the selection of the preferred alternative approaches in the LIP and the specification of the individual transport measures;
- Shared mitigation and enhancement measures involving the co-ordinated action of Boroughs and other stakeholders enabling a more cost-effective solution than separate mitigation of actions;
- Mitigation and enhancement measures needed to address cumulative effects;
- Non-critical mitigation and enhancement measures that should be explored during the implementation of the LIP.

4 Examples of mitigation measures

4.1 Introduction

Many schemes in Boroughs' LIPs may not have significant adverse environmental effects. It is therefore likely that only a few mitigation measures will be required by each Borough.

Despite this, the remainder of chapter 4 below contains ideas that Boroughs might find useful in addressing significant adverse environmental effects that they do identify. Many other approaches could also be envisaged. The measures are divided up by SEA topic. Importantly, many measures would in fact mitigate more than one significant environmental effect.

One important opportunity is the possibility for mitigation by raising public awareness. Borough actions to inform the public about transport issues could be based on a number of the sources of information listed below. Although the effects of a publicity campaign are difficult to measure, the potential gain is very great, given the purchasing power of Borough residents and businesses.

Some of the examples used below are 'design objectives', mentioned in row three of table 3.1 above. These design standards have the advantage that, if they are mandated in an LIP, they would apply to all schemes that are eventually implemented during the lifetime of the LIP.

4.2 Material usage in transport infrastructure

The use of new materials in the construction and maintenance of transport infrastructure will affect the 'materials' topic in SEA. Primary aggregates, steel and wood are examples of materials that are likely to be used for transport infrastructure. Here 'primary' aggregates are virgin materials, which have not been used previously.

There are now significant supplies of lower impact materials, such as recycled aggregates and 'secondary aggregates'. 'Secondary' aggregates are derived from industrial by-products. See also the London Sustainable Construction Project, which is developing guidance on sustainable construction for London:
http://www.lsx.org.uk/programmes/lscp_page1213.aspx
A mitigation measure for an LIP SEA might therefore be a policy decision to set a minimum percentage of recycled and/or secondary aggregates for use in all transport maintenance and construction within the Borough.

4.3 Material usage in transport equipment

The use of new materials in the construction and maintenance of transport equipment also affects the 'materials' topic in SEA. For example, large quantities of steel, plastics and 'precious metals', are used in transport equipment, such as trains, busses and cars.

The amount of these materials that is wasted can be reduced by attention to issues such as 'End-of-Life' vehicles, and abandoned vehicles. The 'End-of-Life' vehicles directive lays down minimum standards for the disposal of vehicles. However, if vehicles have been abandoned, they are likely to be burnt out or vandalised. Early collection of vehicles nearing the end of their lives offers an opportunity to recover materials from vehicles, and helps to reduce the number that are abandoned. This also helps to reduce the visual intrusion, danger and nuisance effects of the oldest vehicles.

An enhancement measure for an LIP SEA might be a policy that incentivises the scrapping of older transport equipment. This will bring large benefits in noise, passenger and pedestrian safety, and both noxious and particulates emissions. One key policy might be to publicise the existence of the London 'Scrap-It' operation. See:
http://www.alg.gov.uk/scrap-it/

4.4 Noise

Changes to transport links are likely to involve changes to the noise levels to which pedestrians and the occupants of neighbouring buildings are subjected.

Various policy actions could improve the situation. For example, noise can be reduced by physical barriers beside transport links, or double or triple glazing for buildings. Noise absorbing tarmac could be made a requirement of all new road links, major junction redesigns and resurfacing. Lower speed limits, such as those common in neighbourhood zones, can be used to reduce the tyre noise of moving vehicles. Clearly, pedestrianisation programmes can eliminate vehicle noise almost entirely from particular areas.

4.5 Energy

Transport is a major user of energy. At least three aspects could be addressed in an LIP, in order to mitigate any increased energy use through the LIP's schemes:

a) Energy use by the transport sector as a whole continues to grow in the UK. Fuel consumption by road vehicles is a major use of energy. This has been addressed recently in some areas by local policies that provide incentives for the public to purchase more fuel efficient vehicles. Winchester City council offers reduced parking charges for vehicles with low CO_2 emissions per kilometer, or those with hybrid petrol/electric propulsion. Many commuter stations in the South East offer reduced parking charges and reserved spaces to drivers of the 'Smart car' city vehicle, in order to encourage their purchase and use.

b) Boroughs' own vehicles can be selected for minimum environmental impact. This might involve policies to encourage Borough staff to select low impact vehicles, and to mandate the selection of such vehicles as official vehicles. See for example the vehicle ranking system at:
http://www.eta.co.uk/news/car-buyers-guide.asp
See also the Transport Energy best practice site for Local Authorities, for grants and advice:
http://www.transportenergy.org.uk/transportenergy/local/
The government's own 'Vehicle Certification Agency' offers a further vehicle selector:
http://www.vcacarfueldata.org.uk/search/fuelConSearch.asp
All of these websites can be publicised as part of the LIP.

c) Some Borough LIP transport schemes will involve the construction and operation of facilities, e.g. transport interchanges. Minimum standards can be set for these. For example, passive thermal control can be achieved through appropriate architectural design, instead of relying solely on active heating or air conditioning. Policies can specify the use of electricity from renewable supplies in all facilities. Small scale Combined Heat and Power (CHP) can provide efficient electricity and heating supply, without transmission losses over electricity grids. Low energy lighting can make a major contribution for a very low investment, particularly since facilities such as stations may require 24 hour per day illumination.

4.6 Noxious emissions and particulates

Air quality is a major problem in London. If continued air quality problems are identified as an environmental effect of the schemes in the LIP, then mitigation measures can be used:

a) Legislation allows road-side emissions testing of vehicles. Given adequate publicity, this acts as a strong deterrent to people operating poorly-maintained vehicles. This deterrence also supports other MTS strategies, because poorly-maintained vehicles perform poorly in accidents and are prone to breaking down, both of which cause congestion and lower network reliability.

b) Publicity for, and use of government staff for inspecting the most polluting commercial vehicles. These staff are part of the 'Vehicle and Operator Services Agency' (VOSA). The telephone contact number is 08706060440. The procedure for addressing commercial vehicles with high emissions levels is a one page form at:
http://www.vosa.gov.uk/vosa/forms/smoky%20vehicle%20report%20form.pdf
Eliminating these vehicles also reduces accidents and improves network reliability.

Where Borough sub-contractors and suppliers operate large fleets of vehicles, the Borough could specify a maximum limit on the age of vehicles for use on Borough contracts. Besides having better emissions, more modern vehicles also tend to use less energy and to be quieter than older vehicles.

c) Encourage the uptake of the cleanest fuels, such as Liquified Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Sulphur-free petrol and diesel. These fuels can reduce emissions of some pollutants by very large factors.

Further information is available from the Government's Commission for Integrated Transport, in the report '*Pollution from Older Vehicles'*. This report advocates retrofitting exhaust gas treatment systems to busses. It also advocates payments to scrap the most polluting vehicles in urban areas, in order to reduce air pollution, safety issues and vehicle crime. The report also recommends action to ensure that garages are testing vehicles correctly under MoT regulations:
http://www.cfit.gov.uk/reports/pollution/ov/index.htm

4.7 Biodiversity, fauna and flora

The schemes in an LIP may involve the construction of new transport infrastructure, such as bus lanes, cycle lanes or car parks. These all involve the potential loss of green space, and many involve the clearance of relatively rare roadside trees. Even brownfield land may have rich biodiversity, which is lost if the land is used. Birds and small mammals are particularly dependent on such habitats. If levels of traffic rise on railway or road links, this will result in collisions with more birds and mammals.

Mitigation could involve:

a) Careful site selection;

b) Choosing the shape of a car park, or the route of a cycle way or bus lane, to avoid the most heavily wooded areas.

c) A policy decision that land loss to new construction must always be offset by the purchase and preservation of an equivalent area of land. Academic work has favoured the purchase and conservation of sites with the same or greater biodiversity as that lost. However, habitats are not necessarily substitutable. In addition, an urban habitat may be part of a wildlife corridor,

which would be broken, even if land elsewhere in the UK is purchased and conserved as a substitute.

4.8 Climatic factors

The UK's greenhouse gas emissions from the transport sector continue to rise. Where LIP schemes add to this problem, then many options exist for mitigation. Notably, the mitigation strategies listed under points 4.5 and 4.6 above address the emissions that lead to climate change. A further approach, demand management, has been used rarely in the UK.

The tables on pages 18 and 19 of the publication 'London's Warming' contain further information about areas where mitigation might be applied, e.g. through water conservation:

http://www.london.gov.uk/gla/publications/environment/londons_warming02.pdf

4.9 Population and Human health

Human health can be affected by any schemes that reduce opportunities for walking and cycling, that increase air pollution or noise, or that expose any age group to a greater risk of accidents.

Mitigation for loss of opportunities to walk or cycle may involve a policy decision that the LIP cannot contain schemes which have an adverse affect on these. However, the creation of new opportunities for walking and cycling is also an ideal compensation measure, for schemes that have significant adverse effects on any SEA topics and that cannot be mitigated by prevention. This is particularly the case because London is behind many other continental cities in provision for walking and cycling.

Accident prevention measures are covered thoroughly in many government publications. Speed monitoring, traffic calming and driver education can be highly effective.

4.10 Other SEA topics

Sections 4.2-4.9 above cover the major SEA topics. From discussions with individual Borough's the authors believe that in the majority of cases there is unlikely to be significant adverse effescts on soil or cultural heritage, as a result of measures proposed in LIPs.. Specialist advice should be sought for mitigation measures in these areas, if required.

Appendix A. How SEA mitigation differs from EIA mitigation

Box A.1 provides a summary of the differences between mitigation in SEA and that at project level EIA.

Box A.1: Differences in mitigation between transport SEA and EIA

- With SEA, the alternative options are only defined to a level of detail that confirms their feasibility. So the mitigation or enhancement measures equally cannot be defined in detail. This creates a problem of uncertainty.
- The effect of mitigation or enhancement measures upon the performance of the transport measure can have a substantial influence upon the selection of the preferred transport option.
- At a strategic level, the array of mitigation measures available at EIA project level is complemented by the availability of institutional measures. These include partnerships or policy measures.

Where significant adverse effects do arise from LIP strategies/approaches, the appropriate mitigation will differ from mitigation for project EIA. SEA is conducted at a high level, the level of the overall LIP. As such it is neither possible nor reasonable for the SEA to examine mitigation measures at the level of individual schemes and sites. Within SEA of LIPs, the objective is to identify the need for mitigation in general, rather than mitigation measures specific to individual transportation schemes.

Within SEA, mitigation and enhancement measures should be developed to a level of detail that confirms that they can be delivered. Many detailed aspects of mitigation that are typical of project level EIA can be examined during scheme planning and design. This is exactly analogous to the further design and refinement of alternative options presented in an LIP SEA.

LIP strategies may provide opportunities for environmental and community enhancements. Such enhancements may be of significance to particular communities or interests, without necessarily addressing a particular transport problem. For example, works to reduce pedestrian severance and/or enhance cycling may be carried out at the same time as a re-allocation of road space from cars to busses. An extension of the bus lane network might therefore be accompanied by a program of removing pedestrian barriers, on the principle that pedestrians are less likely to stray into the path of busses in a marked bus lane than into ordinary road space. Similarly, improvements to highway runoff through the provision of pollution control measures, where none currently exist, may occur as a result of highway infrastructure improvements.

Some mitigation or enhancement measures may be delivered by parties other than the Borough. Indeed, several Boroughs or other administrative jurisdictions and stakeholders may be involved. Co-operation between these other interests is needed, in order to ensure that the mitigation/enhancement or monitoring measure is successfully implemented. Partnerships with neighbouring Boroughs, TfL and other stakeholders may be the only means of addressing complex cumulative effect issues.

Acknowledgements

The work described in this report was carried out in the Environmental Assessment Group of C4S/TRL Limited. The authors are grateful to Chris Fry, who carried out the quality review and auditing of this report.

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