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1 TECHNICAL GLOSSARY

Term	Explanation
ALG	Association of London Government
ANPR	Automatic Number Plate Recognition
AQMA	Air Quality Management Area
AQAP	Air Quality Action Plan
BAA	British Airports Authority – responsible for Heathrow airport in the London Borough of Hillingdon
CAPEX	Capital Expenditure
CO₂	Carbon dioxide. A greenhouse gas
CCS	Central London Congestion Charging Scheme. In the text this refers to the area consistent with the CCS
CleanUp	The EST's TransportAction CleanUp Campaign aims to improve air quality in pollution "hotspots" by encouraging the fitting of emissions reduction equipment to the most polluting vehicles
CNG	Compressed natural gas. An alternative transport fuel
CSR	Customer Service Representative
CPZ	Controlled Parking Zone
CRT	Continuously Regenerating Traps. A type of Diesel Particulate Filter
DEFRA	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
DPF	Diesel Particulate Filter
DTi	Department for Trade and Industry
DVLA	Driver Vehicle Licensing Agency
EC	European Commission
EEV	Environmentally Enhanced Vehicle. (Voluntary standard for vehicles significantly exceeding Euro V emission levels)
EGR	Exhaust Gas Re-circulation
EST	Energy Saving Trust
EU	European Union
Euro (I-VI)	European Commission vehicle emission standards legislation, relating to Euro standards I to VI

Term	Explanation
FSB	Federation of Small Businesses
FTA	Freight Transport Association
GL	Greater London
GLA	Greater London Authority
GoL	Government office for London
GTPP	TfL's Group Transport Planning and Policy – developing the Freight Strategy
GVW	Gross Vehicle Weight
HDV	Heavy Duty Vehicle – vehicle whose Gross Vehicle Weight is greater than 3.5 tonnes
HGV	Heavy Goods Vehicles, i.e. lorries. In the Feasibility Study, this refers to vehicles >3.5 tonnes
HMCE	HM Customs and Excise
LBTC	London Boroughs Transport Committee
LDV	Light duty vehicles = light goods vehicles and cars
LEZ	Low Emission Zone
LGV	Light Goods Vehicles. Light commercial vehicles such as vans
LIPs	Local Implementation Plans
LLCS	London Lorry Control System
LNG	Liquefied Natural Gas. An alternative transport fuel
LPG	Liquefied Petroleum Gas. An alternative transport fuel
LRUC	Lorry Road User Charging. UK scheme being considered by HMCE
LSA	Local Service Agreement
LSP	London Service Permit
LTS	London Transportation Study (and model)
MACs	Minister Approval Certificates. This is an alternative to the Certificate of Conformity
NSCA	National Society for Clean Air
NSC	North-South circular. Usually in the text this refers to the area bounded by, but not including, the North-South circular
NO	Nitric oxide
NO_x	Oxides of nitrogen (includes NO and NO ₂)

Term	Explanation
NO₂	Nitrogen dioxide
OPEX	Operational Expenditure
PATAS	Parking and Traffic Appeals Service
PCN	Penalty Charge Notice
PCO	Public Carriage Office. The PCO (part of Transport for London) is responsible for licensing taxis in London
PM₁₀	Particulate matter less than 10µm aerodynamic diameter
Powershift	EST programme that promotes cleaner vehicles and can offer grant support to help with the purchase of vehicles which are proven to offer emissions benefits and which have been shown to be technically viable. These include vehicles running on natural gas (CNG and LNG), liquefied petroleum gas (LPG) and electricity (including hybrids)
Pre-Euro	Vehicle made before the introduction of European legislation on emission limits for new vehicles was introduced
PSV	Public Service Vehicle
RHA	Road Haulage Association
RPC	Reduced Pollution Certificate. The RPC scheme enables vehicles with modifications or particulate traps fitted to reduce particulate matter to benefit from reduced VED
RTRA	Road Traffic Regulations Act
SBS	Small Business Service
SCR	Selective Catalytic Reduction
SEA	Sustainable Energy Action – a charity dedicated to environmental protection and social equity
Steering Group	The LEZ Steering Group is jointly chaired by the Association of London Government (ALG) and Greater London Authority (GLA). This Steering Group comprised representatives from GLA, ALG, Transport for London (TfL), London Boroughs, Department for Transport (DfT), Department of Environment, Food and Rural Affairs (DEFRA), National Society for Clean Air (NSCA) and Energy Saving Trust
TEC	The Transport and Environment Committee of the ALG
TEU	Traffic Enforcement Unit
TfL	Transport for London
TLRN	Transport for London Road Network
TRO	Traffic Regulation Orders

Term	Explanation
ULSD	Ultra Low Sulphur Diesel
VCA	Vehicle Certification Agency
VED	Vehicle Excise Duty
VET	Vehicle Emissions Testing (scheme)
VI	Vehicle Inspectorate Agency
VMM	Vehicle Market Model
VIM	Vehicle Index Number
VOSA	Vehicle and Operator Services Agency
VRM	Vehicle Registration Mark
VSL	Value of Statistical Life
WEZ	Western Extension Zone – the proposed extension to the existing Congestion Charging Zone
Working Group	This Group comprised representatives from GLA, ALG, Transport for London (TfL), London Boroughs, Department for Transport, and Department of Environment, Food and Rural Affairs

2 EXECUTIVE SUMMARY

London suffers from some of the poorest air quality in Europe and the Mayor has stated his intention to introduce a Low Emission Zone (LEZ) in London. He is committed to designating the whole of Greater London a 'Low Emission Zone' from which the worst polluting lorries, coaches, buses and taxis will be excluded. Since his re-election the Mayor has instructed TfL to implement a Low Emission Zone.

In July 2003 a Feasibility Study was published that looked in depth at the options for introducing a Low Emission Zone in London. This Feasibility Study was conducted by a consortium led by AEA Technology on behalf of the GLA, the ALG, representing the London Boroughs, TfL, DfT and Defra.

In November 2004 TfL asked Deloitte to conduct a brief review of the Feasibility Study to determine whether the recommendations of the Study still formed a viable basis for the implementation of a LEZ. Specifically, we were asked to determine what could feasibly and practicably be delivered and what the timescales for implementation would be.

2.1 SUMMARY OF FEASIBILITY STUDY FINDINGS

The original Feasibility Study team conducted an extensive analysis of how a Low Emission Zone might be implemented in London and what the potential costs and benefits of a scheme might be. The findings and recommendations of the Feasibility Study can be briefly summarised as follows:

- The area covered by a LEZ should include the whole of Greater London (i.e. all 33 London Boroughs) and should not extend out to include the M25 as this would require co-ordination with councils outside London which might be difficult to achieve.
- The scheme should target the reduction of PM₁₀ and NO_x emissions.
- The LEZ should apply to HGVs over 3.5 tonnes, coaches and buses initially and should potentially be extended later to include taxis and LGVs depending on the results of further analysis into the socio-economic impact this would have on small businesses.
- The LEZ should be implemented through a Traffic Regulation Order (TRO) under the RTRA (1984).
- A manually enforced scheme would be quickest to implement but a camera-based scheme would achieve a higher detection rate and would therefore deliver more air quality benefits. The most cost effective automated enforcement regime would be one that made use of the existing Congestion Charging infrastructure supplemented with a mix of fixed ANPR cameras and mobile units.
- The certification scheme for the LEZ would be based on the age of first registration of a vehicle, taken as a proxy for the Euro standard, with a certification database for exempt and retro-fitted vehicles. This would be built from data available from the DVLA and DfT's Reduced Pollution Certificate scheme. This scheme would ideally need to be extended to cover NO_x abatement equipment if the emission standard in 2010 required this.
- The emission criteria for the LEZ should be as follows:
 - For 2007 - Euro II + RPC or equivalent
 - For 2010 - Euro III + RPC or equivalent **or**
 - Euro III + RPC or equivalent and vans > 10yrs old.

- The Study estimated that the 10 year cost of operating a Low Emission Zone that used Congestion Charging enforcement infrastructure and included LGVs from 2010 was approximately £80 million, with the set up costs (Capex) estimated at £10m and annual running costs (Opex) estimated at £7m.
- To meet the requirements of a LEZ with a 2007 emission standard of Euro II + RPC the Study estimated the costs to operators of upgrading the vehicle fleet at between £64m - £135m. To meet the requirements of a LEZ with a 2010 emission standard of Euro III + RPC the Study estimated the further costs to operators at between £113m - £332m (HGVs and coaches only) or £174m - £412m including LGVs.
- The air quality benefits projected in the Feasibility Study, with the emissions criteria stated above, are shown in the table below:

Pollutant	Reduction in Emissions (relative to baseline)			Reduction in Area Exceeding Targets* (relative to baseline)		
	2007	2010 A)	2010 B)	2007	2010 A)	2010 B)
NO _x (NO ₂)	1.5%	2.7%	3.8%	4.7%	12%	18.9%
PM ₁₀	9.0%	19%	23%	0%**	32.6%***	42.9%***

* UK National Air Quality Targets

** London should meet the relevant air quality for PM₁₀ in this year without any additional action for an average year's weather.

***Exceedence of the annual mean PM₁₀ objective.

The 2007 scheme only includes lorries, buses and coaches.

In 2010: A) includes lorries, buses and coaches and B) includes lorries, buses and coaches, vans and taxis.

- The projected health benefits were primarily a reduction in the number of minor respiratory illnesses and a small reduction in the number of more severe illnesses leading to premature death or hospitalisation. These benefits were quantified at around £100m in total for the 2007 scheme and £122m in total for the 2010 scheme without LGVs and £143m in total for the 2010 scheme with LGVs.

2.2 FOCUS OF THIS REVIEW

In order to review these findings and determine the earliest LEZ implementation date, Deloitte and a team of subject matter experts focused on the following areas:

- Analysis of the legal options and associated timetables for establishing the legal basis for a LEZ
- Analysis of the enforcement options for a LEZ, the detection rates that could be achieved through the possible options and assessment of the feasibility of using the Congestion Charging infrastructure to support a LEZ
- Analysis of how the certification database could be built, including access to DVLA data and investigation of how end of series, retro-fitted and foreign vehicles could be identified
- The views of key LEZ stakeholders including the London Boroughs, vehicle operators, DfT and Defra
- Analysis of industry developments in the area of emissions technology in order to review the proposed emission standards for a LEZ
- Review of the costs of implementing a LEZ, including set up and running costs and the costs to operators.

The scope of this review has not included remodelling the projected air quality and health benefits but we asked Cambridge Environmental Research Consultants to comment on the findings of the Feasibility Study and to recommend the scope of further work to be carried out in this area.

2.3 HOW LONG WILL IT TAKE TO IMPLEMENT A LOW EMISSION ZONE?

This review has found that the legal process is the primary driver of the LEZ implementation timescale given the regulatory and consultation process required. The legal analysis identified three feasible routes that could enable a LEZ:

- A TfL-sponsored Parliamentary Bill. TfL has the power to promote a local Bill in Parliament under section 167 of the GLA Act 1999. Such a Bill could contain all the relevant provisions for a LEZ or could provide a basic framework and allow for regulations to be made containing detailed provisions
- A single TRO made under the Road Traffic Regulation Act (1984) on behalf of TfL and all the Boroughs. This enables a LEZ scheme that bans from Greater London all HGVs, buses and coaches that do not meet the agreed emission standards
- A Scheme Order made by the Mayor under the GLA Act (1999). This enables a LEZ scheme where operators of HGVs, buses and coaches that do not meet the agreed emission standards are charged to bring their vehicles into Greater London.

Each of these options has advantages and risks associated with it which can be summarised as follows:

Parliamentary Bill

A TfL-sponsored Bill is the most flexible legal option in terms of design of the LEZ as it allows TfL to tailor the scheme details exactly as it wishes. The Act would exclude specified classes of vehicles which fail to meet the LEZ emission standards from entering the zone. It would also be possible for the Act to contain provisions allowing for flexibility to apply the LEZ to other vehicles at a later date.

Although attractive from the scheme design perspective, the Parliamentary Bill option is likely to take longer to enact than the other two options. This is because the earliest the Bill could be deposited in Parliament is 27th November 2005 and the Parliamentary process after that would almost certainly take at least 18 months, until May 2007. Similar Bills recently taken through Parliament have taken longer than this. Allowing six months after Royal Assent for operators to take the necessary steps to comply with the requirements of the LEZ, the earliest the LEZ could be launched would be December 2007. Realistically, allowing for the uncertainties associated with the Parliamentary legal process the launch could be some months after that.

TRO

Like the Parliamentary Bill option, a scheme enacted under a single TRO bans specified classes of vehicles that do not meet the LEZ emission standards from entering the zone. This option could be enacted more quickly than a Parliamentary Bill - the legal process for putting in place a TRO is estimated to take until July 2007. With this timetable it would be possible to launch the LEZ in February 2008.

The primary risk associated with this option is the requirement for all Boroughs to sign up to joint arrangements delegating these TRO-making powers to TfL. This will require cross-Borough co-ordination with the possibility that some Boroughs may choose to opt out of the LEZ.

Scheme Order

The Scheme Order legal route is different from the two options discussed above in that it allows for a charge to be levied on those polluting vehicles that enter the zone thus applying

the principle that “the polluter pays”. If the charge/fine is made sufficiently high then this would achieve a similar effect to a ban. If the Mayor decides that a Public Inquiry is not required, the legal process for a Scheme Order could be completed by March 2007, making it possible to implement the LEZ in October 2007. If a Public Inquiry was held, this would add at least another nine months to the timescale.

The Scheme Order route provides the earlier implementation with the lesser risk of timetable slippage as the process is more within TfL’s control.

2.3.1 Implementation Dependencies

Irrespective of the legal route chosen to implement the Low Emission Zone, TfL will be dependent on DfT in a number of critical areas including the following:

- DfT and VOSA to continue to run the Reduced Pollution Certificate scheme to enable identification of vehicles with retro-fitted abatement technology and to cater for potential increased volume of applications driven by a London LEZ
- DfT to clarify position on grant funding for fitting of abatement equipment
- DVLA to modify data feed to TfL to include vehicle class, date of first registration and other emissions data where available
- LEZ signage to be agreed by DfT
- For the TRO option, DfT to prepare a schedule to lay before Parliament to enable TfL to issue PCNs under a decriminalised scheme.

Without support from DfT in these areas it will not be practical for London or any other local authority to implement a Low Emission Zone. The services that DfT provides need to operate at a national level.

TfL will also have to announce the emission standards for the LEZ as early as possible in order to give vehicle operators sufficient time to plan their vehicle upgrades, reallocations or replacements.

In summary, the earliest a Low Emission Zone could be implemented is October 2007 under the legal framework of a Scheme Order, as long as there is not a requirement for a Public Inquiry.

2.4 EMISSION STANDARDS

2.4.1 Emission Standards for 2007

The Feasibility Study recommended that the emission criteria for a LEZ launched in 2007 should be a minimum of Euro II plus RPC or equivalent. This recommendation was made on the basis of analysis of the cost effectiveness of the possible emission standards, taking into account the air quality benefits delivered and the cost of implementation to TfL and to industry.

The review of emission standards undertaken for this study has reached a similar conclusion. It would not be possible to implement a higher standard than Euro II plus RPC or equivalent because the cost to operators would be too great. Confirmation of this emission standard for the initial launch of the LEZ will require further consultation with operators and manufacturers in a next phase of implementation planning

2.4.2 Tightening the Emission Standards in 2010

This review recommends that further work is required before a definitive view can be reached on the appropriate emission criteria for a LEZ in 2010. There is perhaps a greater case to be made for an emission standard of Euro IV or equivalent given that Euro IV vehicles are beginning to enter the market now. A higher standard would deliver greater air quality benefits, in particular making a greater impact on NO_x emissions, and would move London closer to meeting its air quality targets for 2010.

However, to reach a definitive conclusion, further analysis is required of the cost to operators that would be incurred by moving to a higher standard and the projected air quality and health benefits should be remodelled. Further work should also be carried out to assess the socio-economic impact of extending the scheme in 2010 to include Light Goods Vehicles. Greater air quality benefits would be achieved by including these vehicles but the air quality benefits will need to be balanced against the possible impact on small business.

If the emission standards were to be raised in 2010 to address NO_x emissions a scheme for certifying the fitting of NO_x abatement technology would be required – this does not exist today. DfT has indicated that it currently has no plans to extend the current RPC programme to cover NO_x abatement; however DfT will have to participate in resolving this issue as it is not practical for TfL to take on this role. The most straightforward solution would be to extend the role of VOSA or possibly the EST to cover this requirement. No provision has been made in our estimate of the LEZ implementation timescale for TfL to establish and operate a certification organisation or for any legislation required to facilitate this.

2.5 VIEWS OF STAKEHOLDERS

The key LEZ stakeholder groups whose views we felt were critical to understand at this stage were the London Boroughs, the vehicle operators and national government through DfT & Defra. Their views, to the extent that they could be assessed under the limited timescale of this review, are summarised in the following paragraphs.

2.5.1 London Boroughs

The key findings from our interactions with the London Boroughs and the ALG were:

- Most of the Boroughs have expressed conditional support for a Low Emission Zone
- Full support will depend on them understanding more detail about how a LEZ will be implemented and the impact it will have on them
- Many Boroughs have concerns about the cost of implementing a LEZ and whether any of this cost will be passed back to them
- The Boroughs will be looking to TfL to 'make the case' for a Low Emission Zone
- There is more support for a LEZ among the inner Boroughs than the outer ones
- There are mixed views on the inclusion of vans in a scheme from 2010. From a benefits perspective some Boroughs would like to see them included in order to reduce emissions, but some expressed concern over the potential cost to businesses and the potential impact on employment within their area.

2.5.2 Vehicle Operators

On the whole both HGV and coach operators are supportive of a Low Emission Zone as they acknowledge the need to address the issue of pollution in urban areas and recognise that they are significant contributors to the problem. Key points raised by the operators include:

- The need for early notice of the emission standards of a LEZ to enable upgrade, relocation or replacement of vehicles to be planned into the replacement cycle
- The preference for emission standards that are 'technology neutral' i.e. that do not depend on the fitting of abatement technology and are based on Euro standards
- Concern about the impact on small businesses that may only have one or two vehicles that are the primary asset of the company and who typically have longer vehicle replacement cycles
- The availability of grants was considered to be important to enable this sector in particular to comply with a LEZ.

Further work is required to assess the financial impact on operators of a LEZ as there is insufficient analysis available of the vehicle age profile relative to fleet size and the frequency of journeys into London. This will be important both with regard to the launch of a scheme and for tightening the emission standard in 2010.

2.5.3 DfT and Defra

DfT and Defra are important stakeholders in a London LEZ. Defra is responsible for the UK's air quality targets and is responsible for reporting the UK's progress towards meeting EU targets. It has an interest in supporting local authorities in meeting emission targets and represents the UK in discussions at EU level on how the Commission can help to facilitate the implementation of Low Emission Zones.

DfT makes transport-related policy decisions that have an impact on how a Low Emission Zone may be implemented. It also funds the agencies whose participation will be required to operate the LEZ effectively, including DVLA and VOSA. Key DfT dependencies for the LEZ initiative have been discussed above. As a result of our review we recommend that TfL seeks early discussions with DfT, in particular to obtain clarification of its position with regard to grants and the RPC scheme, the status of EST and to facilitate the necessary system changes that a LEZ scheme will require from DVLA.

2.6 LEZ COSTS AND BENEFITS

2.6.1 Costs to TfL

The Feasibility Study recommended implementation of Scenario 5 (HGVs and coaches), migrating to Scenario 6 (the addition of LGVs) in 2010. These scenarios were based upon manual enforcement supported by the Congestion Charging infrastructure and a small number of fixed and mobile cameras. This review has concluded that it may not be commercially or contractually desirable to include the Congestion Charging infrastructure until the contract is re-let in 2008/09.

The variability around the current data for the number of vehicles entering the zone and the likely compliance rates gives a wide range of cost estimates. Our modelling indicates that the costs projected in the Feasibility Study are at the low end of the likely range. The main differences are due to the higher legal and project management costs identified in this study, together with the projected service provider costs.

2.6.2 Costs to Operators

The costs to operators of a LEZ are likely to be significant and will depend on the emission standards set. Stricter emission standards affect more vehicles and make it more expensive for operators to adapt or change their vehicles. The Feasibility Study estimated the costs to operators of upgrading the vehicle fleet to meet an emission standard of Euro II + RPC at between £64m - £135m. To meet the requirements of a 2010 LEZ with an emission

standard of Euro III + RPC the Study estimated the costs to operators at between £113m - £332m for HGVs and coaches. This would rise to £174m - £410m if LGVs are included in 2010. We have estimated that the cost to operators of meeting a Euro IV standard in 2010 could be an additional £30m - £120m although this figure may be reduced by operators moving directly to the Euro IV standard.

2.6.3 LEZ Benefits

The primary benefits of a LEZ are in the improvements to air quality delivered and in the associated health benefits. The projected air quality benefits of the LEZ will need to be remodelled in the next phase of implementation planning as there are factors which may have changed the baseline air quality against which future benefits will be measured. These include:

- Impact of recent traffic management measures
- Earlier introduction of Euro IV vehicles
- TfL actions taken to improve emissions from buses and taxis
- Accounting for the likely compliance rates.

The air quality modelling should look at the impact an emission standard of Euro IV in 2010 as an alternative to Euro III + RPC would have. It is likely that this measure would help London to achieve its objectives for NO_x more quickly than it would do otherwise. The impact on health of this measure should also be modelled, although it is currently thought that particulates rather than NO_x cause the greatest harm to human health. Similarly, the relative impact on CO₂ emissions will need to be assessed and taken into account in the final decision on emission standards.

The remodelling should produce a range of potential air quality benefits taking into account sensitivities with respect to meteorology, emissions and model inputs and assumptions. The predicted health benefits of the LEZ will then need to be recalculated based on any changes to the forecast air quality benefits.

2.6.4 Overall Economic Case

The Feasibility Study concluded that “for the recommended heavy vehicle scheme, the benefits are broadly similar to the overall costs of introducing a LEZ (including costs to operators). The extension of the scheme to include vans increases the costs, relative to the benefits achieved, when compared to the heavy vehicle scheme alone.” This review estimated higher likely implementation and operating costs and hence, using the cost to operators and the benefits derived in the Feasibility Study, concluded that there will be an overall cost associated with the heavy vehicle scheme and that this will rise with the inclusion of vans.

The Feasibility Study also concluded that a net present cost of the LEZ in the range of £100 million to £250 million would “have little discernable macro-economic impact.” Whilst the range of economic costs estimated in this study varied significantly depending on the volumes and compliance factors chosen, the most likely estimates fall within this range.

2.7 CONCLUSIONS

The table below summarises the key differences between the findings of the Feasibility Study and this review. These differences arise because:

- a. the transport and air quality environment has evolved since 2002/2003 when the report was written
- b. some implementation considerations have been examined in more detail in this review e.g. legal options, certification options, enforcement regimes and project related costs.

	Feasibility Study Finding	2005 Update
1	Grants may not be available to support fitting of abatement technology for a LEZ.	Grants almost certainly will not be available to support meeting of LEZ requirements although details of when they will be withdrawn with respect to an announcement on LEZ is unclear.
2	A NO _x based RPC scheme should be investigated as this could support the implementation of a NO _x -based emission standard in the future.	DfT has no plans to extend the RPC scheme to include NO _x abatement.
3	The LEZ should apply to HGVs, coaches and buses and should possibly extend to cover LGVs and taxis in 2010. Taxis should be regulated early through the licensing process.	The emissions of TfL buses and taxis have been addressed directly through bus contracts and taxi licensing since the Feasibility Study and will all be compliant with a LEZ standard of Euro II + RPC by 2007.
4	The most appropriate legal basis for a LEZ is a TRO derived from the RTRA (1984).	The LEZ is also implementable via a Scheme Order made by TfL under the GLA Act 1999 and via a Parliamentary Bill. A LEZ implemented under a Scheme Order would have to be a charging scheme. A Scheme Order based scheme can be implemented for 2007, although further work on EC law considerations is required. It is unlikely that a scheme implemented via a TRO could start before early 2008.
5	Integrating the LEZ with the Congestion Charging architecture would not be technically difficult and would provide a more cost effective basis for an enforcement strategy than introducing a more expensive stand alone infrastructure.	There would be a high one-off cost of building LEZ requirements into the CCS technical infrastructure. It is unlikely to be economic or commercially desirable for TfL to vary its contract with the service provider for a 2007 implementation. The requirements could be included in the 2008/2009 re-let at marginal cost.
6	Foreign vehicles should be included in the LEZ.	There are no common European standards for certifying the fitting of retro-fit equipment to vehicles. Not all foreign vehicle VRMs can be read by ANPR cameras. Foreign vehicle registration information is not available electronically. All non-UK vehicles will therefore have to register with TfL.
7	The emission criteria recommended were: 2007 – Euro II + RPC 2010 – Euro III + RPC or 2010 – Euro III + RPC and vans > 10yrs.	Emission criteria should stay the same as Feasibility Study for 2007 but a higher standard should be revisited as an option for 2010 as the air quality benefits are greater for NO _x and the market is evolving to potentially make Euro IV vehicles more readily available to operators than previously envisaged.

The conclusion of this review is that the likely earliest a Low Emission Zone for London could be implemented is in October 2007 via a Scheme Order. This route is more within TfL's control and has less risk of slippage than the TRO enabled scheme. This programme assumes a revision to the Transport Strategy but no Public Inquiry and is dependent on collaboration from DfT for certification and for DVLA records.

The recommended emission standard for a 2007 launch is Euro II plus RPC or equivalent. For 2010 this review proposes that an emission standard of Euro IV and the inclusion of LGV over 10 years old is considered as this will deliver greater air quality benefits than Euro III plus RPC or equivalent. This recommendation is subject to further analysis of the air quality benefits, including the effect on CO₂ emissions, and further consultation with DfT, operators and manufacturers.

We estimate that, subject to further modelling of air quality and health benefits and the cost to operators, there will be an overall cost associated with implementing a Low Emission Zone in London. However, the objective of reducing illnesses caused or exacerbated by air pollution and the need to proactively take steps towards meeting London's air quality targets for 2010 may provide an overriding imperative for making Greater London a Low Emission Zone.

3 INTRODUCTION

This report documents the findings of Deloitte's review of the London Low Emission Zone Feasibility Study, conducted between November 2004 and February 2005. The report was compiled by Deloitte with specialist input from TRL, Mott MacDonald, Simmons & Simmons and Cambridge Environmental Research Consultants (CERC).

3.1 BACKGROUND TO THE REVIEW

In July 2003 a Feasibility Study was published that looked in depth at the options for introducing a Low Emission Zone (LEZ) for London. The work was conducted by a consortium led by AEA Technology on behalf of the Greater London Authority (GLA), Association of London Government (ALG), Transport for London (TfL), Department for Transport (DfT) & Department for Environment, Food & Rural Affairs (DEFRA). This study built on the London LEZ Feasibility Study Phase I which was undertaken in 2001 by the ALG and the GLA.

The Phase II study analysed the options for the operation, enforcement, implementation, emission standards and funding for a London LEZ and also assessed the potential impacts of a scheme in terms of air quality impact, transport impact, socio-economic impact, public acceptability and costs, both to the scheme operator and the vehicle operators.

In June 2004 the Mayor of London was returned to office and stated his intention to make Greater London a Low Emission Zone from which the most polluting lorries, coaches, buses and taxis would be excluded. He has since instructed TfL to implement a Low Emission Zone.

TfL commissioned Deloitte in November 2004 to conduct a high level review of the Feasibility Study implementation options with the remit to establish how long it would take to implement a scheme, to review the implementation and running costs of a LEZ and to identify any significant issues that might prove to be implementation 'showstoppers'. The results of this study which was completed in February 2005 are contained in this document.

3.2 THE MAYOR'S STRATEGY

Growing concerns about the impact of air quality on health led to EU and UK air quality legislation, namely the EU's Air Quality Framework Directive and the Air Quality Strategy (AQS) for England, Wales and Northern Ireland. This legislation has introduced targets for the reduction of air pollutants to levels which will have minimal impacts on human health.

The EU legislation sets legally binding air pollution targets to be achieved by 2005 for particulate matter (PM₁₀) and targets to be achieved for nitrogen dioxide (NO₂) by 2010. The UK legislation sets objectives in terms of both PM₁₀ and NO_x for 2005 and 2010, which Local Authorities are obliged by law to work towards.

Much of London will meet these targets at the required dates. However, without further action, there are also likely to be considerable areas of London that do not (particularly in central London and areas alongside the main road network). Some progress is being made through recent measures to reduce overall traffic levels. However, the greatest benefit will come from encouraging the introduction of cleaner vehicles into the fleet at a faster rate than is currently being achieved. Newer vehicles have much lower emissions because of European legislation implemented over the past decade (known as Euro standards).

The Mayor's Air Quality Strategy is therefore focused on measures that will accelerate the introduction of cleaner road vehicles across London. In December 2004 the Mayor unveiled his Taxi Emission Strategy which will require all of London's black taxis to meet Euro III emission standards by 1st January 2008. London's bus fleet is also being upgraded to an emission standard of Euro II + particulate trap by the end of 2005. As another example, alternatively fuelled vehicles receive a 100% discount on the Congestion Charge. A Low Emission Zone which would prohibit the most polluting vehicles from the Greater London area is seen as potentially one of the most effective ways of encouraging the replacement of old, polluting vehicles with newer, cleaner ones. Such schemes have been successful in reducing NO_x and PM₁₀ levels in several cities in Sweden and Denmark, and have recently been introduced in Japan.

3.3 SUMMARY OF FEASIBILITY STUDY FINDINGS

The Feasibility Study was an extensive analysis of many possible options for implementing a Low Emission Zone in London. The study looked at:

- The geographical area that a LEZ might cover
- The vehicle types that the LEZ might apply to
- The emission standards that might apply to a LEZ and how these might evolve
- The potential timeframes for introduction of a LEZ
- The legal basis for the introduction of the LEZ
- Enforcement options including manual and automatic regimes
- Options for certification and registration for the scheme
- The potential costs of implementing a LEZ
- The impact on vehicle operators of the introduction of a LEZ
- The air quality and health benefits that might be delivered by a LEZ.

The overall findings of the Feasibility Study are summarised below.

Geographical coverage

The Feasibility Study recommended that the London Low Emission Zone should cover as great an area as possible to maximise the air quality benefits. It was recommended that the area should extend to the Greater London boundary i.e. incorporate all the London Boroughs, but that extending it out to the M25 would be too difficult to achieve as it would require the co-operation of county councils outside London. A LEZ that only extended to North & South circular would impact a large number of vehicles but the effect of diverted traffic around the area might reduce the benefits that could otherwise be achieved.

Vehicle types covered

The Feasibility Study concluded that it was most cost-effective for a LEZ to target Heavy Goods Vehicles, Coaches, Buses and Taxis. This group of vehicles emits more emissions per kilometre driven than other vehicle types and there are relatively low-cost retro-fit technologies available that are straightforward to fit to these vehicles. The study recommended that the scheme be extended at a later date to include Light Goods Vehicles but that more analysis needed to be done to assess the impact of this on operators, as the costs could potentially be quite high.

It was not recommended that cars be covered by a LEZ, primarily because of the very large number of vehicles that would be affected and the fact that the majority of older cars are owned by low income households and the scheme would affect them disproportionately to the rest of the population.

LEZ emission standards

The emission standards that were recommended by the Feasibility Study were:

- For 2007 - Euro II + RPC (or equivalent)
- For 2010 - Euro III + RPC (or equivalent) or Euro III + RPC (or equivalent) and vans > 10yrs old.

These standards were assessed to be the most cost effective to implement taking into account the air quality benefits achieved vs. the cost to the industry to achieve the targets.

The study highlighted the fact that the Reduced Pollution Certificate (RPC) programme currently only applies to PM₁₀ and not to NO_x. It suggested that a RPC or equivalent certification scheme for NO_x would facilitate the move towards NO_x based emission standards in later years and recommended that the potential for such a scheme be investigated.

Timeframes for introduction of a LEZ

The Feasibility Study estimated that it would take around three years to implement a Low Emission Zone from the date the go-ahead was given. The report also highlighted the fact that vehicle operators would need to be given as much notice as possible ahead of the launch of a scheme in order to plan their vehicle upgrades.

Legal basis for the introduction of a LEZ

Whilst several options were considered for the regulatory basis of a LEZ including voluntary and negotiated agreements, the study recommended that the LEZ be implemented through a Traffic Regulation Order under the Road Traffic Regulations Act (1984). This was deemed to be the most effective way of achieving maximum compliance with the scheme. The report recognised that TfL has powers to set standards for buses and taxis under their contract and licensing arrangements and that these could be used to set emissions criteria in line with the requirements of a LEZ.

Enforcement options

To enforce an LEZ the Feasibility looked at both manual and automatic (i.e. using cameras) solutions. They concluded that whilst a manual solution would be quick and inexpensive to implement the level of detection that could be achieved would be low. This would lead to higher levels of evasion and less air quality benefits.

The study concluded that an infrastructure that used ANPR cameras as well as mobile units and that also made use of the Congestion Charging infrastructure would be the most cost effective enforcement solution.

The study recognised that in order to introduce a scheme as quickly as possible once the go-ahead had been given a manual enforcement regime might be required to start with but that it would be desirable to move to automatic enforcement as soon as practicable. The report emphasised that if the scheme were to be extended to include LGVs then automatic enforcement would be required given the large number of vehicles involved.

Certification and registration options

The Feasibility Study examined a number of potential data sources for building a database to support the vehicle identification and certification process. The study concluded that there were limited sources of data for determining the exact Euro standard of a vehicle. The recommended certification process assigned a provisional Euro rating to a vehicle based on date of first registration with follow-on processes to refine this estimate and deal with early compliance, end of series, retro-fits and fuel conversions.

The RPC process was put forward as the most robust data source which could be used to identify HGVs which have had abatement equipment fitted. It was also suggested that the Energy Savings Trust could be used to identify vehicles funded under the CleanUp register, thus widening the technology routes to compliance (including NO_x Selective Catalytic Reduction). For vehicles not registered by the Energy Savings Trust a certificate of conformity from the conversion company was proposed as evidence.

The Feasibility Study suggested that the development of a database of end of series vehicles would be a labour intensive process and whilst the exceptions were noted in relation to these vehicles no mitigation was proposed. For Early Compliant vehicles it was recognised that there was little the organisation could do to identify these vehicles in advance and so a registration route was proposed.

Impact of a LEZ on vehicle operators

The Feasibility Study recognised that the introduction of a Low Emission Zone in London would have significant cost implications for vehicle operators and that these costs would depend to some extent on the strictness of the emission standards set and on how operators chose to respond. For example some fleet operators might have the option of moving their older vehicles out of London. Depending on the lead time given running up to the introduction of the LEZ many operators could plan their vehicle replacement cycles to accommodate the LEZ.

However the LEZ is likely to have a greater impact on the smaller, London-based operators who keep their vehicles for a long time and who do not have the option of moving vehicles out of London. The introduction of a LEZ would also impact the second hand vehicle market reducing the value of vehicles that did not meet the LEZ criteria and impacting operators and leasing companies.

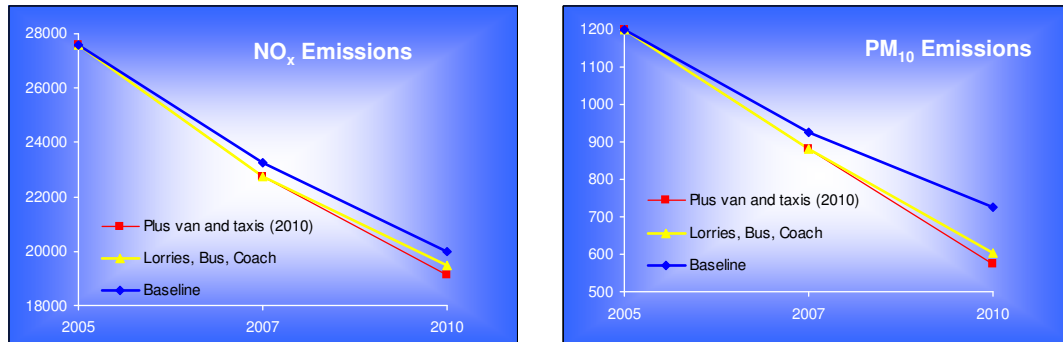
Air quality and health benefits

As part of the Feasibility Study extensive modelling was conducted of the predicted air quality benefits of a London LEZ. The study used the ERG London model for this analysis with additional modelling for the purposes of comparison also being conducted by CERC using the ADMS Urban model.

The main pollutants that are a danger to human health are particulate matter (PM₁₀) and nitrogen dioxide (NO_x) and these are the pollutants that would be targeted by a low emission zone. Improvements with regard to these pollutants can be measured in reduction in emissions (tonnes emitted from vehicle tailpipes) and air quality concentrations (measured in µg m⁻³). The EU and UK emission standards are set in respect of air quality concentrations.

In terms of the benefits that the introduction of a LEZ might bring, the Feasibility Study found that the LEZ would accelerate the benefits that are being achieved anyway as older vehicles are replaced with cleaner vehicles. This study found that the benefits of a LEZ are likely to be lower than had previously been predicted as other initiatives are also having an impact on air quality e.g. London buses, London taxi strategy

With the emission standards recommended in the Feasibility Study in 2007 and 2010, the projected reduction in tonnes of PM₁₀ and NO_x emissions vs. the baseline 'do nothing' scenario are shown in the graphs below which are taken from the Feasibility Study.



In percentage terms the proposed emission standards would give the following reductions compared with the baseline:

	PM ₁₀	NO _x
2007	-9%	-1.5%
2010 (without LGVs)	-19%	-2.7%
2010 (with LGVs)	-23%	-3.8%

With regard to air quality concentrations and meeting EU and UK targets the Feasibility Study found that even the strictest LEZ would not on its own, achieve all the London NO_x or PM₁₀ air quality targets for 2010. However, a LEZ would have a positive impact on the number of individual locations that would exceed the annual targets. This is because many areas of London are likely to be close to the air quality targets and even a small reduction in emissions could have the effect of taking an area below the required threshold.

The Feasibility Study did indicate that there are many factors that could affect the results of the modelling, for example the meteorology of the year selected as the baseline as meteorological conditions have a significant impact on air quality. The authors also recommended that the modelling be revisited if improved emissions data became available to assess the impact factors such as the increasing proportion of diesel cars in the fleet, measures to address bus and taxi emissions and the impact of traffic management schemes on background emissions in London.

The business case for implementing and operating a LEZ

The Feasibility Study estimated that implementing a Low Emission Zone in London would deliver between £222m and £243m (depending on whether LGVs are included in 2010) of health benefits primarily through the reduction in the number of respiratory illnesses each year.

The Study estimated that the 10 year cost of operating a Low Emission Zone that used Congestion Charging enforcement infrastructure and included LGVs from 2010 was approximately £80 million, with the set up costs (Capex) estimated at £10m and annual running costs estimated at £7m.

When the cost to operators was taken into account, the study found that the business case for a LEZ was more or less neutral for 2007 with the overall cost of operation being about the same as the benefits delivered.

3.4 SCOPE OF THIS STUDY

This review of the Feasibility Study, undertaken between November 2004 and February 2005, has three primary objectives:

- To determine the earliest date that a Low Emission Zone could be implemented
- To identify any key issues that might prevent the implementation of a LEZ or that require further analysis in a follow on phase
- To understand what changes have happened since the Feasibility Study that might impact the design of a LEZ, primarily in terms of emission standards and developments in abatement technology.

Assumptions

As the timeframe for this analysis has been short, there are some findings from the Feasibility Study that we have taken as given and have not revisited within this review. These are:

- A LEZ would apply to Greater London area including all the London Boroughs but not including the M25
- A 2007 LEZ would apply to HGVs over 3.5 tonnes, coaches and buses and a 2010 LEZ would also apply to these vehicles as well as potentially to LGVs
- There would be some exceptions to the vehicle categories, for example specialist construction vehicles but we have not done a detailed analysis of what these would be.

We have conducted a high level review of the vehicle numbers provided in the Feasibility Study but, unless otherwise stated, we have used the numbers provided.

Feasibility study review workstreams

This review has been divided into five primary workstreams looking at different aspects of a LEZ, with a focus on determining how the LEZ can be implemented.

- **Legal.** This workstream was conducted by Simmons & Simmons working with TfL Legal. The objective of this work was to identify the legal frameworks, with their accompanying legal processes, that would enable the LEZ. The legal process for establishing a LEZ is the primary factor driving the implementation timescale so it is important to understand the detail of the legal steps to be gone through to determine how quickly the LEZ can be implemented. This workstream also looked at EC law issues including those relating to free movement of goods and/or services and state aid to determine how these might impact the design of the LEZ.
- **Emission standards.** The purpose of this workstream was to identify how the industry has developed since the Feasibility Study was written. This included reviewing the developments in abatement technologies both for PM₁₀ and NO_x in terms of equipment available for different types of vehicles and the emissions reductions that can be achieved. In particular some of the stakeholders to this study were keen to see what steps could be taken to reduce NO_x emissions as well as particulates and therefore increase the air quality benefits delivered by the LEZ. This study has reviewed the emissions criteria recommended in the Feasibility Study for 2007 and 2010 to see whether these should be revised in the light of industry developments. Deloitte worked closely with TRL on this workstream.
- **Infrastructure & operations.** In this workstream the review looked at the enforcement options for LEZ, both manual and automatic, and the options for certification & registration, in particular how to build a database of excluded vehicles. The requirements for other aspects of the operation were considered, including the

facility for making enquiries and complaints. The potential options were considered in sufficient detail to identify any implementation 'show-stopper' issues. This workstream looked at the costs and timescales associated with the implementation of the enforcement and certification options and developed the overall implementation plan for the LEZ.

- **Traffic management.** This workstream reviewed the transport numbers in the Feasibility Study and obtained additional information where available. This data was used to inform the analysis of the enforcement options. This workstream also looked at the requirements for signage of a Low Emission Zone. Deloitte was supported by Mott MacDonald on this workstream.
- **Stakeholder acceptability.** The objective of this workstream was to meet with key organisations that have an interest or involvement in the London LEZ and to understand their views and whether these had changed since the Feasibility Study was written. We were particularly interested in the views of the London Boroughs whose involvement in the planning and implementation of a LEZ is considered very important for its success. We met with DfT and Defra who are key influencers at the European level with regard to EU standards for LEZs. DfT is also responsible for funding grants for the fitting of abatement equipment to vehicles and for the operation of the Reduced Pollution Certificate (RPC) scheme. The future of both grants and the RPC scheme will have an impact on how the scheme can be implemented. The other important stakeholder group is the vehicle operators who will have to modify their fleets to meet the requirements of the LEZ.
- **Business case.** Within this workstream we reviewed the estimated costs of implementing and operating a Low Emission Zone based on the feasible enforcement and other technical options evaluated in the Infrastructure and Operations workstream.

Air quality and health benefits

The scope of this review did not include remodelling of the air quality and health benefits projected for a Low Emission Zone. However, we asked CERC to review the modelling output of the Feasibility Study and to comment on the work that would be required to update this. It is clear that the air quality and health benefits modelling will have to be revisited – the Feasibility Study itself recommends this is done – as more current data is now available against which to baseline any LEZ improvements. Modelling will need to take into account the impact of recent initiatives such as the new taxi emissions strategy and the bus upgrade programme, which will reduce emissions of PM₁₀ and NO_x in London. Against these measures the impact of increasing numbers of diesel engines in the overall UK vehicle fleet will need to be taken into account.

Outputs of this review

The main outputs of this review are:

- An analysis of the implementation options for the Low Emission Zone taking into account legal, technical, operational and stakeholder considerations
- A review of the proposed emission standards for 2007 and 2010
- An assessment of the costs of the recommended option
- An assessment of the strategic risks associated with the recommended option
- A summary of the views of stakeholders who were interviewed as part of this review
- The programme plan for the implementation of the preferred implementation options, with key dependencies

- Identified next steps required to take forward the recommendations of this report to the next stage of implementation planning.

4 SCHEME EMISSIONS CRITERIA

This section reviews the Emission standards recommended as entry criteria for the LEZ in the Feasibility Study, the factors that influence the selection of these standards and changes that have occurred since the report was published that may change these conclusions. In particular it considers the potential for tightening the standard for NO_x in the light of advances in abatement technology. It draws upon the findings of a research report commissioned from TRL,¹ which is included as Appendix C, together with the evidence gathered from stakeholder interviews during this phase of work. This includes a review of the available technology which can help vehicles achieve the tighter emission standards, and the implementation issues which will need to be considered. We conclude with recommendations for the standards which should be taken forward and additional work needed in this area.

4.1 LEZ VEHICLE EMISSION STANDARDS

Since 1990, EU legislation has meant vehicle manufacturers have had to meet continually tightening emission standards, commonly referred to as the Euro standards. These have set increasingly tight standards for Carbon monoxide, hydrocarbons (HC), particulate matter (PM) and Nitrogen oxides (NO_x) emissions. They have also mandated more sophisticated engine management and on-board diagnostic systems which have significantly reduced emissions. Newer vehicles are therefore generally less polluting than older ones.

By imposing LEZ entry criteria the Mayor aims to exclude both older, more polluting vehicles, or encourage operators to fit abatement devices that clean emissions to meet the emissions standard set. It also aims to accelerate the earlier adoption of cleaner vehicles than would otherwise occur through the natural fleet renewal process. However, as the fleet is continually improving, the emission benefits achieved through the LEZ reduce if the introduction date is delayed.

4.2 AIR QUALITY OBJECTIVES

Within Greater London, traffic emissions are the major source of NO_x and PM pollutants, contributing 58% of the total NO_x and 68% of the total PM₁₀ emissions for Greater London.² Despite developments in new vehicle design, diesel engines are responsible for a large proportion of NO_x, PM and to a lesser extent, the HC emissions.

The objective of the LEZ scheme is to reduce emissions of NO_x and PM₁₀ to assist in achieving legally binding Air Quality targets set by the EU. These set limit or target values for 1st January 2005 and 2010. The limit values for 2010 are indicative which are subject to review, and there are likely to be further targets set for PM_{2.5}.

¹“A review of the London low emission zone entry criteria”, Turpin K, McCrae I S, Latham S, Barlow T and Boulter P G, TRL, January 2005

² page 60, “London Low Emission Zone Feasibility Study Phase. Final Report. Issue 3”, AEA Technology, July 2003

EU directive targets

Pollutant	Averaging period	Limit Value $\mu\text{g m}^{-3}$	Number of exceedences allowed	To be met by
NO ₂	Hourly	200	18	1/1/2010
NO ₂	Annual	40	-	1/1/2010
NO ₂	Annual	30	-	19/7/2001
PM ₁₀	Daily	50	35	1/1/2005
PM ₁₀	Annual	40	-	1/1/2005

EU directive indicative targets (subject to review)

PM ₁₀	Annual	20	-	1/1/2010
PM ₁₀	Daily	50	7	1/1/2010

UK national objectives

The UK Air Quality Strategy is the key mechanism for implementing the EU directive. This sets national objectives as:

Pollutant	Averaging period	Limit Value $\mu\text{g m}^{-3}$	Number of exceedences allowed	To be met by
NO ₂	Hourly	200	18	31/12/2005
NO ₂	Annual	40	-	31/12/2005
PM ₁₀	Daily	50	35	31/12/2004
PM ₁₀	Annual	40	-	31/12/2004

UK London objectives

In 2002 the UK Government announced new objectives for PM₁₀ which consider London separately from the rest of the UK. These set reduced objectives for London for 2010, together with a long-term aspirational objective which will be kept under review, “that the Mayor and London Authorities should work towards.”

The Mayor’s Air Quality Strategy has recommended introducing a LEZ in order to contribute to meeting these Air Quality targets.

Pollutant	Averaging period	Limit Value µg m ⁻³	Number of exceedences allowed	To be met by
NO ₂	Hourly	200	18	31/12/2005
NO ₂	Annual	40	-	31/12/2005
PM ₁₀ – UK	Daily	50	7	31/12/2010
PM ₁₀ - London	Daily	50	10	31/12/2010
PM ₁₀ – UK	Annual	20	-	31/12/2010
Aspirational Objectives				
PM ₁₀ - London	Annual	20	-	31/12/2015

4.3 EMISSION CRITERIA RECOMMENDED IN THE FEASIBILITY STUDY

Following an assessment of various options, the Feasibility Study recommended the emission criteria that should apply to vehicles allowed entry into the LEZ in years 2007 and 2010.

These standards were based on the Euro emission standards which are set for all new vehicles, together with the Reduced Pollution Certificate (RPC) to certify particulate matter reductions achieved by retro-fitting abatement technology to vehicles. The classes of vehicles that would be allowed into and excluded from the zone are summarised in the table on the following page.

The Feasibility Study did not include standards targeted at NO_x abatement, since NO_x abatement technology was not mature at that stage, and there was no equivalent of the Reduced Pollution Certificate for this equipment.

The key question to be addressed at this stage is whether the 2010 entry criteria could be tightened to achieve additional NO_x reduction.

Proposed Emission Criteria for HGVs, buses and coaches from Feasibility Study			
Emission standards for vehicles at manufacture	Available From - To³	2007 EII + RPC (PM) <i>or equivalent</i>	2010 EIII + RPC (PM) <i>or equivalent</i>
E0	- Oct 1993		
EI	Oct 1993 – Oct 1996	Excluded	Excluded
EII	Oct 1996 – Oct 2001		
EII + RPC (PM)			
EII + RPC (PM + NO _x)			Allowed
EIII	Oct 2001 – Oct 2006		Excluded
EIII + RPC (PM)		Allowed	
EIII + RPC (PM + NO _x)			Allowed
EIV	Oct 2006 – Oct 2009		
EV	Oct 2009 -		
For LGV			
LGV > 10 years	< Jan 2000	Allowed	Excluded

³ Dates are shown when all new vehicles have to comply with Euro standards. Early Compliant vehicles and End of Series vehicles will fall outside these ranges. (source p14: Feasibility Study: Phase 2)

4.4 SUMMARY OF CHANGES SINCE THE FEASIBILITY STUDY

Since the Feasibility Study was completed, a number of developments such as advances in abatement technology have occurred, which may impact the choice of LEZ emission criteria. The table below summarises these developments and their potential impact on the LEZ entry criteria.

No.	New Developments since Completion of the Feasibility Study	Impact on LEZ 2010 Entry Criteria
1.	The early availability of Euro IV vehicles using EGR in 2004 for both HDV and LDV classes.	Euro IV standards more feasible.
2.	The conclusion that SCR technology will be used on the majority (80%) of Euro IV vehicles introduced in 2005 (and that this technology will be able to support stricter Euro V standards) has been confirmed by manufacturers.	Stricter standards and use of SCR abatement technology feasible.
3.	SCR abatement technology has been demonstrated as working retro fitted to unmodified engines and fitted with Particulate Traps, and is in use in selected applications on buses and PSVs. However there is very little evidence outside these markets.	Retro-fit NO _x technology may be available, but the testing, and operational use in all types of vehicle and in older Euro I or II engines, is less certain.
4.	<p>RPCs currently apply to particulate matter only. According to the Feasibility Study, a NO_x based certification would simplify the approach for enforcing tighter NO_x based criteria towards 2010. It could also result in much greater NO₂ benefits, at lower cost, due to promising retro-fit technology.</p> <p>The Feasibility Study identified the requirement for a certification scheme for NO_x abatement technology, and this report reinforces this requirement. However at present there is no commitment from DfT to implement such a certification process.</p>	Without such a certification scheme NO _x emission levels can neither be checked by the LEZ operator, nor their on going operational maintenance approved, so emission benefits will be reduced.
5.	There has been slightly higher than predicted take up of the RPC scheme, although the number of renewals has reduced in the last year.	More vehicles able to enter the zone than in the Feasibility Study.
6.	Statements by manufacturers that Euro IV vehicles will not suffer a fuel efficiency penalty compared to Euro III (although retro fit installations may be impacted).	Stricter standards do not have negative impact on CO ₂ emissions or operator costs.
7.	Introduction of German Toll Roads with tolls discounted for Euro IV vehicles, so encouraging their early availability and adoption.	Other external factors are driving the market to Euro IV take-up.
8.	London Buses' research highlights that in urban London conditions Euro III vehicles may emit more NO _x than Euro II vehicles fitted with particulate traps – leading to the fear that setting a LEZ standard that encouraged Euro III vehicles may be detrimental.	Prolonging Euro III fleet life, or encouraging these over Euro II + RPC or Euro IV could be disadvantageous from a NO _x emissions point of view for some vehicles.

No.	New Developments since Completion of the Feasibility Study	Impact on LEZ 2010 Entry Criteria
9.	Statement from SMMT and manufacturers that they do not favour retro-fit technology as after-fit treatment devices are sensitive to the vehicle driving conditions (i.e. may not perform well in urban stop-start conditions)	Support from manufacturers for Euro based standards, rather than retro-fit technology specific ones. Reinforces need for maintenance and testing regime.
10.	Consideration from RHA that vehicle operators favour manufacturer-based standards rather than retro-fit technology, since manufacturers bear responsibility for their correct operation.	Support for EURO based standards, rather than retro-fit based ones.
11.	Consideration from RHA and FTA that operators require at least three years notice to enable fleet replacement cycles to be planned.	2007/08 standards cannot easily be tightened at this stage, but 2010 ones could with sufficient warning.
12.	EU questions as to the anti-competitive nature of the Stockholm LEZ, being based on Swedish specific certified abatement technology.	Standards should be based on Euro levels or equivalent, not UK specific tests such as the RPC.
13.	Confirmation by DfT that whilst grants will continue this year for retro-fit technology, there would not be significant extra funding to extend them to all vehicles, nor could they be maintained once standards were mandated by the LEZ.	Operators will bear costs of meeting the LEZ standards, so are major factor in determining what level can be born.
14.	Continuing EU pressure for tighter emission standards is anticipated. It is expected that Euro V will require all new diesel-powered HDV to be fitted with exhaust gas after treatment devices. Review clauses contained in the latest amending directives require the Commission to propose further measures beyond 2005/8.	Stricter standards are likely beyond 2010; The LEZ criteria may potentially need to be tightened in the future.
15.	The Commission has indicated that Euro VI standards for HDV engines will enter into force in 2013 (and this date is likely to be challenged to be advanced to 2010). Some countries are calling for standards that are intended to see diesel particulate filters (DPFs) fitted to most or all diesel vehicles, and some bodies proposing tighter standards from 2008.	Stricter standards are feasible beyond 2010. LEZ entry criteria may need review beyond 2010.
16.	To guarantee the use of DPFs may well require the addition of limits based on numbers of particles emitted per km. Further consideration of this may be necessary after work on such measurement techniques concludes late in 2004. At present HDV Euro V emission standards will be enforced from the beginning of 2010 to 2013 (introduced initially in 2008). Euro Standards beyond 2010 are currently being reviewed by the DfT in light of abatement technology developments (DfT, 2004).	Future standards may be tougher, or require measures of smaller particulates.
17.	Implementation of TfL licensing conditions on taxis and buses that ensure they meet the requirements specified.	These fleets will meet stricter standards than set in Feasibility Study.

No.	New Developments since Completion of the Feasibility Study	Impact on LEZ 2010 Entry Criteria
18.	From March 2003, LGV Euro IV vans are specifically identified in DVLA data.	Could use Euro IV as standard rather than age for LGV, especially after 2010.
19.	The Feasibility Study suggests that due to different abatement technology options, Euro III heavy vehicles could emit higher levels of ultra-fine particulate matter than those vehicles complying with Euro II standards (Phase II Feasibility Study, 2004, p159).	Standards should not encourage Euro III vehicles at the expense of Euro IV.
20.	<p>A number of cities such as Bath, Edinburgh and Bristol have included a LEZ as components of their Air Quality Strategies, although none are as far advanced in terms of progressing to implementation as London.</p> <p>In implementing local schemes, there is some interest in a coordinated approach nationally, since costs to both scheme and vehicle operators increase if different administration and emission levels are set. There has been discussion about national standards for entry criteria, road signs, and national certification of vehicles and DfT has engaged with the EU regarding EU LEZ implementation issues.</p>	London LEZ is setting de facto national standards. DfT will need to ensure EU standards, signage and coordinated national approach.
21.	EU Air Quality Limit Values are likely to be introduced for PM _{2.5} .	LEZ standards and underlying certifications may change during course of the scheme.
22.	Local authorities such as Greenwich are starting to use planning agreements to create low emission schemes when new developments are proposed in their areas. These typically are stricter than LEZ proposals, but some opportunity for coordination / simplification may emerge.	LEZ standards may conflict with borough standards, so coordination may be needed.
23.	DfT working with EU working group on Low Emission Zones.	EU cooperation is being mooted for LEZ operation.

4.5 VEHICLE EMISSIONS TECHNOLOGY AVAILABLE TO MEET LEZ ENTRY CRITERIA

In this section we review the equipment available to enable vehicles to meet proposed LEZ emissions criteria. This introduces the various particulate and NO_x abatement technologies that can be applied, both to new vehicle designs or as retro-fit options to reduce existing vehicle emissions and focuses on how these technologies have matured since the Feasibility Study was written.

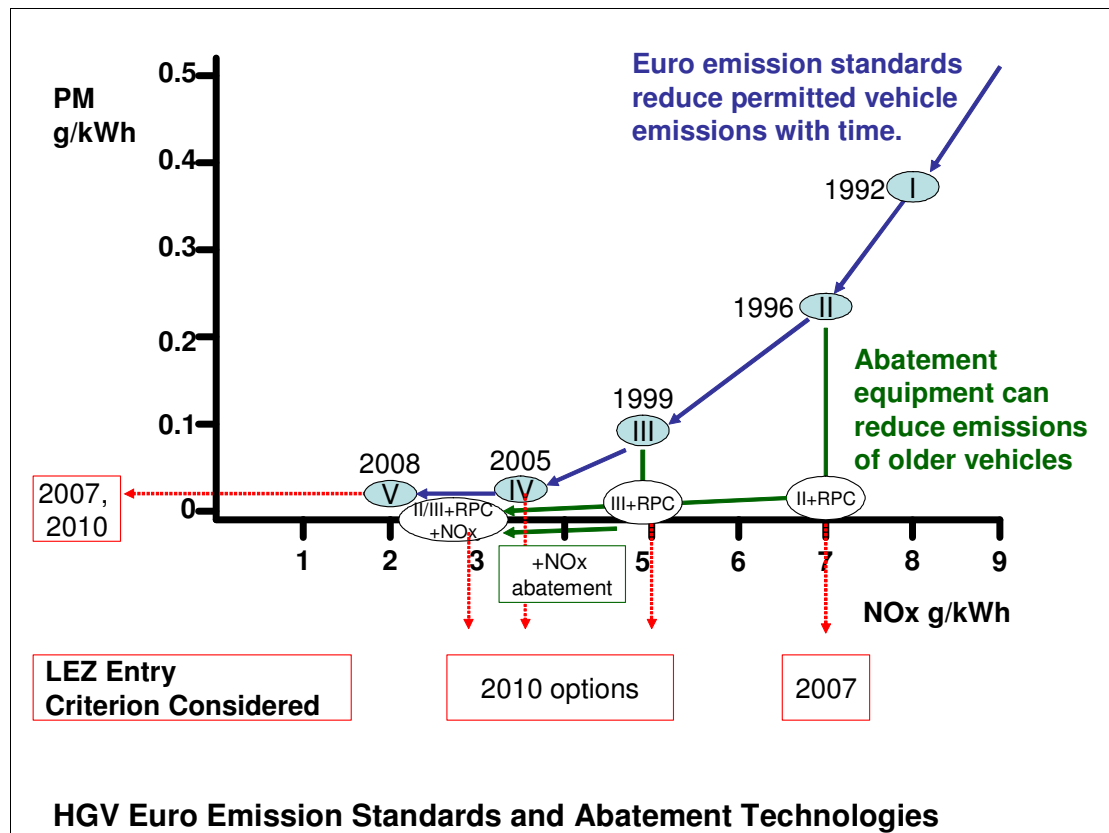
4.5.1 Engine Design and Emission Standards

In most cases heavy vehicle types operate using diesel fuel, whilst a small proportion use natural gas which provides significantly reduced NO_x and PM₁₀ emissions.

For LGVs the vast majority of current vehicles are now diesel, although LPG variants are available and older petrol vehicles are still running.

HGV Euro standards have specified increasingly tight standards for PM and NO_x, and more sophisticated engine management and on-board diagnostic systems have significantly reduced emissions. However, engines and control mechanisms will need substantial development to meet future emission standards. Under these circumstances an alternative strategy is to apply abatement devices to the vehicles' exhaust system that can both capture and or breakdown emissions. Whilst all UK petrol cars have been fitted with oxidation catalysts since 1992, such technology will only be required for heavy vehicles from October 2005 when Euro IV comes into force.

For existing vehicles, after-treatment abatement systems can be fitted in order to reduce emissions. However, such retro-fit equipment may impact fuel efficiency (and hence increase CO₂ emissions) unless designed specifically for the engine to which it is fitted, and the engine tuned accordingly.



4.5.2 SCR and EGR for NO_x Abatement Technologies

The Feasibility Study considered a number of abatement technologies to meet different emissions criteria. The following are descriptions of those considered, together with views on their readiness for roll out:

Selective catalytic reduction (SCR) This NO_x abatement system works by injecting ammonia or urea into an engine's exhaust stream to chemically reduce NO_x emissions into nitrogen. As of 2005, new heavy-duty commercial vehicles from the major European manufacturers will be fitted with SCR technology as standard and a consortium of twelve major European companies has confirmed plans to introduce SCR technology to meet Euro IV emission standards⁴ and forthcoming 2008 Euro V emission standards. The lead consortium members DAF, Mercedes-Benz, Iveco, and Renault/Volvo hold around 80% of

⁴ "Industry Initiative to develop NO_x control technology for lorries", ENDS Report 356, September 2004

the truck market. Mercedes is expected to launch Euro IV trucks in the UK in early 2005. We therefore assume that the required urea supply will be available to meet 2010 criteria.

The consortium also cites a 2-5% fuel consumption improvement compared to Euro III vehicles. Early SCR technology cited in the Feasibility Study had resulted in a 5% fuel consumption penalty for Euro IV, and 7% for Euro V. Increased costs due to urea consumption will be far outweighed by the benefit in fuel economy of Euro IV vehicles.

One major disadvantage of SCR is that it uses ammonia as a reducing agent which must be stored on-board the vehicle, and if incorrectly applied would be emitted into the atmosphere.

Whilst this technology is well tested and ready for introduction on production vehicles, its use in the retro-fit market is far less well advanced. Trials and abatement equipment manufacturers' data have demonstrated successfully combining this equipment with particulate traps fitted to unmodified engines^{5 6}, but there is not sufficient operational experience to determine what fraction of the existing fleet could effectively be fitted with this equipment. The EST CleanUp register has, to date, only approved this technology on coaches, buses and taxis.

Further work and testing of such solutions would be required to ensure they are viable.

Exhaust gas recirculation (EGR) involves recirculation of exhaust air back into the combustion chamber. This reduces the amount of oxygen available for NO_x formation. EGR has been fitted to all light duty diesels in Western Europe for some years, but will not be used on medium and heavy duty applications until Euro IV standards are introduced in 2005. EGR technology is in competition with SCR systems. Scania have been the first to market with a Euro IV vehicle, based on EGR technology. This offers comparable fuel consumption to current Euro III vehicles. (Although there is a 3% penalty compared to a Euro III engine variant introduced at the same time).

Diesel oxidation catalysts promote the oxidation of hydrocarbons (HC) and carbon monoxide (CO) into harmless gases. In Western Europe all new diesel light duty trucks and passenger cars and vans must be fitted with an oxidation catalyst (Phase II Feasibility Study, 2003).

Diesel particulate filters/traps (DPF) are the most commonly used types of abatement equipment in the UK. They convert NO_x to NO₂ in the exhaust stream and use the NO₂ to continuously oxidise the particulates that are held on the filter. The efficiency of these DPFs in reducing PM emissions is typically around 90%. Some new diesel truck models are now equipped with this type of DPF. A negative impact of these filter types could be the generation of primary NO₂.

Large numbers of DPFs have been fitted as retro-fit devices world-wide,⁷ and have been fitted and certified in the UK under the RPC scheme. Therefore this technology can be considered both reliable and feasible.

⁵ "A Review of the London Low Emission Zone Entry Criteria", Turpin et al, TRL, January 2005

⁶ AECC, "Response by AECC to European Commission Call for Evidence on the technology potential of achieving the 2.0 g/KWh limit for oxides of nitrogen (NO_x) due for application from 2008, as laid down in Directive 1999/96/EC", August 2002

⁷ AECC, "Response by AECC to European Commission Call for Evidence on the technology potential of achieving the 2.0 g/KWh limit for oxides of nitrogen (NO_x) due for application from 2008, as laid down in Directive 1999/96/EC", August 2002

4.5.3 Conclusions on Technology Availability

Euro IV vehicle availability

Manufacturers are already producing and delivering vehicles capable of meeting Euro IV standards, although the certification process is not formally complete. During 2005 the majority of manufacturers will have Euro IV vehicles on the market, and over 80% will use SCR technology capable of meeting Euro V for NO_x.

Particulate retro-fit abatement technology availability

Retro-fit PM Abatement technology is well advanced in the after market, with many thousands of vehicles fitted with this equipment in the UK alone. Introducing the LEZ potentially increases significantly the requirement to fit these devices and, with sufficient advanced notice, the after market should be able to accommodate the take up of the devices.

A national certification scheme is in place which ensures this equipment is fitted and maintained correctly. Whilst this certification scheme legally only certifies an emissions improvement relative to the original Euro standard of the vehicle, the particulate traps are so effective that for most Euro I or better engines particulate emissions are reduced to below Euro IV standards.

NO_x retro-fit abatement technology availability

NO_x abatement technology is far less well advanced as a retro-fit option. In the UK only buses and taxis have adopted this in any volume. However, as manufacturers introduce it as standard technology on Euro IV vehicles now entering the market, the acceptability will probably increase. An initial action needs to be to ensure that TfL works with abatement technology manufacturers, the fitters and TransportEnergy to encourage the development of the necessary supply chain to supply the equipment needed to meet tighter standards. The continued provision of CleanUp grants to support the development of demonstrators and certification of engine and abatement technology combinations is critical to this.

Retro-fit NO_x technology suitable for light vans and mini-buses is available on the CleanUp register, and the fitting of SCR NO_x technology to 10-15,000 London taxis by 2007 demonstrates a significant step in its introduction. However this still represents a relatively low volume of units, fitted on a small range of vehicles compared to the total number and variety of LGVs that may need the equipment to avoid exclusion from the zone. Therefore the increase in manufacture and fitting capability of these units would have to increase dramatically to meet the requirements of the LGV market.

No national certification scheme exists at present and without this the correct fitting and maintenance of the equipment cannot be guaranteed. This certification is critical to being able to specify tighter entry criteria.

4.6 EMISSION CRITERIA OPTION EVALUATION

4.6.1 Emission Criteria Evaluation Approach

The earlier and tighter the standards set by the LEZ as entry criteria, the greater the emissions benefits obtainable. However, raising standards increases the number of vehicles impacted, the costs operators face in replacing or modifying vehicles, and the detection and enforcement volumes. In imposing emission standards it is important to balance the health and air quality benefits against the increased costs the operators face in replacing or upgrading their fleets.

The recommended options for a London wide LEZ scheme were based on a balance of air quality improvements, costs, benefits, and scheme acceptability. These factors depend upon:-

- Vehicles excluded – the composition of the excluded fleet
- Air quality benefits achieved
- Availability of vehicle technology to meet the standards, for new vehicles and as a retro-fit option for existing vehicles
- Ability to certify, sign, detect, and enforce the standard
- Cost to implement and operate the scheme
- Costs to vehicle operators to comply.

4.6.2 Emission Criteria General Recommendations

Emission criteria should be Euro based

The input received shows that entry criteria should be based on Euro emission standards if possible, rather than specific abatement technology since:

- This uses a Euro wide standard as the basis of the scheme and so reduces EU anti competitive issues
- It is easier to apply to foreign vehicles, since Euro standards are available on EU registration documents
- It provides technology neutral standards - in line with DfT and EST moves to this approach – although certification will still be needed to allow retro-fit abatement solutions to be used, with extension to provide certification of new NO_x abatement equipment
- This encourages operators to consider the highest possible Euro standard when making fleet purchase decisions as soon as the LEZ criteria are announced.

Emission criteria need to be set as soon as possible

Operators need as much notice as possible to ensure they can make appropriate fleet purchase decisions. Early publicity and announcements can influence the fleet composition prior to introduction of the scheme. Therefore:

- Proposed standards for 2007 and 2010 should be considered and published together, since this gives operators the notice they need to make informed fleet purchase decisions
- The tightening of standards in 2010 gives more Air Quality benefits, but cannot be done without the 2007 step. This puts emissions on the public agenda, and encourages operators and manufacturers to 'go cleanest' sooner rather than later
- Stricter standards are desirable, provided the socio-economic impact is not too great. Earlier introduction of cleaner vehicles improves air quality in both NO_x and PM₁₀.

Longer term entry criteria beyond 2010

Analysis needs to be carried out for the post 2010 case to assess the potential medium term nature of a London LEZ, given:

- The impact on baseline levels of pollution from early introduction of Euro IV, V and potentially VI vehicles
- Possible tightening of EU targets, and the aspirational targets set for London in 2015
- Possible setting of targets for other pollutants such as PM_{2.5}.

4.7 HGV ENTRY CRITERIA

HGVs are responsible for a significant proportion of traffic emissions, despite the low number of total vehicles. For heavy goods vehicles and buses/coaches, a reduction in PM₁₀ emissions with each Euro standard can be observed with a larger reduction with Euro IV vehicles, even relative to Euro III vehicles.

For NO_x emissions, there is only a gradual decrease with each standard, such that a Euro IV diesel vehicle generally has just under half the NO_x emissions of a Euro I diesel vehicle. This means that the difference in NO_x emissions between a Euro I and Euro II HGV, or a Euro II and Euro III HGV is not that significant. The benefits are further reduced compared to predictions based on the standard emissions values, since actual emissions in an urban context have tended to be greater than the test cycle based predictions. To address this, the Euro IV standard has added a transient emissions test, to more closely reflect urban driving conditions; Euro IV vehicles are therefore expected to achieve the predicted emissions reductions in these urban conditions better than earlier standards did.

Tests by London Buses have found that under test cycles representative of a London Bus route (MLTB test ⁸) some Euro III vehicles can emit more NO₂ than Euro II vehicles, rather than less.

Therefore, whilst selection of a Euro III standard for HGVs would impact on PM₁₀ emissions, it would have a smaller impact on NO_x emissions. This may even worsen such emissions if the urban cycle effects observed on buses are repeated in other vehicles. In terms of NO_x reduction, a tighter Euro standard of Euro IV has significant benefits. This reduction is encouraged by the early introduction, from 2005, of new heavy-duty commercial vehicles from the major European manufacturers. Such vehicles will be fitted with SCR technology as standard which will meet Euro IV emission standards⁹.

In order to reduce both PM₁₀ and NO_x levels, a dual abatement technology approach and alternative would be required. Fitting two pieces of abatement equipment may impact on the fuel efficiency of HGV vehicles and would also tie the LEZ to a specific technology combination, rather than a European standard.

Therefore, selection of a Euro standard as a measure of emission standard may be preferable for HGVs and will gain the greatest reduction of both PM₁₀ and NO_x.

4.7.1 Options for HGV Entry Criteria in 2007

In the light of these factors, and the other impacting issues high-lighted in section 4.4 we have considered three options:-

- Euro II + RPC (PM) or equivalent, as recommended in the Feasibility Study
- Euro II, A lower standard than the recommendation
- Euro II + RPC (PM + NO_x) or equivalent, a higher standard than recommended

Euro II + RPC (PM) or equivalent

This is the criteria recommended by the Feasibility Study. We consider that this is achievable with the impact falling on older trucks only.

The current particulate filter technology and RPC certification process exists and DfT expects the market to be capable of supporting the volumes of additional vehicles.

As this standard allows currently available Euro III vehicles into the zone as an equivalent, it has little impact on the immediate fleet purchasing decisions for operators, and so gives them time to adjust to the LEZ scheme.

⁸ "Comparison of Euro II versus Euro III bus NO_x", Lemon, D. , 9 July 2004

⁹ "Industry Initiative to develop NO_x control technology for lorries", ENDS Report 356, September 2004

However the drawback of this is that it will potentially encourage more Euro III vehicles to be purchased, and so delay the introduction of Euro IV into the fleet parc.

RPC and related Vehicle Excise Duty discounts are designed to encourage early adoption of Euro IV standard vehicles and become less relevant from 2006 when this is the mandated standard for all new vehicles. It is therefore possible that the VED structure and RPC scheme will be reduced, removed or changed during the life of the LEZ. Confirmation will be needed from DfT that this certification and data from it will be available via DVLA for new and existing certificate holders until at least 2010.

Other possible options for 2007 are:

Euro II

A lower standard than the recommendation (e.g. Euro II) would have minimal benefits, impacting on 18% of the vehicle fleet and only exclude the very oldest vehicles, which, whilst more polluting, may be doing lower mileages. This is therefore not recommended.

Euro II + RPC (PM + NO_x) or equivalent

Raising the standard in 2007 to Euro II + RPC (PM + NO_x) would deliver greater emissions reductions, specifically targeting NO_x emissions.

This assumes the implementation of a certification scheme to control and monitor NO_x abatement technology, in a similar manner to that currently in place for particulate abatement technology. We have assumed certificates would be issued for vehicles fitted with NO_x abatement technology which reduces emissions to levels which are at least better than the next higher Euro standard. i.e. a Euro II + RPC (PM + NO_x) would exceed Euro III levels of both PM and NO_x emissions (but will still only achieve Euro II levels on all other emissions.)

Establishing such certification procedures will be challenging, given they would need to be in place nationally by 2006 to allow operators to be ready for the introduction of the LEZ. It is also unlikely that the retro-fit NO_x abatement technology market would be ready to cope with this increase in demand, given that at present the technology has only been tested in a limited range of vehicle types.

Even if this certification process is in place, this standard would impact 42% of the fleet, so the cost to operators would be unacceptably high

Our conclusion is therefore that this is not thought to be feasible.

4.7.2 Options for HGV Entry Criteria for 2010

In the light of issues highlighted in section 4.4 we have considered three options for the 2010 HGV Entry Criteria:-

- Euro III + RPC (PM) or equivalent, the entry criterion recommended in the Feasibility Study
- Euro IV or equivalent, a higher standard than recommended
- Euro IV, allowing Euro II + RPC (PM + NO_x) and Euro III + RPC (PM + NO_x) or equivalent, a higher standard than recommended.

Euro IV or equivalent

Setting the standard as Euro IV or equivalent¹⁰ would have greatest impact on both NO_x and PM₁₀ emissions. However a standard based strictly on Euro IV standards and not permitting

¹⁰ Option C in TRL Paper in Appendix C.

older vehicles even if fitted with abatement technology, would exclude 59% of the fleet, and is unlikely to be commercially viable for operators.

In practice therefore a Euro IV standard would require NO_x abatement technology to be available and certified in order to permit older vehicles to be modified to enter the zone.

The number of vehicles excluded completely would depend upon how strictly the emission criteria are defined when specifying “Euro IV or equivalent.” If this is interpreted strictly as meaning “vehicles which exceed Euro IV levels for both PM₁₀ and NO_x emissions” then only Euro III vehicles fitted and certified with abatement technology would be allowed to enter the LEZ. This is because the certification process records the relative improvement in emissions compared to the original engine class, rather than the absolute emissions level and only guarantees one Euro standard higher than the original engine.

Whilst Euro II or pre-Euro II vehicles fitted with a particulate trap typically will have reductions in particulates likely to exceed Euro IV, this is not the case for NO_x abatement, where emission levels will depend upon the specific engine technology and abatement equipment used. Therefore some Euro II vehicles fitted with NO_x abatement technology would not be able to meet strict Euro IV NO_x emission criteria. This standard would therefore restrict entry to Euro IV or Euro III + RPC (PM + NO_x) vehicles, or vehicles re-engined with Euro IV engines.

Euro IV, allowing Euro II + RPC (PM + NO_x) or Euro III + RPC (PM + NO_x)¹¹

A slightly less strict criterion could be set based on allowing vehicles with Euro II or III engines fitted with certified abatement technology that meets or is near to Euro IV levels into the zone. This would mean that all vehicles entering the zone would be equivalent to Euro IV for PM₁₀, and at least better than Euro III levels for NO_x emissions.

This would allow greater use of abatement equipment, prolong the useful life of some older vehicles, and support those operators who have already taken steps to clean up their fleet, and so reduce operator costs. This would achieve similar levels of NO_x emissions benefits to a strict Euro IV criterion, and greater PM₁₀ benefits as traps almost eliminate PM₁₀ emissions completely.

This approach would mean that a small number of Euro II vehicles which do not quite reach Euro IV standards for NO_x would be allowed into the zone, whilst some pre Euro II vehicles fitted with abatement technology would be excluded even though they may potentially be cleaner than Euro IV. The latter cases may need to be dealt with on an exceptions basis.

A LEZ scheme with emissions criteria of Euro IV with allowed certified abatement solutions would result in:

- 60% of rigid HGVs, 50% of articulated HGVs, and 70% of coaches being affected by the scheme: however abatement technology can be applied to the majority of these vehicles and an early notification period enables operators to plan fleet purchases in plenty of time.
- Manufacturers being encouraged to introduce Euro IV vehicles early into UK market, and operators encouraged towards early adoption of Euro IV vehicles (moving more purchases in 2006/2007 to Euro IV) so having an earlier positive impact on emissions.
- Significantly reduced NO_x emissions
- Some reduction in CO and HC emissions

¹¹ Option B in TRL Paper in Appendix C.

- Potentially, less emphasis placed on the use of abatement technologies, whilst permitting their use if they are available and certified to meet equivalent Euro IV emission levels
- Provision of a standard that may be more acceptable to the EU, as it is applicable European wide
- Provision of a standard that does not directly depend upon RPC or TransportEnergy certification, although is far easier and cheaper to administer if these are available.

Our conclusion for 2010 HGV Entry Criteria is that some of the operational barriers to implementing a tighter Euro IV standard have reduced, in that the abatement technology is more mature, available on production vehicles and cheaper to implement and operate. However, questions regarding retro-fit technology and its certification nationally are still to be resolved and remain a barrier to providing a cost effective solution for operators. To address these issues will require the support and commitment of government, without which a tighter NO_x abatement standard is not practicable in 2010.

4.7.3 Recommendations Regarding 2007 HGV Entry Criteria

Euro II + RPC (PM) or equivalent remains the tightest, feasible standard for HGVs in 2007. It brings forward the replacement of some of the oldest vehicles by some five to seven years. Introducing this standard will impact on 42% of the fleet. Emissions could be reduced by 113 tonnes for PM and by 291 tonnes for NO_x.

The required particulate filter technology and national certification process exists and DfT expects the market to be capable of supporting the volumes of additional vehicles requiring retro-fit.

As the emissions impact of the Euro II and Euro II + RPC (PM and NO_x) options are currently not known, further air quality analysis is required in order to enable a full comparison of options. The above options will also require further consultation with operators in order to understand their acceptability, particularly for those options where 42% of the fleet is affected. It is recommended that both these pieces of work are carried out in the next phase prior to making a decision on the 2007 entry criteria being made.

4.7.4 Recommendations Regarding 2010 HGV Entry Criteria

Extension of the criteria to strengthen NO_x reductions is desirable, and makes Euro IV the most attractive standard from an emissions point of view. Since the Feasibility Study was completed, the introduction of production Euro IV standard vehicles using both EGR and SCR technology has commenced, and SCR abatement technology has been selected for London taxis and buses. This demonstrates progress towards this technology becoming a feasible, proven option.

Stating the emission criteria in terms of Euro IV standards provides a European wide standard approach which should be acceptable to the EC, and encourages the early take up of Euro IV vehicles by fleets, if LEZ entry criteria are announced as soon as possible.

However for this standard to be viable for operators, a NO_x abatement retro-fit approach is required, to provide operators with an economic option for prolonging the service life of existing vehicles. These retro-fit systems need to have been tried, tested and certified on a wide variety of vehicle and engine types (as is currently the case for particulate traps.)

At present, this certified NO_x abatement technology is only available in the taxi and bus market, for a limited range of engines which have been certified by the EST to receive CleanUp grants, and whose maintenance and operation is controlled through TfL licensing conditions. At present there is no testing of fitting or correct maintenance of NO_x abatement technology for other types of vehicle. This would be required nationally in a similar manner to the current RPC for particulate traps provided by VOSA.

This requires that government support the introduction of such a national certification testing process, which TfL could not achieve on its own. Specific actions required are to:

- Continue and extend of the CleanUp certification by EST for NO_x abatement equipment, and/or provide equivalent certification testing by VCA. This certification procedure would need to commence this year if retro-fitting technology is to be readily available in 2007 to enable operators to start fitting it to vehicles in time for the 2010 deadline, and this in turn requires continuation of the CleanUp grant funding to encourage operators and equipment manufacturers to undertake these demonstration trials
- Establish national certification tests of fitting and operation of the NO_x abatement equipment, in a similar manner to the RPC certificates issued by VOSA for PM technology. This is important since emissions could be made worse if the wrong equipment is fitted, or if it is not fitted, maintained and operated correctly
- Provide mechanisms by which this certification information can be provided to TfL, through DVLA registration records or otherwise.

Without this certification control, emissions benefits cannot be certain, and without further trialling support, the abatement technology may not become widely available. It should be noted that the requirement for a national NO_x certification approach applies to any entry criteria set which is stricter than Euro III + RPC (PM).

We therefore conclude that Euro IV should be taken forward as the standard for 2010, with certified retro-fit abatement solutions fitted to Euro II or Euro III engines as permitted alternatives, but that the feasibility of this entry criterion depends upon the successful outcome of critical pieces of further work to:

- Achieve government support for the certification and testing of retro-fit NO_x abatement technology
- Achieve government support for continuing to support the development of retro-fit technology for NO_x abatement
- Re-model emissions, benefits and operator costs to show that the health benefits achieved justify these costs.

This needs to be completed as soon as possible since ensuring that standards are announced as early as possible is essential both to minimizing these costs to operators, and to achieving maximum benefit from the LEZ.

Should this further study conclude that a NO_x abatement certification and development programme will not be supported by Government, then the impact on operators is likely to be too great and the Feasibility Study recommendation of a 2010 standard of Euro III + RPC (PM) should be taken forward.

Should this further study conclude that Euro IV is technically viable and a NO_x abatement certification scheme will be supported by the government, but that operator costs are too high, a number of options could be considered to reduce these costs. These include:

- Implement the Euro III + RPC (PM) based standard in 2010, and then tighten the standard to Euro IV at a later date (e.g. 2013). The implication and additional costs of additional standards would need to be considered
- Phase introduction of the standard by adding an age-based restriction in addition to the Euro standard allowed in the zone, providing a maximum age for a given standard of vehicle
- Continuing to provide grants for abatement technology, targeting these at the operators most impacted.

4.8 LGV ENTRY CRITERIA

Diesel vans are a major traffic source of PM₁₀ emissions, both on a national and urban basis. If DPF technology were to be applied to this vehicle category, then their contribution to PM₁₀ concentrations would be negligible.

Total NO_x emissions from diesel vans are similar in terms of road traffic source apportionment to that from diesel cars. The technological difficulties of reducing NO_x from vans are similar to that for cars. However, the economic considerations are much greater since vans are sold in much lower numbers than cars. In addition, there is generally a time lag between new technology appearing on cars and when it is available on vans - again due to economic considerations. It is assumed that NO_x limits graded by vehicle weight will continue to be necessary for vans.

The Feasibility Study recommended an age-based criterion. Since the Feasibility Study was completed, a new LGV vehicle classification has been introduced which would allow Euro IV vans to be identified. We have therefore considered the option of using an emission based criteria for vans.

4.8.1 An Age Based LGV Entry Criteria from 2010

The Feasibility Study recommended an age-based approach, banning all LGVs greater than 10 years old from the zone. This would mean that 21% of petrol LGVs and 13% of diesel LGVs would be excluded from the LEZ in 2010.

Age-based exclusion criteria are logical since road side emission test evidence is that older vehicles are more polluting than younger ones, generally through poor maintenance and operation. These represent gross polluters, contributing disproportionately to emissions. Implementation is relatively straight forward since age is easier to determine than emissions class, for both UK and foreign drivers.

The downside is that potentially cleaner vehicles, such as vehicles certified to higher emission standards, retro-fitted with abatement equipment, LPG vehicles, and vehicles which have been well maintained and are not polluting would also be excluded. The Euro standards specify a durability threshold of 100,000km (which is expected to be increased to 160,000km from Euro V¹²) so any age threshold should take as a minimum the average time taken to reach this mileage.

A fixed age excludes well maintained vehicles, and particularly vehicles which were early examples of stricter standards or Exceptional Environmental Vehicles (EEV), despite the fact that they actually meet the desired emission standards. This may require exemptions to the age limit based on emissions class or certification.

An age based approach may also not be favoured by the EU.

Strengths

- It is easy to implement for both UK and foreign vehicles, since date of registration is readily available from registration documents
- This approach tackles the older vehicles that road side testing by VOSA demonstrates to be the worst emission offenders
- It provides a rolling introduction, so reducing the “bow wave” impact of banning such a large volume of vehicles from London
- It improves the average age of the London fleet so improving fuel efficiency and all emissions, but is likely to ‘export’ older, dirtier vehicles outside the zone.

¹² DfT Discussion Document, Future Vehicle Emission Standards – 2010 and Beyond, AQF4/04

Weaknesses

- It does not relate directly to emissions – early Euro IV vehicles would be excluded, for example, even though they may be cleaner
- There is nothing the operator can do to prolong the life of the vehicle
- The vehicles are likely to move out of London thereby increasing polluting vehicles outside the zone and doing relatively little to improve the overall UK fleet.
- Whilst excluding older vehicles, it does not promote the early purchase of cleaner, less polluting vehicles and so does not improve the overall UK fleet population.
- It assumes the continued tightening of vehicle emission standards, whilst the future of Euro standards beyond Euro VI is not certain
- It requires an extensive registration and enforcement approach to deal with exceptions.

4.8.2 An Emissions Based LGV Entry Criteria from 2010

For HGVs the Euro classification of UK vehicles is not easily obtained from registration data. However for LGVs a specific Euro IV registration class has been introduced since the Feasibility Study was written. This would give a means of identifying and excluding vehicles automatically. This was introduced in March 2003, so if we assume from the Feasibility Study that a ten year life is a viable minimum age for exclusion, we could combine this with a Euro IV standard from 2013 onwards, or from 2015 to tie in with EU targets.

Strengths

- It relates the exclusion to emissions
- It provides a means for operators to enter the zone by fitting abatement technology if they wish
- It encourages the earlier introduction and purchase of cleaner, higher emission standard vehicles.

Weaknesses

- It requires access to information about emission standards which is not available from DVLA for all vehicles. Only Euro IV LGVs registered after March 2003 are identifiable from DVLA records
- It would require a testing and certification approach for exemptions
- If brought in from 2010, vehicles seven years old or greater would be excluded. This is a more severe criterion than recommended, excluding some 64% of vehicles. Since abatement solutions are not as readily available for these vehicles, this would be a significant increase in the number of vehicles excluded permanently compared to the age based approach
- It is not yet clear how Euro V or better LGVs would be classified by DVLA, so the future of this classification is uncertain.

Our conclusion is that due to the restricted certification data available this approach is not practical in 2010. However if the LGV restriction were to be delayed (say to 2013) this would become an effective approach, since then the criteria would remove vehicles younger than ten years, which were less than Euro IV, whilst allowing older Euro IV vehicles to enter the zone.

In addition the age based approach remains the easiest approach to explain and implement, although the diverse nature of the wide range of LGV operators is likely to lead to objections and alternative approaches may need to be retained for consideration.

4.8.3 Recommendations Regarding LGV 2010 Entry Criteria

The age based approach is easier to implement, understand and apply across both UK and foreign vehicles for this class, although does not encourage early take up of cleaner vehicles.

The major question is the impact to operators, both in terms of the cost impact and the number of vehicles to be replaced or retro fitted before the scheme is introduced. The impact on SMEs and owner operators raised particular concerns from Boroughs and DTI, and the economic impacts are not well known. Further modelling and investigation is required, including investigation of targeted assistance.

Should these costs be too high then the option of delaying introduction of the LGV ban till 2013 or 2105 could be considered, by which time an emission based criteria is easier to implement both for UK and UK vehicles.

Exemptions for less polluting vehicles, Environmentally Enhanced Vehicles (EEV), based on a Euro standard should be considered.

4.9 NEXT STEPS

The next phase of the LEZ Implementation should undertake the following tasks with regard to Emission Criteria:

- Re-model emissions and benefits for a longer period, to assess the case for inclusion of NO_x abatement. This modelling of the volumes of each vehicle class, and sub classes to be excluded
- Provide a more detailed model of the operator costs, in particular the impacts on depreciation and costs of early introduction of newer vehicles into the fleet
- Work with DfT, EST and VOSA to determine the future options for certification of retro-fit abatement technology, continuing the current EST CleanUp database to certify this equipment is needed
- Gain a clear position from DfT on the future funding of EST, grants and the role of these grants promote development of NO_x abatement technology
- Gain a clear position from DfT on the future of the RPC scheme, and any likely changes to it or VED that may limit our ability to rely on this for identifying vehicles with particulate abatement.
- Undertake updated detailed modelling of the socio-economic impacts of the standards. A study of the depreciation, operating costs, and impact of the emission standards is required. This is particularly true for LGV
- Investigate with TfL, Boroughs and DfT the impact of a LGV scheme on SMEs and owner operators, and the potential for any assistance that can alleviate this
- Any future tightening of the LEZ entry criteria after 2010 would need to be planned and announced in good time. Consideration should be given as to the longer term intentions for the scheme, particularly modelling the longer term aspects in light of the 2015 London Air Quality Targets
- Based on this modelling and assessment, decide on the appropriate entry criteria for the Low Emission Zone in 2010 such that the criteria for 2007 and 2010 can be announced at the same time.

5 LEZ - LEGAL ISSUES

5.1 INTRODUCTION

The Feasibility Study focused on the making of an order under section 6 of the Road Traffic Regulation Act 1984 (“RTRA 1984”) as the most appropriate legal basis for a LEZ.

Discussions during this further assessment have identified two additional possible legal routes for the introduction of a LEZ: a TfL sponsored local Bill (something which the Feasibility Study only considered as a means of decriminalising an order made under section 6 of the RTRA 1984), and a charging order scheme under the GLA Act 1999 (which was the basis for introduction of the Congestion Charging scheme). These additional options were also considered in this assessment. The options have been assigned numbers 1 - 4 (with Option 2 split into 2A and 2B) and are summarised in section 5.2 below.

Legal issues associated with each of these options have been assessed by Simmons & Simmons and TfL’s Legal Department including the issues (if any) raised by:

- The procedure to be followed in implementing a particular option
- The enforcement regime under an option
- Legislation protecting nature conservation sites protected under UK and EC law
- Legislation on strategic environmental assessment (SEA) and environmental impact assessment (EIA)
- The overall time required to implement an option
- The requirement to erect signs to indicate the presence of a LEZ
- EC and UK air quality legislation
- EC free movement issues
- State aid implications
- Providing any necessary funding for the LEZ
- The Human Rights Act 1998
- Flexibility for the future extension of the LEZ.

This section sets out the legal options potentially available for implementation of the LEZ.

5.2 OPTIONS CONSIDERED

Option 1

Option 1 is a TfL sponsored Bill. TfL has a power to promote a local Bill in Parliament under section 167 of the GLA Act 1999. Such a Bill could contain all the relevant provisions for a LEZ or could provide a basic framework and allow for regulations to be made containing detailed provisions. A LEZ introduced under a Bill would prohibit specified polluting vehicles from entering the zone.

Option 2

Option 2 is the making of an order or orders under section 6 of the RTRA 1984 (Traffic Regulation Order - TRO) by TfL and the Boroughs that apply to all roads throughout Greater London, with the exception of some private roads. A LEZ introduced under a TRO would prohibit specified polluting vehicles from entering the zone.

There are two variations of option 2:

Option 2A – is the making of a single TRO by TfL and the Boroughs with the consent of the Secretary of State in respect of roads for which he is the traffic authority;

Option 2B – is the making of a number of TROs. One by TfL to cover GLA roads (including GLA side roads) and trunk roads (again with the consent of the Secretary of State) and one by each of the Boroughs for the other roads within their areas.

Option 3

Option 3 is the making of a single TRO by TfL covering the GLA roads (including GLA side roads) and trunk roads only. Borough roads would not be covered.

Option 4

Option 4 is the making of an order by TfL (that is confirmed by the Mayor) under section 295 and Schedule 23 of the GLA Act 1999 to create a charging scheme. A LEZ introduced under a charging scheme would not prohibit vehicles from entering the zone, but would impose a charge on specified polluting vehicles that would be high enough to act as an economic deterrent. It is envisaged that the cost to non-compliant operators would be substantial. The precedent for a fine of £500 for contravention of the LLCS exists.

5.3 REVIEW OF OPTION 1 (TFL SPONSORED BILL)

Although TfL does have the power to promote private Bills in Parliament with the Mayor's consent, private Bills cannot generally be promoted to achieve an end that can be achieved under current legislation. A Bill might therefore be rejected by Parliament if it is considered that other options exist for the creation of a LEZ. This Option may therefore only be practical should there be insurmountable problems in implementing a LEZ by other means.

The Bill would be able to contain provisions detailing all aspects of the LEZ or it could instead set out a framework for the LEZ and allow for the specific details to be prescribed in orders or regulations made under the Act. Of these two options the latter would provide for greater flexibility in developing the details of the LEZ, but as these regulations or orders could not be finalised and made until after the Act was passed, a considerably longer period of time would be required to implement the LEZ.

In any event the timing of this process could be longer than that involved for the other options. If TfL were to promote such a Bill, the Parliamentary process would not be able to start until after 27th November 2005, that being the next date upon which TfL would be able to deposit a Bill. Such a Bill would almost certainly take more than 18 months to get through all the legislative stages of both Houses of Parliament. Furthermore, work could not commence on implementing the LEZ until after the Act was passed because, until that time, it would not be possible to be certain exactly what the Act (if enacted) would allow for.

It must also be noted that, in order to meet the requirement to have the Bill deposited in Parliament by 27th November 2005, the detailed provisions of the LEZ would have to be developed much earlier than under the other options. The details of the proposed LEZ would have to be developed sufficiently early to allow for adequate consultation on the draft Bill before it is deposited in November - a period of consultation of approximately three months would be appropriate.

TfL does already intend to promote a Bill in 2005 covering a variety of matters and provisions relating to the LEZ could be contained within this Bill rather than needing to be contained in a separate one.

5.4 REVIEW OF OPTION 2 (TRO)

5.4.1 Procedural Issues

No single body currently exists which is empowered to make a TRO that covers all roads in Greater London. The Secretary of State, TfL and the Boroughs are each responsible for the making of TROs covering the roads for which they are the traffic authority (although it is possible for local traffic authorities, including TfL and the Boroughs to make TROs for roads for which the Secretary of State is the traffic authority, if the Secretary of State consents to this). If the LEZ is to cover all roads in Greater London, then TfL and each Borough will need to make a TRO encompassing their respective roads and the trunk roads. This could take the form of separate orders made by TfL and each Borough or a single order made jointly by TfL and the Boroughs.

One order for all – Option 2A

It would be feasible for the Boroughs and TfL to make one TRO rather than each Borough having to make its own order (see below). Local Authorities (which in this instance include TfL) are able to enter into arrangements to delegate the discharge of any of their functions to another local authority. This would allow the Boroughs and TfL to delegate their order making function to one single authority and that authority could then (with the consent of the Secretary of State for his roads) make a TRO that covers all the roads in Greater London. By preference, the body delegated the order making function would be TfL.

However, putting in place an agreement which is satisfactory to TfL and all the Boroughs is likely to be a significantly difficult and time consuming exercise and may not provide a robust structure. The integrity of a LEZ implemented by means of an agreement between TfL and the Boroughs will depend on the number of Boroughs that commit to it. The TRO could be vulnerable to Boroughs withdrawing from the LEZ either during the planning and implementation process or after commencement. Any withdrawal could also give rise to the need for additional signage along the new zone boundary which could involve significant expense. It is impossible to be precise as to the number of withdrawing Boroughs that would result in the disintegration of an effective LEZ because it could depend on their location, but it is thought that withdrawal of five or more Boroughs could have this effect.

There are only limited steps that TfL could take to minimise the risk of Boroughs withdrawing from the LEZ either during the planning and implementation process or after commencement. TfL may be able to negotiate suitable provisions in an agreement, committing the parties to a minimum term (although probably no more than two or three years), and/or specifying financial consequences for withdrawal over the longer term.

The Mayor does have powers under Part IV of the GLA Act 1999, which would enable him to encourage Borough councils to participate in the LEZ and there are also powers in Part IV of the Environment Act that may assist. However, the exercise of these powers would introduce significant additional complexity and time to the process. An amendment to the Mayor's Transport Strategy would be required.

Separate orders by each traffic authority – Option 2B

There are reasons to suggest that it could be extremely difficult to implement LEZs across Greater London if each Borough and TfL were required to make their own individual orders covering the roads for which they are the traffic authority. If each traffic authority was required to make individual orders it would be difficult to manage co-ordination of the

drafting of the orders, the consultation on them and the public inquiries that would be required for each order. There could be considerable costs involved in installing appropriate signage at the boundary of each separate zone, and significant difficulties in operating and enforcing the separate zones. It has been concluded on the basis of the issues identified above that Option 2B would not be viable and this option has not been considered further.

5.4.2 Timing

The timing of Option 2A will depend on whether the Boroughs are supportive of the introduction of the LEZ. The procedure for making a TRO is lengthy and will almost certainly involve, as a statutory requirement, a public inquiry and the time-table will probably need to accommodate an additional period of at least nine months between processing the objections and making the order.

All Boroughs are supportive of the LEZ

If in May 2005 the TfL Board decides to go ahead with the LEZ by way of a single TRO made by TfL pursuant to an agreement between TfL and the Boroughs, then the earliest date that it could reasonably be expected that the TRO could be made by would be July 2007 taking into account a revision to the Transport Strategy.

The broad outline of the time line would be as follows:

- Decision made to go ahead in May 2005
- Between May and March 2006 TfL would need to formalise the case in favour of the LEZ and consult with the Boroughs on it. As part of this and to enable the consultation with Boroughs to be meaningful TfL would need to produce a draft TRO, draft environmental report and draft a suitable agreement. The output of this stage would most of the Boroughs signing up to the agreement. If it was decided to amend the Transport Strategy this amendment would be made during this period
- Between April 2006 and August 2006 TfL would finalise the draft TRO and consult on it with stakeholders and the public. This would include a three month period of public consultation in line with TfL's approach to major consultation exercises rather than the 21 days statutory minimum consultation required for making a TRO. Any notification to the European Commission of a draft technical standard would be made once the draft TRO was finalised (see section 1.7.8 below)
- As it is expected that the consultation will result in objections, a public inquiry will be required. A public inquiry process could be expected to take approximately nine months, the Inspector's report therefore being given to TfL in May 2007
- Analysis of the report and the responses to the consultation and making any changes to the draft TRO could be expected to take a further two months, meaning that the TRO would be made in July 2007
- Go-live would be February 2008.

Some Boroughs are not supportive of a LEZ

If in May 2005 the TfL Board decides to go ahead with the LEZ by way of a single TRO made by TfL pursuant to an agreement entered into by the Boroughs and TfL, then the earliest date that it could reasonably be expected that the TRO could be made by would be April 2008 if a critical number of Boroughs resisted entering into such an agreement.

The broad outline of the time line would be as follows:

- Decision made to go ahead in May 2005
- Between May and March 2006 TfL would need to formalise the case in favour of the LEZ and consult with the Boroughs on it. As part of this and to allow the consultation with Boroughs to be meaningful TfL would need to produce a draft TRO, a draft

environmental statement and draft agreement. If at the end of this time period a significant number of Boroughs had not agreed to sign up to the agreement the Mayor would be able to take the following steps

- The revision to the Transport Strategy will be completed by March 2006
- Between April 2006 and December 2006 guidance on Local Implementation Plans, and the Local Implementation Plans themselves, could then be amended requiring Boroughs to enter into the agreement
- Between January 2007 and May 2007 TfL could finalise the draft TRO and consult on it with stakeholders and the public. This would include a three month period of public consultation in line with TfL's approach to major consultation exercises rather than the 21 days statutory minimum consultation required for making a TRO. Any notification to the European Commission of a draft technical standard would be made once the draft TRO was finalised (see section 5.7.8 below)
- As it has to be assumed at this stage that the consultation will result in objections, and a public inquiry will be required. A public inquiry process could be expected to take approximately nine months, the Inspector's report therefore being given to TfL in February 2008
- Analysis of the report and the responses to the consultation and making any changes to the draft TRO could be expected to take a further two months, meaning that the TRO would be made in April 2008
- Go-live would be November 2008.

5.5 REVIEW OF OPTION 3 (TRO ON GLA ROADS AND GLA SIDE ROADS ONLY)

A third option in terms of making a single LEZ TRO is for TfL to act alone in making a TRO that only applies to GLA roads and GLA side roads. These roads carry a significant proportion of London's traffic and it might therefore be argued that, by prohibiting polluting vehicles from these routes, it will discourage such vehicles from coming to Greater London at all. Boroughs would be able to opt into the LEZ by making their own TRO for their roads.

However, this option is not recommended as there are alternative routes that vehicles would be able to take that would avoid using GLA roads and side roads completely. It would be difficult to place enforcement cameras in a way that would deter drivers from crossing GLA roads even if they do not drive along such roads.

Another significant reason why this approach is not recommended is that the requirement to place signs at every point where a Borough road intersects with or becomes a GLA road would be extremely burdensome. It is estimated that the number of such intersections might be as many as 4,700. Additionally, if Boroughs were to opt in by making their own LEZ TRO the system might become quite fractured and complicated to administer (especially if the individual TROs were worded and / or enforced differently.)

5.6 REVIEW OF OPTION 4 (CHARGING SCHEME)

5.6.1 Procedural Issues

Under Schedule 23 to the GLA Act 1999, TfL is empowered to make a Road User Charging Scheme Order (a "Scheme Order") that covers all of Greater London. Under this option TfL would have sole responsibility for implementing the LEZ. The procedure for making a Scheme Order is set out in Schedule 23 to the GLA Act 1999.

The GLA Act provides that the Authority may hold an inquiry, or cause an inquiry to be held for the purposes of any order containing a charging scheme (paragraph 4(3)(b) of Schedule

23). This discretion is exercisable on behalf of the Authority by the Mayor (paragraph 2 of Schedule 23).

5.6.2 Timing

If in March 2005 the Mayor decides to revise the Transport Strategy to provide specific support for going ahead with the LEZ by way of a Scheme Order, then the Scheme Order could be made by March 2007, at the earliest, if a public inquiry is not required. If a public inquiry is required then the earliest date the Scheme Order could be made would be January 2008. The broad outline of the time line would be as follows:

- Decision of the Mayor to commence a revision of the Transport Strategy to provide additional support for a LEZ made in March 2005
- Between April 2005 and March 2006 a revision to the Mayor's Transport Strategy would be developed, consulted on and finalised, and a SEA conducted
- Developing, consulting on and making the Scheme Order could be expected to take from April 2006 until March 2007, if the Mayor decides that a public inquiry is not required
- Go-live would be October 2007
- If the Mayor decides that a public inquiry is required then approximately nine months will be need to be added to the time line, so that the Scheme Order would be made in January 2008 go-live would be August 2008.

5.7 ISSUES COMMON TO ALL OPTIONS

5.7.1 Amendment to the Mayor's Transport Strategy

An amendment to the Mayor's Transport Strategy would not be expected under Option 1. Whilst an amendment to the Mayor's Transport Strategy to include specific support for a LEZ is not legally required for either Option 2A or 4, such an amendment would be desirable. The consultation on such an amendment would provide useful input into the early development of the proposals and would narrow the focus of any subsequent public inquiry. An amendment to the Transport Strategy would be "highly preferable" under Option 2A if Borough participation had to be encouraged via the LIPs process.

5.7.2 Enforcement

Under all of the options, a civil enforcement regime is available. Any penalty or charge will have to be set at a level that is reasonable having regard to all the circumstances of the scheme. The fact that the UK is required to meet air quality targets under EC legislation will be a relevant circumstance in this context.

5.7.3 Nature Conservation

It does not appear that the proposed LEZ would be incompatible with the requirements of the Wildlife and Countryside Act 1981 or require an "appropriate assessment" of its impacts on designated nature conservation sites. However, this should be confirmed with English Nature.

5.7.4 SEA and EIA

It should be assumed that a Strategic Environmental Assessment ("SEA") will be required in the event of a revision being made to the Mayor's Transport Strategy and/or the London Air Quality Strategy. It is not expected that Environmental Impact Assessment ("EIA") would be required in relation to implementation of the LEZ under any of the options, but TfL will need to consider in any event what level of environmental information will be required to support the LEZ implementation process.

In addition to the time and cost involved in preparing the necessary report, SEA would require probably 12 weeks' consultation prior to any revision of the Mayor's Transport Strategy. It cannot in principle be ruled out that the outcome of a SEA exercise might be a conclusion that a LEZ is not desirable, since the whole purpose of SEA is to inform, and therefore potentially to affect, decision-making. This point aside, SEA does not, by itself, render any of the Options unfeasible. However, the incremental effect of any time required to prepare a compliant environmental report, and to carry out consultation, taken together with other factors, such as a need for a public inquiry, will need to be taken into account in selecting the preferred Option.

5.7.5 Signage

Currently no traffic signs exist to cover the concept of a LEZ. Under Options 2A and 4, the Secretary of State would therefore need to be asked to approve new traffic signs (including road markings). As a minimum it is likely that traffic signs will be required at every entry point into the LEZ and outside the zone to provide advance warning to drivers that they are approaching the LEZ boundary. As TfL and the Boroughs have no powers to force surrounding traffic authorities to accept advance warning signs on their roads, this is a matter that would need to be negotiated with such authorities. Under Option 1, signage issues could potentially be dealt with specifically in the TfL promoted Act, although it is more likely that signage issues would be dealt with under existing legislation in the same way as under Options 2A and 4.

5.7.6 Actions Required by the Secretary of State

Actions are required by the Secretary of State under each of the options. Under Option 2A these are: making of a TRO or consent to making of a TRO in relation to trunk roads, listing of a new offence as decriminalised, and approval of LEZ signs. Under Option 4 these are: consent to the Scheme Order extending to trunk roads, approval of a 10 year plan for application of the proceeds of the scheme and approval of LEZ signs. Under Option 1 the Secretary of State will need to approve LEZ signs unless signage issues are addressed in the TfL promoted Act.

5.7.7 EC/UK Air Quality Legislation

Nothing has been identified in EC or UK air quality legislation which would undermine the feasibility of the LEZ – indeed, this legislation is a supporting factor, in that a LEZ would represent a major contribution to compliance with it, and failure to comply with the EC requirements carries the risk of infringement proceedings and even the possibility, in the long run, of a fine being imposed on the UK. This legislation also contains direction-making powers exercisable by the Mayor in respect of the Boroughs' air quality functions, which would be of particular relevance where the LEZ would contribute to avoiding the contravention of the Air Quality Framework Directive in respect of areas of poor air quality within a Borough.

5.7.8 EC Law Issues

As the detailed proposal is developed, certain aspects may have to be justified as being necessary and proportionate to the environmental and health aims of the measures, to ensure that they are compliant with free movement rules in the EC Treaty.

The entry criteria for the LEZ may also need to be notified to the European Commission as a technical regulation, which could have timing implications. Member States are under an obligation to notify the Commission of any draft technical regulation which does not merely transpose the text of an international or European standard. This is so that the Commission can examine whether or not the technical standard adopted may operate so as to hinder trade.

There may also be issues relating to Option 4 due to EC legislation and new proposals in respect of the imposition of infrastructure-related user charges on heavy goods vehicles.

This issue will have to be considered further in the light of ongoing EC developments in this area.

5.7.9 State Aid

Any grant or other financial incentive made available to vehicle owners/operators to enable them to comply with the LEZ either by facilitating the purchase of a new vehicle or of retrofitting an existing one will raise State aid issues. Notification of the relevant measure to the European Commission for clearance is likely to be required.

5.8 FUNDING

There are no apparent legal issues in relation to TfL receiving funding towards the implementation and operation of the LEZ.

5.9 HUMAN RIGHTS

No human rights grounds of challenge have been identified to date which would be expected to have a realistic probability of success in the absence of procedural improprieties in the implementation process, or the imposition of wholly disproportionate penalties for contravention. Under Option 1 a declaration that a Bill is compatible with Convention rights would be required, and at present there is no reason to consider that an appropriately drafted Bill could not be the subject of such a declaration.

5.10 FLEXIBILITY FOR FUTURE EXTENSION

There is flexibility for future extension of the LEZ to other vehicle classes and emission standards under all of the options.

6 OPERATIONAL PROCESSES

The operation of a LEZ requires four primary customer facing business processes:

Identification – the process of pre-determining which individual vehicles (by VRM) are allowed into or are excluded from the zone based on emission standards. This requires the creation of a database containing the VRMs of either all vehicles allowed into the zone or all vehicles excluded from the zone.

The database is built taking a feed from DVLA using an age-based criterion to derive the baseline of included or excluded vehicles. However, there will be vehicles which meet the required emission standards included in this baseline through the fitting of abatement equipment or vehicles that have complied with the Euro standard early. The registration and certification processes are required to enable identification of compliant vehicles that cannot be identified from the data available directly from DVLA.

- **Registration** – where the emissions class of a compliant vehicle cannot be determined automatically via DVLA, the vehicle is required to be registered directly with TfL in order to be removed from the database of excluded vehicles or added to the database of allowed vehicles. TfL will have to be notified of vehicle compliance through submission of authorised documents. The authorised documents for retro-fit vehicles are “certification” documents showing that their abatement equipment has been fitted by an authorised fitter. The authorised document for Early Compliant vehicles is the Certificate of Conformity from the manufacturer stating the emission standards of the vehicle. Most retro-fitted vehicle can currently be identified directly from DVLA records because they claim VED discounts, and this is recorded by the DVLA.
- **Certification** – the fitting of abatement technology has to be regulated to ensure that abatement equipment is fitted by qualified fitters and that the equipment is maintained. A certification function is currently operated by VOSA who manage the Reduced Pollution Certificate scheme on behalf of DfT. RPCs are currently only issued for the fitting of Particulate Traps. The scheme is incentivised by the VED reductions available for vehicles that hold a RPC. A certification process will always be required to support a LEZ for as long as it is possible for vehicles to be made compliant with LEZ standards through the fitting of abatement equipment. This process should be handled at a national level and therefore is not suitable for management by TfL.

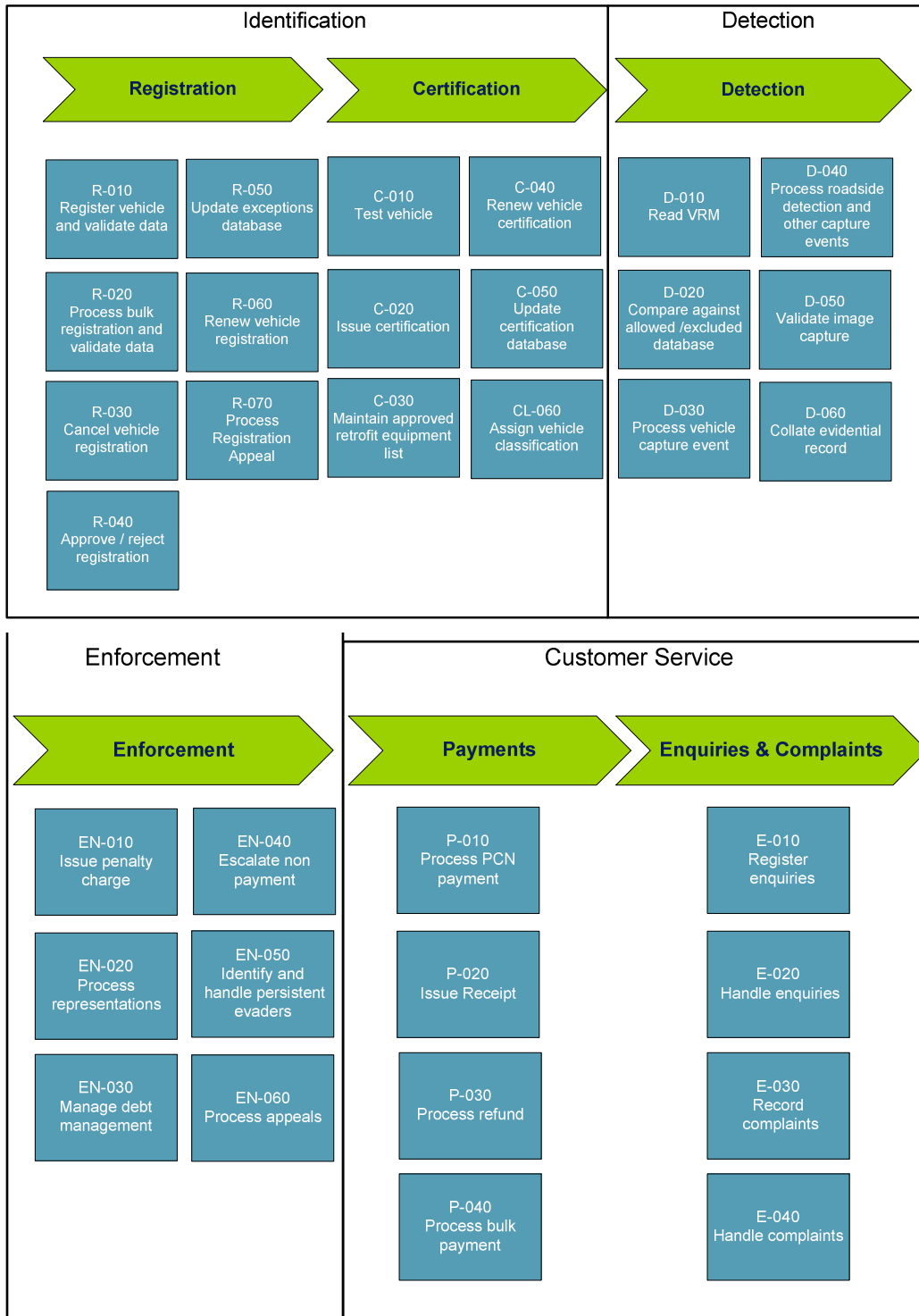
Detection – detecting and recording that an individual, prohibited vehicle is within the defined LEZ. This can be carried out either manually or automatically using camera-based technology.

Enforcement – identifying vehicle owners and operators of prohibited vehicles found within the zone and enforcing a Penalty Charge Notice (PCN) against them.

Customer Service – the registration and enforcement processes require a customer facing service to enable queries, payments and complaints associated with the operation to be handled.

The components of these operational processes are outlined in the following diagram.

LEZ operational processes



These operational processes are discussed in the remainder of this section. The options put forward in the Feasibility Study for how each process should work, plus any additional options identified, are evaluated and a recommendation put forward for each process. We have also identified issues and further work required.

7 IDENTIFICATION

Enforcement of the LEZ is dependent on the availability of a list of vehicles that are either all allowed into the zone or are all excluded from the zone. This enables the identification of non-compliant vehicles from the list of those which have been detected within the zone.

7.1 BUILDING THE DATABASE

The creation of a database to support LEZ enforcement is based primarily on the output of a DVLA feed using an age-based criterion, derived from the introduction date of the Euro Standard. To generate a first cut list of vehicles, the DVLA output would contain all vehicles at or newer than the required Euro standard.

The use of an age-based criterion to generate this list gives rise to a number of exceptions which cannot be identified on the basis of the DVLA data alone. These are:

- Vehicles fitted with abatement equipment
- End of Series vehicles
- Early Compliant vehicles
- Alternative fuel vehicles.

The primary consideration in the development of this database is whether it will be a list of included vehicles, as proposed in the Feasibility Study, or alternatively a list of excluded vehicles. In addition, the method by which exceptions are handled also needs to be considered. These exceptions apply regardless of whether an inclusions or exclusions database approach is adopted.

7.1.1 Options Proposed in Feasibility Study

Inclusions database

The Feasibility Study proposed the creation of an “inclusions” database recording details of all LEZ compliant vehicles in order to support the Vehicle Identification process. The proposed method for developing this database involves obtaining an extract of all vehicles from the DVLA at or newer than the Euro Standard and assigning a provisional Euro rating to all target vehicles, based on date of first registration. This list is then refined based on a set of exceptions databases holding data on End of Series, Early Compliant, Retro-fitted and Alternative Fuel Vehicles.

The Feasibility Study suggested that these exceptions databases would be pre-populated in advance of the scheme go-live. In order to achieve this, interfaces were proposed with the VCA to identify End of Series vehicles and with the DVLA for vehicles fitted with abatement technology. For alternative fuel vehicles and Early Compliant vehicles the Feasibility Study proposed a direct LEZ registration route.

The vehicle details captured through the detection process would be compared against the inclusions database in order to identify the non-compliant vehicles that have entered the LEZ. The Feasibility Study recognised that the amount of information held in this database would be large and that it would contain a number of non-relevant vehicles as their approach included holding information on all compliant vehicles including private cars. They proposed that the set of captured vehicles could be streamlined using vehicle classification or registration suffix as a screening filter in order to reduce the number of non-relevant vehicles.

As the inclusions database would hold details of all compliant vehicles, this would facilitate the issuing of permits to all HGVs and coaches allowed into the LEZ, if the method of detection required this.

7.1.2 Additional Options

In addition to the option of an inclusions database outlined in the Feasibility Study, we have proposed the development of an exclusions database which captures details of non-compliant rather than compliant vehicles.

Exclusions database

The generation of this database would be similar to that proposed in the Feasibility Study. This proposed exclusions database approach applies an up-front filter to the DVLA data in order to return only those vehicles whose date of first registration indicates an emission standard below the requirement of the LEZ. This provides a target group of vehicles which might be excluded. This list is then refined through a registration process through which vehicle owners and operators must prove compliance in order to be removed from the database.

Whilst the same target group of exceptions (End of Series, Early Compliant etc) must be identified to build an exclusions database as for an inclusions database, we propose that, apart from End of Series vehicles, a registration process be adopted in order to identify and remove these vehicles from the exclusions list. This places the onus on the vehicle owners and operators to prove compliance with the LEZ.

The development of an “exclusions” database can also be used to support a targeted publicity campaign, identifying and contacting this set of vehicle operators to notify of potential non-compliance in advance of a LEZ go-live and encourage registration of compliant vehicles.

7.1.3 Evaluation

The following table provides an evaluation of the options outlined above, identifying how each benefit can be used to support the London LEZ.

	Inclusions Database	Exclusions Database
Enables identification of compliant and non-compliant vehicles	✓	✓
Supports manual and automatic enforcement	✓	✓
Optimises the process for identifying non-compliant vehicles from list of detected vehicles (i.e. database is smaller, supports PDA and intelligent camera use)		✓
Supports a targeted publicity campaign ensuring that non-compliant vehicles are advised, giving them advance warning of the need to take corrective action.		✓

7.1.4 Issues

End of series vehicles

Our assessment of third party interfaces has determined that the VCA interface is not a feasible source of information to support the identification of End of Series vehicles. The information held by the VCA relates to families and classes of vehicles as part of the Type

Approval process, not individual vehicles as required by the LEZ. Whilst it may be possible to link Type Approval numbers with vehicles via the DVLA interface, a workable process; which could be implemented to support an early go-live has not been identified at this stage.

If a solution cannot be found, the extent of this impact will vary depending on the Euro standards adopted as the number of End of Series vehicles is not consistent from year to year. For an implementation using Euro II + RPC as a standard, up to 2,500¹³ non-compliant HGVs may be able to enter the zone. For 2010, the total number of these vehicles will be higher if the scheme is extended to include LGVs.

7.1.5 Recommendation for Building the Database

We recommend an exclusions database is implemented as it will be a smaller list than an inclusions database, thus optimising the daily comparison with the list of detected vehicles. In addition, the exclusions database will support a targeted publicity campaign towards the operators of vehicles which will not be compliant with the LEZ.

We recommend that the VOSA managed RPC programme is used to enable the identification of vehicles fitted with VOSA-approved abatement technology through their DVLA VED classification. This will enable these vehicles to be identified automatically and removes the requirement for these vehicles to register their details directly with TfL.

7.1.6 Further Work Required

The following activities are recommended for the development of the exclusion database:

- Further analysis of options for identifying End of Series vehicles.
- Further discussions with the DVLA to identify, plan and cost any additional work required to support the interface with TfL.

7.2 REGISTRATION

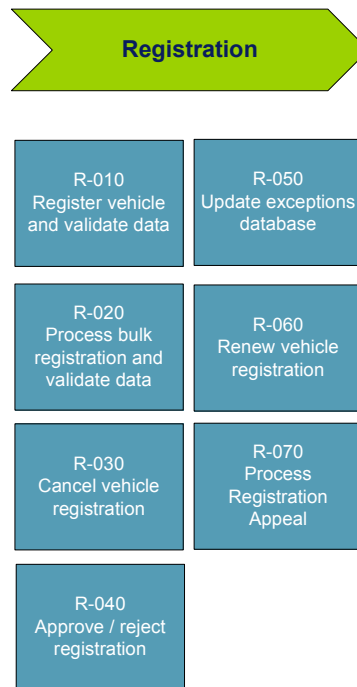
The registration of vehicles with the LEZ is required to handle the exceptions outlined in the previous section namely:

- Vehicles with abatement technology fitted
- Early Compliant vehicles
- Alternative Fuel vehicles.

The number of vehicles that have to be registered directly with TfL can be minimised by using the RPC process to facilitate the automated identification of vehicles with retro-fitted abatement technology fitted through DVLA data. European equivalent certifications should be used where available to identify foreign vehicles that are compliant.

The process diagram below identifies the key sub-processes involved in registration. This section provides an overview of how these processes work to support the identification of compliant vehicles which can then be removed from the list of excluded vehicles. The Feasibility Study did not document a proposed end-to-end registration process.

¹³ Derived from production statistics for 2000 – National Statistics Office – as reported in SMMT Press Release February 2003. Reported volumes of commercial vehicles were discounted by 75% (average proportion of vans in the commercial fleet). Final figure based on % of production that is sold into the UK market as opposed to output produced for export markets. 2,500 represents the potential national number of End of Series vehicles. It is expected that only a proportion of these would operate within London.



Register vehicle and validate data

This process involves the receipt of a registration form with supporting authorised documentation. The incoming applications are opened, scanned and information on the registration form is entered into the system either manually or using optical character recognition technology. The supporting documentation is also scanned and linked with the registration record in the system.

The authorised documentation is reviewed to ensure that it is complete and provides adequate evidence of compliance.

Process bulk registration and validate data

Bulk registrations support the submission of a number of vehicles and their authorised documents in a single application. This will reduce the administrative overhead for the operators of large fleets. Bulk registration of vehicles is not considered to be a key requirement for the start of the scheme, however the introduction of LGVs in 2010 will increase the number of potential registration candidates within each operator's fleet. It is also expected that the number of Early Compliant vehicles will rise in 2010 if the LEZ is extended to include LGVs.

Approve/reject registration

Once the authorised documents have been reviewed, a decision is made as to whether sufficient evidence of compliance has been provided. Cross-referencing with external sources may be required to validate this decision.

For Early Compliant vehicles the format and content of Certificates of Conformity will vary across manufacturer, however all should state the emission standards of the vehicle.

If a registration application is rejected, the reasons for rejection are recorded and a return communication sent to the operator. For bulk applications, this communication will refer only to those vehicles which have been rejected.

Applications which require further evidence are held on the system and a request for further evidence sent to the operator. During this period any PCNs due to be issued to the vehicle are put on hold, pending the completion of the registration process. If the registration is

approved the PCNs are cancelled and the system updated. If the registration is subsequently rejected the PCNs are issued to the operator. This process will be subject to strict timescales in order to ensure that any PCNs are issued within the legal timeframe.

Approved registrations are recorded on the system and a return communication is sent to the operator. If registrations have to be renewed annually, for example vehicles fitted with abatement technology will require annual renewal, these are stated on the letter to the operator and the relevant time period is recorded in the system.

Vehicles with approved registrations will be removed from the exclusions database.

Cancel registration

If the operator does not submit the required evidence prior to the registration expiration date the registration is cancelled for that vehicle. The vehicle is then added to the exclusions database and PCNs are issued from that point forward if the vehicle is detected in the zone.

Handle registration appeal

There may be instances where appeals are made against rejected registration applications. Clear business rules and clear routes to compliance for vehicles requiring registration will minimise the number of appeals received.

7.2.1 Issues

Sizing of registration operation

It is expected that the majority of vehicles registering for the LEZ will do so in advance of the scheme launch, causing an initial bow wave period, with annual peaks for renewals. If the RPC route can be used to automatically identify vehicles via DVLA data, then the volume of vehicles that need to be registered is smaller and limited to Early Compliant vehicles. Extension of the scheme to include LGVs may result in a higher number of registrations, however again, only for those vehicles which cannot be identified via DVLA data

Pre-funding registration

In order to facilitate early implementation TfL may need to pre-fund the setting up of the registration process, which needs to be in place some six months prior to go-live, to allow operators sufficient time to amend their vehicles and register.

Registration interfaces with other schemes

The registration process should seek to avoid where possible the duplication of registration processes for vehicles that are already required to register with Congestion Charging and London Lorry Control Scheme.

Interfaces should be developed if possible to ensure that Congestion Charging and LLCS do not issue permits or receive payment for vehicles that are not allowed into the LEZ.

Any publicity and websites for these schemes should contain relevant information about the LEZ and should contain links to a LEZ website.

7.2.2 Recommendation

The process steps outlined above provide an outline view of how LEZ registration could work. This process will need to be refined and the business rules for handling each vehicle type defined.

7.2.3 Further Work Required

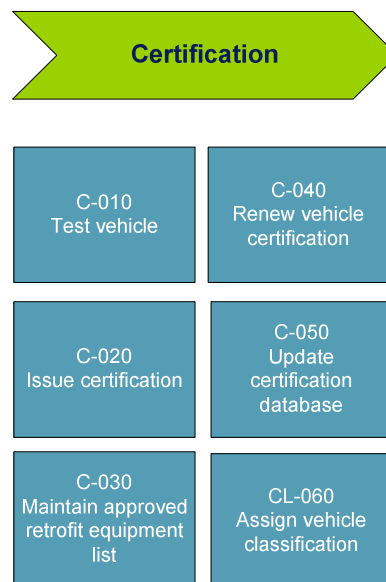
The following activities are recommended for the next phase of work to develop the registration process:

- Initial volume analysis, capacity planning and bow wave planning will need to be carried out in order to determine the volume of registrations anticipated. This will be necessary in order to inform the procurement and costing of the operation. This is dependent on the resolution of issues that determine the size of the registration operation, namely understanding how many compliant vehicles can be identified automatically
- Information sharing arrangements will need to be discussed with other schemes.

7.3 CERTIFICATION

Where the emission standards of a vehicle cannot be determined automatically from the DVLA and an operator has to register the vehicle directly with TfL, a certificate that proves compliance with LEZ entry criteria is required. This applies to vehicles that are older than the date of the Euro standard but which through early compliance, or the fitting of abatement technology, meet the LEZ emission criteria.

The diagram below outlines the key process steps involved in the certification of vehicles. The certification processes currently available to support the LEZ are the RPC programme managed by VOSA on behalf of the DfT and the Type Approval process carried out by the Vehicle Certification Agency (VCA). The Feasibility Study outlined a number of additional sources through which compliance could be validated (e.g. VIN numbers, MOT test records) however the above have been selected as they utilise existing, nationally recognised programmes.



7.3.1 Reduced Pollution Certificate

The Reduced Pollution Certificate programme is funded by DfT and managed by VOSA and enables operators to prove they have fitted and maintained emission abatement equipment which allows them to claim a VED discount for treated vehicles. The RPC programme only applies to the fitting of particulate traps and VOSA specifies the allowable engine/equipment combinations. The RPC for a vehicle has to be renewed annually with the vehicle having to undergo a VOSA approved test to ensure the equipment is maintained to the required standard.

The Reduced Pollution Certificate is accepted as evidence by DVLA that a vehicle qualifies for a VED rebate. This tax incentive was introduced to encourage early adoption of Euro IV level engines. Once Euro IV becomes the mandated standard for new vehicles from 2006 the scheme will be limited to certifying the retro-fit of older vehicles.

In 2001 the emission standards that had to be achieved were tightened, but vehicles already issued with a RPC could retain the certification based on the original emission levels, even if they did not meet the new tighter standards. As this vehicle population is likely to be very small (due to the low number of certificates issued prior to 2001) it is recommended that no special measures will be necessary to identify them, other than excluding vehicles that do not meet the Euro II + RPC standard.

The link between the RPC programme and the DVLA VED classes enables vehicles that hold a RPC to be identified through the DVLA interface. As discussed previously, this will facilitate the automated identification of these vehicles and remove the requirement for these vehicles to register directly with the LEZ.

7.3.2 Type Approval and Certificates of Conformity

In order to register Early Compliant vehicles, their emission standards need to be verified. Manufacturers can certify that a vehicle meets specific emission standards, based on the VCA vehicle type approval process. This information is provided to operators as a Certificate of Conformity and can be used to provide evidence of emission standards for Early Compliant vehicle registration.

7.3.3 Issues

Future of the RPC and reduced VED programme

The reason for having a RPC scheme diminishes beyond 2006 once new vehicles are Euro IV standard. It will only exist to support the renewal of existing certificates. If the RPC process were to cease there would be no means of formally certifying the retro-fitting and maintenance of particulate traps. The EST could provide a list of vehicles that had received grants to fit abatement equipment but they do not certify the ongoing maintenance of the equipment. Also, if DfT withdraws the funding of grants for meeting the requirements of a LEZ, as it has indicated it will, this source of data will no longer be available. It is critical that the future of these programmes is discussed and clarified with DfT.

One alternative is for TfL to implement a London LEZ certification process. However, this would be a significant undertaking and would require testing and approval processes to be implemented and the appropriate infrastructure put in place. Therefore, it is not considered to be a realistic option.

Inclusion of a NO_x emission standard for the LEZ

If the emission criteria for 2010 are tightened to address NO_x, including moving to a Euro IV standard, a certification scheme would be required for NO_x abatement technology. This has a wider use than supporting the LEZ in London, since it will encourage adoption of this abatement technology nationally.

The Feasibility Study suggested that if the emission standard for 2010 required NO_x abatement, the current RPC certification procedure should be extended to cover emerging NO_x abatement technology. Our recommendation is also that DfT considers extending the RPC scheme, since this would provide a national capability to certify NO_x abatement equipment. DfT has indicated however, that there are currently no plans to extend the RPC scheme beyond its current form. Also, RPC is a statutory scheme and primary legislation may be required to amend it.

In the absence of a RPC-type certification programme for NO_x, the Energy Savings Trust maintains a database of vehicles which have had NO_x abatement equipment fitted through

grant funding. However, this programme may need to be extended to provide for regular inspections to ensure the equipment is being operated reliably. Enforcing this process may require road-side testing and checking of installation and certification paperwork. DfT has also indicated that grant funding is unlikely to be available to help operators meet the requirements of a mandatory scheme such as a LEZ.

If a suitable NO_x certification process was established, it would need to link the issue of a certificate to the DVLA database. This link would enable both the PM and NO_x standards of the vehicle to be identified from DVLA provided data. If this was not the case, either an additional interface and data matching process or direct registration, with TfL, of all certified vehicles would be required.

Certification for abatement technologies not approved by the RPC programme

The list of particulate abatement equipment approved by VOSA for RPC does not include all technologies available in the marketplace and is a sub-set of the approved technologies funded through the EST CleanUp programme. Vehicles with abatement technology fitted that is not included in the list of RPC approved combinations may still be eligible to travel in the zone if their emission standards meet the LEZ criterion. Ideally, the VOSA list would be extended to cover more technology options, therefore providing a single route to LEZ compliance for vehicles fitted with abatement technology. This will need to be discussed with DfT.

Increased volume of RPC certificates required

Currently operators of vehicles in 3.5t to 7.5t classes get a VED discount which is worth less than the cost of the annual RPC test. This may have deterred operators of vehicles in this class from applying for a RPC and registering with the DVLA. Currently, it is estimated that 46,000 certificates are renewed each year with 4,000 new applicants annually. Implementing a LEZ that mandates RPC as the only route for certifying retro-fit technology will force more operators to obtain a RPC. This will increase the number of new applications and annual renewals that need to be processed as part of the RPC programme. VOSA will need to be able to handle this increase in volumes in order to minimise the number of PCNs issued to vehicles that meet LEZ emission criteria.

7.3.4 Recommendations

It is recommended that the national RPC and Type Approval certification programmes are continued. A meeting with DfT is required urgently to establish their commitment to the provision of such a scheme, similarly, discussions are required as to the feasibility of a national certification programme being implemented for NO_x emissions in the future. If there are no plans to introduce NO_x certification on a national level then we would recommend that alternative certification options are explored before a commitment can be given to a NO_x standard in 2010.

It is considered essential that the RPC and Type Approval processes are continued to provide the certification mechanisms that the operation of a LEZ would require.

7.3.5 Further Work Recommended

The following activities are recommended for the next phase of work to determine the future of the certification programmes:

- Investigate the proposed plans for the RPC programme and EST grant programme with DfT
- A policy decision on the mandating of RPC certification for operators is required. This will need to be discussed with DfT and the DVLA and a consultation held with operators on the approach

- Determine the likelihood of a national NO_x certification programme and the linking of this with a reduced VED incentive programme.

7.4 IDENTIFICATION OF FOREIGN VEHICLES

The Feasibility Study identified that foreign vehicles would have to be covered by the LEZ, but did not explore implementation details. Currently, there is no EU wide information-sharing programme in relation to registration information for foreign vehicles and there is no method by which compliance with LEZ emission standards can be validated automatically for each vehicle. Automated reading of foreign vehicle VRMs is not straight forward either, as the syntax of many VRMs cannot be interpreted by the cameras. Manual intervention is required to identify the VRM.

Identification of the Euro emissions class, age, and certified abatement technology for non UK vehicles will require direct registration with TfL by the operator until non UK vehicle registration data is available from national registration bodies.

At present, DVLA has data-sharing agreements with some EU states for enforcement and policing purposes. These arrangements are used by TfL to enforce other traffic regulations such as parking and Congestion Charging and similar arrangements should be possible for LEZ.

7.4.1 Issues

Potential low volumes of foreign vehicle registration

There are concerns that low volumes of foreign vehicle registration will be experienced due to the observed low success rate for foreign vehicle enforcement for Congestion Charging and other traffic offences. Use of data held by other organisations to assist in identification of the target vehicle groups and to support collection of data on foreign vehicles is recommended where possible. These sources include Congestion Charging, the London Lorry Control Scheme and from 2007/8 the HMCE Lorry Road User Charging scheme, all of which currently (or propose to) hold data on heavy goods vehicles.

The percentage of foreign vehicles making repeat journeys into the UK is low, with DfT surveys indicating 59% making fewer than one journey per month into the UK. This implies that there may be a lower take up for registration, as vehicles would be required to register for relatively few journeys.

Lack of consistent authorised documentation to support registration

The vehicle characteristics that form the basis for the LEZ restrictions, e.g. weight, length, age or "emission class" can be found in the vehicle registration certificates. Which are mandatory for commercial vehicles to carry in some, but not all member states. However, according to Council directive 1999/37/EC concerning registration documents for vehicles, some information, e.g. information on the exhaust and sound emissions is voluntary, so may not be available. Where countries do require such data in their national registration certificates, this could be used as evidence to support LEZ enforcement. Again this non-mandatory data may, like UK data, only be available for certain classes or ages of vehicle, since retrospective collection of data is not performed.

DfT could support an amendment of the directive, making it mandatory for vehicle registration documents to contain information on a vehicle's Euro standard. However, it is unlikely that a complete data set will be available in the timeframe required, certainly for implementation of a LEZ in 2007, and alternative sources of this data will therefore be needed for some or all countries.

Registration of vehicles fitted with abatement technology from foreign countries

There is no standard European approach to certifying emissions of vehicles fitted with abatement technology or retro-fitted with an engine conversion. If the London LEZ were to specify a separate UK standard for this technology this would have to be notified to the EU. This may trigger challenges if it were felt to restrict the free movement of goods/services (as has happened in Stockholm which used, for a period, specified Swedish test standards to certify its LEZ). The application of Euro IV standard would simplify this activity.

There are a number of other EU countries which already restrict vehicles based on emissions, and which therefore must require vehicles to have certified emissions documentation. The recommendation is to investigate the equivalent standards that exist, and which could be referenced as equivalents, to provide simplified certification evidence for foreign vehicles – for example the Stockholm LEZ and the German motorway tolling scheme (Maut).

As abatement systems and vehicle engines are not country specific, the CleanUp register can be used to identify abatement equipment that is allowed, although means of certifying that this is fitted to the vehicle in each country would be required to support registration and renewal. However, the CleanUp register is unlikely to hold details of vehicles which are not common in the UK, and the EST does not currently have an official role in giving advice on or certifying combinations for non-UK vehicles.

Anti-competition challenges

It should be noted that any process that favours either foreign vehicles through a reduction in entry criteria, or puts them at a disadvantage, should be avoided as it risks a challenge. EC law relating to the free movement of goods/services may prevent a certification or classification approach which excluded foreign vehicles because they could not provide UK registration or certification evidence.

Initial analysis of the legal issues that may arise, with regard to the registration and certification of foreign vehicles for the LEZ, indicate that none of these should be insurmountable.

7.4.2 Recommendations

In the absence of an EU-wide information sharing programme, a registration process for foreign vehicles wishing to enter the LEZ is required. It is recommended that prior to scheme go-live a publicity campaign is run, focusing on all UK ports, to encourage foreign vehicle registration.

The DVLA should be asked to assist in identifying sources of information from other national vehicle registration sources through their existing cooperation and information sharing routes. We envisage that this data may not be complete or available for all countries and so alternative data sources should be investigated. Current information sharing arrangements focus on enforcement rather than certification. These include Congestion Charging, London Lorry Control Scheme, and commercial foreign debt recovery agencies.

7.4.3 Further Work Required

The following activities are recommended for the next phase of work to support the identification of foreign vehicles:

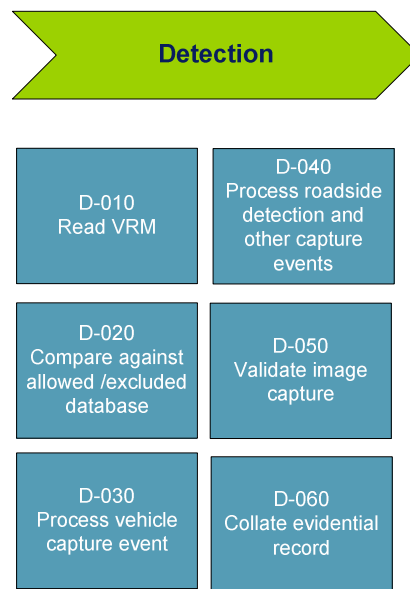
- Detailed analysis should be undertaken of the sources of information available for identifying the age and emission classes of foreign vehicles. Schemes in place in other countries to certify the retro-fitting of abatement equipment should be investigated, as well as the ability to use these sources to support the registration of foreign vehicles for the LEZ

- DfT support for EU-wide registration and enforcement sharing, and the mandating of the provision of Euro standard classification on registration documents, should be sought
- The legal issues and regulatory environment of the recommend approach need to be explored further.

8 DETECTION

Vehicle detection is the method by which details of vehicles travelling within the zone are captured, compared with the exclusions database and an evidential record created for non-compliant vehicles. It has been assumed that the LEZ will operate these processes on a 24 by 7 basis.

In the diagram below we have identified the main processes required to support this function.



8.1 OPTIONS PROPOSED IN THE FEASIBILITY STUDY

Within the Feasibility Study two options for vehicle detection and identification were considered. The options were:

Manual capture

The Feasibility Study proposed that manual enforcement, similar to that used by the London Lorry Control Scheme (LLCS) operated by ALG TEC should be considered. This implies that a permit system will be in operation and that vehicles which are excluded from the zone would be manually spotted and enforced by operators on the street. This approach, without the use of cameras was considered a faster, cheaper way of achieving the LEZ and had the advantage that it could help identify cloned, forged or swapped registration plates.

In Section 7 it was concluded that a list of excluded vehicles, rather than a list of compliant vehicles, should be implemented. As a result of this, issuing permits to a list of compliant vehicles is not considered to be the best approach. Alternative approaches to manual enforcement have been identified, and are evaluated below. An option exists to incorporate Borough parking attendants and the CCS On Street Enforcement contractor teams, but this has not been evaluated in this study.

Use of Congestion Charging cameras and other cameras

Scenario 5 of the Feasibility Study proposed manual enforcement supplemented by automated detection using the Congestion Charging camera infrastructure and an additional 12 fixed and 12 mobile cameras. Automatic enforcement would achieve higher detection

rates than a manual approach and would be required should the LEZ be extended to include LGVs in 2010. The detection rate was estimated as 10% to 15% possibly rising to 35% with the inclusion of fixed cameras on motorways and major A-road sites.

Since the Feasibility Study was written, consultation has commenced on the widening of Congestion Charging to include the Western Extension Zone (WEZ). If WEZ were to proceed, this would increase the camera locations available for enforcement of the LEZ. However, even the extended zone would only cover a small proportion of the Greater London area; only approximately 4,000 HGVs per day are detected within the Central Zone which could rise to approximately 6,000 a day with the Western Extension. The Feasibility Study estimated 60,000 to 127,000 HGVs per day within the Greater London area. Whilst the Congestion Charging infrastructure could provide a supplementary means of capture, it will not help with detecting the majority of HGVs or coaches travelling within the LEZ.

The LEZ requirements could be accommodated within the Congestion Charging operation by means of an amendment to the facility to draw off selected categories of vehicles. In addition, it would be perverse if TfL were to sell a Congestion Charge for a vehicle on the LEZ exclusions database. To avoid this will require a series of modifications to the various sales channels and fleet schemes, and may require consultation on a variation to the scheme order (a similar amendment will be required for the LLCS). Given that the Congestion Charging contract will be re-let in 2008/9, when these requirements could be obtained at marginal cost if written into the revised Statement of Requirements, TfL will need to assess whether expenditure is justified at this stage. Inclusion in the scope of the restructured contract will ensure that the facility is available for 2010 if the decision to extend the LEZ scheme to LGVs is taken.

8.2 ADDITIONAL OPTIONS

There are a number of existing camera-based infrastructures available to TfL which could support the LEZ. These are examined below.

Bus lane, moving traffic offences and decriminalised parking

The Transport Policing and Enforcement Directorate (TPED) infrastructure is linked into King's Building where operatives have access to a large number of TfL and Borough cameras. Detection is by an operative observing and recording the offence. This observation effectively creates the "witness statement" which initiates the issue of the PCN. The video recording acts as support to the evidential record and a print of this image is issued with the PCN.

The bus lane cameras are fixed head and focused on the bus lanes, they will only detect a HGV if it enters the bus lane. The CCTV cameras used to detect the other offences are Pan, Zoom and Tilt (PZT) and could therefore support LEZ enforcement. Thus, two opportunities to use this infrastructure are available. Firstly, the list of vehicles captured for other offences could be compared on a daily basis with the LEZ exclusions database and any dual offenders identified. Implementation costs would be very low and would demonstrate integration of TfL's enforcement activities. However, it would be necessary to notify the public of the extended use of the images in order to comply with data protection rules. Initial advice is that as TfL is a single data controller and the data is used within a single operation (Surface Transport) this will be admissible. The likely capture rate is minimal.

A second, alternative use of this infrastructure would be to co-locate additional staff to use the PZT cameras when not in use for TPED enforcement.

Congestion Charging monitoring cameras

There are currently some 98 lanes monitored on the Inner Ring Road, within and adjacent to the zone. The cameras are connected to ANPR equipment at King's Building and are used for traffic counting and journey time measurement. The plate is anonymised and there is no

contextual image, thus the images do not meet evidential requirements for PCN issue. Retro-fitting with a contextual camera will be costly because of the fibre optics links. However, the current poles are strategically placed and could provide a low-cost mounting for the new generation of cameras proposed for the WEZ which will communicate via a broadband link. Other camera sites such as those located on the North and South Circulars could also be treated in this way.

London Traffic Control Centre (LTCC)

The LTCC has a network of cameras covering the TLRN but these cameras are controlled by the police and access is limited. It is assumed that these cameras will not be available for LEZ enforcement purposes.

Borough cameras

There are a significant number of parking and security cameras operated by the Boroughs. These cameras are allocated for specific purposes and LEZ enforcement would be a marginal application, which would need to be discussed on a site by site basis with the operating Borough. These cameras can be accessed by TfL through King's Building and could provide capability if used when not required for Borough purposes.

VOSA

VOSA operates a small fleet of camera/ANPR equipped vans for national enforcement purposes. The number of units in Greater London at any time will be small and dedicated to VOSA purposes.

Traffic Master cameras

Traffic Master has 113 sites in the Greater London area at strategic locations to measure traffic flows and journey time. These cameras transmit an encrypted reading of the vehicle plate but do not provide a video image or a contextual image and therefore do not meet the evidential requirements established for camera/ANPR enforcement for Congestion Charging.

Highways Agency

The Highways Agency has a number of cameras operating on trunk roads, but again the camera configuration does not meet the evidential requirements.

The conclusion of this review is that the existing camera infrastructure is of only marginal value for the enforcement of the LEZ and that a separate, dedicated network will be required if camera enforcement is to form the basis of LEZ enforcement.

Therefore, for the remainder of the document it is assumed that a dedicated infrastructure is required to support a camera-based detection approach for the LEZ.

8.3 EVALUATION

A key consideration in the evaluation of camera-based and manual detection options is the capture rate they can each achieve. The Feasibility Study estimated differing numbers of potential evaders depending on whether the scheme was manually or camera enforced, and the likely degree of compliance by vehicle operators. These estimates were derived from an analysis of available traffic survey data which included a range of results. The potential variability in the data used for analysis and costing in the remainder of this section is illustrated in the following table. The figures used for the more detailed analysis are shown in bold. The table reference within the Feasibility Study is also shown. A further level of variability has been introduced by differences in the calculated numbers of vehicles in the zone arising from the use of different sources of traffic count data. This issue is discussed in Appendix D prepared by Mott MacDonald.

	HGV	Coach	LGV	Car
Total UK (Table 4.10)	325,428	20,000	2,469,445	23,196,112
Visiting LEZ Within Any One Year (Table 4.10)	60,058 to 154,542	9,959	338,796 to 437,447	3,674,815 to 4,897,863
Vehicles Requiring Retro-fit/ Replacement (2007) (Table 3.6)	59,500	3,834	56,000 to 72,000 (2010) (Table 10.10)	Not used
Compliance Rate (Table 3.6)	Manual 65% Automated 87%	As HGV	20% to 82% Avg 62%	Not used
Non-Compliant Vehicles at Start of Scheme (Table 3.6)	20,325 to 7,670 (2007)	1,310 to 494	21,280 to 27,360 (2010)	Not used
Assumed % of Non-Compliant Vehicles in Zone on Any One Day (Working Assumption – see below)	10% to 30% Avg 20%	As HGV	As HGV	Not used
Number of Non-Compliant Vehicles in Zone on Any One Day	150 to 4100 (1910 Automated) (4,100 Manual)¹⁴	50 to 390 (220)	4,256 to 5,472 (4,864)	Not Used

The above “working assumption” has been developed as only a proportion of all vehicles entering the zone over the course of a year will be in the zone on any one day. Many of the operators who decide not to comply with the LEZ emission standards will do so because their vehicle makes only infrequent journeys into the zone. There will be a second group of evaders who will deliberately seek to avoid payment, in the case of Congestion Charging

¹⁴ Due to different compliance rates

these are 16% of the evaders on any one day. A third category will be a small number of evaders who make a conscious decision to send a banned vehicle into the zone to meet a customer service requirement because a compliant vehicle is not available. For the purpose of this analysis it has been assumed that between 10% and 30% of the potential evaders are in the zone on any one day.

It can be seen from the previous table that for HGVs, coaches and LGVs, the total number of potential evaders on any one day is relatively small.

Potential capture rates - manual enforcement

In order to analyse the potential capture rate two modes of manual enforcement have been considered. These are:

- An operative in a van parked at a strategic location e.g. adjacent to a main highway or outside an industrial estate. The operative records sightings on paper or via a configured PDA. This is similar to the arrangement used for LLCS
- An operative in a van supported by a camera and ANPR array similar to those used for Congestion Charging. In this case single manning has been assumed as opposed to the dual manning used for Congestion Charging. The dual manning was included because of concerns over operator security but there has been no adverse public reaction affecting the safety of operatives.

The estimated captures per 24 hour period and the costs of the two approaches are shown below. The result shows that the ANPR equipment is only marginally more effective. This is perhaps counter intuitive, but arises from the assumption that the manual operator will apply a level of intelligence to the pre-selection of the vehicles recorded and is flexible in the field of vision from the observation site. The camera/ANPR unit is less flexible as it has to be set up to observe a single spot and observes all traffic not just the target population.

Enforcement Option	Evader Captures per 24 hours	Estimated Capex per Unit	Estimated Opex per Unit (24 by operation) 7
Mobile Operator	12	£28,000	£113,000 pa
Mobile operator Supported by Camera/ANPR	12 to 18	£35,000	£117,000 pa

On this basis, the experience of the operation of the mobile Camera/ANPR units on Congestion Charging, it is recommended that for the LEZ manual enforcement would be based on the simpler operative recording sightings option. Potential clearly exists for the combination of LEZ and LLCS enforcement during the night time hours, but this has not been considered further in this report. Similarly, the issue of whether the operatives would be TfL or Borough staff has not been considered at this stage.

The potential evader capture rate under a manual regime for differing resource levels is illustrated in the following table. It can be seen that, despite employing a substantial labour force, the evader capture rate remains relatively low.

Units Operated	% Evaders Captured	Estimated Capex	Estimated Opex
10	3.0%	£0.3 million	£1.2 million
20	5.7%	£0.6 million	£2.3 million
40	11%	£1.2 million	£4.6 million

The conclusion reached is broadly similar to that reached in the Feasibility Study (paragraph 3.82) which concluded that some 60 units would provide an evader capture rate of 5% against the estimate of 5.7% for 20 units (80 staff for 24 by 7 working).

Potential capture rate – camera enforcement

The HGV vehicle flows were examined using DfT's 2003 AADF Estimates in order to assess the potential evader capture rates for the HGV population. It has been assumed that the pattern for coaches is similar. The table below shows the estimated capture rates from groups of cameras located at areas of peak HGV flows. More detail is provided in Appendix D. Existing Traffic Master locations have been used as indicative sites of high traffic density. In practice, a detailed survey would be required in order to determine optimum camera location and configuration and, as discussed above, use would be made of existing TfL infrastructure wherever possible. Costing has been based upon use of the new generation of cameras for Congestion Charging, that is, using on-site ANPR processing with data transmitted via broadband.

The table below indicates that a network of some 67 sites based upon the locations of peak HGV flow could give a capture rate of approximately 50% of the evader population.

Site Option	Number of Sites	HGV Flow per Day	Estimated Unique Captures	Estimated Number of Evaders Captured	Cumulative % of Evaders Captured
Higher volume boundary sites	23	34,750	20,085	385	20%
Key intersections in outer areas and N/S circular	24	39,500	21,792		
Additional sites at Traffic Master locations	20	22,250	8,400	955	50%

Adding additional sites will not increase capture rate in a linear fashion. The flows at additional sites will be less than for the main sites examined above and multiple captures will become a factor. In addition, non compliant vehicles will divert to avoid camera sites. A very broad estimate indicates that the incremental capture rate will fall off at approximately

125 sites, giving a maximum capture rate of some 70% of evaders. Again, this capture rate is broadly in line with the Feasibility Study that estimated that some 115 sites would give a capture rate of 70% (paragraph 3.96).

Three automated detection regimes have been considered which will provide differing levels of detection to support the scheme. These are shown below:

Detection Option	Resources	Capex (£m pa)	Opex (£m pa)	Probability of Detection	Estimated Number of PCN/day*
Mixed manual patrols and camera	10 mobile units plus 23 camera sites	3.3	2.8	28%	385
Mixed manual patrols and camera	10 mobile units plus 67 camera sites	6.4	4.3	50%	955
Mixed manual patrols and camera	10 mobile units plus 125 camera sites	8.8	7.1	70%	1,340

The estimated PCN issue rates are shown for the start of the scheme. Evasion should decline rapidly if detection and PCN issue proves effective.

Planned detection rates

The table above illustrates the significant incremental cost associated with the use of camera enforcement to increase the detection rate.

If there is a large degree of pre-compliance, that is, operators upgrade or retro-fit their vehicles in advance of go-live, the numbers to be enforced against will be relatively small. If the economic impact of non-compliance (fine and/or charge) is high, even a low level of detection will be sufficient to influence operators who only enter the zone infrequently to upgrade their vehicles or enter commercial arrangements which avoid them having to enter the zone.

If however pre-compliance is low, a more rigorous detection regime will be required.

This analysis leads to the conclusion that expenditure on an operator information campaign to promote pre-compliance is likely to be more cost effective than additional expenditure on camera detection.

The proposed approach is therefore to concentrate on the design of the operator information campaign and go-live with manual enforcement only. If initial pre-compliance is low, decisions can then be taken to install the camera infrastructure.

The surveys undertaken for the Feasibility Study indicated that operator pre-compliance would be high for HGVs and coaches given sufficient notice, whereas LGV operators would be less likely to conform. Thus, it is assumed that a camera infrastructure giving at least a 50% detection rate will be required for 2010. The phased increase in detection will allow camera maintenance and image processing to be provided as part of the Congestion Charging re-let, giving cost savings over a stand alone LEZ.

Level of charging/fines

The Feasibility Study did not detail the relative frequency of visit to the zone by operators. Clearly, it will be economic for operators within the zone, and those with frequent trips into

the zone, to comply. If however, there are a large number of operators making infrequent trips, the level of charge/fine will need to influence their propensity to comply.

Further work is required to assess the frequency of visits to the zone by non-London based operators and model the likely economic drivers to compliance. The level of charge/fine is likely to be high. The precedent already exists for a £500 fine for breach of the LLCS.

Limitations of camera detection

The camera-based infrastructure will be located on major routes and interchanges where the bulk of movements currently take place. It is likely that a number of operators will seek to avoid these sites and divert to other routes which are not monitored. To discourage this, and to increase detection rates, the camera estate should always be supplemented by a group of mobile operators. These operators could also be directed towards industrial estates and other concentrations of vehicle movements where it may not be feasible to position a fixed camera. Manual enforcement rates may be increased by concentrating the available resources into an area in order to maximise the probability of capture.

Other detection processes

Manual units would upload the list of observed VRMs at the end of each shift to a central database either via a PDA or by manual entry to a PC provided by TfL. Each VRM would be compared with the exclusions database and if a match was found, a flag would be sent to the operative together with a reference number which would be attached to the evidential record. This record would be submitted to the enforcement provider for scanning into workflow and storage of the original document. The matched VRM would be added to the list to be submitted to DVLA for acquisition of keeper details. Upon receipt of the DVLA data the record would be checked for vehicle class, make, model or any other information recorded and, if appropriate, the evidential record would be consolidated and passed to the enforcement provider for PCN issue.

If the TfL enforcement cameras were to be used, the process would be similar to the manual process except the video tape would be retained for evidential purposes.

Records received from the LEZ cameras would be compared with the exclusions database and any matches would initiate transfer of the evidential record to the optical evidential store. As with the manual system, the keeper details would be requested, the image checked and the record passed to the enforcement provider. The image management and visual checking process is simpler than in Congestion Charging as comparison to the exclusions database should yield only full plate matches, with partial reads and misreads largely eliminated from the data going forward to DVLA.

A similar process would apply if feeds from Congestion Charging and feeds from TPED or LLCS were to be used to identify LEZ evaders.

8.4 FURTHER WORK REQUIRED

The following activities are recommended for the next phase of work to improve the quality of data available and enable decisions to be made on the optimum location and numbers of cameras:

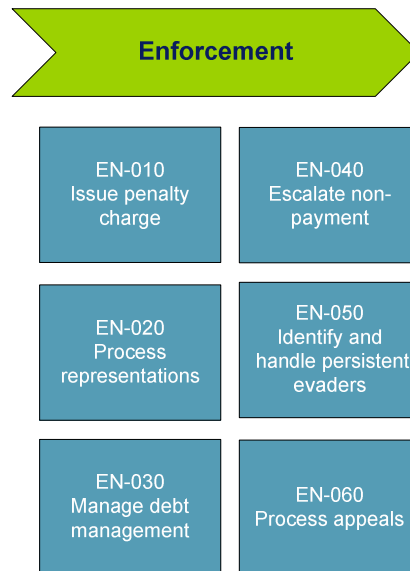
- Compare and resolve the different volumes in the zone indicated from the LTS and DfT counts. This will be a desk based study
- Understand better the profile of visits per year into the LEZ by the population of target vehicles and model the likely impact of varying charge/fine levels.

9 ENFORCEMENT

The enforcement process which covers the issue of the PCN, payment collection and representation and appeals processing is similar to that used for Congestion Charging and in Bus Lane, Moving Traffic and Decriminalised Parking enforcement. Minor variations would arise over the access to the evidential record for representation and appeals processing.

It is anticipated that PATAS would provide the Appeals Service. It will be necessary to have early detailed discussions with ALG TEC on whether a new Tribunal will be required as this will have significant impact on the period required to recruit adjudicators.

The diagram below outlines the key steps involved in the enforcement of the LEZ.



9.1 ISSUES

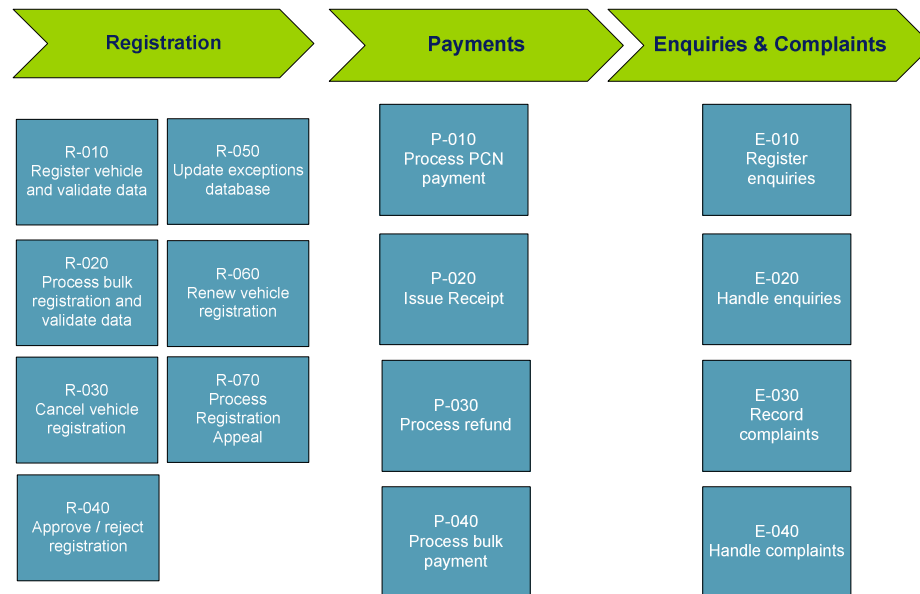
Time-lag in RPC process and impact on representations and appeals

Delays between fitting equipment, obtaining a RPC and this being registered in the DVLA system (and hence available to the LEZ) can be significant. The representation and appeals process will need to take account of this delay as PCNs will be issued to compliant vehicles unless an alternative solution is identified.

Unlike other offences such as Bus Lane, Moving Traffic and parking offences this is an offence that some operators may not be able to remedy quickly. This can be addressed by providing sufficient advance notice and a timely Information Campaign.

10 CUSTOMER CONTACT CENTRE

The Customer Contact Centre acts as a single point of contact for all customer interaction. The diagram below outlines the key processes which must be implemented within the customer contact centre to support the London LEZ. The processes are discussed in more detail in the following paragraphs.



10.1 CUSTOMER CONTACT CENTRE PROCESSES

Enquiries and complaints – The implementation of a LEZ will generate queries from drivers and operators wishing to enter the Low Emission Zone.

Payment processing (PCN payments) – The Customer Contact Centre will need to accept payments against PCNs.

Registration

The Customer Contact Centre can be used to provide support for the processing of registration applications and verification of supporting evidence (see Section 7.2 Registration for further detail).

In order to carry out these processes the Customer Contact Centre will require access to the registration system, DVLA data, exclusions database, EST CleanUp register and enforcement system in order to handle the likely range of enquiries and to validate registrations. It may also be necessary to provide specialist training to the customer service representatives to support the more technical enquiries that may arise – for example, questions on vehicle and technology combinations.

10.2 CONTACT CENTRE SUPPORTING PROCESSES

The Customer Contact Centre will need the following supporting processes:

Postal processing – Opening, scanning and sorting of incoming mail and association with a particular customer record. This will include postal registration, enquiries and payments.

Bulk printing and fulfilment – Large scale printing, fulfilment and posting of documentation (e.g. enforcement documentation, and customer information leaflets).

Document management – Storage and management of paper documents and scanned images generated through the postal processing process. This includes enforcement correspondence (representations), enquiries, and postal payments. The documents will be required to be indexed and associated with a customer record in order to facilitate accessibility.

The above processes are often outsourced or sub-contracted. For example, the bulk printing and fulfilment operations and the postal processing components of the TPED enforcement operation are outsourced to sub-contractors (through the main contractor). Similarly, the Congestion Charging bulk printing service is outsourced, however postal processing operations have been retained in house.

10.3 CUSTOMER CONTACT CHANNELS

The customer contact channels to support the LEZ are expected to be similar to those offered by other TfL contact centre operations and will include:

- Web
- Telephone
- Interactive Voice Response (IVR)
- Postal.

The use of customer channels will vary depending on the type of process being carried out.

Process	Web	Telephone	IVR	Postal
Enquiries and complaints	✓	✓		✓
PCN payments	✓	✓	✓	✓
Vehicle registration				✓

The channel mix is an important factor in the implementation of the customer contact centre. Use of low effort channels such as the web reduces the need for customer service representatives to handle payments and enquiries. It is recommended that these channels are incentivised where possible in order to reduce the size of the front office operation required.

10.4 ISSUES

Capacity planning

The volume of enquiries will be subject to initial peaks at scheme go-live or when new classes of vehicles or emission standards are introduced. Initial volume analysis, capacity planning and bow wave planning will need to be carried out in order to size the operation accordingly. This can be mitigated through a comprehensive Information Campaign.

10.5 FURTHER WORK REQUIRED

Expected volumes of calls and registrations need to be modelled once all relevant policy decisions have been made. This will facilitate the procurement and costing of the customer service operation.

11 CONTRACTUAL ARRANGEMENTS

The anticipated implementation approach is to launch the LEZ with manual detection only and implement the camera infrastructure potentially required for 2010 through the re-let of the Congestion Charging contract in 2008/9. Using this approach the following contracts will be required:

Operator communication campaign

This is the design and delivery of the communications campaign to operators prior to the launch of the LEZ. The campaign must focus on communicating the launch date of the scheme, the emission standards that have to be met, the options they have for achieving compliance, and the steps that are required to register with TfL. The campaign will be a combination of general information to the industry and targeted mail-shots, and other communications to operators of vehicles which DVLA records indicate will be affected.

It is anticipated that these services will be provided by TfL Group Communications, potentially supported by specialist marketing and communications consultants.

Registration

Although this is similar to the registration process used for Congestion Charging, current advice is that this contract cannot be extended to cover the scope of LEZ. A new short term contract will be required to undertake this service until it can be incorporated into the specification for the re-let of Congestion Charging. An OJEU would be required to establish this service.

Payment

As there are contractual and commercial reasons why this should not be combined into the current Congestion Charging contract, a separate, short term contract will be required for the period from go-live to 2008/9, when the Congestion Charging contract is re-let and LEZ can be incorporated into the scope of works.

Mobile enforcement units

A contract will be required for the provision of vans, equipment and operators for the detection of scheme evaders. The contract will also provide back office services to support the operation. An OJEU would be required to establish this service.

Enforcement

Current advice is that the Congestion Charging and the Bus Lane enforcement contracts cannot be extended to cover the scope of LEZ. The current Bus Lane contract expires in 2007. A short term contract will be necessary to enable enforcement between go-live and 2008/9 when LEZ enforcement could be combined at marginal cost with Congestion Charging or with a pan-TfL enforcement contract.

It has been assumed that a Memorandum of Understanding will be signed with DVLA to cover the supply of data for registration purposes and for the daily provision of offenders' keeper details over the existing web enabled interface developed by DVLA.

Appeals

PATAS would be requested to provide the appeals service. It is not clear whether a new Tribunal will be required. Further discussions are required with ALG TEC to clarify this issue.

Bailiff services

These services would be procured under an OJEU procedure. It is not planned to include on-street enforcement against persistent evaders.

European debt recovery

These services would be procured as an extension to existing contracts, if permissible, or under an OJEU procedure.

Signage

The advanced warning and boundary signage would be procured under an OJEU procedure.

If and when the decision to implement camera enforcement is taken, the following additional contracts will be required:

Camera procurement

This would be a TfL contract as TfL will own the assets. It may not be possible to extend the camera provision contract currently being negotiated for the WEZ. In this case, a separate OJEU will be required for LEZ, but this would be based upon the specification developed for the WEZ cameras (assuming successful completion of the trials in early 2005).

Camera installation and commissioning, and image capture, processing and storage

The LEZ requirements will be incorporated into the scope of work for the Congestion Charging re-bid. If earlier implementation is needed, it is likely that a separate OJEU will be required for this procurement as the terms of existing Congestion Charging contract and the proposed WEZ contract would probably not allow their extension to include LEZ. Consideration will need to be given as to whether this is a short term contract, and whether the service can be novated into the re-let Congestion Charging contract.

12 TfL PROJECT GOVERNANCE

It is assumed that once the decision to proceed has been taken by the TfL Board, responsibility for implementation will be transferred to one of the operational teams within TfL Surface Transport. For planning purposes it has been assumed that the Congestion Charging team is extended to provide resources during the implementation and operational phase. Recruitment would commence as soon as conformation to proceed is given.

The implementation team would be supported by project management, legal and specialist technical resources during the implementation phase. Estimates for the level of resources required have been based on experience from Congestion Charging and other initiatives.

Project reporting

The responsible directorate would report to a steering committee set up to oversee the project. It is anticipated that the committee would include representatives of TfL senior management, GLA and other interested parties. Expenditure authorisation would be in accordance with TfL's Standing Orders. Financial reporting would conform to TfL's investment accounting procedures.

13 SIGNAGE

Signs and road markings will be legally required to identify the entry points to a Low Emissions Zone. Signs and road markings provide a notification to drivers of the LEZ boundary, enabling them to take alternative routes if desired. If the necessary signs are not displayed, drivers may have a grounds to challenge the scheme.

The number and type of signs required will be impacted by the type of legislative framework implemented and the roads included. Focusing the scheme on the GLA boundary will restrict the required signage to the GLA entry points with no further signage required within the zone. The signs would need to be supplemented with carriageway markings similar to those introduced for the Congestion Charging Scheme.

The options for signage and road marking are discussed in Appendix D to this report.

The estimated cost of signage is as follows:

Regulatory Framework	GLA Boundary Signs & Marking	Advanced Warning Signs
TRO	£798,000	£92,000 to £690,000
Scheme Order	£1,064,000	£92,000 to £690,000

14 OTHER INITIATIVES

In this section the current review has looked at other initiatives that are underway within TfL and also externally, that may have an impact on the scope or operation of a Low Emission Zone (LEZ). These include:

- Other TfL air quality initiatives
- Other TfL transport projects
- Other London initiatives
- National initiatives.

14.1 OTHER TFL AIR QUALITY INITIATIVES

The Mayor's Air Quality Strategy is underpinned by the recognition that replacing older, more polluting vehicles more rapidly will produce the greatest air quality benefits for London. A number of initiatives, under the banner of a Low Emission Zone, have been proposed and in some cases, have been initiated by TfL and these have been reviewed as part of this study to understand their impact on the requirements for a LEZ.

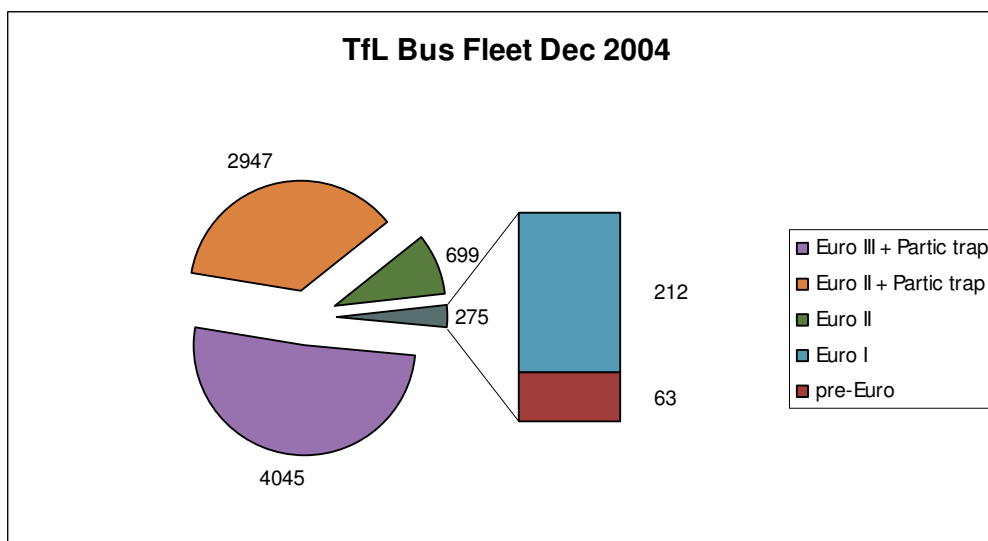
14.1.1 Approach

The Feasibility Study recommended that buses and taxis were included in a LEZ. However since the report was written, separate measures have been taken to address emissions from these vehicles. The review team interviewed a number of stakeholders involved with the bus and taxi operations in order to understand these measures and have summarised their findings below.

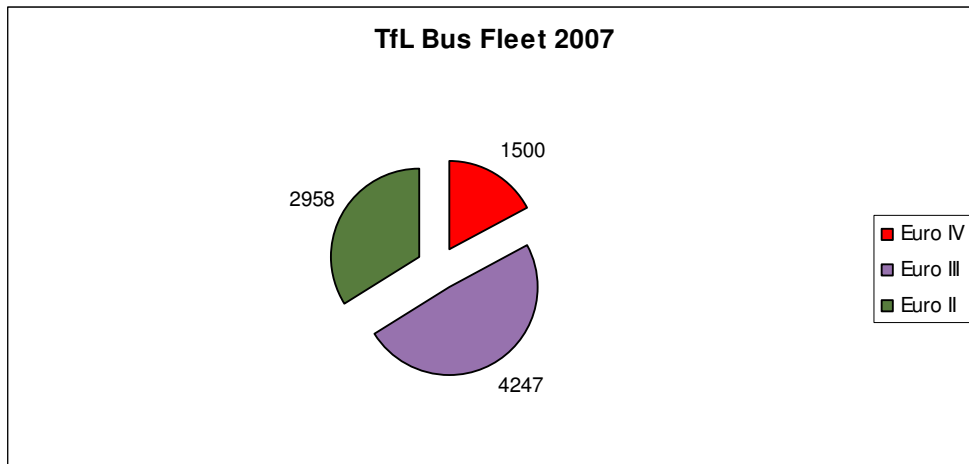
14.1.2 Our Findings

TfL buses

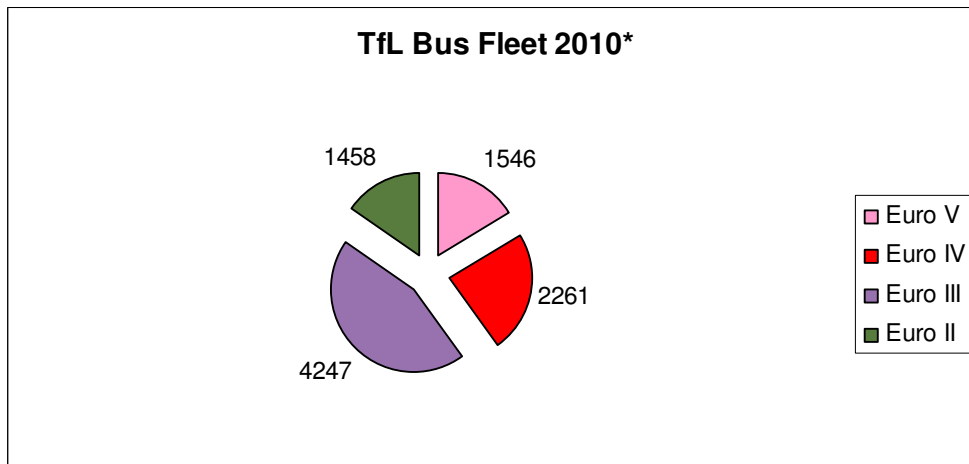
As of December 2004 the TfL bus fleet breaks down as follows:



As a result of TfL regulation, by 2007 TfL's entire fleet of London buses will be compliant with the likely emission standards for a LEZ of Euro II plus particulate trap. They will all have reached this minimum standard by 2005. There will be no buses of Euro 0 or Euro I standard in operation. In addition, the entire fleet will have been fitted with particulate traps.



By 2010 all of TfL's bus fleet will be Euro II or above, with over 84% Euro III or higher. Emission standards for buses in 2010 have not yet been agreed. This decision is likely to be made during 2005 and will be published in 2006. However, the intention is to continue to reduce emissions through a system of rolling standards which tighten taking account of the Air Quality Strategy and the LEZ.



As a further measure to drive the clean up of bus emissions, when Euro IV vehicles come onto the market from early 2007 only Euro IV and above vehicles will be entering the fleet as any operator purchasing a new vehicle will be obliged to ensure that it is of the latest standard.

TfL is also trialling three hydrogen fuel cell buses in the fleet in a bid to find cleaner fuels for future buses and to reduce pollution.

The effect of this TfL regulation is that the implementation of a LEZ in 2007 will not affect TfL's bus fleet directly as its vehicles will already be compliant with the emission standards. Any affect of the tightened LEZ standards in 2010 will depend on the bus emission standards for 2010 that will be decided during 2005 by TfL taking account of the Air Quality Strategy.

Non TfL buses

The vast majority of buses operating in London are under the responsibility of TfL (covered above). Of the remainder there are four other ways to run a bus in London:

- London Local Service Agreements (approximately 17): viewed as being part of the London network. They are expected to reach the same levels of compliance as the rest of TfL's fleet and are bound to TfL fleet emission standards by their service agreements

- London Service Permits (roughly 160): these buses are not part of the London network and include such services as sightseeing and commuter coaches. Their grant criteria are being reviewed and will be amended going forwards to reflect the standards required by a LEZ
- Unlicensed Express Services (very few): such as long distance coach services - as no licence is required for them to operate in London, there is no method of ensuring LEZ compliance through a licensing system
- Services not charging fares: such as hospital shuttle buses or supermarket convenience services - as no licence is required for them to operate in London, there is no method of ensuring LEZ compliance through a licensing system.

It would be the responsibility of these bus and coach operators to independently comply with a LEZ.

Taxis

The Feasibility Study recommended that taxis should be included in a LEZ to reflect their high London based mileage and that the possibility of mandating the emission standards, using the Public Carriage Office's (PCO) licensing agreements, should be investigated.

The Mayor's emission strategy for London taxis was published on 20th December 2004. Under the strategy all taxis licensed by the PCO will, in order to comply with their licensing standards, have to be at least Euro III compliant by 31st December 2007.

This upgrade will be funded by an environmental charge levied on all fares which will initially be a 20p increment on every fare and will apply for the next three years.

The PCO is planning to implement the emission standards in the Mayor's Taxi Strategy in three waves, each wave affecting taxis of certain ages. Taxis will have to display at their annual licensing inspection that they have had either PCO/EST approved emissions reduction equipment fitted or that they have undergone an approved conversion to alternative fuels so that they meet Euro III emission standards for NO_x and PM₁₀. The dates and criteria for these waves are detailed below¹⁵:

- From July 1st 2006 all taxis that are of a pre-Euro emission standard will be required to meet the Euro III standard
- As of January 1st 2007 all taxis that are of a Euro I emission standard will be required to meet the Euro III standard
- As of January 1st 2008 all taxis that are of a Euro II emission standard will be required to meet the Euro III standard.

As taxi emissions have already been addressed independently by the Mayor, taxis will not need to be regulated by the LEZ for 2007 as their emissions will be compliant with the scheme.

There is currently no plan to introduce a new taxi strategy by 2010. Therefore the standard for 2010 would be a minimum of Euro III for existing taxis as laid out in the Mayor's December 2004 Taxi Strategy. It is possible that emission standards may be more stringent by 2010 however, as newly manufactured taxis will have to meet Euro IV from January 2007. This would be a PCO decision which would take into account any LEZ standards set for 2010.

Biodiesel use in London

TfL engaged Sustainable Energy Action (SEA) to undertake a review that was published on 14th October 2004 regarding the potential use of biodiesel in London fleets as a further measure in tackling emissions. Initial results demonstrate potential for significant local air

¹⁵ Mayor's Press Office, "Taxi Emissions Strategy", Mayor's Press Office, December 2004

quality improvements through the introduction of biodiesel in Borough fleets. For example¹⁶, using a 30% biodiesel blend in the ALG vehicle pool could reduce emissions by 1.4 tonnes of PM₁₀ and 31,500 tonnes of CO₂. There is no quantitative evidence regarding the potentially positive effect on other pollutants, however this measure does not reduce NO_x emissions.

The biodiesel initiative does not have a direct impact on a LEZ but may be considered in the future as an additional measure to improve London's air quality.

BAA

BAA has in place a number of strategies designed to reduce airside vehicle fleet emissions on its Heathrow site¹⁷. All new BAA vehicles now meet the Euro II standard and a vehicle age limit has been imposed. Random roadside testing is carried out for emissions, with any vehicle that fails being required to make improvements up to acceptable standards. BAA is also on track to meet their 40% target for their commercial fleet being alternatively fuelled by March 2005.

In addition, BAA is developing a 10 step structured programme – the Clean Vehicles Programme - to guide activities in pursuit of a less polluting vehicle fleet. It will be adopted internally prior to being offered to other on-airport companies to help drive improvements in vehicle fleet management to reduce emissions.

TfL has limited powers over the Heathrow area, as much of BAA's activities are on private roads and are therefore out of scope of a London LEZ. However, BAA is to undertake its own feasibility studies to assess the potential costs and benefits of introducing a LEZ for Heathrow with the possibility of implementing a scheme airside in the future.

Other TfL transport initiatives

TfL is involved in a variety of transport initiatives designed to improve transport in the greater London area. These have been reviewed as part of this study to discover whether they would have any impact on a LEZ, or vice versa.

Congestion Charging and the Western Extension

The Congestion Charging scheme in London has been in operation since February 2003. It uses a mixture of fixed and mobile camera enforcement and has a camera network using ANPR that closely covers roughly 1.5% of the Greater London area.

Following a public consultation in 2004 a revision to the Transport Strategy has been published by the Mayor which allows for a Western Extension to the Congestion Charging zone (WEZ). This would be operational, at the earliest, in early 2007 and would roughly double the Congestion Charging zone in central London.

The Feasibility Study recommended that the LEZ enforcement strategy should be closely integrated with Congestion Charging in both technology and policy terms and considered how a LEZ could build on existing Congestion Charging infrastructure¹⁸. However, this review concluded that whilst integration is technically feasible, for commercial and contractual reasons it is better to implement in 2008/9 as part of the re-let of the Congestion Charging contracts.

¹⁶ Parker, Larry, "TfL Emissions Review for Biodiesel Use in London Fleets & Dealing with the NO_x Issue", Sustainable Energy Action, October 2004, Page 5

¹⁷ BAA Heathrow Planning & Environment Department, "Air Quality Strategy and Action Plan 2001 - 2006", BAA Heathrow, April 2002

¹⁸ AEA Technology, "London Low Emission Zone Feasibility Study Phase II" AEA Technology, July 2003, Page 25

Freight strategy

TfL's Surface Transport is working in conjunction with TfL's Group Transport Planning and Policy to develop the Freight Strategy. This Strategy will lay out the vision, objectives, policies and strategies for freight in London for the period until 2011. It will cover the sustainable development of freight in London – broken down into three segments: society, the economy and the environment. A London wide LEZ would align with the latter segment – environment.

There may be opportunities in the future for a LEZ to be publicised alongside TfL's Freight Strategy and for LEZ to be mentioned as a further facet of the Freight Strategy's environmental segment.

14.2 OTHER LONDON INITIATIVES

The review team has looked at other London initiatives to see whether any exist that would have an impact on a London wide LEZ, or that a LEZ would affect.

Greenwich Peninsula

With regard to the largest development involving LEZ criteria – the Greenwich Peninsula development on 190 acres of East London – their own LEZ controls would apply even if a London wide LEZ scheme was adopted, unless the London wide standards were more stringent.

The Greenwich Peninsula controls were developed in response to the significant impact that the development would have in terms of air quality - with 10,000 residential units and 11,000 car parking spaces anticipated. For this reason private passenger cars have been included in this scheme. These passenger car controls would not be covered by a London wide LEZ and would continue independently.

In terms of HGVs, the Greenwich Peninsula controls were designed to tie into a London wide LEZ and to promote the use of Euro IV as the standard for 2010. 80% of HGVs and construction vehicles (over 7.5 tonnes) would have to achieve Euro II plus RPC or equivalent up to 2007, with a view to achieving Euro IV by 2010. Greenwich Council aims to secure a Euro IV standard for HGVs and LGVs associated with the development through planning agreements.

Other LB Greenwich initiatives

In addition to the Greenwich Peninsula scheme, LB Greenwich is working on three further low emissions schemes at Tripcock Point (Thamesmead), Royal Arsenal and the Thames Gateway Bridge.

Tripcock Point is designed to incorporate Euro II plus RPC or equivalent for HGVs from the outset of construction. The final scheme is expected to incorporate Euro IV for commercial deliveries. Residential parking would include incentives for low carbon dioxide emitting vehicles.

Royal Arsenal – 3,000 residential units plus leisure/retail – has also been approved. It includes LEZ provisions for Euro IV standard for HGVs and LGVs, tightening at future dates to Euro V. Given that the scheme is due for completion between 2008/10 it is being proposed that a percentage will be set for commercial traffic to be Euro V or better from that date. Full Euro V compliance would be likely to follow during 2012/14. Private car usage on this scheme will be incentivised to reduce CO₂ emissions.

LB Greenwich also approved the Thames Gateway Bridge application on 14th December 2004, subject to a legal agreement. This will include provision for a LEZ, to be based on Euro IV standard for HGVs and LGVs. The bridge is scheduled to open in 2012.

LB Hackney/Newham/Tower Hamlets/Waltham Forrest

The Lower Lea Valley/Olympic planning report was agreed on 9th September 2004. Various local Air Quality and Transport measures were proposed as part of it, including all

construction HGVs being subject to emissions controls. The construction phase would incorporate Euro III, moving to Euro IV and V in the future.

The 2012 bid incorporates a commitment to using the cleanest vehicles possible and a LEZ for the Olympic site with no associated vehicles over five years old.

LB Camden initiatives

All construction road vehicles are to be a minimum of Euro III plus RPC or equivalent by 2006, moving to Euro IV by 2010.

Borough fleet initiatives

The Mayor's Air Quality Strategy focuses on reducing emissions from vehicles in order to meet Government targets in London. His Proposal 65¹⁹ in the Air Quality Strategy targets London Boroughs:

"The Mayor expects London Boroughs to establish a fleet register that includes emissions information and to ensure measures to implement emissions improvements in their fleets are included within their air quality action plans and local air quality strategies".

To begin this initiative a survey of Borough fleet vehicles was undertaken and confidentially reported back to the individual Boroughs in September 2004. It focused the Boroughs' attention on their fleet vehicles and was a catalyst for the initiatives being developed by Boroughs across London aiming at cleaning up fleets.

Although the Borough response to the survey was varied, information was gathered on 8,700 vehicles from 29 responding Boroughs. Of these, 80% run on diesel²⁰.

Emissions produced by these Borough fleets are low in relation to overall London vehicle emissions. However, the report stated that it was important for Boroughs to be seen to be tackling their own fleets' emissions and to be leading by example. This view is also found in the Mayor's Air Quality Strategy²¹:

"London Boroughs should lead by example and implement measures to reduce their emissions, including the following:

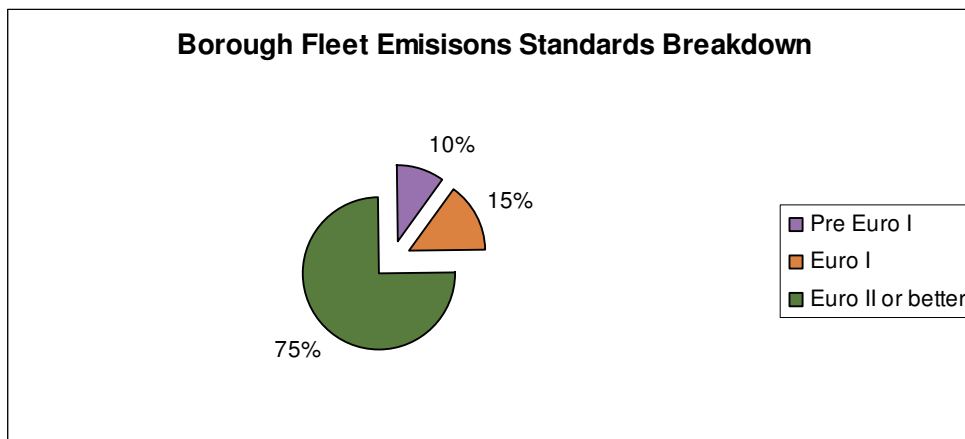
Ensuring that their vehicle fleets, and those of contractors operating on their behalf, have the lowest exhaust emissions practicable. The minimum standard for vehicles should be either Euro III or Euro II plus retro-fit technology...."

Further analysis was carried out to look at the emission standards of Borough fleet vehicles (HGVs, LGVs, cars and minibuses) with the majority already being at least Euro II standard.

¹⁹ AEA Technology, "London Low Emission Zone Feasibility Study Phase II" AEA Technology, July 2003, Page 253

²⁰ Transport and Environment Committee, "Borough Fleet Survey", Association of London Government, September 2004, Page 47

²¹ AEA Technology, "London Low Emission Zone Feasibility Study Phase II" AEA Technology, July 2003, Page 252



The Borough fleet survey produced recommendations – communicated to the Boroughs – for Boroughs to maintain a full and complete fleet register and emissions inventory. It also made them aware of the support they could receive to help them achieve this.

The Borough Fleet Initiative aligns with a LEZ and should assist the Boroughs in cleaning up their fleets to a standard that will be compliant with a London wide LEZ scheme.

London Lorry Control Scheme

The London Lorry Control Scheme (LLCS) was introduced in 1985 to address environmental concerns and to prevent unnecessary lorry movements disturbing the peace of Londoners at night and during the weekends. It covers the whole of the Greater London area, focusing on lorries greater than 18 tonnes, and permits registered vehicles to travel on certain roads through London.

It is operated by the ALG which issues permits (free of charge) to lorry operators with essential business in London (around 60,000 permits) and provides routing advice to assist operators in complying with the scheme. The LLCS is largely viewed as successful - straightforward to operate for ALG and to understand for operators.

The scheme is enforced by a team of five operators who patrol a zone each and currently prosecute for roughly 2,000 offences a year using PCNs. The evidential record they produce consists of their manual record of the vehicle's VRM, the time, and a description of the vehicle and location.

Foreign vehicles are able to apply for permits using the same method as UK based vehicles. In practice few foreign vehicles are prosecuted for breaking the ban and it is recognised that it is difficult to enforce the LLCS for foreign vehicles.

ALG TEC suggested that if the LLCS were extended to cover a LEZ the two schemes would be able to share one Tribunal. In this way they could share resources and maintain better flexibility. To follow this option LEZ would need to be inline with PATAS regarding enforcement and fines. This would necessitate fixed penalties and absolute offences (no motive being necessary).

The review team found that both the possibility of extending ALG TEC's remit to cover LEZ and the possibility of simply using the output from the ALG TEC to run a LEZ using a database of excluded vehicles are both optional for a LEZ. They therefore recommended that further work should be undertaken during the next steps in order to ascertain whether any facets of the LLCS should be extended to cover a LEZ.

14.3 NATIONAL INITIATIVES

Under the 1995 Environment Act, local authorities are duty bound to review air quality in their locality. If national air quality objectives are unlikely to be met, the local authority is required to declare an Air Quality Management Area (AQMA) and produce an Air Quality Action Plan (AQAP) on how to reduce pollution levels.

In urban areas many of the problem pollutants, such as nitrogen dioxide and particulates, are derived from road traffic. This is one fact that has encouraged a number of local authorities nationally to consider LEZs amongst their options for addressing the issue of poor air quality. Local authorities that have identified the possibility of a LEZ in their AQAPs include: Oxford, Sheffield, Stoke on Trent, Derby and Bristol.

14.3.1 Approach

To investigate national initiatives the review team have consulted with a range of agencies to gain a comprehensive understanding of other national initiatives being considered.

The review team consulted:

Department for Transport (DfT)	Department for Environment, Food and Rural Affairs (Defra)
Department for Trade & Industry (DTi)	Government Office for London (GOL)
Association of London Government (ALG)	Greater London Authority (GLA)
Transport for London (TfL)	Driver & Vehicle Licensing Agency (DVLA)
Road Haulage Association (RHA)	Freight Transport Association (FTA)

14.3.2 Findings

Support in principle for a London LEZ at Central Government level is evident. Defra has indicated that they consider local LEZs to be one of the most effective measures that local authorities can consider to help achieve national air quality targets. In addition, the DfT report Ministerial support in principle for a London LEZ.

A national standard would create more benefits in air quality. This was investigated by the NSCA Cleaner Transport Forum in 2003. The study concluded that there was strong support for the concept of a national standard from Local Authorities, fleet operators, vehicle manufacturers and freight industry representatives. However, no consensus was reached on what it should be and the NSCA continues to monitor the issue²².

Feedback from the study showed interest in setting higher emission criteria for heavy duty vehicles (HGVs, buses, coaches etc) than for other vehicles. This is because heavy duty vehicles tend to produce higher levels of pollutants and are also the most economical to abate with after treatment equipment technology options.

Respondents' opinions to the consultation carried out by the study were evenly split between those favouring the use of Euro standards to set LEZ criteria and those leaning towards a rolling age limit.

Three principles emerged as key to maintaining any LEZ standards²³:

- An approach to achieve Euro standards should not be tied to a specific technology, fuel type or after market modification
- In the future, tightening of emissions criteria may be required to keep a LEZ relevant and help meet the increasingly stringent national air quality targets in later years

²² Cleaner Transport Forum, "Special Report Low Emission Zones", NSCA, December 2003

²³ Transport and Travel Research Limited, "Low Emission Zones – national vehicles emission standards", NSCA, October 2003, Page 3

- Fleet owners must have sufficient notice to respond to any agreed standard so that they can make changes in preparation.

Many local authorities may treat a London LEZ as a basis for making their own decisions regarding air quality in the future. Success of a London scheme is therefore likely to drive an increase in other areas considering and implementing LEZ schemes. In addition, the emissions criteria and standards of a London LEZ are liable to become a de facto national entry point to other LEZ schemes.

Key local authorities:

Nottingham: The local authority has designed a “Clear Zone” that includes many aspects of a LEZ. Traffic is limited in the city centre, emissions and quality standards have been set (all buses entering the area from 2003 on are Euro II or cleaner) and the use of low/zero emission vehicles is encouraged. Hackney carriage taxis have also been tackled via the licensing system and have to undertake mandatory six monthly MOT tests (which are supplemented by spot checks).

Edinburgh: Edinburgh is considering implementing a LEZ in the city centre as a measure to improve air quality as specified in their AQAP. The compliance standard would be Euro IV for HGVs and buses from 2010. Their preferred method for setting up the proposed scheme is likely to be a Traffic Regulation Order (TRO) and the approximate cost of administration and enforcement is £2 - £4 million, with £16 - £24 million being used to reduce vehicle emissions. This initiative is still under consideration.

Bath: Bath is considering re-developing the city centre as a 20mph zone with restricted access points, pedestrian walkway widening and improved facilities for public transport users and cyclists.

The installation of the three bus gates – which would give controlled access to buses, taxis, cyclists and emergency vehicles – would reduce the amount of general through traffic and access by service vehicles. They would also enable future control over access linked to emissions criteria.

A key issue for Bath is the impact of large vehicles on this historic city, therefore, Bus Quality Partnerships are being explored for their potential to include emissions criteria for vehicles operating in the city.

York: The levels of traffic-generated air pollution in York are predicted to exceed Government targets. The city has already held a major public consultation on the future of transport and the public’s response was that radical solutions are needed. York already has a good basis for the development of a LEZ with an extensive and long standing central, pedestrian zone in addition to public support. This situation could give the city the encouragement to introduce a LEZ.

Bristol: Included an option to investigate a LEZ in their draft AQAP

Oxford: Have expressed an interest in how they might integrate emissions criteria into current access restrictions on their city centre (by using TROs) – they are still to submit an AQAP

In addition there are UK cities with existing low emissions strategies:

Winchester: The city provides free and reduced parking spaces for cars according to their emission standards

Merseyside: Has undertaken a trial of hybrid buses and alternative fuels

With other cities planning on following:

Manchester: AQAP promised a Feasibility Study

Doncaster / Derby / Stoke on Trent / Sheffield (M1Action): AQAP suggested a Feasibility Study

Cleaner fuels

Fiscal incentives have been used by Government since 1989 to encourage the use of cleaner fuels and therefore positively affect air quality in the UK. This initiative commenced with the tax differential for unleaded petrol.

Since 1999 Ultra Low Sulphur Diesel (ULSD) has had the same duty rate as unleaded petrol in an attempt to encourage its use. In the Chancellor's 2004 Budget a 0.5ppl duty differential was created between zero sulphur-fuels and ultra low sulphur diesel to trigger the supply and use of sulphur-free fuels.

In the March 1999 Budget, duty on road gas was reduced by 29% and since 1998 the cost of converting company cars to gas has been outside the tax calculations of employee benefits.

Vehicle Excise Duty (VED) concession of up to £500 was also introduced in 1999 for buses and lorries fitted with catalysts or that run on gas, and therefore meet tighter standards for particulate matter. Later in the same year this was increased to a maximum of £1,000.

In 2001 the VED concession was extended to cover cars in Private Light Goods taxation classes with engines of 1549 cc or less. A system of graduated VED has been in operation since then for new cars based primarily on CO₂ emissions levels to encourage them to run on less polluting fuels. Company taxation has also been reformed to become based on the value of the vehicle and its emissions rate rather than on mileage.

By 1st January 2005 the EU will require member states to ensure that sulphur-free fuels are available on a balanced geographical basis. The use of sulphur-free petrol will be mandatory by 1st January 2009, with sulphur-free diesel probably becoming compulsory from that date as well.

These are all measures that will assist in improving UK air quality alongside any LEZs introduced.

Lorry Road User Charging

In his 2002 Budget speech, the Chancellor announced that the Government would modernise the taxation of the haulage industry to deliver its Manifesto commitment to make sure that lorry operators pay towards the costs that they impose in the UK regardless of their nationality.

In order to meet this tax objective, HMCE is developing a Lorry Road User Charging (LRUC) scheme due for launch in January 2008. The purpose of LRUC is to identify for lorries whether their journeys take place on motorways or non motorways, the time of day of the journey and whether the vehicle is towing a trailer. This will be achieved by fitting all vehicles with a device that captures and records this information, and they will then be charged accordingly. There will also be gantries around the UK in order to capture vehicles – these will be primarily focused around ports. All vehicles, including foreign vehicles, would have to register with the LRUC scheme operator.

The review team recommend that potential synergies between a London wide LEZ and LRUC should be looked into in more detail – particularly with regard to the potential exchange of data on foreign vehicles and vehicle movements in the London area.

15 PUBLIC AND STAKEHOLDER ACCEPTABILITY

An important aspect of this review has been to speak to the key LEZ scheme stakeholders to understand their views and see how these may have developed since the Feasibility Study was published.

Our approach has been to identify a wide range of stakeholder groups covering London wide issues, national issues, operator views and public acceptability. Representatives of these groups were contacted and meetings were held to collate their views.

15.1 PUBLIC ACCEPTABILITY

Implementing a London wide LEZ is a considerable undertaking – and one that requires public endorsement. If the decision to proceed is taken, opinion surveys may be held to assess public opinion. However, it is also important at this early stage to consolidate the public's position on this area.

15.1.1 Approach

In order to ascertain public acceptability for a London wide LEZ the review team looked at the results of a recent poll carried out by the GLA regarding public opinion on a LEZ.

The review team also took into account responses collected via the www.london-lez.org website that operated as a channel allowing comments and questions to be received regarding the LEZ and the Feasibility Study.

15.1.2 Findings

The GLA survey of 1,007 Londoners in October 2004²⁴ showed a high level of support for a London wide LEZ. Overall, 67% of those surveyed expressed a favourable opinion - either Strongly Support (48%) or Tend to Support (18%).

The Feasibility Study did consider the effect of including private cars in a LEZ – a step that could have a negative impact on public acceptability. Several issues were raised including the significant inequity impact that targeting cars would bring about for low income households, the large socio-economic costs from even a modest scheme and the low cost effectiveness of their inclusion. It was therefore recommended that although some action should be taken to address old cars (pre-Euro standard cars which have a disproportionately high impact on emissions relative to the rest of the car fleet) this should be addressed as part of a wider low emissions strategy rather than specifically by a LEZ.

There is a similar acceptability issue with regard to the inclusion of Light Goods Vehicles in a LEZ from 2010. Such a move could impact a large number of small businesses and further analysis is required to determine whether or how they should be included.

Additional benefits that might influence public opinion were identified by the Feasibility Study. These would be due to the hastening of the modernisation of the heavy vehicles driving in London and could include; quieter vehicles, a perceived benefit in the reduction in visible emissions and odour and improved safety performance by the more modern vehicles. Moreover, a cleaner London could influence businesses' location decisions and might also create additional employment through the retro-fitting of abatement technology to vehicles.

15.2 NATIONAL GOVERNMENT AND THEIR AGENCIES

15.2.1 Approach

The review team consulted with representatives from the following Government departments and agencies to gather their opinions and insights into a London wide LEZ:

²⁴ MORI, "Greater London Authority Survey of Londoners – October", GLA, October 2004, Question 21

Department for Transport (DfT)	Vehicle Certification Agency (VCA)
Department for Environment, Food and Rural Affairs (Defra)	Energy Savings Trust (EST)
Government Office for London (GOL)	Association of London Government (ALG)
Department for Trade & Industry (DTi)	Greater London Authority (GLA)
Driver & Vehicle Licensing Agency (DVLA)	

These departments and agencies were identified to provide a balanced and informed view of LEZ implementation. They represent interests in air quality and transport both at a London and national level as well as providing more specific insight into operational issues associated with either the setting up or running of the scheme.

15.2.2 Findings

The general overview from Central Government is supportive, viewing a London LEZ as an appropriate measure for tackling air quality issues at the local level.

The Feasibility Study also highlighted the importance of DfT agencies in any LEZ implementation and operation, especially with regard to vehicle certification. DfT agencies such as VOSA, VCA, DVLA and the Vehicle Inspectorate would be likely to have a role in the creation of a certification system as they hold much of the data that would be necessary. Part of the next steps of a LEZ implementation would be further discussion with these agencies, as well as with the Highways Agency, regarding important areas such as certification, signage and methods of dealing with foreign vehicles.

With regard to data requirements for certification, the DVLA will support the scheme and believe that gathering the basic data from their information systems is possible and likely to be practicable within the suggested timescales. If new data was required however, the DVLA might find it difficult to obtain, particularly if retrospective data was required. The VCA echoed this view of support for the scheme with some issues regarding the availability of some data.

In addition, the EU is supportive of using a LEZ as an emissions reduction measure. The Commission's Joint Expert Group on Transport and the Environment agrees that Environmental Zones (LEZs) are a potentially useful instrument to improve environmental conditions in urban areas and encourage the Commission to take action in order to facilitate an early introduction in interested Member States and cities. The report of the Joint Expert Group on Transport and the Environment Working Group on Environmental Zones could be seen as a useful input in this work²⁵.

Defra

Defra views Low Emission Zones as being one of the most effective measures that can be taken at the local level to move towards meeting local and national air quality targets. Currently Defra does not see a role for Government in setting national standards for LEZs as they are local measures to be justified by local assessment of costs and benefits. However some independent organisations such as the Clean Transport Forum are considering issuing recommendations for national standards for Low Emission Zones.

²⁵ Working Group on Environmental Zones, "Report from the Working Group on Environmental Zones", January 2005, Page 26

DfT

DfT reported that discussions had been taking place at Ministerial level regarding the London LEZ. These discussions had expressed support in principle for a LEZ, contingent on Government receiving more detailed plans and information on its operation.

DfT is a key stakeholder in the context of its wider transport policies and the road haulage industry. There are also potential synergies with DfT programmes, including grant programmes to support fitting of abatement equipment to vehicles and the Reduced Pollution Certificate (RPC) programme which could influence the implementation and operation of a LEZ scheme.

DfT said that Ministers had agreed that grants should not be available to support the fitting of abatement equipment to meet the requirements of a mandatory scheme, such as the London LEZ. The current grant programmes were established to promote the development of new technologies and were not intended to support retro-fitting to meet mandatory standards on a significant scale, and which would also run counter to the “polluter pays” principle.

DfT stated that there are no plans to extend the current RPC programme beyond October 2006 when all new vehicles sold will be, by then, mandatory Euro IV standard. Incentives to encourage early adoption of Euro IV technology will then be inappropriate. The scheme will be maintained for older vehicles in respect of which there is a commitment from Government to continue the current reduced rate of Vehicle Excise Duty (VED).

To support the building of a certification database for a London LEZ, DfT expressed the view that it should be possible to extract data on current holders of RPC certificates.

No decisions have been taken as to whether there will be any future incentives e.g. in relation to the reduction of NO_x emissions. There are no current plans to extend the RPC programme to cover NO_x abatement technology. DfT's view is that it is doubtful whether the necessary technology is sufficiently developed for a scheme to be established to promote its use.

DfT raised the subject of signage and the need to start early the process of agreeing LEZ signage with TfL as this was likely to take some time given that a new sign would need to be designed. TfL will also need to engage with the Highways Agency (HA) to discuss how their roads that would fall inside a London LEZ would be handled. Due to their national strategic function, it should not be assumed that they would automatically be included in the scheme. However they may need to carry LEZ signage. This issue should be investigated further in planning the implementation of a LEZ.

On the subject of technical standards DfT said that if London were to set emission standards that were different from the recognised Euro standards then this would have to be notified to the EU, who would need to be satisfied that they were not a barrier to the free movement of goods before they could be implemented. In this context, it would also be important to consider how foreign vehicles would be treated by a London LEZ.

The DfT is also part of the EU's Working Group on Environmental Zones and so is directly involved in influencing the direction the EU will take with regard to opinions on LEZs. The research produced by this group so far indicates EU approval of the use of LEZs.

15.3 BOROUGH & ALG

A core recommendation in the Feasibility Study was for any scheme to be London wide – thereby including all London Boroughs. This is because the results of the air quality modelling showed a London-wide scheme was necessary to achieve significant air quality benefits across all areas of the city predicted to exceed the EU and UK air quality objectives.

For this reason it has been important for this review to engage with the Boroughs and the ALG to identify and discuss any issues that might affect Borough support for a LEZ and to maintain an ongoing dialogue with the Boroughs regarding the LEZ implementation.

15.3.1 Approach

The London Borough of Westminster and the Royal Borough of Kensington and Chelsea first brought up the idea of a London wide LEZ to tackle the increasing problem of air quality in the capital. Since then, and consistently throughout the evolution of the LEZ, the London Boroughs have been closely involved.

In order to continue this association we have actively sought Borough views and input both indirectly – through the GLA, ALG and TfL – and directly, through a Borough briefing in which Borough representatives were briefed on LEZ progress and encouraged to make comments and raise issues. Following on from the meeting, Boroughs were invited to provide additional input through the completion of questionnaires provided.

The review team also collated the information contained within Borough Air Quality Management Plans (AQMPs) to add to our understanding of Borough views. This specifically focused on any reaction from Boroughs to the Mayor's Proposal 10 in his Air Quality Strategy²⁶ – to consider the recommendations of the London Low Emission Zone Feasibility Study Steering Group. In addition, we have investigated and recorded whether Boroughs have designated any Air Quality Management Areas to demonstrate how important the air quality issue is to them.

15.3.2 Findings

The Boroughs' general opinion of the scheme is cautiously supportive. All are aware that the Mayor has stated his commitment to a Low Emission Zone on many occasions. Many Boroughs cite the London LEZ as key to their own local air quality plans and it is therefore in their interest for it to be implemented smoothly and successfully. It is expected that more information regarding the importance of a LEZ to Borough Air Quality Plans will be made explicit in Borough's LIP submissions later in 2005. Boroughs agreed that the best results would come from a LEZ that all London Boroughs had signed up to and that the Mayor and the GLA should work to achieve this.

The ALG is also cautiously supportive of a London wide LEZ. However, they have requested more detailed implementation plans and more information regarding the expected costs.

Boroughs also generally support the decision to focus the early implementation of a LEZ on HGVs, taxis, buses and coaches and have welcomed a joined up approach to tackling air quality across the Greater London area.

A number of Boroughs stated that grant availability would be critical in gaining support from their members and from the public. They focused on the effect a mandatory upgrade/retrofit without funding could have on owner operators – especially if the 2010 eligibility criteria extended to LGVs.

Several areas of concern have also been expressed by the Boroughs and ALG. These include the need for TfL to make the case for a LEZ and demonstrate the benefits of a scheme. There is naturally some concern around how a LEZ will be funded and whether any of the costs will be passed back to the Boroughs rather than being borne by TfL. Lastly the inclusion of LGVs in a LEZ scheme from 2010 is of concern to some Boroughs given the potential impact it may have on small businesses. On this latter point, some air quality managers from the Boroughs expressed the view that LGVs should be included as soon as possible given the impact they have on pollution.

In addition, Boroughs were keen to see that the planned enforcement strategy would be adequate to encourage compliance. Adequate enforcement was a concern for some boundary Boroughs. They were also eager to have an implementation date and the emissions criteria announced early to give themselves, residents and businesses sufficient time to prepare. Signage was cited by some Boroughs as a potential issue with a risk of

²⁶ Greater London Authority, "Cleaning London's air; The Mayor's Air Quality Strategy", Greater London Authority, September 2002, Page 130

increasing street clutter, particularly for boundary Boroughs. For this reason, the ability to use existing cameras, if automatic enforcement was required, was seen to as beneficial.

Clearly on some of the issues associated with the introduction of a LEZ there is a balance to be struck between the different interest groups that are represented within the Boroughs. The air quality management representatives and members may have different views to those representing local business.

Part of the next steps of a LEZ implementation will include ongoing Borough communication in order to maintain Borough support and deal with any issues as they arise.

Air Quality Management Plans/Areas

In looking at Boroughs' Air Quality Management Plans and areas that have been designated Air Quality Management Areas further tentative support for a LEZ is evident. Only two Boroughs are still to declare any Air Quality Management Areas – Bromley and Havering.

Of the 28 Boroughs that provided a response to the Mayor's proposal regarding a LEZ they all said that they would support a London LEZ. Although some of this support was given over a year ago it does provide a baseline of opinion to work from.

In Appendix E is a table displaying the views that have been put forward by the Boroughs.

15.4 OPERATORS AND THIRD PARTIES

15.4.1 Approach

We have gathered the opinions of operators' and third parties by discussing the London LEZ with representatives from the Road Haulage Association (RHA), Freight Transport Association (FTA), Small Business Services - DTI, Government Office for London and the Federation of Small Businesses (FSB). We also received emails via the www.london-lez.org website email address from operators and third parties. Furthermore, LEZ was discussed at the London Commercial Coach and Bus conference.

15.4.2 Our Findings

Small businesses

Small businesses are an important sector of the economy to consider in reviewing the public and stakeholder acceptability of a London wide LEZ. In the UK there are over 3.6 million small businesses, employing roughly 12.2 million people which contribute approximately 51% of private sector turnover.

The main concern raised by small businesses is an increased financial and/or administrative burden. This could be due to the cost of retro-fit equipment or, ultimately, of having to purchase a new or newer compliant vehicle. The administrative burden would depend on how certification and/or registration – whether one-off or annual – would to be dealt with. A LEZ could add to the cumulative burden faced by small businesses as it would come in addition to the planned Lorry Road User Charging scheme and the existing requirements of Congestion Charging, the Congestion Charging price increase and the Western London extension to Congestion Charging zone (WEZ).

The effect on small businesses could be much higher if LGVs and/or vans were included 2010. LGVs are essential to business for many small operators (e.g. self employed tradesmen) - for many micro businesses their vehicle is their largest expenditure and greatest asset. Any additional cost in relation to that would impose a potential strain on their operation. Small businesses would also find their business planning easier if they had longer term visibility of any future emission standards.

The potential for financial incentives was also raised as these could be highly beneficial in achieving maximum compliance. One suggested method was to build on the current scheme for VED reduction. However, the level for LGVs is currently such that is a low

incentive. Another method could be via a loan scheme for financial assistance for a new vehicle or vehicle upgrade.

The impact on vehicle resale value would also affect small businesses in two ways. Firstly, in how small businesses depreciate their vehicles and the lack of residual value that might result. Secondly, the impact it would have on small businesses that plan to purchase second hand vehicles and might find that ability constrained.

Unlike the situation with the large operators it is not believed that awareness is high amongst small businesses. Some may also be hard to reach via conventional public information methods such as trade publications and bodies - especially owner operators. Care must be taken to communicate the implementation of any LEZ to small businesses.

The FSB considered it important that the introduction of a London LEZ does not become an impediment to doing business in London or a barrier to operators outside London operating in the city.

To summarise, small businesses are not against a LEZ as such, but do harbour worries about how they would be affected. Care should be taken to ensure that their areas of concern are considered during the next steps.

Operators

Operators largely recognise that measures are going to be taken to tackle air quality issues and are likely to have a direct impact on them. They accept this in principle, but have some concerns regarding the details of how a LEZ is to be implemented and run.

They believe that LEZ compliance will have less of an impact on larger firms as these tend to have newer fleets and more flexibility in where their vehicles operate. Operators with a mix of older and more modern vehicles may also have a zero cost option of altering their fleet logistics to deploy non-compliant vehicles outside a LEZ – a strategy that 25% of those operators questioned in the Feasibility Study proposed to adopt²⁷.

The cost to smaller operators was considered more significant. Operator associations recognise that there is unlikely to be Government funding and that the VED reduction is not guaranteed to continue. Without this financial assistance some operators, particularly small ones, would find the cost hard to bear. For this reason the importance of realistic lead times for operators, to enable them to prepare their cash flow and replacement strategies, was emphasised. Three years notice was considered reasonable. Operators have also requested that they be made aware of standards for 2010 early – potentially at the same time as the criteria for 2007 are published.

The impact a LEZ would have on the second hand vehicle market, reducing the resale value of older vehicles, was raised by operators. It would affect both operators and leasing companies, imposing a cost penalty for companies refreshing their vehicle fleet who may recoup less on vehicles they are disposing of. Some leasing arrangements could run into problems, with operators being tied into a lease on a vehicle that is no longer compliant. In addition, some vehicle manufacturers and leasing firms maintain guaranteed buyback schemes – these companies would be affected by a drop in the residual value of non-compliant vehicles.

The operator view is that a LEZ should be based on Euro standards. This is because they are widely understood both in the UK and internationally. Euro standards also have the benefit of being a technology neutral proven standard, rather than operators being dependent on the fitting of abatement equipment which can affect vehicle performance and has to be maintained.

Operators have also commented on enforcement. They feel that if they have paid to comply with the scheme then they want enforcement to be strong enough to justify their investment and to provide a decent level of encouragement for other operators to comply.

²⁷ AEA Technology, "London Low Emission Zone Feasibility Study Phase II" AEA Technology, July 2003, Page 204

A further important area for consideration of a LEZ is foreign vehicles. It is believed that an inability to deal with foreign vehicles in a fair and comparable manner would be an anathema to operators. This belief is strengthened as operators are using more vehicles from Eastern Europe and 2004 EU accession countries due to their competitiveness on price and could generate negative opinions on a LEZ from UK operators.

As operators are facing multiple schemes requiring compliance; LEZ, Congestion Charging, LLCS etc, operators recommend that a single point of contact be developed to avoid confusion and ease the administrative burden.

The overall view from operators is that the majority will aim to be compliant with a LEZ and are prepared to take steps to achieve this. There are however outstanding issues, detailed above, have been raised and that should be further looked into during the next steps to ensure a smooth LEZ implementation.

Unusual vehicle classifications

Some businesses operate specialised vehicles that could be severely impacted by a LEZ due to the longer life expected from the vehicles. Additional work is required to understand how these vehicles might be dealt with within the scheme.

A small number of heritage bus operators used the www.london-lez.org website to query how a London LEZ would affect their business – specifically – whether vintage buses would be exempt from the scheme.

In addition is the Showman's Guild, which represents travelling showmen who make their livelihood from running fun fairs. The guild has 4,000 active members representing 20,000 travelling families²⁸. In order to stage these funfairs a significant amount of equipment and machinery is needed and is transported around the country and abroad, much of it using large lorries and specialist vehicles. The Showman's Guild is a powerful lobby and it is in the interest of a LEZ to ensure that their vehicles are treated fairly within the scheme.

²⁸ www.showmansguild.com

16 BUSINESS CASE FOR PROJECT COSTS / REVENUES

16.1 FINANCIAL COSTS TO IMPLEMENT AND OPERATE

16.1.1 Options Presented in the Feasibility Study

The Feasibility Study identified six potential strategies for the implementation of a LEZ in Greater London. From these six strategies, strategy 5 was identified by TfL as the preferred strategy for the implementation of the LEZ, extending to strategy 6 with the inclusion of LGVs in 2010. These strategies were chosen as they represented a relatively low cost of implementation, made use of the existing Congestion Charging camera infrastructure and captured inbound vehicles using a minimum number of additional cameras. The main components of these strategies are outlined below:

Strategy	Name	Targeted Vehicles	Enforcement Method	Estimated Detection Rate (see note 1)	Estimated Compliance Rate	Projected CAPEX	Projected Annual OPEX	Total Capital +10 Year Operating Costs	Revenue Estimate per annum
5	CCS + Mobile + Fixed HGV	HGVs Only	Congestion Charging cameras, fixed ANPR cameras (six at motorway sites and six at major A roads) and mobile ANPR units at key sites Enforcement through TRO	Medium (20%)	High	£9.3m	£6.4m	£73m	£2m-£4m
6	CCC + Mobile + Fixed HGV + Vans	HGVs and Vans	As above, but with an additional 20 fixed camera sites and parked vehicle checks (determined as cost neutral due to the assumption that this would be an extension of parking officers duties) Enforcement Through TRO	Medium (20%)	High	£10.4m	£7.0m	£80.5m	£2m-£5m

Note 1: The detection rates have been estimated from the analysis undertaken in this review but appear to correspond with the information provided in The Feasibility Study.

The Feasibility Study identified two further scenarios with higher levels of detection; estimated as equivalent to a 70% detection rate in section 8 of this report.

Strategy	Name	Targeted Vehicles	Enforcement Method	Estimated Detection Rate	Estimated Compliance Rate	Projected CAPEX	Projected Annual OPEX	Total Capital + 10 Year Operating Costs	Revenue Estimate per annum
2b	ANPR (Fixed + Mobile) HGV	HGVs Only	128 Fixed camera sites around Greater London supported by 10 Mobile ANPR units Enforcement through TRO	High (70%)	High/ Medium	£26.9	£10.8m	£134.9m	£2.5m £8.6m
3	ANPR (Fixed + Mobile) HGV + LDV (Vans+Cars)	HGVs and LGVs	As above, but supported by 15 Mobile ANPR units	Medium (70%)	Medium/ High	£27.9m	£12.2m	£149.7m	£2.5m- £8m

These two sets of scenarios illustrate the range of costs for the LEZ depending upon the level of camera detection applied.

The above scenarios assume that the Congestion Charging cameras are an integral part of the solution. As discussed in section 9 of this report there are commercial and contractual reasons why this infrastructure may not be available until 2008/9.

The cost estimates derived from this review are higher than those in The Feasibility Study principally due to a view that the legal and project management costs would be significantly higher. Also, based upon current offers, the service provider costs for operating the scheme would be higher than allowed.

There was however a very significant variation in the estimated cost depending on the assumptions on the level of compliance and numbers of vehicles affected. It was concluded that until further work is undertaken to reconcile the apparent difference in traffic volumes, discussed in section 8, and further analysis is undertaken to assess the likelihood of compliance, the estimates in the Feasibility Study represent the low end of the likely order of magnitude of the implementation and operating costs.

16.2 OVERALL COST BENEFIT

16.2.1 Cost to Operators

The Feasibility Study estimated the cost to operators arising from the requirement to retro-fit or replace vehicles and the potential impact that this would have on the vehicle market. TRL examined the potential cost to operators using more recent fleet age and composition data. The comparative estimates are shown below, although the TRL figures exclude the impact that adapting or renewing vehicles will have on fuel consumption. The TRL work, which is attached in Appendix C, also estimated the costs if the Euro IV or equivalent standard is introduced in 2010.

	2007 Euro II + RPC	2010 Euro III + RPC	2010 Euro V	2010 LGV
The Feasibility Study	£64m - £135m	£113m - £332m		£61m - £78m
Current Review (Appendix C)	£55m - £126m	£134m - £313m	£164m - £430m	£61m - £105m

The above analysis excludes TfL buses and taxis. The TRL work indicates the additional cost of making the 2010 standard for HGVs and coaches Euro IV rather than Euro III + RPC as some £30m to £117m.

For the purpose of calculating the overall economic impact of the scheme The Feasibility Study estimates of costs to operators have been used. More detailed work will be required to assess the impacts on varying sizes operator and impact on local employment if LGVs are included in 2010.

16.2.2 Health Benefits

The Feasibility Study estimated the Health Benefits as shown below:

		Total Impact
HGV + Coach Euro II + RPC	06/07 £26m	£100m
HGV + Coach Euro III + RPC	10/11 £32m	£122m
HGV + Coach + Van Euro III + RPC	10/11 £40m	£143m

This review has not re-estimated these benefits nor has an estimate of the impact of introducing a Euro IV or equivalent standard for 2010 been made. The method of calculation of health benefits is based on particulates. The introduction of NO_x abatement will increase operator's costs as shown in the previous paragraph but will have little impact on the benefit as calculated. It will however contribute to reducing emissions against the 2010 targets.

The delayed implementation of the scheme compared with The Feasibility Study will reduce the benefits due to the underlying improvement in the vehicles parc. However, no account has been taken of this in this review. Further work is required to re-assess the health benefits.

16.2.3 Net Benefits

The Feasibility Study concluded "For the recommended heavy vehicle scheme, the benefits are broadly similar to the overall cost of introducing a LEZ (including costs to operators). The extension of the scheme to include vans increases the costs, relative to the benefits achieved, when compared to the heavy vehicle scheme alone."

The Study also concluded that with the net present cost of the LEZ falling in the range of £100m to £250m this would have little discernable macroeconomic impact. Whilst the range of net present costs estimated in this study varied significantly depending on the volumes and compliance factors chosen, the most likely estimates fall within this range.

16.3 ECONOMIC BENEFITS OF THE OPTIONS

16.3.1 Air Quality Impacts

Air quality modelling was undertaken for The Feasibility Study by Kings College's Environmental Research Group. This produced the following results in terms of the impact or the recommended LEZ options, with the 2007 standard being Euro II + RPC and the 2010 standard being Euro III + RPC.

Air quality impacts of the recommended LEZ:

Pollutant	Reduction in Emissions (relative to baseline)			Reduction in Area Exceeding Targets* (relative to baseline)		
	2007	2010 A)	2010 B)	2007	2010 A)	2010 B)
NO _x (NO ₂)	1.5%	2.7%	3.8%	4.7%	12%	18.9%
PM ₁₀	9.0%	19%	23%	0%**	32.6%***	42.9%***

* UK National Air Quality Targets

**London should meet the relevant air quality for PM₁₀ in this year without any additional action for an average year's weather

***Exceedence of the annual mean PM₁₀ objective

The 2007 scheme only includes lorries, buses and coaches

In 2010: A) includes lorries, buses and coaches and B) includes lorries, buses and coaches, vans and taxis

Source: LEZ Feasibility Study, July 2003

The conclusion of the Feasibility Study was that the London LEZ "would have modest benefits in improving overall emission levels and absolute air quality concentrations in London, but it would make a larger contribution to reducing exceedences of the air quality targets". It can be seen that the impact is significantly higher in terms of PM₁₀ than for NO_x. Whilst the LEZ will not, by itself, lead to London achieving the EU 2010 targets for air quality, it will make a contribution.

The Feasibility Study recognised that there was some uncertainty in the air quality modelling. CERC was asked, at the time of the Feasibility Study, to undertake comparative

modelling of air quality. Their findings at the time were, in general, that the ERG modelling indicated a lower base case concentration of PM₁₀ and NO₂ than CERC, resulting in a lower level of exceedences. On the other hand ERG predicted a higher reduction in PM₁₀ as a result of the LEZ than did CERC.

In our review of the Feasibility Study, we have not re-assessed the impacts on air quality or the resulting socio-economic impacts. However work was completed with CERC and Mott MacDonald's Environment and Social Development Team to review the air quality modelling with a view to identifying those factors which may have changed since the modelling work was undertaken, and to provide recommendations for future work that will be required in the areas of air quality modelling and benefits quantification as the LEZ scheme progresses.

CERC comments on the air quality modelling are given in the box below.

- The modelled improvements in air quality arising from the LEZ options are relatively small and subject to considerable uncertainty
- Changes in areas of exceedence are very sensitive to the area close to but just above limit values in the base cases. Little confidence can be attached to percentage reductions in exceedence areas, but more to the reduction in concentrations
- The difference in the base cases between ERG and modelling conducted by CERC for DEFRA is higher than the reduction in concentration estimated by ERG. The CERC model predicts about 2/3 the reduction in annual mean concentrations of ERG from a higher base case, however the reduction in area of exceedence (not calculated) may be larger because CERC predicts a much higher area of exceedence for base case
- The sensitivity of the ERG model to decreases in emission is greater than the CERC model and is also greater than the netcen national model (reference DEFRA Comparison report). This increased sensitivity would lead to an overestimate in the impact of the LEZ options
- The ERG modelling did not consider impacts of the LEZ options on ozone concentrations and how these are impacted upon by decreases in NO_x emissions. This effect has been ignored in the study but the consequent increases in ozone concentration may have a significant adverse health impact this reducing the overall health improvements
- The base case calculations do not include the impact of recent traffic management measures
- The ERG model used is based on a regression analysis using monitored concentrations across London. The extent to which the regression analysis and classification of pollutant sources into different groups applies for future projections is uncertain
- The model for NO₂ did not take account of any future changes in primary NO₂ or of the impact of changes in background ozone.

CERC, January 2005

16.3.2 Recommendations for Future Work

We believe that further air quality modelling is required in the next phase of implementation planning to support the refinement of the business case. It will then be required during the duration of the project to support ongoing updates to the business case, any strategic environmental impact assessments, and to provide input to a public enquiry or judicial review if necessary. Air quality monitoring will then be required to measure and monitor the impacts of the scheme once implemented.

Air quality modelling in the next phase of work will need to consider:

- Changes to the emissions criteria (if made) from that assumed in the Feasibility Study, including the possible addition of NO_x abatement
- Changes to the planned timing for implementation and impact on the baseline of factors including TfL's proposed actions to its own fleet, earlier introduction on Euro IV vehicles and percentage of diesel vehicles
- The impact of recent traffic management measures
- The impact of making changes to the permitted emissions from taxis earlier than envisaged in the Feasibility Study (i.e. from 2007 rather than 2010)
- The impact of the changes achieved to bus emissions
- The effects of changes to the volume and mix of vehicles entering and travelling within the proposed zone. This would reflect changes to assumptions around vehicle types, ages, retro-fit take up and movement patterns
- The impacts of various enforcement infrastructure configurations and compliance rates
- The impact of the LEZ on ozone (O₃) in view of its significant health impacts.

In all cases modelling would need to consider updated assumptions plus analysis of sensitivity to changes. The uncertainties in the air quality modelling need to be fully taken account of in the assessment of the impact of the LEZ options on exceedences of air quality limit values and health benefits. This should include a sensitivity study taking account of interannual changes in meteorology, sensitivity to emissions, and sensitivity to other modelling input and assumptions.

Health and other socio – economic benefits

Health benefits of the different options have been estimated in the Feasibility Study using UK and EU recommended approaches and also London specific epidemiological research. Benefits considered include:

- Reduction in deaths brought forward
- Reduction in chronic mortality.

The Feasibility Study assessed the value of the improvements in health as £26 million in the first year of operation (assumed at that time to be 2006/07) and just under £100 million in total. The benefits for the recommended schemes in 2010 are £32 million (heavy vehicles only) and £40 million (including LGVs and taxis) in the first year of introduction and £122 million and £143 million respectively in total.

We have not attempted to reassess the health benefits as part of this review and there is insufficient information contained in the Feasibility Study to provide further comment on the derivation of the values quoted. There is likely to be a significant range of potential values and we suggest the area of health benefits is looked at again during the next phase of implementation planning.

The Feasibility Study also looked at the socio-economic benefits which would be derived from the various LEZ options (see table below). It identified the primary benefits of improved air quality as the improved health of Londoners, but noted that there would be a number of other benefits realised.

Benefits	Disbenefits
<ul style="list-style-type: none"> • Improved air quality – particularly NO_x and PM₁₀ • Progress towards EU Air Quality Limit Values 	<ul style="list-style-type: none"> • Impact on ozone could be negative • Disproportionate impact on expensive “specialist” vehicles, e.g. coaches, specialist lorries

<ul style="list-style-type: none"> • Health benefits – lower lost time at work, NHS costs • Small reduction in noise • More attractive environment for companies and people • Safety benefits of newer vehicles • Economic and employment benefits for the vehicle manufacturing sector, including retro-fit equipment manufacturers and fitters 	<ul style="list-style-type: none"> • Greater relative impact on smaller companies • Greatest relative impact on road haulage, the wholesale, trade, manufacturing sectors, and smaller construction/building companies • Higher potential business costs for companies (which could negatively affect attractiveness)
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Source: London Low Emission Zone Feasibility Study, July 2003

The Feasibility Study makes the point that it did not attempt to quantify and assign a monetary value to the impacts of air quality outside London (brought about by improvements in the vehicle fleet) or any of the other socio-economic benefits identified.

We consider that further work will need to be carried out in the next phase to model the health impacts in light of updated air quality impact calculations.

17 CONSOLIDATION OF OPTIONS

17.1 SUMMARY OF IMPLEMENTATION OPTIONS FOR SCHEME LAUNCH

One of the key objectives of this review has been to determine how long it will take to implement a London Low Emission Zone and whether there are any 'show-stopper' issues that might prevent this. To do this we have looked at:

- The Legal process requirements and options for putting in place the legislation that will enable a LEZ
- How a LEZ might be enforced, the capture rates that would be achieved and the lead time for setting up the associated infrastructure
- Key technical issues, in particular how a database of excluded vehicles might be developed
- The views of key stakeholders on whom TfL will be dependent in order to implement a LEZ successfully, including the ALG and London Boroughs, vehicle operators and central government (DfT & Defra)
- The proposed emissions criteria for 2007.

This section of the report brings together the outputs of these workstreams to describe the possible LEZ scheme design options for the launch of the Low Emission Zone.

17.1.1 Legal Options

The legal process is the primary driver of the implementation timescale given the regulatory and consultation process required. The legal analysis concluded that there are three possible routes for establishing the legal framework for the LEZ. These are:

- A TfL-sponsored Parliamentary Bill. TfL has the power to promote a local Bill in Parliament under section 167 of the GLA Act 1999. Such a Bill could contain all the relevant provisions for a LEZ or could provide a basic framework and allow for regulations to be made containing detailed provisions
- A single TRO made under the Road Traffic Regulation Act (1984) which TfL and all the Boroughs sign up to. This enables a LEZ scheme that bans from Greater London all HGVs, buses and coaches that do not meet the agreed emission standards
- A Scheme Order made by the Mayor under the GLA Act (1999). This enables a LEZ scheme where operators of HGVs, buses and coaches that do not meet the agreed emission standards are charged to bring their vehicles into Greater London.

Each of these options has advantages and risks associated with it which are summarised below:

Parliamentary Bill

A TfL-sponsored Bill is the most flexible legal option in terms of design of the LEZ scheme as it allows TfL to tailor the scheme details exactly as it wishes. The Act would exclude specified classes of vehicles which fail to meet the LEZ emission standards from entering the zone. It would also be possible for the Act to contain provisions allowing for flexibility to apply the LEZ to other vehicles at a later date.

Although attractive from the scheme design perspective, the Parliamentary Bill option is likely to take longer to enact than the other two options. This is because the earliest the Bill could be deposited in Parliament is 27th November 2005 and the Parliamentary process after that would almost certainly take at least 18 months, until May 2007. Similar Bills recently taken through Parliament have taken longer than this. Allowing six months after Royal Assent for operators to take the necessary steps to comply with the requirements of the LEZ, the earliest the LEZ could be launched would be December 2007. Realistically,

allowing for the uncertainties associated with the Parliamentary legal process the launch could be some months after that.

TRO

Like the Parliamentary Bill option, a scheme enacted under a single TRO bans specified classes of vehicles that do not meet the LEZ emission standards from entering the zone. The legal process for putting in place a TRO is estimated to take until July 2007. With this timetable it would be possible to launch the LEZ in February 2008.

The primary risk associated with this option is the requirement for all Boroughs to sign up to the section 101 agreements that enable the TRO. This will require cross-Borough co-ordination with the possibility that some Boroughs may choose to opt out of the LEZ.

Scheme Order

The Scheme Order legal route is different from the two options discussed above in that it allows for a charge to be levied on those polluting vehicles that enter the zone. If the charge/fine is made sufficiently high then this would achieve a similar effect to a ban. If the Mayor decides that a Public Inquiry is not required the legal process for a Scheme Order could be completed by March 2007 making it possible to implement the LEZ in October 2007. If a Public Inquiry is required this would add another nine months to the timescale.

On balance, the Scheme Order route provides the earliest implementation date and the programme is more within TfL's control.

17.1.2 Enforcement Infrastructure

The analysis of the enforcement options concluded, as did the Feasibility Study, that a LEZ could either be enforced manually or using cameras but that different detection rates would be achieved depending on the type of enforcement regime chosen. Looking at the most cost effective way of achieving compliance with the scheme, the conclusion of this study is that it is preferable to invest in an Information Campaign to encourage pre-compliance than to invest heavily in enforcement infrastructure to catch non-compliant vehicles after the launch. For this reason it may be preferable to launch the LEZ with minimal enforcement, that is, a manual regime and add camera infrastructure afterwards if required.

Under a manual regime a detection rate of between 5% and 6% can be achieved with 20 units, whereas a maximum capture rate of around 70% can be achieved with an ANPR camera-based scheme. A manual operation will take less time to set up than an automated operation.

The Feasibility Study proposed that the most cost effective enforcement infrastructure would use the Congestion Charging camera infrastructure supplemented by additional fixed cameras outside the Central Zone and some mobile units for additional flexibility. Having explored the technical and commercial considerations associated with adapting the Congestion Charging to accommodate the LEZ we have concluded that it is unlikely to be cost effective for TfL to pursue this route for a 2007 LEZ implementation. Significant enhancements would be required to the Congestion Charging technical architecture and adapting the current contract with the service provider would be too costly, particularly given that TfL could incorporate the changes into the contract at minimal cost when it is re-let in 2008/9.

17.1.3 Certification & Registration

Identification of excluded vehicles entering the Low Emission Zone will require a database of these vehicles to be built whether the enforcement regime is manual or automatic.

The Feasibility Study proposed that a manual enforcement regime be based on a permitting scheme similar to the London Lorry Control scheme. However the administrative burden of sending out permits to all allowable vehicles as well as renewing them when the emission standard changed is considered to be too onerous. In addition permits cannot be used if the enforcement regime is upgraded to be camera-based at a later stage. Instead we recommend that under a manual enforcement regime officers enter details of potential

evaders into a PDA device or onto a form during their shifts and upload these details at the end of the shift for verification against the certification database.

Under an automated scheme details of all vehicles captured by the cameras will be checked each night against the excluded vehicles database and PCNs will be generated for vehicles prohibited from entering the zone.

The database needs to be built in collaboration with DVLA who hold vehicle registration details. The first step in determining which vehicles are excluded from the LEZ is to identify, for example, all those vehicles that are of pre-Euro III age. All these vehicles will be excluded. Vehicles can then be removed from the list of excluded vehicles if evidence is available that they have had abatement equipment fitted or are early Euro III vehicles. This will require registration and certification processes to be established for LEZ.

Setting up a registration process to support the launch of a LEZ is dependent on the resolution of some issues which involve third party organisations. The key issues are:

- How to identify end of series vehicles (vehicles at Euro II standard sold after the cut-off date for the introduction of the Euro III standard)
- How to identify all vehicles that have had abatement technology fitted to take them to the Euro III standard for particulate emissions
- How to identify the emission standard of foreign vehicles.

The potential volume of end of series goods vehicles could represent up to 3,000 vehicles nationally although exact figures are not available. Further work is required to find a means of identifying these vehicles as the data does not appear to be readily available at this stage.

The RPC certification route is proposed as the method for validating whether vehicles fitted with particulate abatement technology are compliant. Vehicles with RPC certificates that are in the reduced VED class can be identified directly through DVLA. Vehicles with abatement technology and not identifiable through DVLA data will be required to register with the London LEZ. As the longer term future of the RPC scheme is uncertain, this solution may not be sustainable beyond 2010 and a future alternative will need to be investigated with government.

All foreign vehicles will be required to register with the London LEZ to prove compliance. Validation of foreign HGVs fitted with abatement equipment requires additional investigation to determine data sharing opportunities with other European Schemes. Low volumes of foreign registrations are expected, coupled with a low recovery rate on PCNs. Therefore enforcement rates are likely to be impacted.

17.1.4 Stakeholder Considerations

TfL will require input and support from many external organisations in order to successfully launch a Low Emission Zone in London. These organisations are primarily the London Boroughs, DfT and vehicle operators and their representative bodies. The key considerations for the initial launch of the LEZ relating to these organisations are as follows:

London Boroughs

The Boroughs have generally expressed support for the scheme. TfL will have to “make the case” for the benefit of a London wide LEZ as Boroughs have expressed concerns regarding the impact on business and employment of a LEZ.

DfT

Support and input from DfT will be critical to enable the implementation of a LEZ. The key areas where their involvement is required are in:

- Clarifying their position on whether grant funding will continue to be available for the fitting of abatement equipment. Their stated position is that funding will not be available to operators to support meeting the requirements of a mandatory scheme. However, the details of when funding will be stopped is not clear and whether any

funding will continue to be available to specific groups who may have a greater need than other groups e.g. small businesses

- Clarifying their ongoing support for the RPC (or equivalent) schemes
- Enabling DVLA to make the necessary updates to their systems so that TfL receives the data required to build the certification database
- Preparing a schedule to go before Parliament to enable TfL to issue PCNs under a decriminalised scheme
- Agreeing to the LEZ signage. A symbol will need to be agreed with DfT that denotes entry to a Low Emission Zone.

Vehicle operators

We spoke to organisations that represent the interests of vehicle operators likely to be affected by the LEZ, including the Fleet Transport Association, the Road Haulage Association and the Federation of Small Businesses. In general, the bodies we spoke to were supportive of a LEZ but raised the following points which will need to be taken into account in the detailed planning of a scheme implementation:

- Operators require as much notice as possible of the emission standards of the LEZ so they can plan how they will adapt their fleets to meet the requirements. They said they would ideally like three years notice so that they can build their upgrade plans into the natural vehicle replacement cycle. It will be a priority for TfL to announce the emission standards as soon as a decision to go ahead with a LEZ is announced
- There is concern about the impact of a LEZ on business, particularly small businesses. Further analysis of the socio-economic impacts of the LEZ is required to enable TfL to address these issues during the consultation processes.

17.1.5 Emission Standard for Scheme Launch

Our recommendation is that a standard of Euro II + RPC or equivalent is adopted for the initial scheme launch as proposed in the Feasibility Study. This standard is the most cost effective in terms of air quality benefits delivered balanced against the cost to operators of meeting the standard.

17.2 SUMMARY OF IMPLEMENTATION OPTIONS FOR 2010

17.2.1 Enforcement Options for 2010

The analysis of the enforcement options for 2010 concluded, as did the Feasibility Study, that the expansion of the LEZ exclusion to include LGVs could only be enforced using an automated camera network. The additional volumes could be handled by the selected service provider.

17.2.2 Certification & Registration Options for 2010

The current RPC certification process only certifies and tests particulate filter equipment. If the 2010 emission standard is to address NO_x emissions this will need to be extended to cover NO_x equipment or an alternative certification method will be required. Given that poorly matched, fitted, maintained or incorrectly operated NO_x abatement equipment will have an adverse effect on emissions, it is essential that a rigorous certification and test regime is in place.

Dealing with LGVs requires the exclusions database volumes to be expanded significantly, with the scale of the registration and back room processing increasing similarly. To minimise this impact the exclusions database must be as automated as possible, rather than requiring vehicle owners to register exceptions. The approach adopted in the Feasibility Study was to use an age based approach, to make it as straightforward as possible to identify excluded vehicles.

This approach is viable for UK LGVs, however foreign LGVs remain an issue since the age of a foreign vehicle cannot be always be determined from the registration plate alone, without access to the registration data of each country. This will require ongoing support from government to promote pan-European co-operation for data sharing initiatives that support detection as well as enforcement of European traffic management schemes such as Low Emission Zones. In the absence of common European data sources a London LEZ will have to register foreign LGVs.

By 2010 the registration of foreign HGVs may potentially be improved by gaining access to Lorry Road User Charging registration data, subject to the approval and co-operation of HMCE. DfT support in pursuing this route will be critical.

17.2.3 Stakeholder Considerations for 2010

The key stakeholder considerations for 2010 are as follows:

London Boroughs

Support from the London Boroughs to tighten the scheme emission criteria has been expressed, largely due to support for the increased emissions benefits. However extending the scheme to include LGVs is a source of concern, since the impact on local businesses and local employment needs to be better understood.

DfT

Continued support and input from DfT will be critical to enable the LEZ implementation to achieve tighter emission targets.

The key areas where their involvement is required are in:

- NO_x abatement technology is now beginning to enter production vehicles, but is still a developing technology for the retro-fit market. Continuing and expanding the CleanUp certification to cover the full range of HGV types, not just buses and taxis as at present is essential to 'pump priming' this new market and giving operators a lower cost route to making their fleets compliant
- Clarifying the position on whether grant funding will continue to be available for the fitting of abatement equipment, and NO_x abatement technology in particular. The stated position is that funding will not be available to operators to support meeting the requirements of a mandatory scheme. However, the details of when funding will be stopped is not clear, particularly in the period between the criteria being announced and coming into force in 2010, and in light if the need to encourage the NO_x abatement technology
- Support for the necessary testing and certification of NO_x abatement technology
- DVLA recording and holding of NO_x emission standard data for vehicles.

Vehicle operators

In general the bodies we spoke to were supportive of a LEZ as long as standards are announced sufficiently in advance to enable them to plan their fleets. Thus announcing 2007/08 and 2010 standards as soon as possible will be critical.

Operators expressed a preference for 'technology neutral' emission criteria, based on Euro standards rather than certification of retro-fitted abatement technology as this implies that the emission abatement equipment and fitting is warranted by vehicle manufacturers.

Extension of the zone to LGVs potentially impacts a far wider community of operators, and small businesses in particular whose views are harder to gather. Whilst cost models can estimate the total asset value and replacement costs of vans affected, the distribution of how these costs fall and are distributed across the community of van owners is not clear, and they may place a heavy burden on some groups. A more detailed study is recommended to assess this socio-economic impact of the inclusion of LGVs before any

commitment is made, together with consideration as to what other forms of assistance could be provided to these groups.

17.2.4 Emission Criteria for 2010

Our recommendation at this stage on the emission criteria for 2010 is that further work should be conducted to assess the feasibility of setting Euro IV as the required standard. This would deliver higher air quality benefits than a standard of Euro III + RPC or equivalent but would involve increased costs to industry. There are indications that these costs may be lower than had previously been estimated but further work is required to verify this.

The expansion of the scheme to include LGVs from 2010 should also be investigated further in terms of the impact it may have on operators and businesses.

17.3 PROGRAMME PLAN

In this section we describe the high level plan for the implementation of the Low Emission Zone.

Programme Plans are presented for in section 17.4, 17.5 and 17.6 respectively for the three options under consideration for the legal framework for introducing the scheme:

- A TfL promoted Parliamentary Bill
- A single Traffic Regulation Order
- A Scheme Order promoted by TfL.

The major programme difference between the three legal frameworks is the date at which the registration process and detailed implementation can commence. The commitment of significant implementation spend is tied to completion of the enabling legislation and / or orders.

The earliest dates for completion of the legal processes are as follows:

Parliamentary Bill: Royal Assent for the Bill could be obtained in May 2007. This would enable go live in December 2007.

Single TRO: The earliest extended date for completion of the Public Inquiry is July 2007, which would enable go-live in February 2008

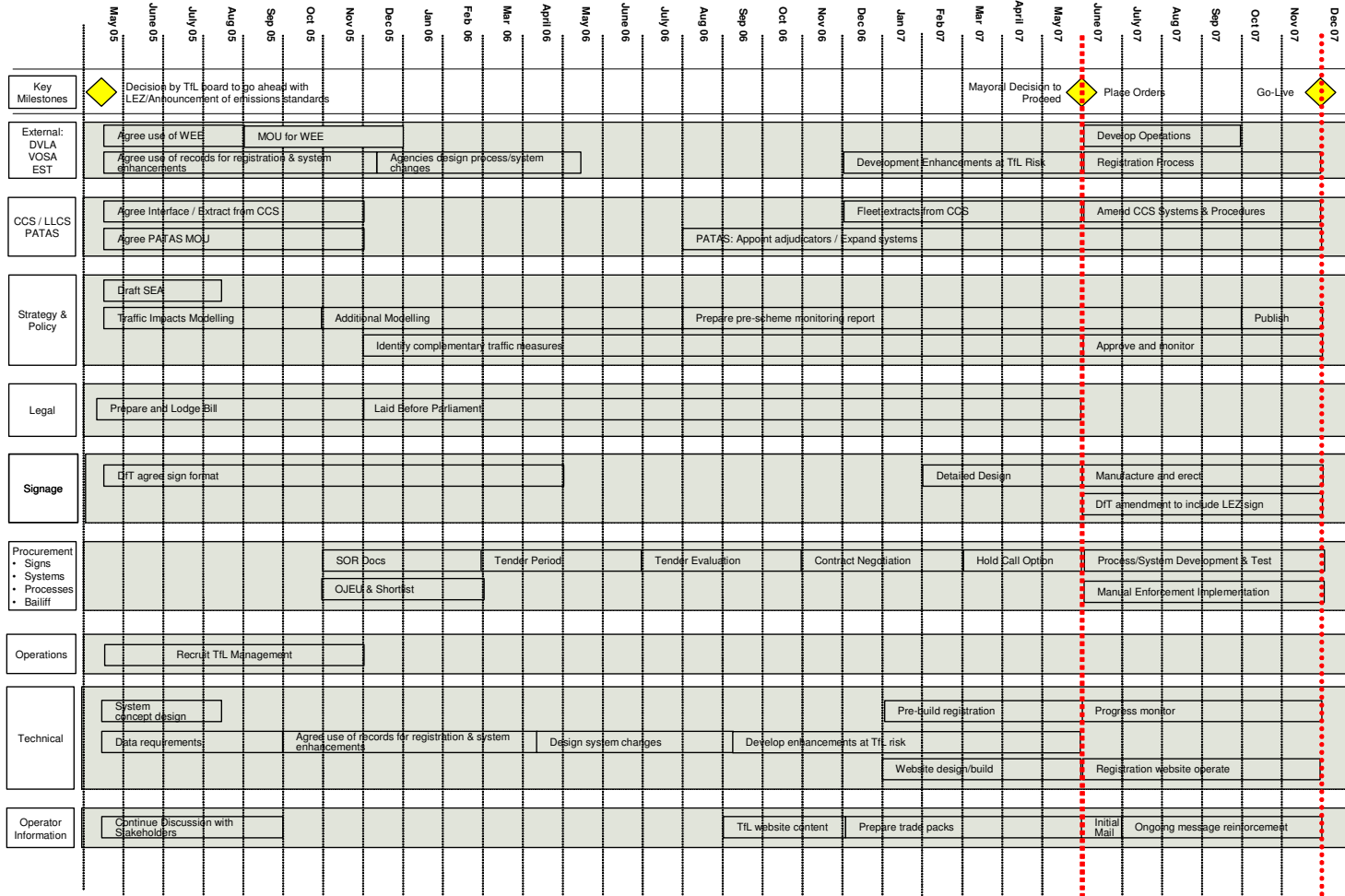
Scheme Order: Without a Public Inquiry the Mayor could confirm the order in March 2007. This would allow go live in October 2007.

In order to maximise the period available for operator compliance and registration a number of activities will need to be funded in advance of completion of the legal process. Those include the establishment of data sharing arrangements with DVLA, pre-population of the database of non-compliant vehicles and the commencement of the process to appoint Adjudicators. Investment in the operator information campaign will also be required to ensure that operators have the maximum time to comply.

The commencement of the programme except for amendments to the Mayor's Transport Strategy is shown as a Board decision in May 2005. Proving that the amendment to the Transport Strategy commences in April 2005 and is ongoing, the formal decision to proceed could be delayed until July 2005 to fit the current TfL meeting cycle without impacting the critical path.

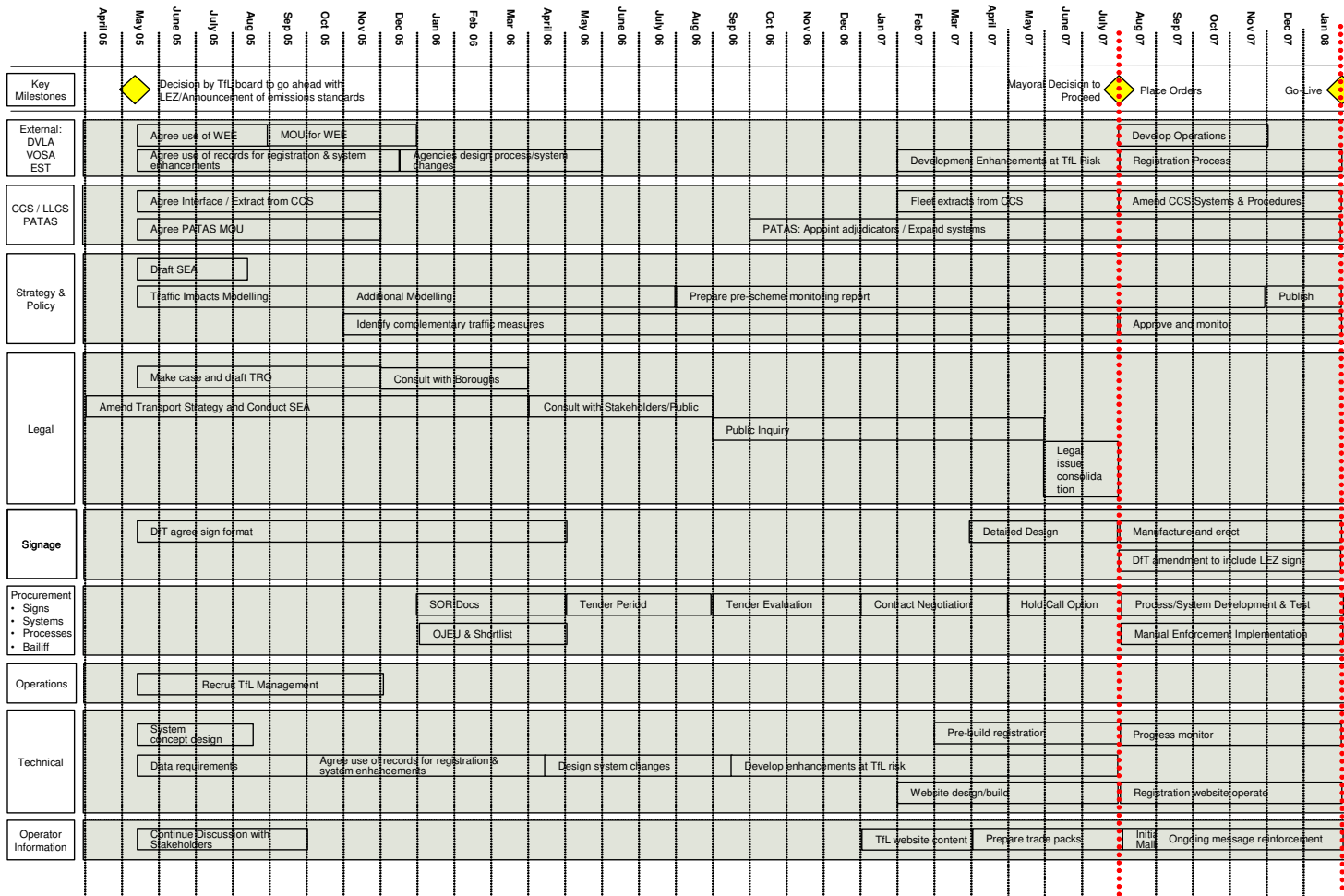
17.4 IMPLEMENTATION PLAN - PARLIAMENTARY BILL OPTION

LEZ Implementation Plan – Parliamentary Bill Option



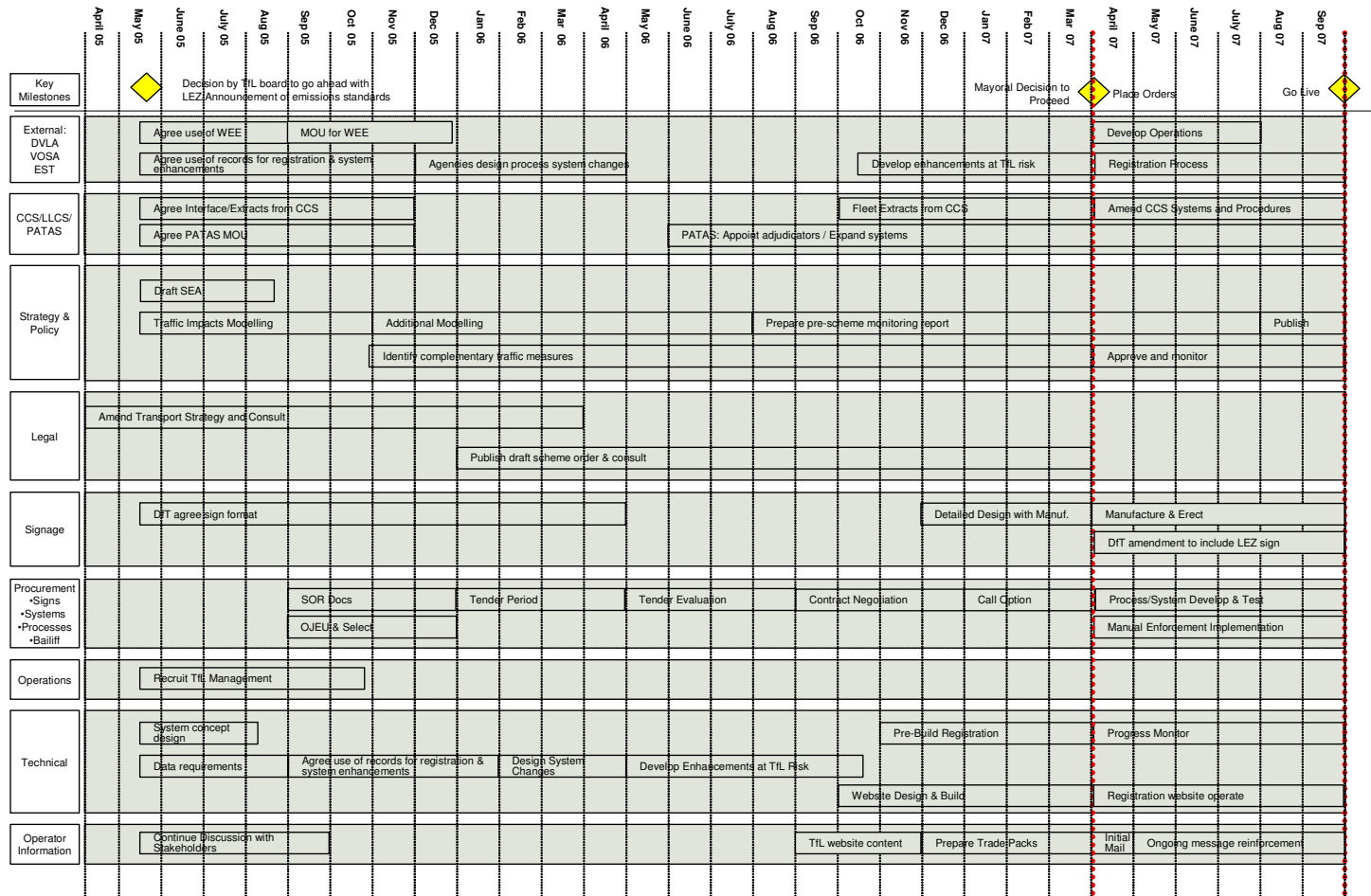
17.5 IMPLEMENTATION PLAN - SINGLE TRO OPTION

LEZ Implementation Plan – Single TRO Option



17.6 IMPLEMENTATION PLAN - SCHEME ORDER OPTION

LEZ Implementation Plan – Scheme Order including Transport Strategy



17.7 KEY DEPENDENCIES

The following sections highlight critical external dependencies for the successful implementation of the LEZ plan which have been identified during this review. Others may emerge following further analysis.

17.7.1 Department of Transport

	Area	Critical Dependency
1.	Traffic Management	Agree signage
2.	Legal	Provide appropriate support to the legal process in line with the legal route selected
3.	Strategy	Clarify position on PowerShift and CleanUp grants for fitting of abatement equipment
4.	Strategy	Confirm grant funding position regarding continued 'pump priming' of NO _x abatement technology, specifically with regard to widening take-up to all classes of vehicle, not just buses and taxis
5.	Operations	Maintain Energy Saving Trust, CleanUp Register and operation of current RPC procedures to support LEZ launch
6.	Operations	Agree future roles for Energy Savings Trust and VOSA in RPC process beyond 2007/08, and for extension to NO _x abatement technology
7.	Operations	Enable and establish Testing and Certification regime for NO _x abatement technology through EST Transport Energy, VCA, VOSA or other means and encourage EU standardisation of this certification
8.	Operations	Enable DVLA to develop necessary changes to WEE registration interfaces
9.	Registration	Review with DVLA and VOSA the possibility of the RPC certification database being extended to provide a national certification database of abatement technology and vehicle emissions to support LEZ in London and elsewhere
10.	Certification	Support TfL in identifying national standards in other countries that are comparable with RPC, which may be used to facilitate certifying foreign vehicles. Facilitate TfL in dealing with EU national certification agencies to provide certification evidence of abatement technology
11.	EU	Continue to work with EU to facilitate EU wide sharing of registration data to appropriate bodies, and access to type approval, Euro emissions class, vehicle age, and vehicle owner information for detection and enforcement of foreign vehicles. Assist TfL in gaining access to this information as available

12.	EU	Support TfL in considering in further detail the potential implications of EC legislation, including proposals relating to infrastructure charging in the context of a LEZ
13.	EU	Support TfL in notifying EC of technical standards
14.	EU	Negotiate with EU to harmonise data and processes that will facilitate Low Emission Zones, including retro-fit certification and registration of vehicle emission standard
15.	Publicity	Assist in publicity to vehicle operators where possible, for example providing routes to operators via VOSA and DVLA

17.7.2 Energy Savings Trust (EST)

	Area	Critical Dependency
1.	Certification	Continue to provide certification of abatement technology and CleanUp register. Provision of this information to LEZ operator electronically to create certification database
2.	Certification	Identify with DfT, DVLA, VOSA the certification options open for new abatement technologies, and NO _x abatement in particular and the role of these bodies in certifying them
3.	Certification	Plan and cost requirements for abatement technology certification for PM and NO _x with DfT and VOSA
4.	Certification	Plan and cost requirements and responsibility for on-going CleanUp register or equivalent type certification for NO _x abatement technology with VOSA
5.	Classification	Work with Congestion Charging and DVLA to identify what emissions certification data will be available in future for vehicles that have received fuel conversions
6.	Publicity	Assist in publicity to vehicle operators where possible

17.7.3 VOSA

	Area	Critical Dependency
1.	Registration	Provide RPC and certification data to assist with registration
2.	Certification	Identify, plan, and cost and implement the certification options for new abatement technologies, and NO _x abatement in particular
3.	Certification	Review with DfT the possibility of the RPC certification database being extended to provide a national certification database
4.	Certification	Plan and cost requirements for abatement technology certification for PM and NO _x with DfT and EST

5.	Certification	Plan and cost requirements for on-going VOSA role in RPC, extended to cover NO _x abatement
6.	Certification	Conduct impact assessment of inclusion of a check of correct fitting and operation of NO _x abatement technology within MOT checks where fitted, and potential for setting in situ validation and testing of abatement systems in vehicle

17.7.4 VCA

	Area	Critical Dependency
1.	Certification	Consider and establish options for Testing and Certification regime for NO _x abatement technology and encourage EU standardisation of this certification.

17.7.5 DVLA

	Area	Critical Dependency
1.	Registration	Review with DfT and VOSA the number of vehicles which have abatement technology fitted according to EST, but are not registered in RPC class
2.	Certification	Identify with DfT, VOSA and EST the certification options open for new abatement technologies, and NO _x abatement in particular and the role of these bodies in certifying them
3.	Certification	Identify with DfT and VOSA the future of the RPC certification, and in particular how this will develop in the future to provide assessment of NO _x abatement technology. Will additional Vehicle Excise Duty reductions be made available, or the existing RPC scheme criteria tightened to include NO _x emissions
4.	Classification	Agree process for mandating registration with DVLA for vehicles holding a RPC. Consult with operators to assess likely compliance
5.	Classification	Review data available, and changes needed to the DVLA – TfL interface to deliver the emission class data we require, Cost and plan the timeframe for development, delivery, and operation of this interface
6.	Classification	Work with Congestion Charging, TfL and EST to identify what emissions certification data will be available in future for vehicles that have received fuel conversions
7.	Classification	Work with Congestion Charging and LEZ teams to define necessary changes to the DVLA interfaces needed to support both schemes, so as to minimise development costs
8.	Publicity	Assist in publicity to vehicle operators where possible

17.7.6 Defra

	Area	Critical Dependency
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1.	Publicity	Support Information Campaign
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17.7.7 TfL

	Area	Critical Dependency
1.	Strategy	TfL Board Agreement to go ahead with LEZ Scheme
2.	Strategy	Work with GLA to update Transport Strategy if required
3.	Traffic Management	Identify changes to LTS model since the Feasibility Study and identify integration with LTS model or SALT-C model for future analytical requirements

17.7.8 GLA / Mayor

	Area	Critical Dependency
1.	Strategy	Update Air Quality Strategy, Update Transport Strategy
2.	Publicity	Support Information Campaign

17.7.9 London Boroughs

	Area	Critical Dependency
1.	Legal	Agree TRO, if this route is selected
2.	Operations	Boroughs agree signage locations
3.	Publicity	Support Information Campaign

17.8 HIGHWAYS AUTHORITY

	Area	Critical Dependency
1.	Operations	Agree signage on Highways Agency roads
2.	Publicity	Support Information Campaign, for example access to VMS signs

17.8.1 London Lorry Control Scheme

	Area	Critical Dependency
1.	Strategy	Consider options for mutual shared enforcement
2.	Operations	Access to vehicle data to assist in planning, scoping and operation
3.	Operations	Review LLCS registration to identify synergies and potential for integration of LEZ registration. Modify systems to prevent LLCS issuing permits to excluded vehicles
4.	Publicity	Provide access to registered fleets and operators to support publicity campaign

17.8.2 Congestion Charging

	Area	Critical Dependency
1.	Publicity Registration	Provide access to registered fleets and operators to support publicity campaign if possible
2.	Registration	Provide access to foreign vehicle registration data, if possible
3.	Registration	Review Congestion Charging fleet scheme and registration schemes to identify synergies and potential for integration of LEZ registration
4.	Registration	Modify systems to warning customers paying Congestion Charge if vehicle is on LEZ exclusion list
5.	Certification	Work with LEZ team, DVLA, and EST to identify what emissions certification data will be available in future for vehicles that have received fuel conversions, in light of changes with EST role Work with LEZ team to design DVLA and other interfaces to single standard so avoiding duplicate effort.

17.8.3 HMCE

	Area	Critical Dependency
1.	Registration	Open discussions with HMCE regarding possible access to foreign vehicle registration data, and potential for sharing enforcement infrastructure, information and records.

18 REPORT CONCLUSIONS

This report has summarised the findings of a brief review of The Phase II Feasibility Study to assess to what extent it is possible to take the report recommendations and use them as a basis for implementing a Low Emission Zone in London. Much has happened in the world of air quality, emissions, technology and transport since the report was written and our review has focused on identifying how these developments affect the findings of the Feasibility Study. We have also assessed the implementation options for a Low Emission Zone.

18.1 SUMMARY OF FINDINGS

Timescale for implementing a LEZ. The earliest a Low Emission Zone could be launched in London is October 2007 under a Scheme Order made by TfL under the GLA Act (1999). A scheme enacted in this way would levy a charge on operators who wanted to bring vehicles that did not meet the LEZ emission criteria into the zone. This timetable allows until March 2007 for the legal process of establishing the Scheme Order and six months after that for operators to comply and register with the LEZ. The timetable does not allow for a Public Inquiry which would add another nine months to the programme if the Mayor deemed this was necessary. The TRO route recommended in the Feasibility Study would deliver a scheme some five months later, but the timescale would be more at risk due to the complexity of co-ordinating sign-up from all 33 London Boroughs.

Use of Congestion Charging infrastructure. The Feasibility Study proposed that a cost effective enforcement infrastructure for a LEZ could make use of the Congestion Charging cameras. We have found that use of the CCS infrastructure will present significant commercial and technical issues for 2007 but that this route should be explored at the time of the re-let of the current contract in 2008/2009. At that time the LEZ requirements could be incorporated at minimal cost to TfL.

Recommended Enforcement Infrastructure. To comply with the requirements of the Low Emission Zone operators will need to plan to replace, upgrade or relocate their non-compliant vehicles ahead of the scheme launch. If the majority of operators make these plans before the launch then the number of non-compliant vehicles to detect will be minimised. It is therefore more cost effective to invest in an Information Campaign to encourage pre-compliance than it is to invest in enforcement infrastructure to detect and penalise vehicles post-launch. Our recommendation is to focus on the Information Campaign and launch the scheme with low cost i.e. manual enforcement. Automated enforcement infrastructure could be added subsequently, if required.

An automated enforcement infrastructure would be based on the use of a network of fixed camera/ANPR equipment of the same type as will be used on the extension to Congestion Charging, supplemented by the use of manual enforcement to provide flexibility. As discussed above it is unlikely to be feasible to integrate an automated LEZ enforcement infrastructure with Congestion Charging before 2008/09.

Enforcement will be supported by a database of excluded vehicles built using data available from the DVLA, EST and vehicle operators.

Stakeholder Views. All the stakeholders we met with during our review were broadly supportive of a Low Emission Zone. This included the London Boroughs, ALG, DfT, Defra and vehicle operator associations. The continued and full support of these organisations will depend on the detailed proposals for scheme implementation. Key concerns are:

- The likely costs of the scheme to TfL, to the Boroughs and to operators
- The impact a scheme will have on small businesses and employment
- Sufficient notice being given to operators of the LEZ emission standards.

Continued support from DfT will be critical as implementation of the LEZ is dependent on their input in several areas including agreeing LEZ signage, maintaining and potentially expanding the RPC process, preparing supporting legislation, clarifying its position on grants for abatement technology and working with DVLA to provide TfL with required data.

Emission Standards. The Feasibility Study recommended emission standards of Euro II + RPC or equivalent for 2007 and Euro III + RPC or equivalent for 2010. In addition the Study recommended that further analysis of the socio-economic impacts of introducing LGVs to the scheme in 2010 should be conducted as this would deliver greater air quality benefits. With regard to 2007 this review concludes that Euro II + RPC or equivalent is the most cost effective standard taking into account the likely cost to operators and air quality benefits achieved.

As part of this review we have considered a tighter emission standard for 2010 of Euro IV, which would include Euro III + RPC or equivalent or Euro II + RPC or equivalent. This would have the advantage of an improved impact on air quality but would lead to increased costs to operators and is reliant on the development of a certification process for NO_x abatement equipment. A Euro IV standard would have the additional benefit of stimulating the market for Euro IV vehicles.

The recommendation of this review is that further analysis should be performed on the air quality and health benefits of adopting Euro IV as the standard for 2010 and the likely cost to operators of this. Further work should also be done to assess the options for establishing a certification scheme for NO_x, similar to the current RPC scheme for PM₁₀. This would be required to support the administration of Euro IV-based scheme.

Scheme Set Up and Running Costs. We have estimated the set up and running costs of a LEZ based on the recommendations set out above. These costs are likely to be higher than those estimated in the Feasibility Study for scenarios 5 and 6. This is largely because they include costs for legal services, project management and scheme monitoring which were not included in the Feasibility Study costs.

Costs to Operators. The costs to operators of a LEZ are likely to be significant and will depend on the emission standards set. Stricter emission standards affect more vehicles and make it more expensive for operators to adapt or change their vehicles. The Feasibility Study estimated the costs to operators of upgrading the vehicle fleet to meet an emission standard of Euro II + RPC at between £64m - £135m. To meet the requirements of a 2010 LEZ with an emission standard of Euro III + RPC the Study estimated the costs to operators at between £113m - £332m for HGVs and coaches. This would rise to £174m - £410m if LGVs were included in 2010. We have estimated that the cost to operators of meeting a Euro IV standard or equivalent in 2010 could be an additional £30m - £120m.

Benefits of the LEZ. The air quality and health benefits have not been remodelled as part of this review. We recommend that this is done in the next phase of work as there are many factors that are likely to have had an impact on the baseline air quality against which the benefits of a Low Emission Zone will be measured. These include the steps being taken by TfL to address emissions from buses and taxis and earlier introduction of Euro IV vehicles. Remodelling must also assess the impact of moving to an emission criterion of Euro IV or equivalent in 2010.

18.2 DEPENDENCIES

Although implementation of the LEZ under a Scheme Order is potentially achievable for 2007 (and in 2008 under a TRO or Parliamentary Bill) there are third parties on whom TfL will be dependent in order to successfully implement the LEZ. Critical dependencies include:

- DVLA to modify data feed to TfL to include vehicle class, date of first registration and other emissions data where available

- DfT and VOSA to continue to run the Reduced Pollution Certificate scheme to enable identification of vehicles with retro-fitted abatement technology and to cater for potential increased volume of applications driven by a London LEZ
- Signage to be agreed by DfT
- DfT to prepare a schedule to lay before Parliament to enable TfL to issue PCNs under a decriminalised scheme
- DfT to clarify position on grant funding for fitting of abatement equipment.
- TfL will also have to announce the emission standards for the launch of the LEZ as early as possible in order to give vehicle operators sufficient time to plan their vehicle upgrades, reallocations or replacements.
- If the emission standard for the LEZ is to be tightened in 2010 to address NO_x emissions e.g. by setting the standard as Euro IV, a certification process for the retro-fitting of NO_x abatement technology will be required. TfL will not be able to provide this independently and will depend on DfT to participate in finding a solution.

18.3 NEXT STEPS

Through this review we have identified several areas of work that we recommend are progressed by May 2005. Key activities include:

- Remodelling of projected air quality benefits taking into account factors that may have affected the baseline air quality since the modelling was last done
- Recalculation of the estimated health benefits based on the revised air quality projections and the adoption of a Euro IV standard in 2010
- Detailed modelling of traffic flows to obtain better estimates of the number of HGVs and coaches entering London on a daily basis and over a longer term period e.g. one year
- Detailed analysis of the likely cost to operators of a LEZ
- Additional surveying of HGV operators to understand how the vehicle fleet is distributed and how they would respond to a LEZ introduced in 2007
- Closer work with the London Boroughs to understand perspectives of all the Boroughs and all stakeholders within the Boroughs
- Decision on and initiation of the legal process
- Further analysis of the options for building the certification database including availability of data from DVLA and other agencies
- Analysis of the availability of relevant data on foreign vehicles including date of first registration and emission standard
- Confirmation of the procurement strategies to be used for the registration and enforcement processes.