

Interim Advice Note 129/10

Travel Demand Management Guidance

High Occupancy Vehicle Gates

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1. Introduction

1.1. Scope of the Guidance

Travel Demand Management (TDM) guidance is being prepared for the Agency and its supply chain to provide high level guidance on evolving network management interventions which are required to support the Department for Transport's DaSTS (Delivering a Sustainable Travel System) policies. This document is part of the TDM guidance series, and provides guidance on High Occupancy Vehicle (HOV) gates to help the Agency select potential sites for HOV gates and implement schemes that will be effective in managing congestion and influencing travel behaviour.

The guidance collates existing knowledge held at the Agency, predominantly from the scheme introduced on the M606/M62, and also refers to relevant international best practice.

In particular, the guidance focuses on specific HOV scheme considerations that fall outside the Agency's standard scheme development process.

Supporting guidance material is also available to provide further information, such as example studies prepared for the M606/M62 scheme, and guidance on similar and overlapping subject areas. Links to further information are provided throughout this document.

1.2. Policy Context

The DfT's reliability target challenges the Agency to make journeys more reliable on the strategic road network. The Agency's Influencing Travel Behaviour Programme has been identified as being able to contribute to meeting this target.

The Agency is developing and implementing a range of TDM interventions to better manage use of the network, rather than provide new capacity, acknowledging that providing for unrestrained traffic growth is not a sustainable solution.

This work supports the DfT DaSTS Strategy which states that '*Our priority to 2014 is making better use of the existing network, combined with a targeted programme of improvements to improve capacity reliability and safety in the most congested areas.*'

The Agency has already implemented a programme of planning based and voluntary travel plans designed to influence current levels of demand and encourage sustainable travel. The Agency is also combining these activities with demand management interventions to understand the level of benefits that can be achieved on congested sections of the Strategic Road Network (SRN).

This guidance is designed to assist the Agency to develop HOV gate scheme proposals to meet these policy objectives, and identifies how these can be combined with off network 'Smarter Choices' activities.

1.3. What is an HOV gate?

Within this document a High Occupancy Vehicle (HOV) gate is defined as a lane designated for use by vehicles carrying more than one occupant and which is physically segregated from other non-HOV traffic.

HOV lanes are often designated for use by buses, coaches, taxis (with more than one passenger), motorcycles, and Light Goods Vehicles (LGVs) with more than one occupant, in addition to car sharers.

The segregated aspect (the 'gate') enables multiple occupancy vehicles to take a shortcut, perhaps through a road which is closed to general traffic, or by allowing a turning movement that creates a journey time advantage to HOV users.

1.4. Why Introduce an HOV gate scheme?

An HOV gate should be considered where the aim is to reduce congestion by increasing capacity through greater people throughput and promote more sustainable use of the strategic road network.

A successful HOV gate scheme will create an incentive to road users to car share because journey times will be shorter than for those using conventional lanes open to general purpose traffic.

Objectives

An HOV scheme will typically have the following objectives. Tailored scheme priorities should be agreed depending upon site specific network characteristics and issues:

- **Journey time savings.** To create a notable travel time difference between the HOV and GP lanes, without causing a decline in service for GP traffic.
- **Journey time reliability.** To improve journey time reliability for HOV users on the HOV lane trial section without worsening reliability for general purpose (GP) traffic compared to the current situation on the same section.
- **Person throughput.** To enable higher sustainable travel behaviour around the targeted network area by increasing average vehicle occupancy (AVO) and total person trips.
- **HOV lane utilisation.** To ensure that the HOV lane will carry the same or more passengers than the average of the other general purpose lanes.
- **Compliance levels.** To ensure that compliant use of the HOV lane is monitored and managed and violation rates are low.
- **Safety.** To ensure that there is no increase in the number and/ or severity of accidents.

1.5. How to introduce an HOV gate scheme

The flow chart below provides an outline of the HOV scheme development process from the idea concept stage through to design and implementation including departments that are likely to be involved and key stakeholders to liaise with. Additional stakeholders may also need to be involved depending on the scheme scale, and local issues.

Phase	Owner/roles	Tasks
Idea/concept of HOV gate as a potential solution		<ul style="list-style-type: none"> Consider how scheme could meet policy objectives and local objectives Compare other TDM interventions as possible alternative solutions
Scoping	<p>Planning team, liaising with:</p> <ul style="list-style-type: none"> Area Team and Division - Senior Management Managed lanes policy team Local stakeholders* MAC 	<ul style="list-style-type: none"> Prepare an outline design proposal Plan supporting communications If appropriate, begin stakeholder engagement on the proposed scheme
Decision on whether to commit to feasibility assessment	<p>Feedback to ITB and managed lanes policy team</p>	
Feasibility assessment	<p>Planning Team, liaising with:</p> <ul style="list-style-type: none"> ITB; RDD; Network Services, NetSev Tech or TFD; National / Regional Area Teams (including the Managing Agent or Design Build Finance and Operate (DBFO) Contractor); and Regional Press Officer. 	<p>Feasibility assessment report should include:</p> <ul style="list-style-type: none"> Design options Safety assessment Compliance strategy Outline monitoring and evaluation strategy Outline communications and marketing strategy Scheme costing Cost benefit analyses
Decision on whether to proceed to design stage	<p>Feedback to ITB and managed lanes policy team</p>	
Detailed design	<p>MAC, Area Team or MP led, liaising with:</p> <ul style="list-style-type: none"> Procurement; Regional Press officer; and Local Stakeholders 	<p>Ensure design includes:</p> <ul style="list-style-type: none"> Adequate signage to enable compliance Detailed enforcement considerations Operation and Maintenance considerations <p>Prepare supporting strategies:</p> <ul style="list-style-type: none"> Detailed evaluation and monitoring strategy Detailed engagement strategy Detailed media and PR strategy
Implementation / Build	<p>MAC, Area Team or MP led, liaising with:</p> <ul style="list-style-type: none"> Operations and Maintenance; Local Press officer; and Local Stakeholders 	<ul style="list-style-type: none"> Prepare Traffic Orders Civils Deliver media and PR strategy
Ongoing work	<p>Project coordinator or route management</p>	<ul style="list-style-type: none"> Monitor in line with evaluation framework Continue to deliver promotions and marketing Review scheme performance against KPIs and respond as necessary
<p>* Local stakeholders should include Local Planning and Transport Authorities, police and local organisations. Further guidance on securing stakeholder involvement is available in a separate guidance document.</p>		

Note. This flow chart does not replace the Agency's governance arrangements and decision making process (e.g. PAR) for taking forward schemes.

2. Scoping

2.1. How to ensure the scheme will be effective

The rationale for identifying a suitable site for an HOV scheme will be dependent on a number of local circumstances including:

Are there traffic generators or attractors in the area?

HOV schemes will be most effective when they support land uses that result in journeys that can be shared, for example:

- Commuter routes, where most journeys are regular trips at a fixed time;
- Leisure routes, where groups can travel together, to popular leisure sites or town centres; or
- Sites where Local Development Frameworks are in place that plan to increase employment / leisure uses along a particular corridor.

Are there other Smarter Choices Initiatives in the Area?

Lessons learned in the US also point towards the importance of combining network management interventions with Smarter Choices activities. For example, an HOV scheme will add value in locations where:

- Local Transport Plans have a strong focus on Smarter Choices; or
- There are Voluntary or Statutory Travel Plans that have been secured through the planning process.

Existing work that has been carried out to promote sustainable transport, and car sharing in particular, will also enhance the take up of the scheme, including:

- Past, current or future plans for sustainable transport awareness raising campaigns, by the Local Authority; or
- Regional car share schemes/ site specific car sharing schemes at workplaces.

Are the Regional Authorities Supportive?

Effective partnerships and political will are essential to build support for the HOV scheme. A strong partnership with a Local Authority is more likely to be formed if:

- The Local Authority is proactive and innovative in the Smarter Choices field; or
- There are established local and regional transport groups already working towards sustainable transport objectives.

2.2. The importance of early stakeholder engagement

International experience emphasises the importance of early engagement at the scheme scoping stage to build consensus and support. Support for the first early schemes in particular will have a strong influence on the public perception and political support for future HOV schemes.

For instance, the M606/M62 scheme was supported by a thorough stakeholder engagement plan and marketing strategy (see Appendix E). This project highlighted that to achieve the level of stakeholder involvement required for an HOV gate scheme, promotional activities will need to commence early, targeting groups such as Local Authorities, Regional Planning Agencies, Campaign groups and the local Police. This is in addition to the usual scheme promotion that is targeted at the general public.

As HOV schemes are a relatively new concept in the UK, other stakeholders may also need to be engaged. For example the Road Haulage Association, Freight Transport Association, Motorcycle Associations and drivers organisations (RAC, AA, Association for British Drivers, IAM Motoring Trust).

2.3. Preparing a scoping report

To engage stakeholders, an outline design proposal will need to be prepared to communicate the concept. This may be a briefing note with an outline drawing and should be worded in non technical language. It should explain the objectives of the scheme, and why other TDM measures have been considered and then rejected.

Supporting communications plan

It is recommended that an outline plan for stakeholder engagement should identify key and peripheral stakeholders. The plan should establish how they would be contacted, in what timeframes, what information would be provided and how it would be collected.

This early work should also aim to identify potential areas for partnership working, such as existing local networks of businesses or communication channels. Any existing transport or environmental projects may also provide leads and identify suitable platforms for engagement that will support the project in the local area.

These stakeholders may also be instrumental in the delivery of communications, promotions and marketing of the scheme to potential users, should the proposal progress through to the design and implementation phase.

2.4. Factors influencing the decision to proceed to feasibility assessment stage

The outcomes of the work discussed above will influence the decision to proceed to the next stage which is to prepare a feasibility assessment. The Agency's standard governance and approvals arrangements should be used to secure the decision to commit to a scheme. As the scheme will imply a financial commitment it is important that potential 'showstoppers' are identified. Key questions that should be addressed, although not limited to, include:

- Why an HOV scheme is needed?
- How effective is it likely to be?
- Could an HOV scheme complement existing Smarter Choices initiatives in the area, by providing car sharers priority network access?
- Is their local and regional political support for an HOV scheme?
- Have key stakeholders been engaged and provisional agreement been achieved to work in partnership?

3. Feasibility Assessment

3.1. Defining the scheme type

Existing or New Capacity

Utilising existing capacity or providing new capacity will be the most important early determinant of a feasibility study. HOV schemes can be created by reassigning the existing hard-shoulder, by re-allocating existing road space or by physical road widening (i.e. new construction). Experience from the M4 Bus Lane project which involved reallocating all purpose motorway road space suggests that public support might be unfavourable due to the perception that the scheme is detrimental to overall road conditions.

International experience from the United States suggests that the early HOV schemes that used existing GP lanes were also unpopular, and this still influences public perceptions today. However in the Netherlands some schemes have been introduced using existing road space and these have been supported with incentive strategies to help manage their operation more effectively.

Following this we recommend that HOV gate schemes should be created when adding new capacity.

Example Circumstances

Circumstances which lend themselves to the provision of an HOV gate scheme could include the following:

- ***Approach to a congested junction or gyratory***

An HOV gate scheme would be suited at junctions where traffic routinely builds up during peak periods, for example motorway off-slips.

The HOV lane would run alongside other traffic and would begin far enough away from the junction to be able to avoid the queue, and a gate section would be provided near to the junction. The gate could either terminate a short distance ahead of any stop line / give way line like many conventional bus lanes, or at a set of pre-signals, giving HOV traffic the opportunity to change lane before the main junction.

- ***Ramp metering bypass***

An HOV scheme could be built to bypass ramp metering signals on a slip road. This provides an advantage to HOVs because they do not need to queue at the traffic lights. The lane needs to be long enough to bypass the queue that may form on the slip road, so it is essential that there is sufficient land available to build the lane e.g. through use of the hard shoulder or on the highway boundary.

- ***By passing a major junction***

An HOV gate could also be extended through a junction to provide a direct route for HOVs that avoids congestion. For new-build grade separated junctions it might be feasible to develop a fully segregated lane, but in most cases the HOV bypass would reduce the number of times that a vehicle would be expected to stop at an interchange and reduce the amount of queuing they would encounter. For example a large roundabout interchange could be converted to a 'hamburger' style junction where the direct route is available to HOVs only.

- ***To mitigate the impacts of development***
HOV gate schemes could also form mitigation works to enable future development impacts on the SRN. HOV gate scheme proposal could also be linked into Local Development aspirations and proposals. In these circumstances, schemes could potentially be funded from Section106 or Section278 spatial planning conditions.

3.2 Preparing the Feasibility Report

To assess the feasibility of an HOV scheme refer to the objectives in chapter one which sets out an assessment framework. An example feasibility study is available from the M606/M62 scheme for reference (see Appendix E).

3.2.1 Developing an Evaluation Framework

The following evaluation framework has been prepared based on the monitoring strategy for the M606/M62 scheme (see Appendix E) and referring to international best practice in the US and Australia. The evaluation framework provides a checklist for HOV gate scheme proposals, and should be referred to throughout the development of the feasibility assessment.

Key Performance Indicators (KPIs) have been suggested to provide guidance for scheme proposals; however the priority for each of these indicators will vary according to local traffic conditions. Therefore, the KPIs must be considered for each scheme.

An indication of the baseline data sources that will need to be gathered to measure accurately against the KPIs are also highlighted below.

Outline targets are based on international experience and also the initial evaluation of the M606/M62 scheme. The performance of schemes will vary depending on the level of uptake by users and how compliance and enforcement is addressed.

The evaluation framework is provided in Table 3.1:

Table 3.1 HOV Gate Evaluation Framework

Objective	KPI	Data Source	Target Performance	
			Qualitative	Quantitative**
Journey time savings	Travel time difference between HOV and GP lanes*** Impact on GP lanes	Automatic traffic counts (ATCs) or loop detectors to understand average traffic speeds	HOV travel time is less than GP travel time. Travel time difference must be significant enough to avoid 'empty lane syndrome' No decline in GP level of service	Between 10% and 20% travel time saving
Person Throughput	Journey time standard deviation	Automatic traffic counts (ATCs) or loop detectors to understand average traffic speeds	HOV journey time should be more reliable than General Purpose (GP) journeys	75% or greater reduction in speed deviation between HOV and GP lane
HOV Lane Utilisation	Average vehicle occupancy (AVO) Proportion of HOV vehicles Total person trips	Vehicle occupancy surveys*	Increased AVO Increased proportion of HOV Increased total person trips	More than a 2.5% increase
Overall Corridor Efficiency	Per-lane efficiency of total corridor	Automatic traffic counts (ATCs) or loop detectors	Increase the efficiency of all lanes	20% or greater increase for 'add a lane' No decrease from 'take a lane'
Compliance levels	Violation rate	Vehicle occupancy surveys*	Low violation rates	No more that 20% violation
Safety	Accident rate	Accident records	No increase in accident rate or severity	-

*The most appropriate method for collecting vehicle occupancy data is discussed in Chapter 4.

** Quantitative targets are based on a review of international al experience (US and Australia) and early evaluation of the M606/M62 scheme.

*** ATC loops provide a spot speed and though this can be converted to a journey time it is unlikely to be sufficiently accurate to be able to distinguish between the speeds in the GP & HOV lane. More ATC loops on the link will help. The loops in the HOV and GP lanes will need to be separate. ANPR data would be the ideal.

3.2.2 Prepare Design Options

To understand the relative advantages and disadvantages of the scheme proposals a range of different scenarios should be considered for design options. The strengths and weaknesses of each option will relate to the priorities in the scheme location and local demographics and the existing journey types, mix of vehicle class and any existing network management issues.

Each design option should present the extent to which it is likely to meet the objectives of the evaluation framework.

The options considered for the M606/M62 scheme are presented in the Scheme Development and Appraisal report (see Appendix E).

3.2.3 Determining the operating regime

US experience suggests that for some schemes it may be appropriate to define certain hours when the scheme is in operation. For example the scheme could operate during peak time only to achieve the optimum benefits to all users. Consideration should also be given to whether the required occupancy should be 2+ or 3+ and which other vehicles should be allowed to use the lane, to achieve the scheme objectives.

It is recommended that the operating regime is launched at its most stringent level to enable future changes that allow more vehicles to use the lane. Schemes in the US that have increased occupancy requirements or excluded certain vehicles at a later stage have met similar public opposition to 'take a lane' schemes. The risk of empty lane syndrome is considered to be preferable to a scheme that does not deliver adequate journey time savings for HOV.

3.2.4 Undertaking Transport Modelling Assessments

The scheme should be modelled to understand the extent to which it will meet scheme objectives and should be compared with existing road layouts and other potential TDM solutions. Local conditions should be considered when deciding which periods it is appropriate to model, for example, for a scheme close to a major retail centre it would be prudent to model the Saturday or Sunday peak as well as modelling the AM and PM peak periods.

Scheme sponsors must involve TAME in the economic assessment of schemes. TAME will provide the necessary assessment approvals. The Agency's PAR process should be used for HOV schemes costing < £10m.

The modelling outputs should be reviewed against the KPIs, for example, to determine if the proposed scheme will result in a sufficient journey time saving that will provide an incentive to car share.

3.2.5 Develop a compliance strategy

To ensure that the benefits of the HOV scheme are maintained, a compliance strategy must be planned for from the outset. It will be necessary to assess the implications of varying levels of compliance on the schemes performance.

Initial occupancy surveys were carried out on the M606/M62 in July / August 2008 after the HOV lane opened. At that time the compliance rate was 83%. Further occupancy surveys were carried out in October 2008 when the observed compliance rate ranged between 61% and 74%. From the latest survey (April 09) the compliance rate had stabilised around 64%,

The targeted Journey Time Savings (JTS) and Vehicles per Hour (VPH) benefits were still being maintained.

The US experience has illustrated the extent to which occupancy requirements can vary according to local demographics or enforcement techniques. For example in Miami compliance of HOV schemes is around 40% indicating that there is a lack of understanding of the scheme. In California, where HOV facilities have been in place for a longer period and the local population is habitually car sharing, compliance is around 90%. The Californian HOV facilities are however enforced with large financial penalties.

Experience at the M606/M62 scheme, relying only upon signage to encourage compliance, has experienced compliance levels falling to 64% as at end 2009.

To minimise the risk of this, the aim should be to make the HOV gate as self-enforcing as possible through the provision of signage, design, communication and education of road users.

The Agency is still considering its policy on required compliance levels for HOV.

3.2.6 Develop an outline monitoring and evaluation strategy

At feasibility stage a programme should be set out for the ongoing monitoring of the scheme. The outline monitoring strategy will reflect the objectives and KPIs in the evaluation framework above, and use the same data sources.

It is important to remember that monitoring of occupancy levels falls outside of the usual scheme monitoring processes and the costs for collecting accurate data will need to be considered in advance. Occupancy data was not collected initially for M606/M62 scheme, so the increase in car sharing as a result of the scheme is unknown. Refer to the monitoring strategy for further details.

3.2.7 Develop an outline communications and marketing strategy

Because communications and marketing are key to the success of an HOV scheme, a strategy must be developed to ensure that a resource budget is allocated for this work.

Sponsors should consult with their Communications Business partner to develop a tailored Communications Plan for the HOV scheme. Detailed recommendations on the techniques to consider are provided in chapter 6.

Early engagement with your regional press or communications officer is also recommended to develop an appropriate communications and marketing strategy.

The exact combination of media work, special stakeholder events, or use of existing marketing platforms in the area will be refined as the engagement work on the project progresses. However at the feasibility stage the following should be planned for in outline:

- National awareness raising (e.g. via national news papers articles and radio interviews);
- Local advertising (such as road hoardings, adverts in local press and radio); and
- Marketing targeted at local traffic generators (such as employer road shows and promotion of car sharing schemes).

3.2.8 Develop Outline Costing

To develop the outline costs of the scheme it will be important to consider the range of costs detailed above that may be incurred in addition to standard highway scheme costs. For example:

- Resource costs for engagement and promotional work; and
- Monitoring costs that are outside of usual processes such as manual counts.

3.2.9 Undertake Appraisal

To carry out an appraisal, project sponsors need to follow the DfT's transport appraisal guidance (WebTAG) and in particular Unit 3.5 (see Appendix E). In particular estimates of the average journey times for both HOV and non-HOV traffic for the do-minimum and do-something cases will be required. The TAME group should be engaged and their advice sought as early as practicable due to the differences of a HOV gate scheme compared to other schemes. Where schemes involve the use of the hard shoulder, then TAME's advice should be sought about the necessity to assess any changes in journey time reliability this may create.

An additional benefit may be an estimate of how much the scheme (in synergy with adjacent travel plans) could reduce actual trip rates by increased occupancy or use of non-car based mode.

If the HOV scheme is to be progressed to the detailed design stage the proposal will need to demonstrate a good Benefits/Cost Ratio (BCR) performance.

In addition to the BCR estimate, the business case can be enhanced by estimating the impact on the NDD Reliability Target.

The scheme appraisal of the M606/M62 scheme is contained in chapter 9 of the Scheme Development and Appraisal report (see Appendix E).

3.2.10 Identify funding sources

Most HOV schemes will fall into the local network management schemes (LNMS) funding category, and so will compete with alternative, more conventional interventions for LNMS funding. Note that sponsors will need to follow existing PAR and Value Management processes.

Additional funding sources should also be explored, such as development funding secured via Section 106 or Section 278 agreements.

3.2.11 Factors influencing the decision to proceed to detailed design stage

The outcome of the feasibility assessment (including PAR and Value Management) will influence the decision to proceed to the next stage which is to prepare the detailed design.

At this point a quantitative case needs to be presented that demonstrates how the scheme will meet the objectives of HOV gate schemes. At this stage it will also be possible to make an estimate of how likely the scheme is to meet the quantitative targets outlined in the evaluation framework.

The decision will also be informed by the extent to which the scheme will meet the specific local network management issues in the scheme area, and how any other potential schemes that are being put forward may also provide solutions for the area.

4. Detailed Design Considerations

The layout of all HOV schemes should be designed in accordance with relevant standards from the Design Manual for Roads and Bridges (DMRB), particularly those relating to highway and junction design. Because HOV is a new concept there may be a requirement to apply for departures from standard.

The responsibility for identifying circumstances where departures may be appropriate rests with the designer and a clear and adequate justification for not adopting the full standard would need to be submitted including how the benefits of a proposed departure would outweigh any adverse impacts. The requirements regarding departures from standards given in GD 1/08, on the Departures Approval System (DAS) (HA staff only have access to this), WebDAS (for suppliers with access to this system on the HA extranet) or the departures applications Word form.

Specific detailed design considerations that are pertinent to HOV schemes are outlined below:

4.1. Signage and Road Markings

Designing for compliance

It is important to ensure compliance and enforcement have been taken into consideration and designed into your scheme through use of signage. Development of an intuitive scheme will influence travel behaviour and maximise compliance.

Signage must be clear and unambiguous, and there will be a mix of regulatory signage which is essential for enforcement of the scheme and directional signage to aid driver navigation.

Regulatory Signage

Signage for HOV infrastructure is not included in the Traffic Signs Regulations and Signal Directions, 2002. Therefore, signs need to be authorised on a case by case basis to ensure that they are lawful.

Draft example signs for HOV have been prepared by the DfT and are being continuously updated. Therefore, HOV signage for new schemes should follow an internal authorisation procedure which is coordinated by the Agency Signs Team. A pro forma is available to apply for new HOV signage, which requires signage for whole schemes to be applied for at once, rather than applying for individual signs. The Signs Team will liaise with DfT to obtain sign off and provide a response to the scheme manager.

The Distance between signs required to comply with legislation will depend on the road class and traffic speeds, and current Design Standards should be referred to as a starting point.

Example signage is provided in Appendix A, which is taken from the M606/M62 scheme. The specification for the M606/M62 scheme signage is provided in Appendix B. The technical drawing to provide example distances between signs.

Although these have been implemented, they are still non prescribed signs. Until signage for HOV is included in formal guidance, signage for all new schemes must be authorised by the DfT.

An example road layout including suggested locations for signage is also provided in Appendix B.

VMS

VMS can also provide additional benefits to HOV schemes, for example:

- To provide notice of road works when HOV schemes are being built, and the planned opening date; or
- To provide better driver information in the operation of dynamic HOV schemes

US experience stresses the importance of collecting accurate real time journey time data for promotion purposes via VMS. Accurate JTS data is not available for all of the US HOV schemes, because loop detectors are not always included in the design. The implication is that real time travel times cannot be used as a marketing tool.

Although US experience promotes the benefits of designing real time monitoring equipment into new schemes the Agency has not yet confirmed their policy on the use of VMS with HOV Schemes.

The use of VMS is limited to situations where HOV gate facilities are dynamic according to traffic conditions (for example ramp metering) to support variable information to drivers. VMS cannot currently be used to support the of HOV gates if operation is permanent or at fixed operating times.

If dedicated VMS (VMS which can only display HOV related messages and nothing else) are installed to support a HOV scheme then a suitable message set may be developed to support the schemes. For example, consideration might be given to using VMS to provide live travel updates of the potential journey time savings of the HOV lanes.

Further work will be required to agree a policy on the use of VMS to promote JTS for HOV.

4.2 Enabling Enforcement

The order of priority for measures to achieving compliance is outlined below:

- **Engineer.** Intuitive design and physical segregation with barriers will generate increased compliance.
- **Educate.** Informative publicity will encourage good understanding and reduce misuse of schemes.
- **Encourage.** Targeted measures will educate offenders at the point of use, perhaps by letter or by police officers warning errant drivers on site.
- **Enforce.** Enforcement of the law and use of penalties is the last resort.

A regime for monitoring and enforcement of the HOV scheme should be included in the scheme design. This is in part to assist in the identification of the level of compliance and hence 'lock in the benefits' that were identified in the scheme objectives. Failure to have an enforcement regime in place could cause the effectiveness of the HOV scheme to deteriorate due to high violation rates and consequently reduce the advantages in terms of influencing travel behaviour or journey time savings.

Manual enforcement options

The majority of US examples of HOV gate rely on policing to enforce compliant usage of schemes, and experience suggests that consideration should be given to this form of enforcement for the first pilot schemes. This is because manual enforcement has the strongest impact for the first scheme and sets a precedent for future compliance.

However, in the UK it is unlikely that police enforcement would be feasible. Experience gained during the M606/M62 scheme has highlighted that Police are not obliged to enforce schemes that are controlled by experimental Traffic Regulation Orders. The Agency has therefore needed to rely on education and encouragement to maximise compliant use of the lane.

Other enforcement options which have proven successful in the US include:

- Linking to in car sensors (in most cars for air bag activation)
- Including space for motorbike police to enter segregated lanes.

In Europe, the most successfully enforced schemes are physically segregated along the whole length of the infrastructure. For example, HOV lanes are introduced in the central lane, with physical barriers either side.

Designers should consider how the scheme is going to be enforced in the detailed design, for example, where space may be needed for enforcement vehicles. This could include a refuge where enforcement personnel can pull vehicles over and park safely off the carriageway. It would also be prudent to include ducting for future electronic surveillance equipment to be incorporated.

A summary of options for enforcement are provided in appendix C.

Technological Enforcement Options

New technology is becoming more widespread that can to monitor occupancy levels within vehicles.

The Agency is considering options to encourage compliance on the M62/606 including potential uses of technology. An automated enforcement system is unlikely to be available in the foreseeable future.

Further policy on the use of technology will be prepared once the effectiveness of the technology and its potential to provide data for enforcement is fully understood.

Technological solutions for enforcement are also being trialled in the US and no clear solution has yet been identified that is both accurate and considerate of traveller experience.

At this stage a detailed monitoring and evaluation strategy must be prepared to ensure that the schemes performance will be accurately be reported and evaluated.

4.3 Safety

All schemes will be subject to usual Road Safety Audits in accordance with HD19.

However special consideration should be taken to intuitive design, because many drivers will not be familiar with the concept of HOV. The study must therefore consider the physical requirements of scheme design such as visibility and road speeds, advanced signage as well as signage and road markings along the lane itself.

For longer segregated HOV lanes schemes, consideration should be given to how traffic would pass a broken down vehicle. Possible solutions include emergency refuge areas; provision of a hardened verge or provision of a carriageway of sufficient width to allow one vehicle to pass another.

The safety record for the M606/62 scheme is reported in the Evidence Base to support the Impact Assessment of implementing a Permanent Traffic Regulation Order (see Appendix E).

5. Scheme Marketing and Promotion

Although engagement with stakeholders will have been ongoing throughout the development of the scheme proposals and an engagement strategy produced during the development of the feasibility of the scheme (section 3.2.7), in the lead up to the scheme launch it will be important to develop a separate campaign that is specifically targeted at the public. The campaign should aim to influence public opinion and increase the level of car sharing.

The effective delivery of the campaign will be key to the success of the scheme and will also affect the wide scale perception of the HOV concept. The wide scale perception of HOV may have a long lasting influence on the success of future HOV schemes across the country. In the US, public opinion has had a strong impact on political issues surrounding HOV and has affected policy making in some areas.

Further information on this subject can be found in the paper North American Experience with HOV Lanes (see Appendix E).

5.1 Timescales

A carefully timed promotional campaign should be developed that targets potential scheme users. By targeting messages to particular groups or land uses at appropriate times, uptake and compliance of the scheme can be increased.

The campaign must ensure that initially the public understand the concept of the scheme, and later how it will benefit them. An example campaign is provided in Appendix C that shows the activities to consider in the year leading up to the scheme launch date.

Target Audiences

Table 5.1 illustrates potential target groups that would not always be including in usual scheme marketing and possible ways to access these groups.

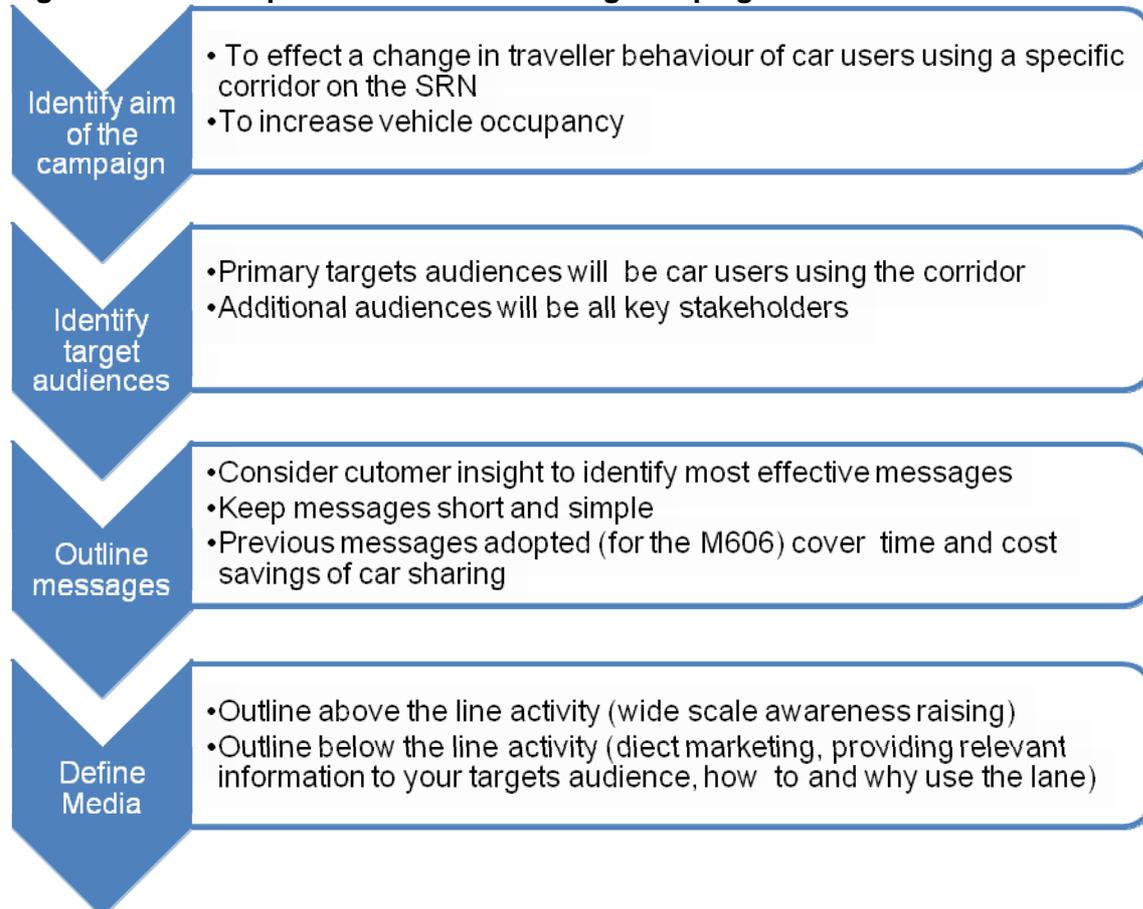
Table 5.1 Engaging Stakeholders

Stakeholder Group	Media
Business Community	Meetings with major employers Local business networks and their publications
Schools, Colleges, Universities	School visits, presentations, School Travel Plans
General Public	Local Newspapers, community notice boards and events.
Traffic volumes from one off events	Tourist boards, tickets, event programmes and other printed media

5.2 Techniques

A suggested approach based on the promotions delivered for the M606/M62 scheme is outlined below in Figure 5.1. The full M606/M62 Marketing Strategy is also available (see Appendix E).

Figure 5.1 Outline promotion and Marketing Campaign



The list below outlines the media adopted by the Agency on the M606/M62 scheme. These forms were chosen because of their high visibility impact and cost efficiency.

- Radio:
 - Advertisements
 - Community Messaging
- Bus Rears:
 - Cover routes along commuter corridor
- Hoardings / Large format posters:
 - Area around junction
 - 1 mile radius of junction
- Petrol Station Forecourts:
 - Focus on commuter routes
 - Consider use of petrol pump nozzles or posters
- Event programmes and tickets:
 - Consider other relevant traffic generators on the route and explore options to advertise in their printed media.

Other forms of media and activities that were also considered for the M606/M62 are:

- Publish construction milestones in local press
- Use of Agency leaflets to explain how the scheme works and the benefits of using it
- Provide information on car sharing to local employers
- Use of the Agency Website
- Use VMS
- Prepare mobile exhibits to use at events on a local and regional level

Develop and Promote Car Sharing

The introduction of new measures accompanied by promotion can also boost usage of the HOV scheme. For example, organised van pooling / minibuses for commuters, has boosted the effectiveness of numerous US HOV schemes in the US.

Evidence from the United States suggests that thorough planning should be undertaken to understand which journeys can be shared by plotting journey origins. This activity can help to inform where car share schemes should be set up and promoted.

6. Implementation Phase

Construction of the scheme will be in line with normal processes however the following additional legal considerations will need to be taken for HOV schemes.

6.1 Legal Considerations

Road Traffic Regulation Act, 1884

Orders for HOV schemes are prepared under Road Traffic Regulation Act 1984. They can be made either under section 9 (Experimental Traffic Orders) or 17 (Permanent Orders for Special Roads).

Enforcing Contravention of Traffic Regulation Orders (TRO)

Contravention of orders made under Section 17 (Permanent Orders for Special Roads) are defined as guilty of an offence and subject to a Fixed Penalty Notice (MW10 Contravention of Special Roads Regulations (excluding speed limits). Section 17 of the Road Traffic Regulation Act therefore offers specific powers which are not open to challenge.

However, under section 9 (Experimental Traffic Orders) are not defined as special roads and it is therefore difficult to apply a penalty under MW10. It is therefore very difficult to enforce compliant use of HOV schemes before the TRO is made permanent.

If there is full confidence that the scheme will operate satisfactorily then a permanent TRO could be made at the outset. If there is some uncertainty about the scheme, such as its operation or benefits, then an experimental order may be used. Experimental orders can be introduced for a period of six months, extendable up to a maximum of 18 months.

After the experimental period, the scheme should be made permanent or withdrawn. It is worth recognising that the costs of implementing a HOV scheme can be substantial (as can scheme removal) and therefore scheme objectives and modelled benefits can be influential when considering the relative merits of an experimental or permanent TRO.

The Impact Assessment of implementing a permanent traffic regulation order on the M606/M62 scheme is available to provide an example of the preparation required to make a temporary TRO permanent.

7. Post Implementation Phase

7.1 Monitoring and Evaluation

Post Scheme Evaluation

The monitoring and evaluation of the scheme should continue post implementation, as the evaluation process is required to provide evidence of the performance of the HOV lane/gate measure against objectives and KPIs.

After implementation of the HOV scheme, the identical data set that was collected for the feasibility assessment should be collected post scheme implementation. The data should ideally be collected in the same month as the baseline surveys and compared with the baseline data. Consistency between the two data sets will provide the best opportunity for effective monitoring and evaluation.

The M606/M62 post scheme evaluation was carried out for 12 months after the scheme opened, and this timescale should also be followed for future schemes.

It should also be noted that the monitoring and evaluation for the pioneer HOV schemes will need to be more thorough than other schemes in the interim period, although requirements may be reduced as more schemes are introduced throughout the country and as their effectiveness becomes better understood.

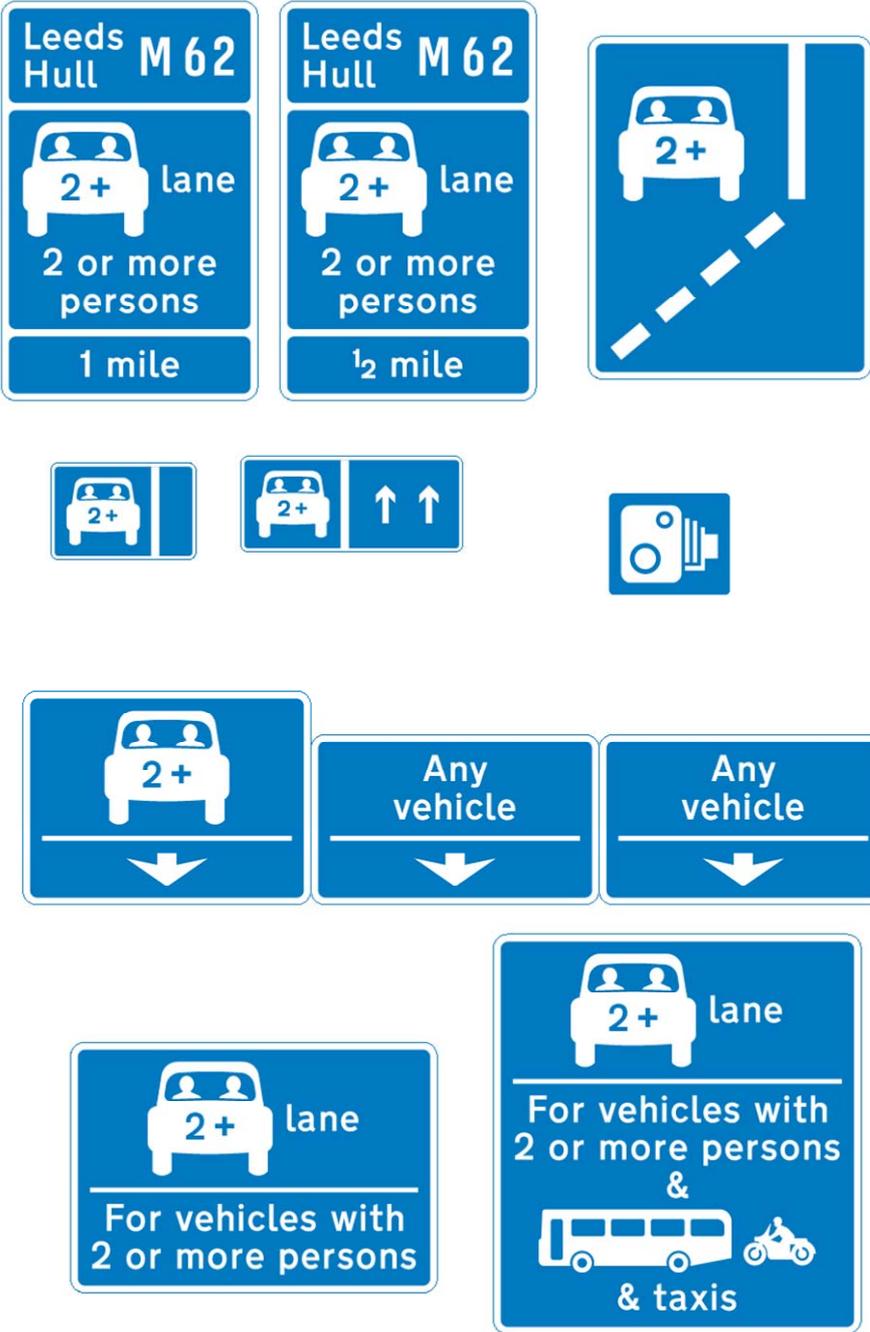
7.2 Ongoing Scheme Review and Response

The results of the scheme monitoring and evaluation will be used to inform the development of future schemes. The evaluation framework for HOV schemes will measure the extent to which the scheme has met its objectives. Performance should be reported against each KPI to understand if the qualitative and quantitative targets have been met.

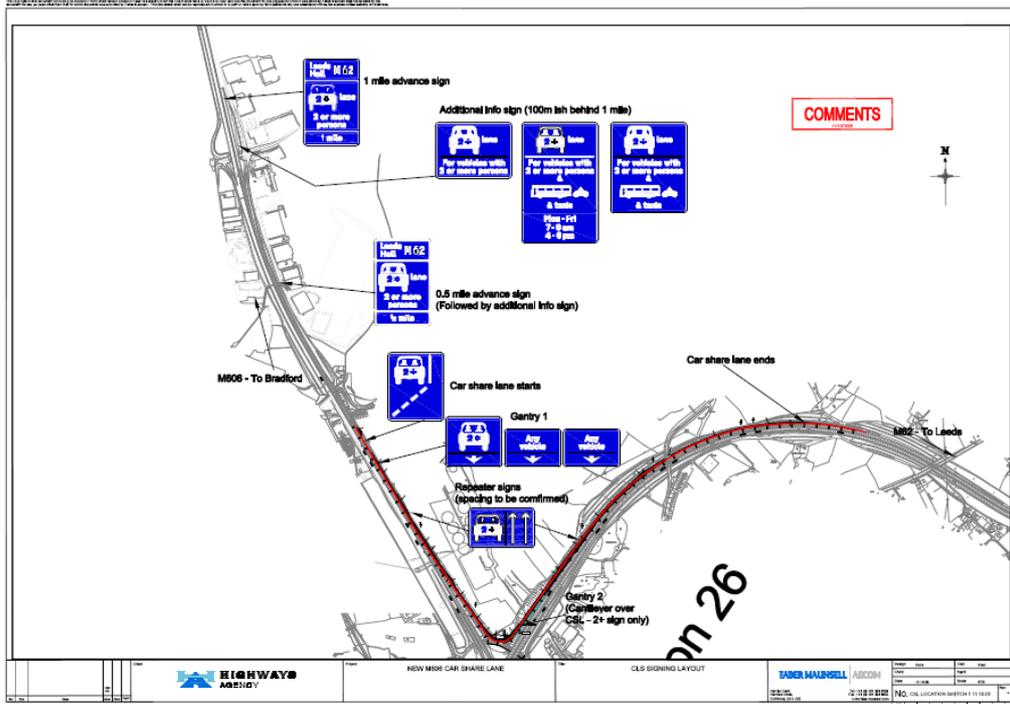
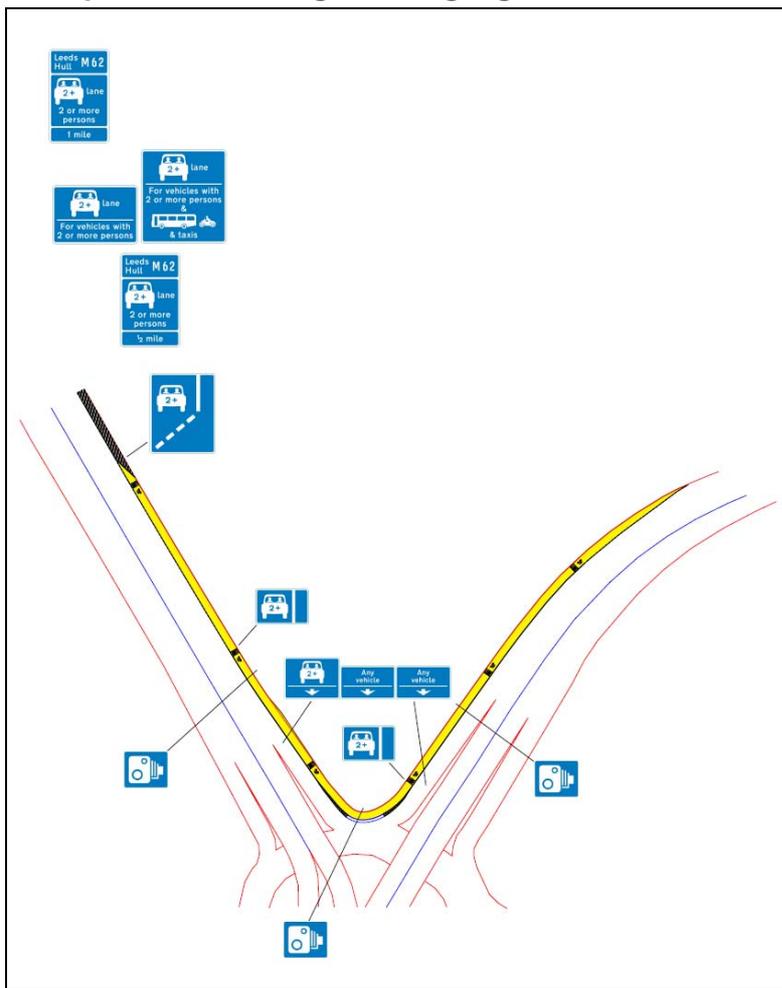
Should the scheme not be meeting its objectives, the network manager should consider what further solutions could improve the scheme, for example, to increase usage and encourage compliance.

The results of the evaluation must also be fed back to the Influencing Travel Behaviour and Managed Lanes Policy Teams so that lessons learned and accumulated best practice can be collated and shared across the Agency.

Appendix A
Example Signage from M606/M62 Scheme



Appendix B Example Road Markings and Signage Locations



Appendix C: Enforcement Options

Enforcement Type	Definition	How does it work	Positive and negative aspects
Fully Automated Enforcement	Use of technology to determine the number of occupants without the need for human supervision or operator intervention	The system can be completely external to the vehicle or a combination of in-vehicle and external systems such as in-car transponders and roadside transceivers. There is potential to link automated enforcement to traffic signals in response non compliance	Technology is still being trailed and the effectiveness is not yet fully understood. Not type approved for use in the UK.
Semi-Automated Enforcement	Similar to a fully automated system except that an operator determines occupancy and detects violations.	The location of the operator can be sited near the HOV lane / gate (such as in a manual system) or at a central control room.	Relies on trained operators being able to accurately determine vehicle occupancy using the images.
Manual Enforcement	On site human Resource is deployed to monitor, identify and tackle users of the HOV lane / gate that appear to be in violation of the Order.	By including suitable observation points at the entry and exit to the HOV lane / gate it allows enforcement vehicles to monitor abuse of the scheme.	This type of enforcement provides a high level of visual deterrent to offenders. Immediate opportunity to educate offenders. Expensive, due to the cost of dedicated enforcement officers or an agreement with the police force.
Self Enforcement	The users of the HOV lane / gate and the motorway/ road are responsible for ensuring compliance through a self-policing strategy.	Identified infringements are reported by the public to a control centre operator. A vehicle license check is then performed and a literature pack is mailed to the owner of the vehicle, containing information on proper use of the HOV lane.	Consideration would have to be given in the UK to the driving regulations under the Road Traffic Offenders Act. For example , use of mobile phones when driving.

Appendix D: Example Marketing Timescale

Table 7.1 Outline Marketing Plan

When	What	Objective	How
1 year prior	Raise awareness	Raise awareness of the existence of the HOV scheme, providing context to a wide audience	National level news: Newspapers, radio interviews, HA website news
6 months prior	Provide information	Ensure that the local catchment population of the HOV scheme understand: <ul style="list-style-type: none"> • How it works • What to do Key messages should also include: <ul style="list-style-type: none"> • Time savings • Shortcuts • Cost savings from sharing cars 	Local marketing: Advertisements in local newspapers and on local radio Road hoardings Distribute fliers with details about the scheme
Weeks leading to launch	Promote benefits	Promote car sharing and use of the HOV scheme for specific journeys that are relevant to the target population.	Targeted marketing: Engage key destinations of road users, employment sites, leisure sites Promote specific advantages linked to popular local journeys, and promote to specific audiences e.g. Promote car sharing for commute to large employers, or family days out at the weekend.
Ongoing	Provide reminders	Maintain user levels Remind of the benefits Respond to compliance issues	Maintenance: Repeat previous messages to ensure users maintain new behaviours

Appendix E: Bibliography

No	Document	Where to find document
1	M606/M62 Marketing Strategy	If you require copies of these documents please forward to your HA contact.
2	Feasibility study from the M606/M62 scheme	
3	Monitoring strategy for the M606/M62 scheme	
4	M606/62 Scheme Development and Appraisal Report	For HA staff please refer to the accompanying CHE memo.
5	Impact Assessment of implementing a Permanent Traffic Regulation Order	
6	North American experience of HOV lanes	
7	Department for Transport's transport appraisal guidance (WebTAG) – Reference Unit 3.5	Department for Transport website

Appendix F: IAN 129/10 Travel Demand Management Guidance - High Occupancy Vehicle Gates in English DBFO schemes

When used on the M25 DBFO Scheme, this IAN is to be amended as follows:

Para No.	Description
1.5 Flowchart: Scoping	After "Senior Management" insert "• Department's Nominee" After "MAC" insert "• Design Build Finance and Operate Company (DBFO Co)"
1.5 Flowchart: Feasibility assessment	Delete "or Design Build Finance and Operate (DBFO) Contractor" and insert " /Department's Nominee and DBFO Co"
1.5 Flowchart: Detailed Design	Delete "MAC," and insert "DBFO Co, MAC, Department's Nominee or"
1.5 Flowchart: Implementation /Build	Delete "MAC," and insert "DBFO Co, MAC, Department's Nominee or"
3.2.10	Delete "development funding secures" and insert "DBFO Co funding or development funding secured"
4	Delete "where departures" and insert "where Alternative Proposals or Departure from Standard as the case may be," Delete "a proposed departure" and insert "a proposed Alternative Proposals or Departure from Standard, as the case may be" Delete "The requirements applications Word form."
4.1 Regulatory Signage	In the third paragraph delete "sign off" and insert "authorisation" In the fifth paragraph delete "DfT" and insert "DfT and submitted as Design Data to the Department's Nominee under the Review Procedure"
4.2	The interpretation principle to change "Engineer" shall not apply
6	The interpretation principle to delete "implementation" clauses shall not apply
7.2	Delete "network" and insert "scheme" Delete "Policy Teams" and insert "Policy Teams via the Department's Nominee"

When used on all other English DBFO Schemes, this IAN is to be amended as follows:

Para No.	Description
1.5 Flowchart: Scoping	After "Senior Management" insert "• Department's Nominee" After "MAC" insert "• Design Build Finance and Operate Company (DBFO Co)"
1.5 Flowchart: Feasibility assessment	Delete "or Design Build Finance and Operate (DBFO) Contractor" and insert " /Department's Nominee and DBFO Co"
1.5 Flowchart: Detailed Design	Delete "MAC," and insert "DBFO Co, MAC, Department's Nominee or"
1.5 Flowchart: Implementation /Build	Delete "MAC," and insert "DBFO Co, MAC, Department's Nominee or"
3.2.10	Delete "development funding secures" and insert "DBFO Co funding or development funding secured"
4	Delete "departures from standard" and insert "an Alternative Proposal" Delete "where departures" and insert "where Alternative Proposals" Delete "a proposed departure" and insert "a proposed Alternative Proposal" Delete "The requirements applications Word form."
4.1 Regulatory Signage	In the third paragraph delete "sign off" and insert "authorisation" In the fifth paragraph delete "DfT" and insert "DfT and submitted as Design Data to the Department's Nominee under the Review Procedure"
7.2	Delete "network" and insert "scheme" Delete "Policy Teams" and insert "Policy Teams via the Department's Nominee"