IMPLEMENTING A SKIDDING POLICY IN LONDON

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ABSTRACT

The maintenance and management of the road network in London is the responsibility of 33 London Boroughs and Transport for London. The boundaries between boroughs are largely historic and the road user doesn't distinguish between different Borough Councils road networks or the more strategic TFL network. Under the guidance of the mayor's transport strategy each borough manages their own road network to locally derived policies. There was a desire to implement a London wide skidding policy on the principal (A) road network that could be applied for each Borough and TFL and ensured that standards applied were broadly comparable. A parallel aim was to improve risk management for the Borough Councils in managing skid resistance across the network to produce a more integrated strategy for safer roads.

Lead by a steering group W.D.M. limited were commissioned to:

- Review the accident and skidding resistance on the network;
- Develop policy and guidance documents;
- Provide training;
- Prioritise sites for investigation.

The paper describes the process of developing the policy, working with the boroughs individually and collectively and how the principles have been applied across London.

BACKGROUND

London's A road network is 2156km in length, which is managed and maintained by Transport for London (TfL), and 33 Borough Councils. The TfL network includes a number of radial routes into the city, as well as some circular routes. The Boroughs, which vary significantly in size, are responsible for the local distributer roads, as well as a network of local roads serving residential and business areas. Figure 1 shows the London A road network. In addition there is the network of trunk roads and motorways that typically extend into the city that are managed by the Highways Agency.

The complexity of the governance arrangements creates difficulties in terms of consistency in standards, procurement and network management. In order to share best practice and develop common standards the London Technical Advisers Group (LoTAG) has been formed to provide a centre for professional advice and assistance for local policy development and service delivery on a London wide basis. LoTAG has a number of working groups which are drawn from the 33 boroughs and TfL. The Highway Maintenance Steering Group was set up in 1997 to identify and encourage best practice in Highways Maintenance.

Under a separate LoTAG initiative road condition surveys for the Boroughs have been coordinated by the London Borough of Hammersmith and Fulham under a programme known as ROADS2000. Under this project skidding condition data has been collected using SCRIM for a number of years. The Highway Maintenance Steering Group identified a need for a consistent approach in the management of skidding resistance across London, and where possible the development of a generic policy that can be adopted by the separate Borough Councils.

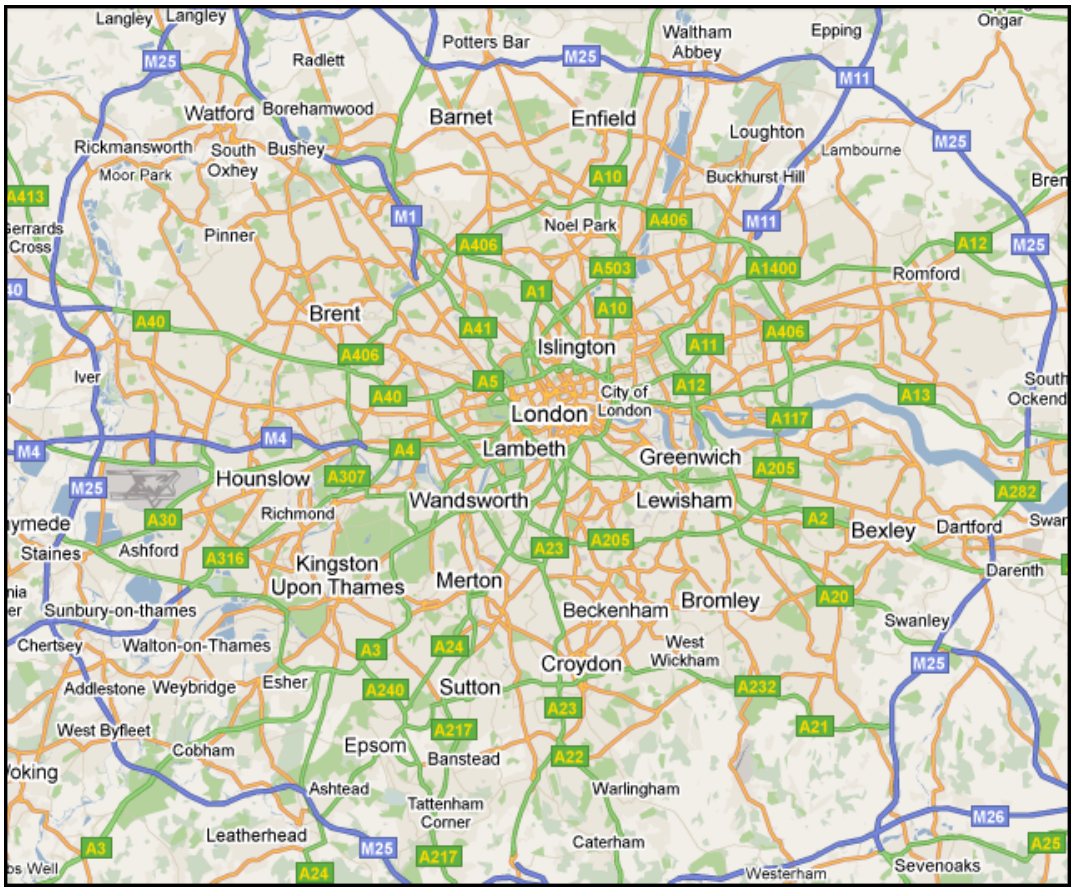

Figure 1: London's A Road network

ACCIDENT ANALYSIS

In order to develop the generic guidance for London it was agreed that a detailed analysis of the accidents occurring on the A (principal) road network be undertaken to determine the appropriate Investigatory Levels for the cities principal road network. The Highways Agency had developed Investigatory Levels appropriate for the trunk and motorway network in the United Kingdom in HD28/04. London's network is fundamentally different to the trunk road network and it was considered that a separate study was required to determine the relative accident risk and appropriate Investigatory Levels in London. The study was initially conducted separately for the TfL and the inner and outer borough networks as there was a perception that due to different traffic conditions the risk ratings may vary significantly.

Establishing Site Categories

In order to undertake the analysis the data held to describe the site categories was reviewed. The TfL network was accurately described using the HD28/04 site categories; however the site category held for the borough roads only included basic information. It was therefore agreed to complete a full site category review for the Borough roads. This was undertaken using Ordnance Survey mapping, videos and geometric data collected from SCANNER surveys in the 'Site Category Manager' software within the WDM® PMS.

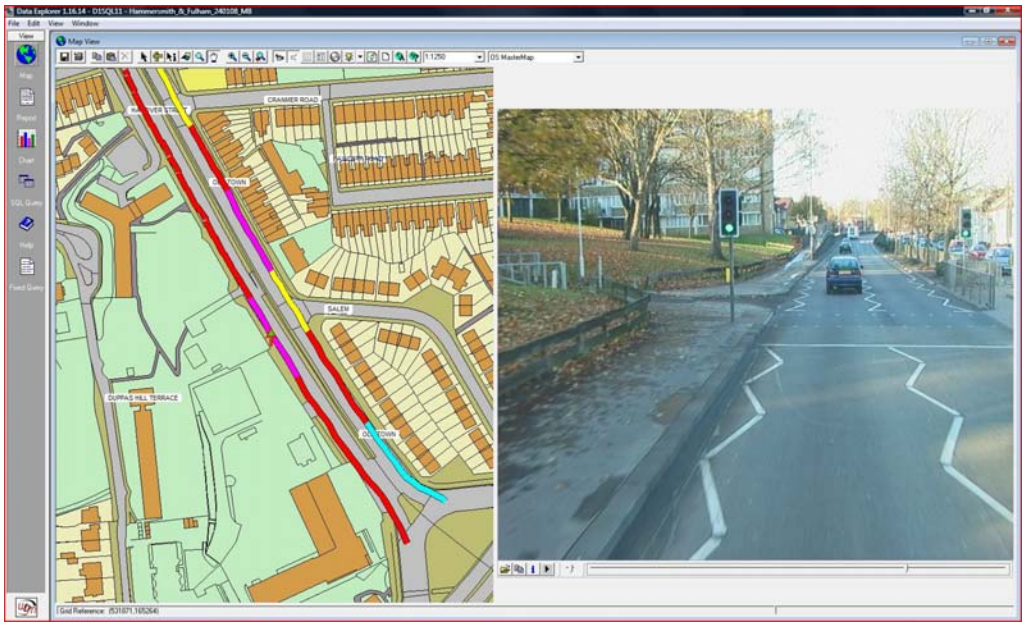

Figure 2: Site category review: details for an approach to a crossing.

The following site categories were identified:

- Single non event
- Dual non event
- Approaches to Junctions
- Approaches to Roundabouts
- Approaches to Crossings
- Gradients (5 -10% and >10%)
- Single and dual bends < 100m radius
- Single and dual bends 100m – 250m radius
- Single and dual bends 250 – 500m radius

The identification of bends by different radii represents a significant change from HD28/04. It was considered that the present of much tighter radii bends on local authority roads represents different risks to those on the trunk road network.

During site category assignment there are many locations where more than one site category is applicable, i.e. a bend on the approach to a junction. A set of priorities were established to decide which category was to be applied where multiple events occur. Approaches to crossings and roundabouts took precedent over the other site categories. The other categories were then applied in the following order:

- Approaches to junctions
- Bends
- Gradients
- Non event

Accident and traffic data

In order to assess the relative site risk ratings for the different site categories accident and traffic data was provided for the TfL and Borough networks. Over 80,000 accidents occurred on the

capitals roads over a 3 year period, of which 9500 occurred on the A road network in wet conditions. These accidents were fitted to the respective PMS networks for the boroughs and TfL. This fitting process used the grid references provided for the accidents and fitted them to the road network using section codes and chainages.

Traffic data was also provided for the network. This was used to derive the annual traffic flow per 100 million vehicle kilometres for every link on the network.

Accident rates

Accident rates could then be calculated for each site category for the various networks. Figure 3 shows the average accident rates for TfL, the Inner and Outer borough networks by site category.

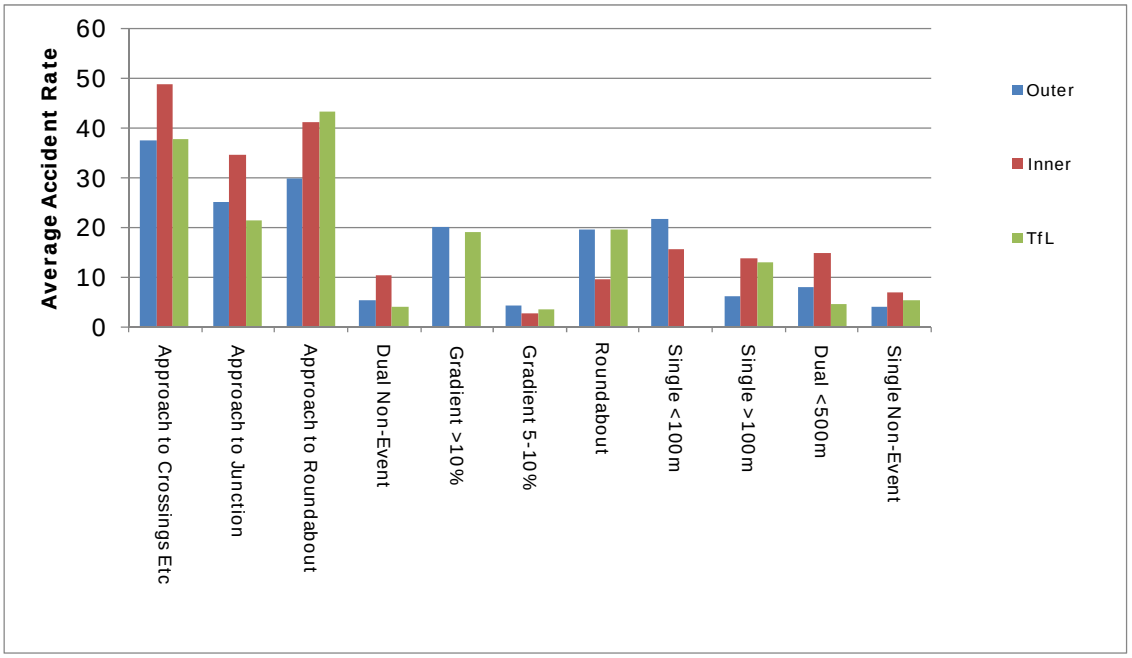

Figure 3: Accident rates by site category.

This shows that the accident rates are highest at the approaches to crossings, roundabouts and junctions. It also shows that the accident rates do not vary significantly between the 3 networks. For the purposes of the subsequent analysis the 3 networks were combined to provide a larger dataset.

Accident rates v MSSC

The data was grouped into Mean Summer SCRIM Coefficient (MSSC) bands, and the accident rate calculated for each band for each site category. These were then plotted to determine the relationship and assess appropriate 'initial' Investigatory Levels for each site category. The initial IL is the value set within the PMS before any site investigation is undertaken.

Figure 4 shows the relationship for 'dual non event', and figure 5 for 'approaches to crossings. Not all sites showed strong relationships, and for many sites the shape of the curve was fairly flat; i.e. for a reduction in the MSSC the change in accident rate was fairly small.

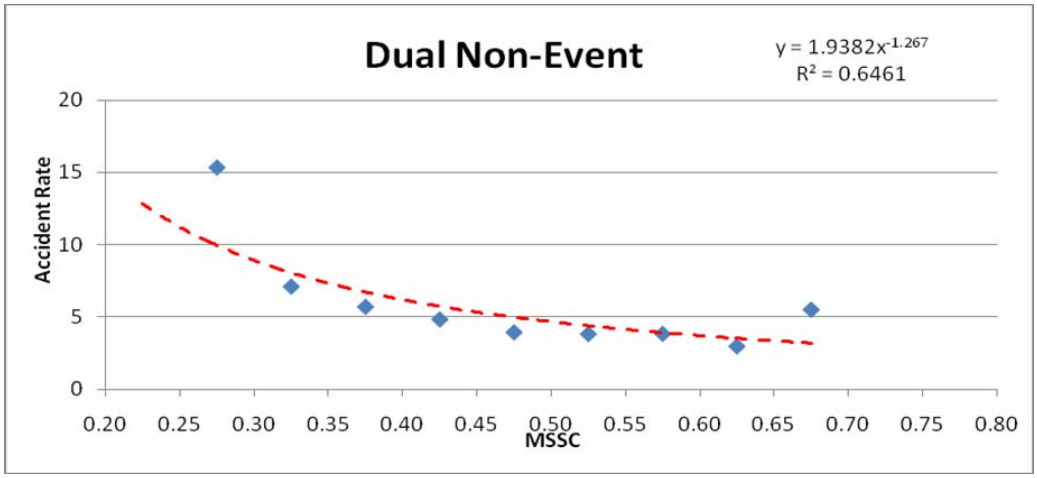

Figure 4: Relationship for dual carriageway non event sections.

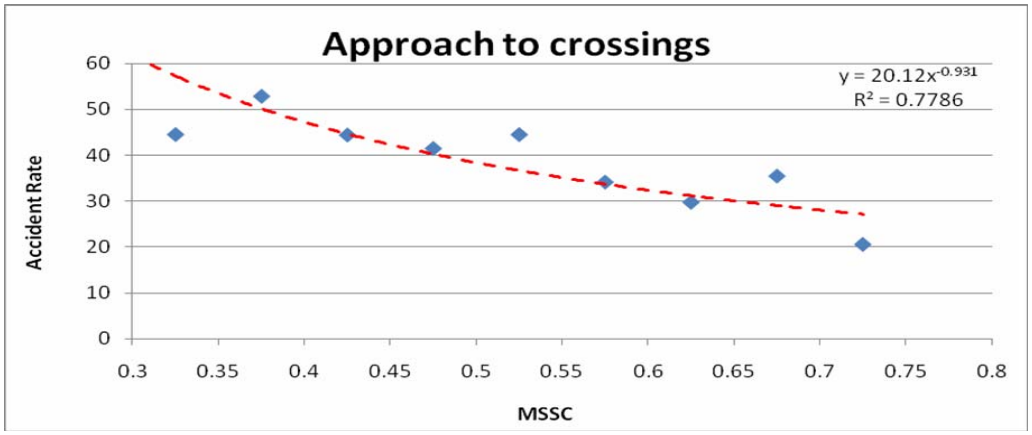

Figure 5: Relationship for approaches to crossings etc.

Using these relationships an 'initial' Investigatory level (IL) was recommended for each site category. These were derived by considering what MSSC would be required to match the background accident rate derived from the non event sections.

In the case of the 'approaches' this required unachievable MSSC values and an alternative methodology was required. After discussion with LoTAG the agreed methodology was to assess the shape of the curve and the MSSC at which the accident rate starts to increase more rapidly was identified and used as the Initial IL. Table 1 shows the initial IL's recommended.

Table 1: Initial Investigatory levels

Site category and definition		Investigatory level at 50km/h							
		0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65
A	Motorway class	Not Applicable							
B	Dual carriageway non-event			I					
C	Single carriageway non-event			I					

QL	Approaches to and across minor and major junctions,				I			
QM	Approaches to roundabouts					I		
K	Approaches to pedestrian crossings and other high risk situations					I		
R	Roundabout				I			
G1	Gradient 5-10% longer than 50m				I			
G2	Gradient >=10% longer than 50m					I		
S1	Bend radius ≥250m and <500m – dual carriageway. Speed limit>40mph				I			
D100	Bend radius <100m dual carriageway. All speeds					I		
D250	Bend radius ≥100m and <250m dual carriageway. All speeds.				I			
S2	Bend radius ≥250m and <500m – Single carriageway. Speed limit>40mph				I			
S100	Bend radius <100m – single carriageway. All speeds.					I		
S250	Bend radius ≥100m < 250m single carriageway All speeds.				I			

The Investigatory Level table shows a range of values for some site categories. This is to enable the specific IL at any site to be adjusted up or down depending on the site characteristics following detailed site investigations.

The London network skidding performance

Using the derived Investigatory Levels the reported length of network below IL is around 50%. This clearly presented significant concerns in terms of risk management with limited resources being available to implement the policy in each borough. It was therefore necessary to develop guidance on prioritising sites for investigation, undertaking investigations and to assess the potential benefits of the policy.

POLICY AND GUIDANCE DOCUMENTATION

Documentation was produced to assist the Boroughs and TfL in implementing a skidding strategy. Two separate documents were produced, a short policy document for approval by the borough councils, and a more comprehensive guidance document.

Guidance document

The guidance document is a comprehensive strategy document that describes the processes necessary to implement a skidding strategy in London. It details:

- The Investigatory Levels
- Examples of sites where the IL can be varied
- Method for prioritising sites
- Investigations (including investigatory forms)
- Benefits of implementing a skidding strategy including economic analysis
- Treatments (including prioritisation)

Prioritising sites

LoTAG were clear that the objective in implementing the policy was to reduce the number of wet accidents on the capitals roads in support of the Mayor's Transport Strategy. Having linked the accidents to the network it is possible to identify sites below the IL with wet accidents, and those without wet accidents. An approach was agreed that prioritised sites using this data that would enable the boroughs to demonstrate they have a system to identify sites for investigation. The prioritisation method is shown in table 2.

Table 2: Site prioritisation

Priority Level	Criteria
1	At least 1 wet accident and MSSC ≤ IL
2	No wet accidents and MSSC ≤ IL -0.1
3	At least 1 wet accident and MSSC is > IL and ≤ IL+ 0.05
4	No wet accidents and MSSC ≤ IL and >IL -0.1

Using this approach has a significant impact on the number of sites prioritised for investigation. Table 3 shows a typical listing of sites for a borough. It can be seen that 48.1% of the network is below the IL by length; however only 9.9% is identified as a priority 1, representing 77 separate sites. The investigation process recommended involves a preliminary 'desktop' investigation where the data for the site is reviewed, followed by a site investigation for those where the data indicates that road surface condition may be contributing to the accidents.

Table 3: sample deficiency listing summary.

Priority	Number of Sites		Length in Borough	
	#	%	Length (km)	%
Priority 1	77	8.2%	6.592	9.9%
Priority 2	71	7.6%	3.545	5.3%
Priority 3	36	3.9%	2.686	4.0%
Priority 4	315	33.7%	21.865	32.9%
Non-Priority	435	46.6%	31.674	47.7%
Total	934	100.0%	66.362	100.0%

The locations of the different sites were provided as GIS overlays, as well as using network referencing. Figure 6 shows a typical deficiency plan.

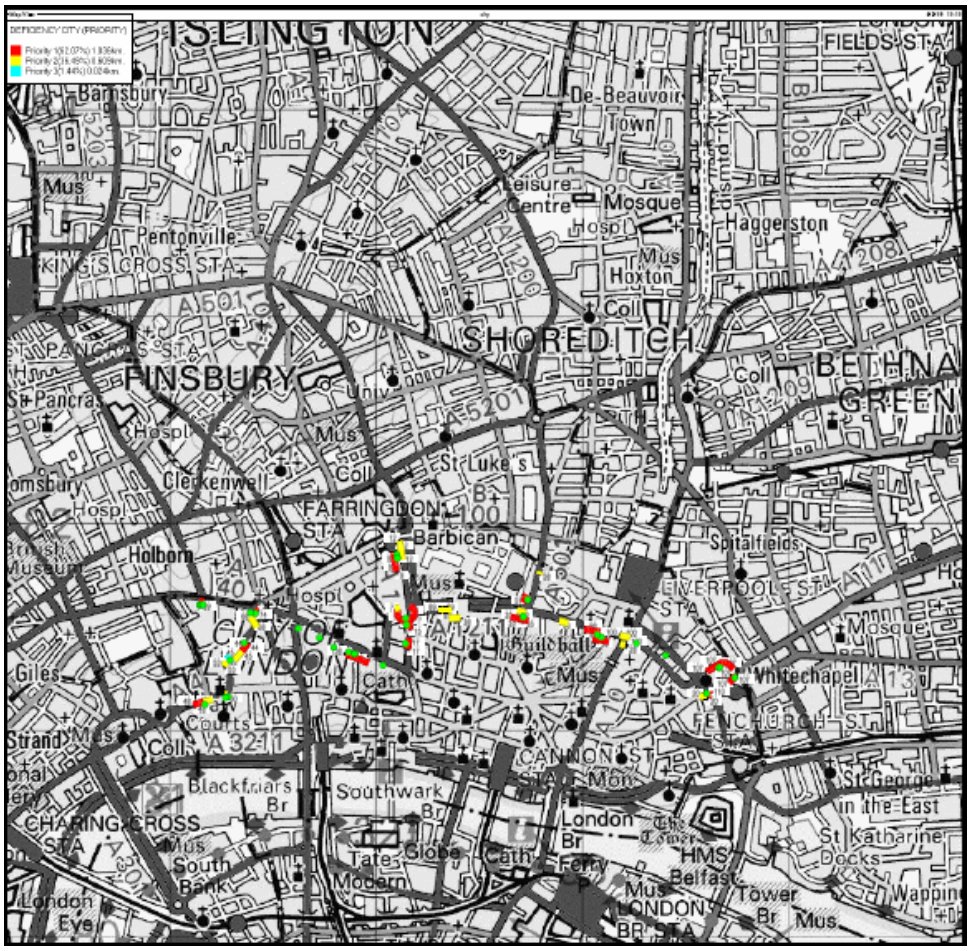

Figure 6: Sample deficiency plan

Benefits of implementing the skidding strategy

Implementing the skidding strategy would involve significant investment in improving the skidding resistance of the road surface. An assessment was undertaken to estimate the benefits of such a strategy. If all the sites under the recommended IL were treated with an appropriate aggregate it is possibly to quantify the numbers of accidents that would be saved. The Department for Transport publish Highways Analysis guidance which provides the cost of accidents to a 2005 base year. Using standard rates for different surface treatments the calculated benefits of improving the skidding resistance at selected sites is shown in table 4.

Table 4: Estimated benefits of skidding policy: Network wide

Site category	Accident Saved (number)	Benefits (10 years)	Costs (10 years)	First year rate of return(%)
Approach to Crossings Etc	827.5	£78,611,712	£37,571,415	21%
Approach to Junction	689.8	£65,535,639	£8,906,228	74%
Approach to Roundabout	54.7	£5,195,078	£771,848	67%
Dual Non-Event	32.3	£3,064,532	£2,716,434	11%
Gradient 5-10%	8.5	£810,102	£368,039	22%

Single <100m	67.7	£6,427,794	£217,977	300%
Single <250m	15.7	£1,491,754	£545,413	27%
Single Non-Event	27.4	£2,606,988	£6,979,670	4%

The cost of this strategy is prohibitive; however by using a more targeted strategy of treating those sites with the worst deficiency the revised benefits are shown in table 5.

Table 5: Estimated benefits of skidding policy: Targeted

Site category	Accident Saved (number)	Benefits (10 years)	Costs (10 years)	First year rate of return(%)
Approach to Crossings Etc	634.7	£60,301,012	£14,339,850	42%
Approach to Junction	298.3	£28,341,700	£1,503,675	188%
Approach to Roundabout	49.6	£4,711,330	£319,211	148%
Dual Non-Event	16.5	£1,562,892	£278,180	56%
Gradient 5-10%	3.6	£342,111	£59,119	58%
Single <100m	56.2	£5,336,359	£106,195	503%
Single <250m	8.4	£798,106	£123,468	65%
Single Non-Event	15.4	£1,466,800	£988,894	15%

This demonstrates the potential benefits available through a targeted approach broadly based on investigating the sites prioritised as detailed in section “prioritising sites”

Policy document

The guidance document is designed as a practical ‘tool kit’ to assist practitioners in implementing a skidding strategy. Local authorities in the United Kingdom are encouraged to seek formal Council approval for the skidding strategy. The policy document was developed as a summary of the key elements of the strategy that could be endorsed by elected members.

The policy document includes recommendations on:

- Roles and responsibilities for implementing the policy
- Survey strategy
- Approved investigatory levels
- Prioritisation of sites for investigation
- Review of effectiveness of policy

Given the concerns about the deficient lengths in some boroughs there is an Implementation Statement included in the policy. This is completed annually by the Borough Councils and sets out the various delegations to implement the policy, the extent of investigations (number of sites and how selected) and a timetable for all the activities required to successfully implement the policy.

IMPLEMENTING THE POLICY

To assist the boroughs to implement the policy support was provided through training and data analysis.

Training

LoTAG acknowledged that for the skidding strategy to be successfully implemented it was important to engage with those who would be responsible for the policy within TfL and the Boroughs. To achieve this a programme of training was provided for the Borough and TfL Engineers. Over 100 people attended the workshops in the spring of 2009.

Annual site listings

The production of site listings identifying priority sites for investigation requires significant data analysis. Listings are provided on completion of the annual SCRIM surveys which combined 3 year accident data and the annual SCRIM results. This provides a dynamic list of sites for investigation using the priorities set out in section “prioritising sites, but also ensures that those sites not investigated in any year are kept under review.

LOTAMB asset management bid

In 2008/09 LoTAG successfully bid for £1m of Department of Transport funding to implement Highway Asset Management. This was supplemented by some additional matched funding to around £3.5m over 4 years. A separate steering group; the London Transport Asset Management Board (LOTAMB) was formed to consider bids for funding. A bid was submitted to progress the implementation of the skidding strategy in London and funding received. This next stage of work will:

- Develop a pan London listing to identify the highest ranks sites across the whole of London
- Provide general and specialist training in implementing the skidding resistance policy
- Undertake reviews of selected Boroughs to assess how effectively the policy has been implemented
- Consider how to implement a skidding strategy for the other roads in London.

The pan London listing is intended to assist in the allocation of funds on a needs basis, rather than by a formulaic approach based on road length.

CONCLUSION

The project to implement a London wide skidding policy commenced in 2008. Prior to the project commencing each borough had developed individual approaches for managing skidding resistance, resulting in a fragmented approach. It was considered that this Borough lead approach resulted in inconsistency of approach and weakened the defence that any Borough had against civil and criminal cases.

The LoTAG Highway Management Steering Group set the objective of achieving a common standard across London. SCRIM surveys were being coordinated through the ROADS2000 project ensuring a common standard of surveying, and a consistency in the method of seasonal correction applied to the data. Once the data was provided to the 33 boroughs it was then used in a variety of different ways.

Through the ‘accident study’ a robust approach was developed to assign Investigatory Levels for the entire London A road network; however it was evident that this resulted in a significant length of network being reported as deficient. The boroughs did not have the resources available to undertake investigations on all the sites below IL and a method of prioritising sites was required. Through considering both SCRIM and accident data it was possible to identify priority sites where the potential benefits that could be attained by improving the skidding resistance. Details of the priority sites were provided to the Boroughs and TfL for investigation.

The process of policy approval for local authorities in the United Kingdom is important in terms of risk management and resource allocation. The development of a policy document enabled the 33 boroughs to seek member approval for a common standard. For Borough Engineers the

development of a guidance document gives a series of tools that will assist in implementing the policy in a consistent manner.

The funding available through LOTAMB provides an opportunity to embed the principles of managing skidding resistance within the asset management practices used across London, improving the safety of the capital's road network.

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AUTHOR BIOGRAPHIES

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Martin Sachs has been Head of Transport and Highways at Lambeth Council since 2004. Prior to that he worked on highways at Newham and Havering Councils. Martin was brought up in the West Midlands and attended Dudley Grammar School. From here he was awarded an Open Exhibition to read Engineering at Corpus Christi College, Cambridge., graduating in 1973. Martin subsequently (1992) took an MBA in Engineering Management at City University. Martin is currently Co-Chair of LoTAG (London Technical Advisers) Group 2, representing London Highway Authorities

Chris Kennedy

Chris Kennedy is a Chartered Civil Engineer and a Director of W.D.M. Limited a post he has held since 1985. He is responsible for Survey and Consultancy surveys. This has involved the introduction and development of highway condition surveys which are now operated on a world-wide basis, together with the development of computerised management systems to achieve cost-effective maintenance programmes. His current areas of interest include surface characteristics of roads, particularly skid resistance, and the development of Safety Policies and tools to enhance Asset Management of highway networks as well as developing budget prediction models to define service levels outcomes.

After gaining his Doctorate at Birmingham University he worked for four years at the Transport Research Laboratory where he took a leading role in development the UK Structural Maintenance Evaluation and Overlay Design Method. He then moved to the University of Plymouth, England as Head of Department of Civil Engineering before joining W.D.M. Limited.

Mark Stephenson

Mark Stephenson is a Chartered Civil Engineer and a Principal Engineer with W.D.M. Limited a post he has held since 2008. He is responsible for a range of projects undertaken for UK clients. These have involved the interpretation of highway condition surveys together with the development of tools and analysis to achieve cost-effective maintenance programmes. His current areas of interest Highway asset management, including lifecycle plans, scheme identification and prioritisation and policy implementation for clients.

He worked for twenty years at the Cornwall County Council where he was responsible for highway maintenance and construction. He represented the council on a number of national

working groups and chairs the Highway Condition Assessment Group which reports to the UK Roads Board.