Transport for London

# Transport for London
# Highway Asset Management Plan

## September 2007

MAYOR OF LONDON

Transport for London

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# Executive summary

The Transport for London Road Network (TLRN), consisting of 580km of London's main roads, has an indicative value of £5bn, making it among the most valuable assets owned by Transport for London (TfL). Almost every resident, worker and visitor in London uses the TLRN, whether as a pedestrian; on a bicycle or motorcycle; in a bus, taxi, or car; or as a goods vehicle driver. Although they are main thoroughfares for distribution of people throughout the Capital, these streets also form key social spaces: those browsing sidewalk fruit stalls or shop window displays, enjoying a snack at an outdoor café, or taking a break on a bench beside the footway are also stakeholders of the TLRN. Maintenance of this network affects the lives of millions of people.

This Highway Asset Management Plan (HAMP) has been written to provide all interested stakeholders with an overview of the policy drivers and investment decisions that affect maintenance of the TLRN. The HAMP demonstrates and informs the process of keeping the TLRN network safe and serviceable while achieving value for money. Key conclusions are identified regarding effective and efficient maintenance of these roads and associated assets, and continuous improvement actions are laid out for the future.

The UK Roads Liaison Group document, Maintaining a Vital Asset, endorsed by the Mayor of London, states that:

> Continuing growth in traffic and its attendant problems has brought an increasingly widespread recognition of the importance of highway maintenance, and the high value placed on it both by users and the wider community. Conversely, public concern is increasing about failure to invest adequately and effectively in highway maintenance and the implications of this for safety and journey reliability. Inadequate maintenance only stores up even greater problems for the future. Recent increases in investment have been welcome and effective, but a sustained long term programme of investment in maintenance of the local highway network is crucial. This investment needs to be planned, efficiently managed and supported by effective technical and management systems.[1]

Maintaining a Vital Asset lays out the cornerstone of asset management, which is a strategic approach to planning and managing investment over the whole life of the asset so as to ensure better value for money. For example, sufficient capital investment in highway assets – for instance, timely resurfacing or reconstruction of the carriageway, rather than continued patching – can achieve both a smoother ride and less traffic disruption, and do so at a lower total cost.

TfL's HAMP covers management of existing assets of the following types:

a) Carriageway and footway

b) Highway structures, including bridges, footbridges, retaining walls, subways and culverts

c) Tunnels

d) Lighting and lighting columns

e) Other assets, including traffic signs, road markings and studs; drainage; street furniture; and the green estate

The HAMP focuses on the level of service delivered by the highway assets and not on the transport system that it supports.

The HAMP explains the service management hierarchy, a framework TfL has developed to

translate Mayoral and organisational strategies into an effective and directed programme of action for the management of all highway assets. This framework draws connections from strategies to the desired levels of service for each type of highway asset (carriageways, footways, lighting, etc) and to the day-to-day activities undertaken to achieve targets set. Spending allocations are in turn derived from this framework and outcomes monitored against specific performance indicators.

The HAMP sets out the levels of service which TfL aims to provide from the physical assets themselves. Levels of service are derived from legal requirements under the Highways Act 1980 and other relevant legislation, as well as Mayoral strategies and other high-level strategic goals.

Pioneering work on asset investment modelling, especially for carriageways and footways, is presented. The broad conclusion is that if the level of capital funding is not sufficient, the backlog of carriageways and footways in a poor state will increase, as will the pressure on funding for day-to-day maintenance. In other words, an optimised balance between capital and revenue investment offers both better outcomes and better value for money in the long run.

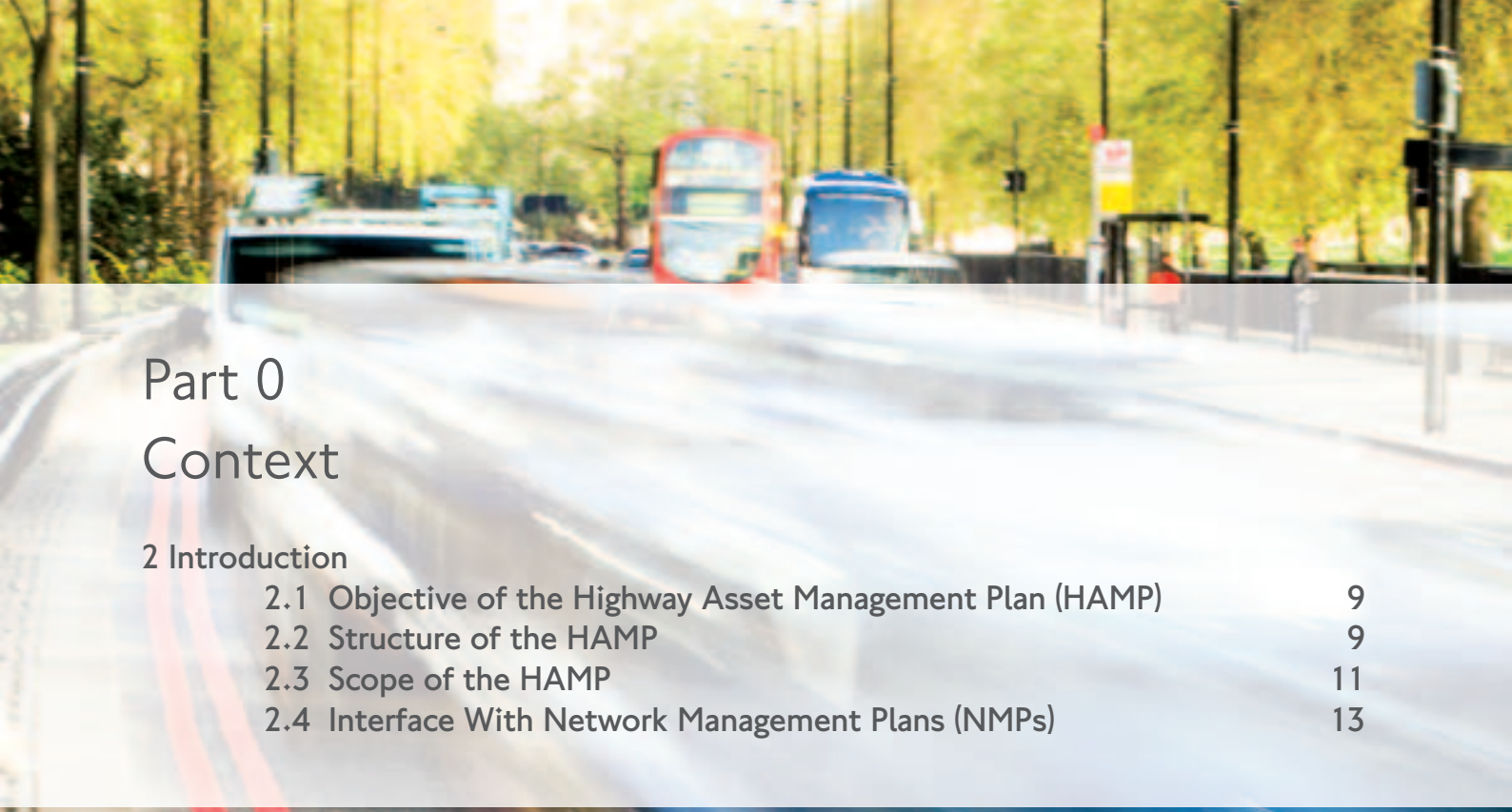
By pursuing this approach, TfL has more than halved the percentage of carriageways in a poor condition, as determined by a standardised survey, from 14.4 per cent in financial year 2002/03 to 5.7 per cent in 2006/07.

The HAMP identifies continuous improvement actions for management of each asset type and sets out a broad map for future development. A mechanism is yet to be developed for making explicit the trade-offs that have to be struck when spending limited resources on a multi-faceted asset base subject to constant wear, but the HAMP presents an indicative valuation of the TLRN assets and explains how asset valuation can be of use in planning the division of available funding among the maintenance and renewal of different types of assets.

In future, as the highway asset management process within TfL matures, later editions of the HAMP will be able to cover more thoroughly the process of reviewing and revising levels of service and targets in response to available funding. In particular, as a fuller suite of performance indicators is developed, it will become possible to carry out more sophisticated analysis of the relative impacts of different levels of service in terms of fulfilling Mayoral policies and proposals.

This first edition of the HAMP serves as a starting point for stakeholder input into levels of service in the future. In addition, further editions of the HAMP will reflect national and international best practice on the use of sustainable materials and innovative techniques. Finally, future editions will also coordinate more completely with TfL's emerging Network Management Plan framework for guiding network improvements.

**Readers are invited to comment by email at hamp@tfl.gov.uk**



# Part 0
# Context

# 2 Introduction

**Transport for London (TfL) is the integrated body responsible for London's transport system and a functional body of the Greater London Authority (GLA). One of TfL's roles is to serve as the highway authority for the Transport for London Road Network (TLRN), the Capital's network of main roads. These 580km constitute about five per cent of the total length of London's roads, yet carry one third of the Capital's vehicle traffic[2]. Most are key bus routes, most are red routes and all are important thoroughfares for pedestrians, cyclists and freight. Proper maintenance of the TLRN – including proper management of the various physical assets – is the bedrock upon which all other road transport improvement projects on that network rely, and is essential to facilitate efficient travel across the Capital.**

**The TLRN is among the most valuable parts of TfL's portfolio, with the latest network valuation approximately £5bn.**

## 2.1 Objective of the Highway Asset Management Plan (HAMP)

The objective of this Highway Asset Management Plan (HAMP) is to lay out, in a clear and transparent manner, how TfL manages the highway assets on the TLRN to keep them safe for use and fit for purpose. The term 'highway' as used here refers to the public right-of-way managed by the highway authority and to all assets (physical components) in this area. The types of assets covered in this HAMP include carriageways, footways, highway structures, lighting (including lighting columns), and other assets, such as the green estate (trees and planted and grassed areas). The HAMP is an organic document, and will be revised from time to time as necessary.

One key role of the HAMP is to make the connections between the higher-level legal and strategic context governing TfL's work (for example, the Highways Act 1980 and Mayor of London's Strategies) and the day-to-day decisions TfL makes to maintain its road network.

Following this approach of linking strategy with practice, the document sets out the levels of service which TfL intends to provide from the physical assets themselves. The HAMP explains the processes TfL undertakes to assist in providing this service efficiently and achieving value for money. In particular, the HAMP aims to explain how TfL makes the decision to replace or extend the life of an asset (through capital renewal) or repair it (as part of operational management).

This HAMP represents a set of goals towards which TfL aims to work, in order to assist it in carrying out its statutory obligations. It is not the intention of this document to set out detailed guidance for management of the streets. It should also be noted that this HAMP forms neither a part of the contracts with TfL's maintenance contractors, nor of the formal guidance for TfL staff in interpreting such contracts. The contents of the document are in no way intended to be, nor should they be understood to represent, legally binding commitments.

## 2.2 Structure of the HAMP

The main body of the HAMP consists of three parts, plus a concluding chapter.

Part I provides the background, Part II explains the strategic context, and Part III addresses how TfL makes the decisions to replace or repair highway assets.

**Part I: Background on asset management**
The main body of the HAMP begins with a background chapter (Chapter 3). This chapter first explains what asset management is, and then discusses the wider context for, and national drivers behind, active management of highway assets and preparation of a HAMP reflecting this. It covers the specific advantages of using an asset management approach for the TLRN. After presenting the main types of expenditure incurred in the management of TfL's highway assets, the chapter explains how asset management is used to make core budgetary choices. Finally, this chapter presents, in more detail, the philosophy adopted in this HAMP.

**Part II: Connecting strategic context with everyday work**
Chapter 4, Policy framework and context, summarises the framework of Mayoral plans and strategies which set the high-level context for the decisions TfL makes in the management of its assets. The chapter connects these high-level commitments to strategies issued by TfL's Surface Transport[3] mode and by its constituent department London Streets, and then to guidance and contractual documents which serve to implement the strategies.

Chapter 5, Levels of service, follows this 'chain' one step further, drawing connections to the service goals which guide everyday work. This chapter covers the service management hierarchy, which connects Mayoral strategies to day-to-day work and performance monitoring. The chapter presents desired outcomes sorted by broad category of activity and relevant section of the Mayor's Transport Strategy, and then lists accompanying level of service statements, stating what TfL will aim to do to achieve these outcomes. The HAMP also provides, in Appendix B (Detailed outcome tables), measurable aspects of these outcomes, referred to as 'customer outcomes'. Appendix B then provides targets for each customer outcome, where available, as well as the performance indicators used to measure progress against each target.

The level of service statements presented in Chapter 5, Levels of service, are derived not only from Mayoral strategies but also from relevant legislation and, of particular note, the priorities of the many customers of the TLRN, as determined through surveys. Chapter 5, Levels of service, (and Appendix G) reflect the customer survey data which currently exists; future editions will develop greater stakeholder input and feedback. This is important as the HAMP can be seen as a public-facing statement of the highway service which TfL aims to provide to its customers.

**Part III: Capital renewal and operational management of TfL's highway assets**
In Chapter 6, Overview of capital renewal, operational management, and high-level decision-making, the HAMP first summarises aspects of capital renewal and operational management which apply to all asset types. After explaining what activities constitute capital renewal and operational management, and how they are accomplished, the chapter explains the tools used to make high-level decisions among different options for management of the assets that make up the network. These tools include asset investment modelling and highway asset valuation. The modelling helps TfL predict the value of future maintenance spending needed and determine the most cost-effective pattern of investment. Highway asset valuation is expected to be required by central Government from 2009-10 to support the advent of Whole of Government Accounts (commercial-style accounts covering all public-sector assets). TfL has begun this exercise already as it has the potential to prove a useful tool for evaluating

assignment of budgets at the highest level, among different asset types.

Five chapters then follow with detailed statements of TfL's management of each major asset type: Chapter 7, Carriageways and footways; Chapter 8, Highway structures; Chapter 9, Tunnels; Chapter 10, Lighting; and Chapter 11, Other assets. The chapter on each asset type begins by summarising how the physical integrity and good repair of that asset contributes to meeting the Mayor's objectives for London, identifying the outcomes and level of service statements most relevant to that asset type, and summarising how TfL works towards them (within the scope of activities covered by the HAMP). In order to explain the work done towards these outcomes, each chapter is then divided into a section on capital investment and one on operational management.

Each chapter concludes with a description (where available) of how TfL monitors its performance in managing that asset type and how it may seek to improve that performance through proposed 'continuous improvement' actions. The term 'continuous improvement' is used to emphasise that these actions refer to improving TfL's management of the asset, rather than to improvements of the asset itself. The actions listed are only proposed, and have not been costed or programmed.

The five operational sections can be taken together to form a Highway Maintenance Management Plan. These sections explain a risk-based regime for the frequency and type of safety inspections of each asset type and how particular assets meet requirements for serviceability.

Finally, in closing the main body of the HAMP, Chapter 12, Conclusion and outlook summarises TfL's progress to date with highway asset management overall and provides an outlook for future development. Key proposed items include:

- Further developing the service management hierarchy with additional outcomes and suitable performance indicators, especially for assets other than carriageways and footways
- Further assessment of the leverage between budget levels and performance indicators, especially for these other assets, assisted by further development of relevant asset investment modelling
- More sophisticated analysis of the relative impacts of different levels of service in terms of fulfilling Mayoral policies and proposals
- Developing advanced tools for measuring trade-offs, in terms of value for money and risk, among competing potential investments in different asset types

Appendices provide further detail on selected topics. Of particular importance is Appendix A, which provides the draft capital renewal budgets for all asset types for the next five financial years. These budgets have been created as a result of the capital planning processes detailed in the sections on capital renewal. The funding allocations for future years are necessarily preliminary and are subject to revision. This appendix should be read in conjunction with Appendices C and D, which offer a complete programme of work for the next two years for carriageway and footway.

## 2.3 Scope of the HAMP

This HAMP is a tactical plan which covers capital investment in, and operational management of, existing assets of the following types on the TLRN network:

a) Carriageway and footway

b) Highway structures, including bridges, footbridges, retaining walls, subways, and culverts

c) Tunnels

d) Lighting and lighting columns

e) Other assets, including traffic signs, road markings and studs; drainage; street furniture; and the green estate

While the statements in the structures and tunnels chapters do hold true for the major Thames crossings, these major bridges and tunnels may in due course have additional individual management plans which are not included in this HAMP. In addition, as their scale would skew modelling of all smaller structures, they, as well as structures with significant cultural or heritage value, are omitted from the overall structures modelling described.

A section of the A13 between the City of London and the outer boundary of Greater London is managed by a concessionaire under a Design, Build, Finance and Operate (DBFO) contract. The same general principles of capital investment and operational management apply here, but the concessionaire is subject to a different performance regime which is specific to that contract.

Traffic signals and other traffic control equipment across the whole of London are owned by TfL but are outside the scope of this HAMP.

This HAMP must not be confused with a Transport Asset Management Plan (TAMP). In other words, this document implements the applicable higher-level strategic plans (in London's case, the Mayor of London's strategies) only in so far as they apply to the integrity of the highway asset itself. Other plans issued elsewhere within TfL deal with management of the transport service that runs over the highway asset – the management of traffic, control of congestion, bus priority measures, etc.

The HAMP is concerned with management activities driven by the need to maintain the existing TLRN network and levels of service that its assets offer. These capital and operational maintenance activities can extend in a limited way to asset improvements but only in so far as:

- (1) Activities taken to extend the life of the asset also improve it somewhat, or
- (2) New standards lead to a limited rise in level of service expected of the asset itself, and subsequent capital renewal includes upgrades to meet this standard

As an example of point (1), the HAMP guides the renewal of assets and the maximisation of serviceable life, including painting, anti-graffiti treatment and reducing the risk of damage or loss by deliberate attack. These activities are undertaken to extend the life of the existing asset but can be seen to improve it as a 'collateral benefit'.

Examples of point (2) might be strengthening a bridge to meet a limited increase in the level of service regarding weight-bearing capacity, or improving street lighting equipment to meet any new standards on energy consumption if such were to come into force. Another example of point (2) consists of opportunistic activities undertaken in relation to implementing the Streetscape Guidance and initiatives related to the green estate.[4] TfL is keen to consider opportunities to make environmental and streetscape improvements where appropriate

when undertaking capital renewal works on the carriageway or footway. Opportunities could include adding street trees or repositioning street furniture to reduce clutter. Opportunistic activities will be covered in more detail in future editions of the HAMP.

However, decisions to change the physical network by adding to, or disposing of, assets specifically to achieve other outcomes (such as modal shift, casualty reduction, or energy efficiency) are not the direct focus of the HAMP but will be covered, in many cases, by other TfL plans. In particular, there is a strong interface with TfL's emerging Network Management Planning approach.

## 2.4 Interface with Network Management Plans (NMPs)

The HAMP is designed to guide the planning of management and investment in the highway asset base. The document describes how decisions are made to employ capital investment and operational management, to prolong the lives of London's main streets and to keep them safe and fit for purpose. This investment does not cover the acquisition of new assets or the reshaping of the network to achieve different ends. Therefore the link between the HAMP and the regime of Network Management Plans (NMPs) that TfL is also planning is important.

NMPs are being developed for the entire TLRN through division into 49 planning 'corridors.' NMPs aim to consider all modes when designing street improvement works along these corridors, incorporating a performance-led approach which integrates modally-focussed programmes to achieve greater coherence in outcome and efficiency. Another key objective of NMPs includes providing a more equitable allocation of road space among:

- people moving along a road and those moving across it
- people using the street and surrounding environment as a place to be
- freight movement

The arrangement of assets may be changed by the implementation of an NMP, whereas the HAMP plans how to optimise the serviceability and lifespan of the existing asset base. (In addition, as mentioned above, the HAMP covers some improvements to meet limited increases in asset levels of service.)

There is an obvious link between NMPs and the HAMP in terms of the need for efficient, coordinated programming of resulting works. There is also a less well-defined interface which will be explored further as TfL refines how activities such as major re-specification of street lighting or the application of new skid resistance materials are treated in terms of coverage by the HAMP or NMPs. Similarly, a line will need to be drawn to define when a minor change or upgrade in asset level of service standards becomes sufficiently substantial to represent a wholesale improvement of the network.

# Part I
# Background on asset management



# 3 Background

**This chapter presents a working definition of asset management and explains why TfL is moving towards a comprehensive asset management approach. It then explains the main types of expenditure incurred in the management of highway assets. The chapter goes on to show how asset management techniques can be used to make the core budgetary decision involved in maintaining a road network: striking the right balance between long-term capital renewal and routine maintenance. Finally, it closes with a more detailed and philosophical look at the approach to be taken in the remaining chapters.**

## 3.1 What is asset management?

Asset management is not easy to define. In fact, the Framework for Highway Asset Management, published by the County Surveyors' Society (CSS) in April, 2004, states that "there is no definitive answer" to the question, 'what is asset management?'[5] However, it is possible to identify the key aspects of asset management as applied to the UK highway network and, through that approach, come to a working definition of what it means for management of highways.

The Framework for Highway Asset Management adopts the following definition for the UK highway context, emphasising strategy, optimisation and a long-term approach:

> "Asset management is a strategic approach that identifies the optimal allocation of resources for the management, operation, preservation and enhancement of the highway infrastructure to meet the needs of current and future customers."[6]

Asset management combines both engineering and financial aspects and requires technical as well as business knowledge. This is reflected in the Organisation for Economic Co-operation and Development (OECD) definition, which is:

> "A systematic process of maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more organised and flexible approach to making the decisions necessary to achieve the public's expectations."[7]

In addition, management of certain assets on the highway, such as the green estate, and of certain aspects of highway maintenance, requires environmental expertise, in particular regarding arboriculture, biodiversity, and the control of pollution and noise. Finally, some assets (such as some of the major Thames bridges) have heritage value and their management requires expertise in this area.

Both the CSS and OECD definitions above make clear that one of the key aspects of asset management is its customer focus. In other words, an effective asset management programme must focus on the service provided by the asset, as compared against customer expectations, rather than simply on the technical condition. Technical condition can often be measured and evaluated in a straightforward manner by standardised scoring but may not reflect how the public actually view or interact with the asset. The process of creating a Highway Asset Management Plan includes gauging customer requirements and priorities as part of setting levels of service for the assets. This edition of the HAMP reflects such customer survey data as currently exists, and future editions are expected to encompass more.

## 3.2 The wider context for use of highway asset management

The public sector in the UK is increasingly adopting asset management principles which

are in line with central Government initiatives towards greater public-sector accountability and transparency. The Framework for Highway Asset Management states that asset management is consistent with, and contributes to:

- Central Government's Best Value initiative for improving efficiency in the delivery of public sector services
- The Code of Practice for Highway Maintenance Management[8]

The Mayor of London endorsed Maintaining a Vital Asset, which lays out the cornerstones of asset management and presents the UK Roads Liaison Group's constituent boards and various codes of practice, such as that listed above, published to assist local highway authorities in meeting their responsibilities.[9]

TfL is the highway authority for the TLRN and so has the same management responsibilities for the relevant carriageway, footway, structures, lighting and other related assets as local authorities have for the highway assets they are responsible for. Highway authorities have a duty of care to all users and to the public in general to maintain the highway in a condition which is fit for purpose. The main duties are established by the Highways Act 1980. Section 41 imposes a duty on each highway authority to maintain its highways. Claims can be lodged by members of the public against highway authorities which do not fulfil this duty. Section 58 of the Highways Act provides a defence for a highway authority if it can show that all reasonable steps have been taken to secure that the part of the network in question was not dangerous for traffic. A Highway Asset Management Plan offers distinct advantages in assuring that reasonable care is taken, based on proper assessment of risk, to ensure that necessary maintenance steps are taken, while at the same time public money is used efficiently.

In recognition of the many benefits, the Department for Transport (DfT) recommended preparation of Transport Asset Management Plans (TAMPs) in the guidance for the five-year Local Transport Plans (LTPs), which most local authorities were required to produce and finalise by spring 2006.[10] TAMPs serve to extend asset management principles to transport and transport infrastructure and to implement the LTP and other strategic-level plans.

As London's government is established under different legislation than applies to the rest of England and Wales, TfL has different requirements. London's administration has been transferred to the Greater London Authority (GLA), which consists of the London Assembly and the Mayor of London. The Mayor's strategies, rather than an LTP, serve the role of strategic plan. This HAMP then fulfils an implementation role, so far as the highway asset itself is concerned. In other words, the HAMP serves as an implementation plan for TfL's highway authority maintenance responsibilities, explaining the strategies and policies behind each of TfL's maintenance activities on the highway network.[11]

Other implementation plans address other TfL responsibilities. For example, TfL is also the traffic authority for the TLRN and GLA Side Roads. Forward planning for TfL's responsibilities and actions arising from its traffic authority role are covered mainly by documents such as the developing Network Management Plans, rather than in this HAMP.

A particular driver for the creation of HAMPs or TAMPs by Highway Authorities is the creation of Whole of Government Accounts (WGAs).The Government's push towards creation of accounts covering all public sector assets is expected to lead to requirements that local and highway authorities value their highway assets. This is likely to require an

asset management process at the core. WGAs will, in turn, significantly contribute to improvement of the asset management process, in ways explained further in Section 6.3.2, Highway asset valuation.[12]

The Highways Act is the main piece of legislation governing management of highway assets. However, there are a number of other relevant acts with which TfL complies. These include in particular:

- The Traffic Management Act 2004 (TMA). This imposes a new duty, known as the Network Management Duty, to keep all forms of traffic moving (this is relevant to planning of maintenance so as to minimise related disruptions)
- New Roads and Streetworks Act 1991 and as amended (NRSWA). This governs the activities on the highway of statutory undertakers (utilities and telecommunications firms which run their services under the highway)

As is the case for the Highways Act, highway asset management offers advantages in ensuring compliance with these acts because it leads to a more structured regime of inspections and works, in accordance with set standards and deliberately-programmed schedules. In addition, monitoring of performance against agreed targets as part of asset management can lead to improved record-keeping and greater traceability of actions to prove compliance with legislation.

## 3.3 Why use an asset management approach at TfL?

In addition to the nationwide drivers mentioned in the previous section, an integrated framework of asset management activities can provide a number of day-to-day benefits for TfL and its customers. Asset management allows TfL to plan asset renewal and maintenance, and set and justify budgets efficiently, fairly and in accordance with agreed priorities. A HAMP is an important component of this coordinated, long-term and transparent approach in that it allows TfL to summarise its activities and future direction to share with stakeholders.

It is important to note, however, that this HAMP is simply the document which collates and presents publicly the results of a comprehensive set of highway asset management activities at TfL. Such activities include:

- Control of internal policies for asset management
- Collection and collation of condition data to keep asset inventories up to date
- Development and maintenance of the Asset Inventory and Management System (AIMS) software tool, a customised geographic information system (GIS) and management tool which stores such data and offers analytical capabilities
- Valuation of the highway assets
- Development and maintenance of models of asset investment and maintenance scenarios
- Prioritisation of proposed capital investment schemes to develop the forward work programme
- Contributing to coordination of schemes• Contributing to development and annual review of levels of service statements and performance indicators to meet higher-level objectives
- Monitoring progress towards targets and revising activities as necessary
- Identification of potential efficiency savings
- Management of piloting and approvals process for new materials for the highway

In order to work towards agreed targets for the service provided by the asset, these activities are performed in cycles of planning, budgeting, completing works, and reviewing performance.

Most of the constituent activities are not new to TfL. However, it is a sign of recognition of their continuing importance that TfL has prepared this HAMP to share them with stakeholders. It is also worth noting that the HAMP is not a 'one-way street' of communication; rather, as part of the setting of levels of service, TfL surveys and takes account of public perceptions and priorities for the TLRN highway assets with the goal of aligning spending with Londoners' priorities.

An asset management approach allows TfL to manage the TLRN network more smoothly and efficiently. Specific benefits include:

- Asset management improves the ability to undertake effective long-term planning for budgeting and works purposes, which in turn facilitates making optimum use of resources for maintaining the TLRN network
- In particular, development of explicit levels of service for assets on the TLRN creates a clear and public set of targets for maintenance of the TLRN network, while collection and careful consideration of data regarding asset condition allows TfL to gauge progress towards targets, and plan accordingly. For instance, modelling of rates of carriageway and footway deterioration allows TfL to determine the minimum budgets for the capital renewal of these assets that would be necessary to eradicate the capital works backlog and maintain steady state once reached, so meeting the relevant target
- The monitoring portions of the asset management cycle allow TfL to evaluate and improve efficiency continuously. In connection with the WGA asset valuation initiative, evaluation of the output of capital schemes also allows more accurate measurement of the increase in value of the network gained through capital investment

Collating a description of TfL's highway asset management activities in this plan improves internal and external communication and awareness about how TfL serves Londoners. By collecting descriptions of relevant practices and forward work planning together in one place, a path is laid out for future development in how TfL manages its highway assets.

## 3.4 Types of expenditure for management of highway assets

Highway asset management requires two main types of expenditure to maintain the service, safety, and financial value of the highway network and related assets. These are **capital renewal** and **operational management**. Deciding when to apply each approach is one of the core decisions which asset management facilitates and standardises.

I. **Capital renewal** is planned maintenance that prolongs the life of a particular depreciated asset, either by replacing it with a new one, or by some other substantial intervention (such as waterproofing a bridge deck).[13] Schemes are programmed in advance based on the results of periodic condition inspections.

The preliminary five-year capital renewal programme for 2007/08-2011/12 is attached to this HAMP within Appendix A.

II. **Operational management** is how TfL maintains assets safe, serviceable and available on a day-to-day basis.

Operational management includes 'reactive' and 'routine' components:

1) Reactive, safety- and serviceability-related operational maintenance:

Safety inspections to detect dangerous defects[14] in assets are themselves routine, meaning that they are carried out according to a scheduled risk-based regime which is

based on a knowledge of the overall likeliness and impact of defects on various parts of the network. Service inspections are also carried out according to a schedule to detect serviceability-related defects related to network reliability, accessibility and integrity.

Defects detected through routine inspections are repaired according to a risk-based protocol, in order to make individual assets safe or to improve serviceability. While the inspections are routine, the repairs themselves are reactive, meaning that they occur in response to an unpredictable trigger (a defect) and are not pre-scheduled.

Winter maintenance to clear the highway of snow and ice to preserve safety and availability is also counted as a reactive operational management activity, although winter extreme weather events can sometimes be forecast slightly in advance.

2) Routine maintenance

This consists of several types of activities:

a. Routine cleaning of assets, tightening of bolts on structures, etc

b. Routine end-of-life replacements of small-value assets, such as bulk lamp changes. These replacements are predictable and pre-scheduled, in contrast to reactive safety-related operational maintenance[15]

c. As mentioned above, safety and serviceability inspections are themselves routine activities

Taken together, the activities comprising operational management are often referred to as revenue maintenance. In contrast to capital renewal, which aims to extend the life of the asset, revenue maintenance covers repairs and routine work necessary to maintain the network in a safe and useable state.

## 3.5 Using an asset management approach to make core budgetary choices

The key aspects of highway asset management are an asset inventory with condition data, and levels of service with targets – statements of the performance expected from each asset. The targets selected are informed by:

- Executive strategic initiatives
- Engineering judgement
- Stakeholder demands and priorities
- Legal and safety requirements
- Budget constraints
- Practical concerns relating to the disruptive nature of roadworks

The levels of service and targets chosen allow the highway authority to put all these within a multi-objective framework that allows practical evaluation of different courses of action, and against which progress can be measured.

A basic decision to be made in highway asset management – in meeting the demands of this framework – is between capital renewal and revenue maintenance. Although the reactive portion of revenue maintenance is unscheduled (each individual repair is not planned ahead of time), the overall level of revenue maintenance that will be required is reasonably foreseeable and often depends on the condition of the asset. In other words, although it is impossible to know where exactly, for instance, potholes will develop in a given year, it is possible to predict approximately how many potholes in total will develop on a highway network in a given condition. Assets in a worse condition can be expected to require a higher level of revenue maintenance. For this reason, the greater the capital investment, the better the overall condition of the network, and the less the revenue maintenance required. Conversely, a network with too little capital investment

can be expected to require a great deal of revenue maintenance to maintain safety.

When faults develop that do require revenue maintenance, they must be addressed. It is not possible to 'save money' on necessary revenue maintenance, as such work is required in order to fulfil the responsibilities of the highway authority, protect the public and prevent legal claims.

For this reason, the main decision to be made is optimisation of the level of capital investment, with revenue maintenance treated as a fixed cost based on the condition of the asset. TfL has developed a model which does this for carriageway and footway, and has calibrated it over several years, beginning with the 2002/03 financial year. The model has shown that this approach can be used to set and justify capital budgets and to demonstrate the value of wise capital investment. As a result of the success of this model in assisting TfL in reducing the maintenance backlog efficiently, a model for highway structures is now under development to aid justification of funding requirements, and further models for other asset types are anticipated.

## 3.6 The philosophy adopted in this HAMP

The overall philosophy adopted in this HAMP is to set out the links between high-level strategies and policies, desired outcomes, level of service statements, and performance indicators with targets (see Chapter 4, Policy framework and context, and Chapter 5, Levels of service). Those chapters explain further the TfL-specific context behind the level of service statements, especially the Mayor's strategies which, as mentioned above, set TfL's HAMP apart from HAMPs or TAMPs which are based on implementation of Local Transport Plans.

After an overview of capital renewal and operational management common to all asset types (Chapter 6), the succeeding chapters explain how TfL works to achieve the targets at the asset-specific level. For each asset, the HAMP discusses capital renewal and operational management separately.

These capital and operational sections deal in two different types of 'asset time.' For planning capital renewal, the approximate length of remaining time that the asset can be expected to provide an acceptable service is revealed through condition inspections for each asset and then represented, in aggregate for each asset type, through asset investment modelling. Capital renewal is based on extending this remaining lifetime of the asset. In contrast, operational management consists of those activities which provide shorter-term benefit in keeping the asset safe and fit for purpose, and are usually performed to a cycle which repeats annually or more frequently.

The capital investment section for each asset type first summarises the modelling assumptions guiding capital investment decisions for that asset type and so records the mechanism for justifying the required capital renewal budgets. The collation of results from these models forms an important consideration in creation of the draft forward work programmes presented later in this HAMP.

The operational management section describes the types of reactive and routine maintenance activities employed in the management of each asset type. Types and frequencies of safety and service inspections used to detect reactive maintenance needs for each asset type are also touched upon.

When taken together, the operational statements for each asset type effectively form the Highway Maintenance Management Plan for the TLRN.

# Part II
# Connecting strategic context with everyday work



# 4 Policy framework and context

**Management of TfL's highway asset operates within an overarching framework of other documents representing various objectives, initiatives and programmes. Chapter 3 covered the national legal context in which the HAMP operates. This chapter focuses on the London-specific strategic context and the policies and manuals which implement this and influence asset management at TfL. In the next chapter, the HAMP will explain further the levels of service for each highway asset type. In this way, the HAMP serves to draw the connections between, at the high level, the national and London-specific legal and strategic context in which TfL works, and on the other extreme, its everyday maintenance decisions.**

## 4.1 Key documents

Key documents which set the context for this HAMP include:

- high-level Mayoral strategies, integrated by the London Plan: Spatial Development Strategy
- TfL Surface Transport and London Streets strategies
- guidance and contractual documents which are influenced by and implement the strategies.

The key documents are discussed below.

### 4.1.1 Mayor's strategies

Under the Greater London Authority Act of 1999 (GLA Act), responsibility for strategic planning in London lies with the Mayor of London. The GLA Act requires the Mayor to develop a number of key strategies for the Capital, covering such aspects as transport, environment and culture, among others.

Section 41(4) of the GLA Act provides that in preparing or revising a strategy, the Mayor shall have regard to:

(a) The principal purposes of the Greater London Authority

(b) The effect on the health of persons in Greater London and the achievement of sustainable development in the UK

(c) Those matters set out in section 41(5)

Section 41(5) provides that these additional matters are

(a) The need to ensure the strategy is consistent with national policies and such international obligations as the Secretary of State notifies to the Mayor

(b) The need to ensure that the strategy is consistent with the Mayor's other strategies

(c) The resources available for the implementation of the strategy

(d) The desirability of promoting and encouraging the use of the River Thames safely, in particular for the provision of passenger transport services and for the transportation of freight

#### 4.1.1.1 The London Plan

The London Plan: Spatial Development Strategy (the London Plan) was published in February 2004.[16] It serves as the framework for spatial integration of all the Mayor's strategies, explaining what kind of development is envisioned in different areas of London in order to target growth to where it is most needed, and to support increasing population sustainably and fairly. The London Plan was developed with public consultation between

2001 and 2004 and is the first 'democratically sanctioned, statutory, strategic plan prepared for London for nearly three decades'.[17]

In recognition of the overarching importance of the London Plan, the HAMP first covers its impact on setting the context for TfL's highway asset management planning, and then moves on to look at the other relevant Mayoral strategies.

The London Plan's summary document explains how the plan integrates all of the Mayoral strategies and creates objectives for the city:

> 'The London Plan is consistent with, and provides an integrating framework for, all of the strategies the Mayor has developed in the last three years. They are all based on ensuring that London becomes a city for people, a prosperous city, a fair city, an accessible city and a green city. The plan develops each of these five themes into a targeted objective, along with a specific additional objective [Objective 1] about the future spatial structure of London.
>
> 'These fundamental objectives are:
>
> **Objective 1:** To accommodate London's growth within its boundaries without encroaching on open spaces
>
> **Objective 2:** To make London a better city for people to live in
>
> **Objective 3:** To make London a more prosperous city with strong and diverse economic growth
>
> **Objective 4:** To promote social inclusion and tackle deprivation and discrimination
>
> **Objective 5:** To improve London's accessibility
>
> **Objective 6:** To make London a more attractive, well-designed and green city'[18]

In recognition of transport's role in connecting places, transport issues are a primary focus of this strategy on spatial development. The London Plan emphasises the importance of increased provision of public transport, intensification of land use to accommodate growth while limiting sprawl, and, of paramount importance, of spatially linking the two to ensure transport serves the areas people want to go. The London Plan aims to ensure that areas targeted for increased utilisation (known as 'Opportunity Areas' and 'Areas for Regeneration') are better served by public transport, as well as that town centres, which are conducive to public transport and often already well-served, offer increased opportunities for retail, jobs and everyday services.

While the London Plan notes that these measures will reduce on-street congestion and allow 'better use of London's streets',[19] at first glance there do not appear to be many initiatives directly relevant to the HAMP, which is concerned with street maintenance rather than usage.

However, the deeper issues driving the London Plan are of key relevance to the challenges TfL faces in managing London's highway assets. The document states:

> 'London's distinctive history has given it a unique set of spatial characteristics. It has grown as a relatively low-density, open city compared to other world cities and most European capitals. Two-thirds of its land area and the majority of its population and workforce are in the suburbs. It has an attractive network of open and water spaces. It has a well-established pattern of town centres varying in size and function from the West End and Knightsbridge in the central area to local centres.

> 'A number of forces are now driving rapid change in London: population growth, economic growth, environmental issues, lifestyle changes and technological change. All of them have their roots in global changes, each with a particular London dimension, and they require a new and imaginative response from policy makers.'[20]

The London Plan goes on to note the importance of accommodating increasing population without impinging on the open spaces within the city or sprawling outwards into the Green Belt.

TfL's challenge as a highway authority is to maintain an ageing network, which was constructed and maintained in the past by a variety of different authorities, within an increasingly dense urban and suburban environment, in a manner which does not degrade the human or natural environment. For instance, much roadwork must be done at night when traffic volumes are lower as often there is not the luxury of extra road capacity to accommodate blocked lanes. Similarly, options for diversions are limited. TfL must consider sustainability in its choice of materials and use of resources. This includes consideration of the noise properties of street surfaces and the energy demands of street lighting. TfL must also aim to reduce the emissions released by contractors' vehicles and be mindful of the risk of noise nuisance to residents caused by works. TfL must be sensitive to the different priorities that different ethnic or religious groups may have for the carriageway and footway networks.

In short, all of the decisions TfL makes for maintaining London's key roads are taken within the context of a large, old city; a city of increasing population, diversity, and density; in an age in which no responsible body can afford to neglect the environmental sustainability of its actions. These are the key points put forward in the London Plan and it is no accident that these same key overarching themes can be traced down to the development, highlighted in this HAMP, of levels of service and performance indicators for maintenance of the TLRN.

#### 4.1.1.2 Other relevant Mayoral strategies

In addition to the London Plan, five of the Mayoral strategies are specifically relevant to setting levels of service for maintenance of the highway network. They are:

- The Mayor's Transport Strategy, published July 2001[21]
- Connecting with London's Nature: The Mayor's Biodiversity Strategy, July 2002[22]
- Cleaning London's Air: The Mayor's Air Quality Strategy, September 2002[23]
- Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, September 2003[24]
- Sounder City: The Mayor's Ambient Noise Strategy, March 2004[25]

Although it is not at the same level as the Mayor's strategies but rather represents their application to street maintenance, TfL's own Street Maintenance Strategy, published in 2003, must also be mentioned here as it is key to this HAMP's discussion of the Mayor's strategies.[26]

#### 4.1.1.3 Four themes

Rather than summarise each Mayoral strategy separately, the HAMP draws together four main themes which highlight the ways in which the relevant Mayoral strategies have an impact on highway asset management. These themes are:

1. Overall priorities for management of London's transport network

2. The importance of proper planning and adequate investment to overcome the maintenance backlog

3. The role of good design and material selection to meet sustainability objectives

4. Coordination with other stakeholders

The first theme explains the overall tone set by the Mayor for how he intends to manage transport for the Capital. The next two themes arise from identification of the ways that street maintenance influences fulfilment of the Mayor's vision for the Capital. The first of these covers the importance of carrying out the maintenance work, and of doing it efficiently to provide value for money, while the next refines this to consider how to do it better to make London a more pleasant place to live, work, or visit. Finally, the last theme expands on Themes II and III to consider the key roles other authorities, and the public, have in management of the highway asset, and how coordination can help improve customer satisfaction and reduce disruption associated with necessary maintenance.

The next sections explain the four themes.

The full text of all Mayoral strategy paragraphs, proposals and policies referred to in the HAMP is provided in Appendix E.

#### 4.1.1.3.1 Theme I: Overall priorities for management of London's transport network

All of the Mayor's strategies, transport and otherwise, were developed with the overarching themes of sustainability, health, and social inclusion. The first priority within Streets for All, Section 4G of the Mayor's Transport Strategy, establishes the tone of the strategy in this context and points out the main competing demands on London's streets:

> 'Policy 4G.1 London's streets should be managed to assist the movement of people, goods and services – safely, expeditiously, reliably, securely and with minimum negative environmental impact; to ensure reasonable access to property, and to recognise their use as social spaces.'

Managing streets so that they fulfil the three key roles highlighted in this policy – movement (distribution), access, and social spaces – is of special importance on the TLRN. Policy 4G.2 of the Mayor's Transport Strategy goes on to state that on the TLRN and most other 'A' roads, 'there is a general presumption in favour of distribution', while on other London roads access and amenity tend to take precedence. TLRN streets serve as the primary inter-borough routes, so that cross-London movement certainly needs to be facilitated. However, many parts of the TLRN are busy shopping or residential districts, and access to shops and homes does need to be preserved. And of course, these busy districts attract many pedestrians, for whom the street should provide a pleasant social space. Balancing these demands presents a unique challenge on the TLRN and one which good street maintenance can help to address.

The street maintenance functions (including capital and operational) covered in this HAMP focus on the engineering aspects of the pavement and related assets, rather than on the design or layout of streets and intersections. However, high-quality maintenance can have far-reaching effects on many aspects of the street atmosphere reaching beyond the benefits of a smooth ride and affecting all three roles of the street as identified in Policy 4G.1. The way in which street maintenance is carried out and its timing can have a significant impact on minimising disruption and hence preserving movement and access.

In addition, the Street Maintenance Strategy identifies five ways in which 'the highway maintenance functions undertaken by TfL have a direct impact' on Mayoral priorities, emphasising the way in which highway maintenance can improve the social space function of the street:

- 'Making London's streets safer and more secure
- Improving the attractiveness of London's streets
- Managing the impact of traffic
- Improving the quality of street maintenance, particularly for pedestrians
- Reducing traffic noise and emissions on London's strategic roads'[27]

This understanding of the ways in which proper maintenance can help the streets meet their key roles leads to the second theme, which emphasises the value of an asset management approach in delivering the necessary maintenance in the most efficient manner.

#### 4.1.1.3.2 Theme II: The importance of proper planning and adequate investment to overcome the maintenance backlog

Under the heading 'Improving the quality of street maintenance' the Mayor's Transport Strategy points out that a proactive approach with both initial and long-term strategy and funding is necessary to overcome the significant backlog of overdue capital renewal. Essentially, the Mayor is calling for an asset management approach to be taken:

> 'Paragraph 4G.122: Real improvements need to be made to the quality of street maintenance within London on both the TLRN and borough roads. Proper planned maintenance can improve street conditions, and save money in the long run.'

Paragraph 4G.123 goes on to add that 'the most serious street maintenance issue in London, as in much of England, is the backlog of work resulting from years of under-funding.' To remedy this, Paragraph 4G.124 states that both TfL and the boroughs must develop both long-term maintenance strategies and 'faster programme[s]… to focus on the immediate priorities and to reverse the pattern of past inadequate investment.'

A proposal then follows that TfL will produce a 'three year priority street maintenance plan to cover bridges and principal carriageways reflecting the objectives of the Transport Strategy and available resources.' (Proposal 4G.25).[28]

The Street Maintenance Strategy was published in 2003. It represents application of the Mayor's Strategies to street maintenance and laid out an initial framework for highway asset management within TfL. This HAMP takes that work further forward, revising the framework as appropriate, and explains how TfL ensures that projects are properly prioritised.

The third theme refines the second to focus on how street maintenance is designed and carried out.

#### 4.1.1.3.3 Theme III: Making careful material and design decisions for maintenance activities

Street maintenance does not take place in a vacuum. The mission statement of London Streets states that it will 'manage London's streets better for people.'[29] Although the capital renewal schemes covered in this HAMP do not of themselves involve substantial elements of new design, a number of decisions are necessary relating to material choice and perhaps seemingly

minor, but nonetheless important, design alternatives, which can have enormous impacts on street users (especially pedestrians, including disabled street users and cyclists) and on those living and working nearby. In addition, the way in which London Streets designs and carries out roadworks can have a significant effect on the environmental impact of both the works themselves and of the resulting scheme.

There are a number of Mayoral strategies relating to street attractiveness, pedestrian-friendliness and the environment (including noise) which have an impact on street maintenance. These include not only parts of the Mayor's Transport Strategy relating mainly to carriageway and footway materials, but also other of the Mayor's strategies relating to spatial development and the environment and affecting the green estate on the TLRN. The London Plan itself includes a number of policies that relate to highway assets. As identified within the Street Maintenance Strategy, the 'key issues that relate specifically to street maintenance are as follows:

- 'To improve quality, safety and amenity in residential streets
- To ensure that lighting is used in a sensitive and appropriate manner in order to maximise amenity and security for people without causing unnecessary levels of light pollution
- To promote a sustainable approach to design and construction
- To promote measures to mitigate disturbance from noise'[30]

These are further refined in the other Mayoral strategies.

The impact of the strategies can broadly be divided into those targeted at improving or reducing negative impact on the human environment, and those aiming at the natural environment, although there is much room for overlap and such distinction is by nature blurred.

**Strategies targeting the human environment:**

- **Streetscape:** The Mayor's Transport Strategy includes several proposals relevant to the theme of streetscape. Proposal 4I.8 proposes that TfL and the boroughs develop programmes to improve accessibility of the street environment for pedestrians. Proposal 4I.10 discusses implementation of improvements to pedestrian facilities, safety and accessibility, including issues relating to the requirements of disabled people, following audits of needs.

  These proposals are relevant to the HAMP in so far as they affect the level of service provided by existing assets themselves. For example, renewal of footways can offer quite substantial streetscape benefits, as recently shown at Lee Green on the A20. Additionally, TfL strives to consider opportunities to make minor streetscape improvements when otherwise undertaking capital renewal works on the carriageway and footway. When, however, the streetscape scheme developed in response to the proposals contained in the Mayor's Transport Strategy includes a full redesign of a junction or, for instance, the pedestrianisation of a square, that is beyond the scope of this asset management plan.

- **Lighting and personal security:** In addition, Policy 4G.3 of the Mayor's Transport Strategy states that 'Transport for London and the boroughs will work together with the police to address personal security issues, reducing crime and the fear of crime on London's streets.' Towards this end, TfL works to ensure that streetlamps remain lit,

delivering a level of service that helps foster a feeling of security for pedestrians.

**Strategies targeting the natural environment:**

- **Biodiversity:** Connecting with London's Nature: The Mayor's Biodiversity Strategy recognises the importance highway verges can have on preserving the diversity of species within the urban environment. It proposes that the Mayor work with TfL and other relevant transport bodies 'to ensure that the potential for wildlife habitat on the verges of roads, footpaths, cycleways and railways is realised wherever possible.'

  The Street Maintenance Strategy elaborates on this, explaining:

  'This has implications for the way in which trees, and grassed and planted areas, within the highway boundary are maintained and managed to protect wildlife habitats and enhance the biodiversity value.

  It is particularly important to consider:

  - Management of street trees to maximise the biodiversity and amenity value of the trees whilst ensuring that they present minimum risk to highway users
  - Management of planted areas to ensure that the plants develop to meet the design objectives, taking account of perceptions of personal safety and attractiveness
  - Management of grassed areas to maximise the biodiversity value where it is appropriate to do so, usually on wider verges, embankment and cutting slopes. Safety and amenity considerations will take priority in some locations
  - Protection of biodiversity interest when highway work by TfL or others, including utility companies, is undertaken
  - Control of harmful weeds and pests as required by law or to control local infestations'[31]

- **Vehicle emissions:** Cleaning London's Air: The Mayor's Air Quality Strategy, ('Cleaning London's Air'), published in 2002, proposes in Proposal 56 that TfL 'encourage… its contractors to reduce emissions from their vehicle fleets. As a first step, information about the fleets is being sought from current contractors and they will be encouraged to ensure their vehicles meet a minimum of Euro III standards by 2004'.[32]

  TfL continues to collect information about fleet emissions from its contractors, and from April 2007 monitors the percentage of their fleets that meet the Euro IV standards (by 2007/08) transitioning to Euro V standards by 2011/12 (see Section 5.5).

  More generally, Cleaning London's Air also includes the following policy:

  > 'Policy 13: The Mayor and Transport for London will work with the boroughs and the Highways Agency to adopt a co-ordinated approach to reducing air pollutant emissions on London's roads.'

  Although much of the effort referred to by this policy is related to traffic management, there is an opportunity to help in HAMP terms by selecting road surfaces to promote smooth driving and so reduce emissions.

- **Road noise:** In addition, low-noise road surfaces can make another contribution to Londoners' quality of life, as explained in Sounder City: The Mayor's Ambient Noise Strategy ('Sounder City'). While this strategy also focuses on better town planning and improved building design, noise from industrial sources and transport systems is pre-eminent. Indeed, the Mayor notes in his

Foreword to Sounder City's accompanying Highlights document that, 'A major early priority is making up the backlog of street re-surfacing.'[33] In particular, the first of three 'key issues' identified in that document is 'Securing good, noise-reducing surfaces on Transport for London's roads.'[34] (Results of the GLA London Household Survey 2002 included the finding that 'road traffic noise was a concern for more Londoners than any other individual source of noise')[35]

- **Recycled materials:** Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy emphasises the importance of using recycled materials as much as possible. In accordance with this, with Proposal 55 within Cleaning London's Air (regarding green procurement), and with the Mayor's other environmental strategies, the entire Greater London Authority (GLA) group, including TfL, procures goods and services to meet sustainability targets. Additionally TfL is examining ways to increase the use of recycled street materials

  Towards this end, TfL also monitors the percentage of recycled materials used by its contractors as explained in Section 5.5.

The fourth theme in the applicability of the Mayor's strategies to TfL's highway maintenance work expands on Themes II and III to consider the key roles other authorities, and the public, have in management of the highway asset.

#### 4.1.1.3.4 Theme IV: Coordination with other stakeholders

This final theme covers coordination of planning and programming with the boroughs, with statutory undertakers, and with the priorities of the public. Coordination can improve value for money, reduce disruption and increase customer satisfaction.

Coordination of roadwork on the TLRN and local borough-managed roads is a priority mentioned in several of the Mayor's strategies, including the Mayor's Transport Strategy and Sounder City.

Proposal 4G.26 of the Mayor's Transport Strategy states that TfL 'will work with the London boroughs to develop a long-term approach to the funding and management of all aspects of street maintenance throughout London'. In many ways this proposal can be seen to be referring to asset management. Indeed, many of the activities described in this HAMP have a long-term, whole-life approach at their core, and some also contribute to planning on borough roads.

TfL has made great strides toward fulfilment of Proposal 4G.26, both in terms of improved management of the scheme-selection process and improved coordination with the London boroughs. It has developed a model of carriageway and footway investment to aid in long-term planning of capital works, and estimation of necessary revenue maintenance budgets. This model is used both for the TLRN, where TfL plans its own work, and for the Borough Principal Road Network (BPRN), in so far as TfL funds some borough-managed capital renewal activities on the BPRN and must allocate that funding among boroughs.

In addition, for the TLRN, TfL uses the model to help divide funding among areas, and has an appraisal system to help prioritise proposed capital schemes. A similar system is used for the portion of capital renewal on the BPRN which is funded by TfL, allowing TfL to allocate funding among schemes proposed by boroughs.

Capital renewal activities on the TLRN carriageway are described in more detail in Section 7.2. The BPRN is outside the scope of this HAMP. However, planning efforts for both networks are mentioned here to show

the progress that TfL has made in fulfilling the Mayor's proposal for long-term, coordinated work planning which allows selection of schemes in a fair and orderly fashion to improve value for money and customer satisfaction.

In addition, coordination in programming of when the selected schemes are implemented is also key to minimising disruption to the travelling public. Indeed Paragraph 4G.124 of the Mayor's Transport Strategy urges TfL and the boroughs to programme implementation of their short-term maintenance plans jointly.

Coordinating works has a positive impact on the transport service provided, reducing congestion, improving network flow, and reducing inconvenience to local residents and businesses and to all users of the highway. While these overall transport service aspects of the highway are important, they are not the main focus of this HAMP. However, coordination of roadworks and streetworks also directly improves the quality of maintenance of the carriageway and footway assets. The surface can be expected to be smoother if repeated excavation can be avoided.

Certain aspects of coordination of scheme programming among highway authorities and statutory undertakers are now also legally required by the TMA. LondonWorks is a relatively new programme, being delivered by TfL, which includes a suite of software tools to plan and register road and street works in London and manage the necessary notifications. LondonWorks offers potential for improving coordination not only among TfL and the boroughs but also with statutory undertakers, and will assist TfL in meeting its obligations under the TMA.

Finally, an expansion of this theme of coordination with other government and corporate entities is that of improved interaction with the public. As explained below in Section 5.3, TfL already has some customer perception data and may be conducting further surveys of public priorities to inform levels of service in future revisions of this HAMP.

(In addition, for some individual capital schemes, public or stakeholder consultation is undertaken during the feasibility stage to gauge needs and concerns. The need for this is determined on a scheme-by-scheme basis.)

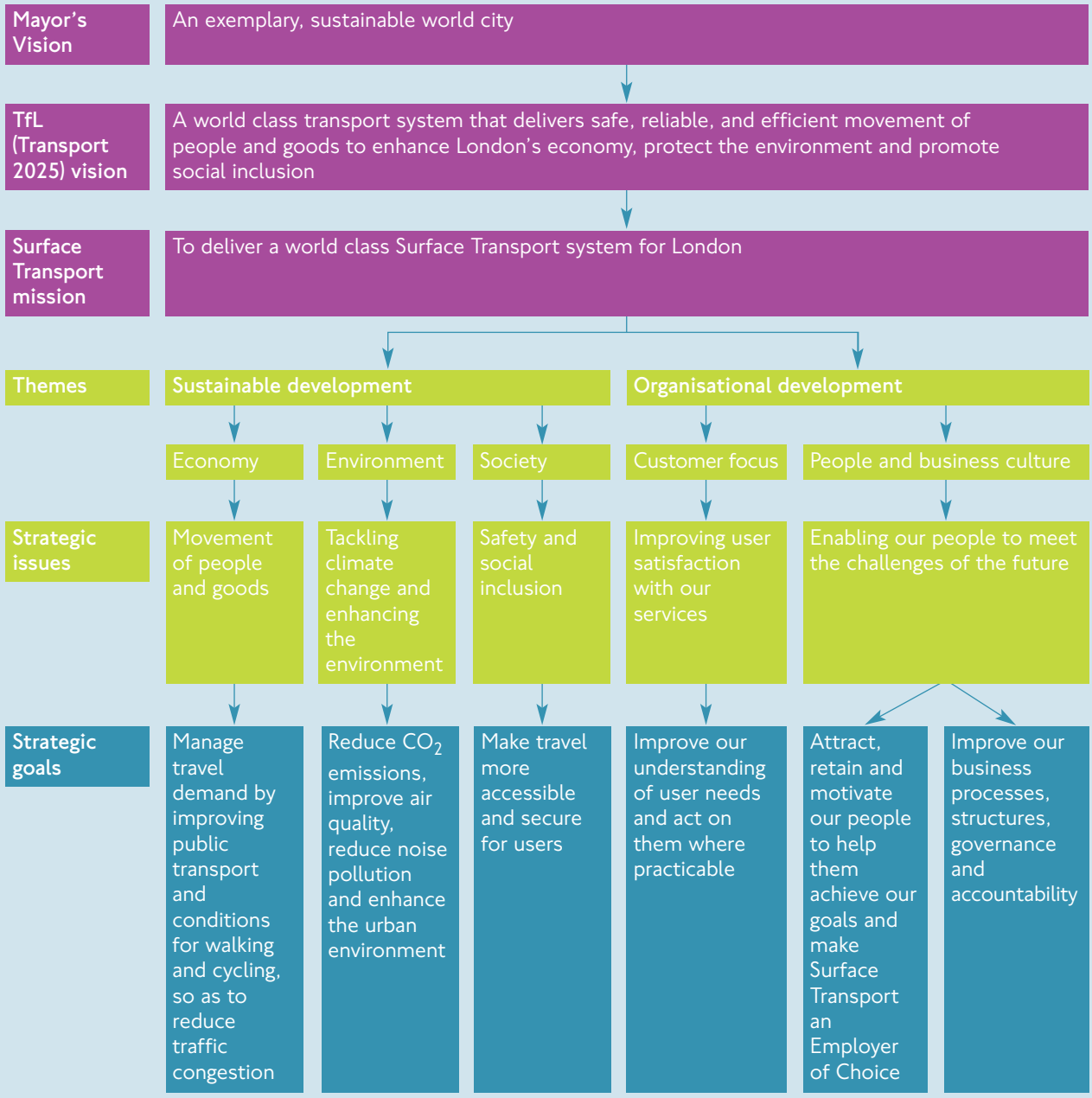
### 4.1.2 TfL Surface Transport and London Streets strategies

Figure 1 shows how the strategic context set at the Mayoral level is developed into strategic themes, issues, and goals for Surface Transport.

The figure shows the connections from the Mayor's vision for London, to TfL's vision (as reflected in the Transport 2025 vision for the future of transport in the Capital), to the mission statement of Surface Transport. This mission is then separated into two broad themes, sustainable development and organisational development, and then further into five strategic issues, each with a strategic goal.

The scope of the HAMP, encompassing management of maintenance and renewal of the existing highway asset, is relevant to many of these strategic goals, and the activities covered by the HAMP offer opportunities to contribute to their fulfilment. However, certain aspects of the Surface Transport strategic goals are better addressed (in so far as they are affected by the streets), by the Network Management Plan framework for managing highway corridors to provide a more equitable allocation of road space among various street users. In particular, although the HAMP does

Figure 1: Derivation of Surface Transport strategic themes, issues and goals




cover maintenance of a safe and smooth carriageway and footway surface, other aspects of improvement of public transport and conditions for walking and cycling fall largely under NMPs. In addition, certain goals included in Figure 1 refer to internal human resources activities which do not relate directly to asset condition and are therefore not covered by this HAMP.

**Table 1: Relevant Surface Transport strategic themes and issues**

| Theme | Issue |
|---|---|
| Economy | Movement of people and goods |
| Environment | Tackling climate change and enhancing the environment |
| Society | Safety and social inclusion |
| Customer focus | Improving user satisfaction with TfL's services |
| Business culture | Improve TfL's business processes and accountability |

Table 1 summarises the strategic themes and issues to which the activities included in this HAMP can contribute significantly.

London Streets has developed a set of strategic themes which further refine the Surface Transport themes to focus on the ways in which management of the highway can further Surface Transport's strategic goals.

Again, the activities covered by the HAMP contribute to many, but not all, of these London Streets-level strategic themes.

Table 2 lists the London Streets-level strategic themes which are relevant to the activities covered by the HAMP, and indicates to which of the Surface Transport strategic themes each contributes.

**Table 2: Mapping of London Streets strategic themes to relevant Surface Transport themes**

| London Streets strategic theme | Relevant Surface Transport strategic theme(s) |
|---|---|
| Minimising disruption | Economy |
| Sustainability of transport utilisation: cycling, walking, mode shift | Economy; environment; and society |
| Safety | Society |
| Asset state of repair and responsiveness | Customer focus; economy; Environment |
| Environment | Environment |
| Business performance and programme adherence | Business culture |

(Appendix F lists those 2007/08 key performance indicators (KPIs) for London Streets that govern discharge of the activities covered by this HAMP. These indicators have been developed to support the London Streets strategic themes and are sorted by relevant theme. KPIs and other types of performance indicators are explained fully in the next chapter.)

### 4.1.3 London Streets strategy documents, guidance and contractual documents

The following documents each serve, in different ways, to implement the Mayor's Strategies as well as the Surface Transport and London Streets strategic themes and goals:

- Street Maintenance Strategy
- Streetscape Guidance
- Highway Maintenance Works contracts for 2007-2013 ('HMW contracts')
- Highway Maintenance Works Contracts guidance manual (internal guidance for the HMW contracts)

These documents set the context for this HAMP.

#### 4.1.3.1 Street Maintenance Strategy

The Street Maintenance Strategy, published in February 2003 and first mentioned above in Section 4.1.1.2, represents application of the Mayor's Strategies to street maintenance. It was developed in response to a series of recommendations resulting from the Maintaining the Streets Best Value Review of TfL's street maintenance services undertaken in 2001/02 and lays out the foundations required for future asset management planning within TfL. The HAMP in turn takes this forward.

The Street Maintenance Strategy notes that 'TfL is required to work within the policy frameworks set by central Government and the Mayor. Mayoral priorities have a direct bearing on service delivery and, therefore, form the focus of the street maintenance strategy.'[36] In particular, the Street Maintenance Strategy follows from Proposals 4G.25 and 4G.26 of the Mayor's Transport Strategy, emphasising the need to work with London boroughs and other stakeholders to address the backlog of road and bridge work in the short term while developing a sustainable and transparent long-term approach to maintenance management and funding.

The Street Maintenance Strategy identifies a comprehensive HAMP as one of two vital factors for delivery of the strategy. The other is a business planning process consisting of a methodology:

- 'To ensure that all the necessary resources to deliver the service are available'
- 'To provide a framework for performance measurement and service development'

The Street Maintenance Strategy shows how asset management planning and business planning overlap by presenting a diagram of the entire highway asset management planning process, including considering the current state of the asset, reviewing competing demands, programming works, setting budgets, reviewing what is feasible in light of available budgets, and reviewing progress against targets. The diagram (reproduced as Figure 2 below) emphasises the key role of having a solid foundation consisting of three parts:

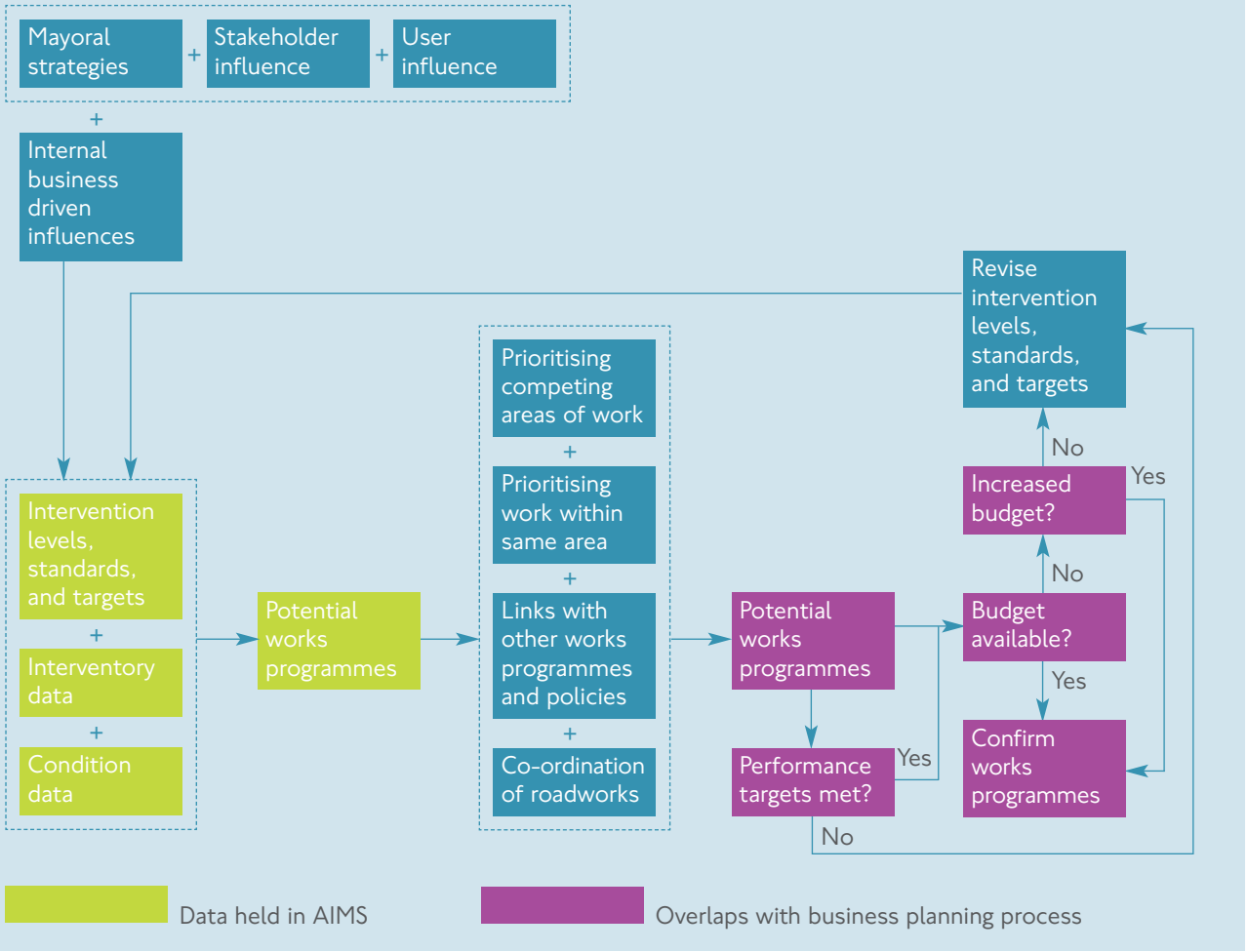
- Inventory data
- Condition data
- Intervention levels, including standards and targets

Once this three-part foundation is in place, a highway asset management plan can be developed by considering the information included in this foundation in tandem with the context of strategic and stakeholder demands and priorities. The Street Maintenance Strategy states that, '[t]he principle of the asset management plan is to combine, weigh and prioritise the various external and internal influences set out on the left-hand side of [Figure 2]'[37]

It is worth noting that TfL's framework for highway asset management has evolved somewhat since the Street Maintenance Strategy was published. However, the process is similar, and the fundamentals remain the same.

The foundation described here is in place. TfL holds most inventory and condition data in AIMS. AIMS combines a database of asset attributes with a map-based display for reference and planning purposes, and offers the ability to aggregate and download data for further analysis.

**Figure 2: Diagram of the asset management planning process as envisioned in the Street Maintenance Strategy, 2003**



Standards and targets are influenced by legal requirements, Mayor's strategies, and TfL-wide and departmental corporate and policy goals, as well as engineering judgement and public priorities as measured through public perception surveys. Standards and targets are measured by Key Performance Indicators (KPIs), some of which are nationally-benchmarked Best Value Performance Indicators (BVPIs). A full, updated set of levels of service for 2007-08 have been developed for the TLRN highway assets. BVPIs, KPIs and levels of service are discussed fully in the next chapter.

The HAMP also touches on some parts of the business planning side of Figure 2. The HAMP explains how modelling is used to make the case for the necessary budgets, and presents the service management hierarchy. In the future, as the highway asset management process within TfL matures, later editions of the HAMP may be able to cover more thoroughly the process of reviewing and revising levels of service and targets in response to available funding.

### 4.1.3.2 Streetscape Guidance

The Streetscape Guidance, published in August 2005, establishes the performance and design criteria for the streetscape, including the design and layout of footways, streetscape materials and street furniture, and how maintenance and management are to be handled, 'in order to raise the standard of streetscape design and encourage authorities to consider pedestrian needs in the design of projects'. In addition, '[t]here is also a focus on quality of materials and equipment to ensure they are durable, maintainable and offer value for money'.[38] The Streetscape Guidance implements Proposal 41.9 of the Mayor's Transport Strategy:

> 'Proposal 41.9: Transport for London, in partnership with the London boroughs and voluntary groups with expertise in walking and disability issues, will establish streetscape guidelines to encourage consistent good practice and design. These will include minimum footway widths related to usage, and set minimum standards for the maintenance and management of London's streets, including repair of footways, signing, avoiding clutter, removing graffiti and rubbish, keeping streets adequately illuminated and the provision of CCTV.'

In turn, implementation of the Streetscape Guidance is taken forward in the activities covered by the HAMP in so far as TfL has the opportunity to improve the streetscape while undertaking maintenance works on the TLRN. Applicability includes:

- Choice of materials for use during significant capital renewal activities
- In order to make footways more pedestrian-friendly, taking the opportunity to reposition street furniture or other objects (posts, signs, bollards, etc) when TfL is already carrying out a footway maintenance scheme

The Streetscape Guidance interprets the Mayor's strategies in terms of their relevance to the street environment on the TLRN.

Three points (each quoted in full from the Guidance) are relevant to the highway maintenance work as covered in this HAMP:

1) 'Building on London's existing urban quality and sense of place by promoting its local centres through a strengthened sense of identify implies that the TLRN network should respect the aspirations of the centres through which it passes'

(Indeed, TfL is aware that different communities within London may have different priorities for maintenance of the highway assets, and plans to take this into account in any surveys of customer priorities which it undertakes.)

2) 'The desire to improve the quality of the public realm also means making London more accessible to people with mobility and visual impairments and ensuring that nobody is excluded from city life by reasons of where they live'

3) 'The emphasis on sustainable development places an obligation on TfL to ensure that materials and products used are energy-efficient and sourced from sustainable supplies. TfL is keen to increase the use of recycled materials and is examining current and potential uses of recycled street materials'[39]

### 4.1.3.3 The Highway Maintenance Works (HMW) contracts

Risk-based regimes for frequencies of safety and service inspections are key to TfL's asset management approach for operational management. The HMW contracts are one of the key documents for translating these high-level asset management objectives into contractual requirements and agreed inspection and work schedules by TfL's highway maintenance supply chain for the period 2007-2013. The Highway Maintenance Works Contractors (HMWCs) carry out most inspections and most reactive and routine maintenance.

Capital schemes may also be undertaken by the HMWCs. Larger schemes may be competitively tendered.

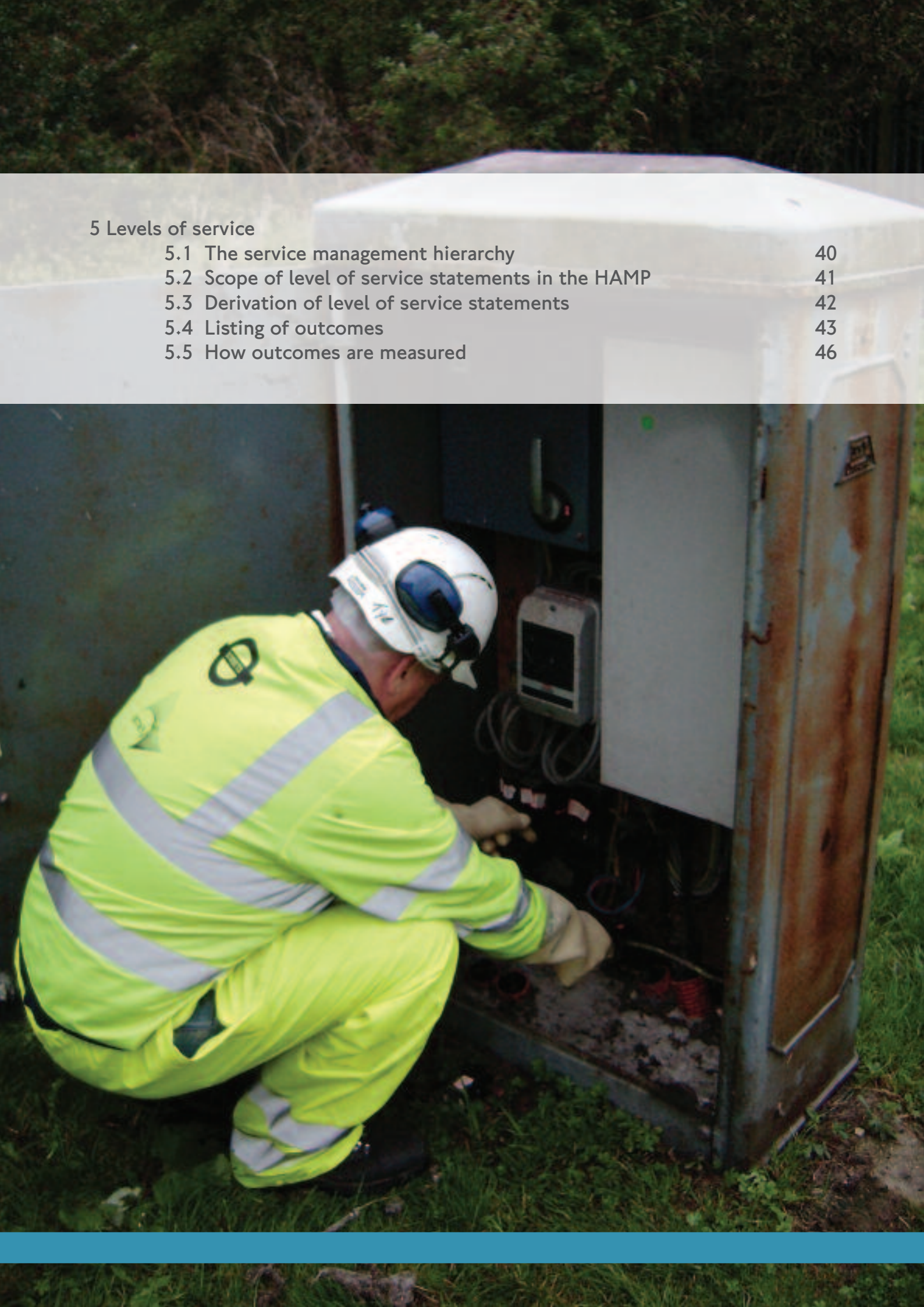
Most of the activities covered by this HAMP are managed by TfL's Directorate of Road Network Management (DRNM). Each area within DRNM (South, Central and North) has its own highway maintenance works contractor (HMWC), hence the reference to the HMW contracts in the plural.

The boundaries for the three area teams from April 2007 are shown in Figure 3:


Figure 3: Area team boundaries from April 2007

### 4.1.3.4 HMW contracts guidance manual

Guidance for TfL staff engineers on how to use the HMW contracts for effective partnering with the supply chain has been developed. It is non-contractual but instead serves to interpret the contractual terms for day-to-day use and set best practice for working within the contractual framework over the next six years to keep the TLRN safe and fit for purpose.



5 Levels of service

# 5 Levels of service

**In carrying out its highway maintenance duties, TfL works within an overall context of strategies and guiding policies as described in the previous chapter. In turn, this chapter sets out, starting from these documents, a delivery framework defined by a service management hierarchy including level of service statements and measurable customer outcomes for each type of asset.**

## 5.1 The service management hierarchy

To help focus the planning and delivery of TfL's highway maintenance activities, the range of activities covered by this HAMP is broken down into simple categories, such as those relating to the road surface, lighting, accessibility, etc. Each category is described in one word and linked to one or more proposals or policies in the Mayor's Transport Strategy which guide what TfL will aim to provide for that category. Categories represent implementation of the Surface Transport and London Streets themes explained in Chapter 4.

High-level desired outcomes are identified and grouped together under these categories, expressing the desired result for the asset or for management of the asset. To elaborate on what is meant by each outcome, the HAMP includes a more detailed level of service statement of what TfL will aim to provide.

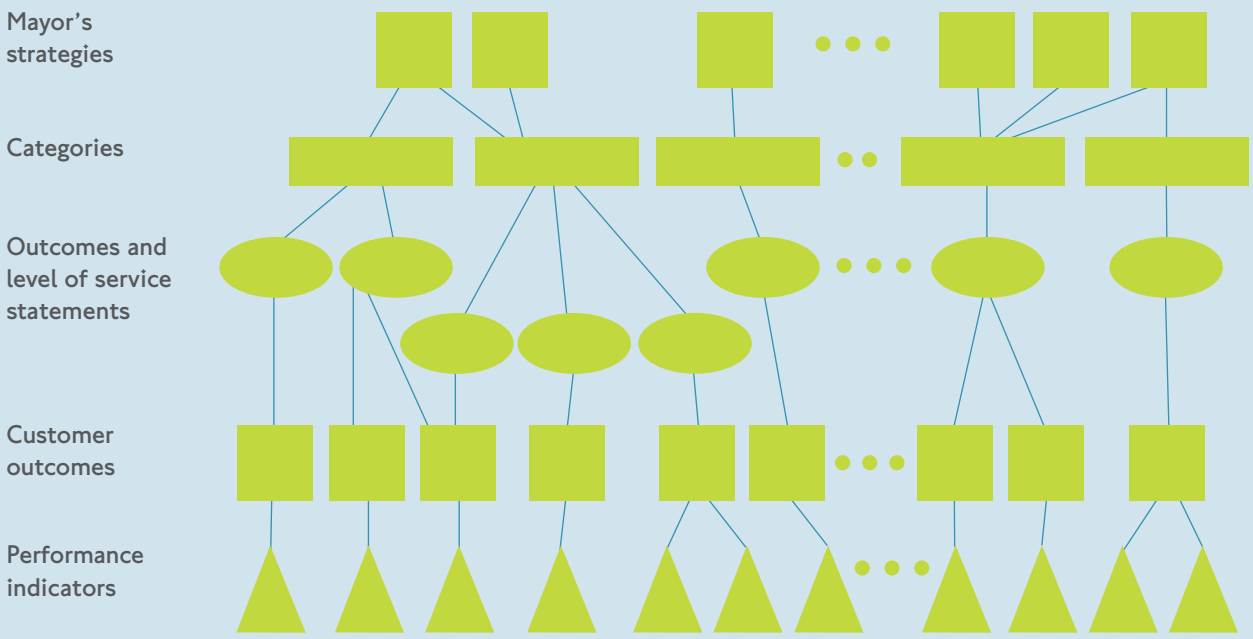
The outcome is then divided into one or more measurable aspects (known as customer outcomes) to which performance indicators are matched, and a quantitative target is set for each performance indicator. TfL monitors progress against these targets.

Levels of service statements are declarations of what TfL will aim to do to ensure that the highway asset provides a fit-for-purpose service achieved in a fair and efficient manner. While levels of service themselves are standards for asset performance, level of service statements emphasise that it is TfL's activities as managers of the asset that lead to achievement of these asset standards. Therefore, all level of service statements begin with the words 'TfL will…' Level of service statements reflect how TfL aims to perform in its management of the network, provision of customer service, protection of the environment, or efforts towards equality and inclusion. In short, statements of levels of service represent what TfL intends, through its highway management activities, to provide to its customers (that is, to all users of the TLRN) either directly or through the service provided by the asset.

This HAMP represents a set of goals towards which TfL aims to work. As noted above in the Introduction, however, the contents of the document are not legally binding commitments. In particular, TfL may need to alter the intended levels of service should circumstances dictate that this is the more reasonable and prudent course of action.

The structure of the links described above, making the connections down from strategies through outcomes down to performance indicators, is shown schematically in Figure 4:

Figure 4: Schematic of service management hierarchy from the Mayor's strategies to performance indicators




(Dots in Figure 4 indicate that more strategies, categories, etc could be included.)

As this figure shows, the connections among levels are not 'one-to-one,' as explained below:

- A given category can be influenced by more than one of the Mayor's strategies (and a given Mayor's strategy can influence more than one category)
- Each category can have more than one relevant required outcome and level of service statement (and possible additional ones representing the contributions of other directorates – see the next section, Scope of level of service statements in the HAMP)
- Each outcome and level of service statement could be divided into more than one customer outcome (and a given customer outcome could be relevant to more than one outcome)
- Each customer outcome could be measured by more than one performance indicator

## 5.2 Scope of level of service statements in the HAMP

The HAMP presents outcomes and level of service statements, as well as performance indicators, covering all asset types.

However, because TfL maintains and improves only the network of red routes and other major roads, and not neighbourhood streets, and also does not have authority over all non-transport aspects of streets, some aspects of street management which might appear in a local authority's HAMP (or TAMP) are not applicable here. These include, for instance, outcomes relating to targets for take-up of Safe Routes to Schools education (which is primarily concerned with smaller neighbourhood streets, not the

TLRN) and driver training (which is related to Council and other education programmes).[40]

In addition, as explained in earlier chapters, this plan is concerned with the highway and the service provided by the assets themselves, rather than the overall transport service provided. As noted above, although TfL is the traffic authority as well as the highway authority for the TLRN, this Highway Asset Management Plan covers only highway authority responsibilities.

While the Surface Transport themes presented in Chapter 4 are high-level general requirements for the entire modal division, the HAMP has focused on level of service statements which are influenced by the capital and revenue highway maintenance activities on the TLRN undertaken mainly by the Directorate of Road Network Management (DRNM). Other departments within Surface Transport can have their own level of service statements explaining how their work contributes to the themes, for example:

- Directorate of Traffic Operations (DTO), which manages traffic signals London-wide, including on the TLRN
- London Buses, which is responsible for bus stops and shelters London-wide, including on the TLRN

The level of service statements developed by all of the Surface Transport departments should work together to support the Surface Transport themes. The HAMP is about contributions. The activities described here can contribute to meeting the outcomes listed, but inclusion of an outcome here by no means implies that the activities covered in this HAMP fully determine whether the outcome is achieved.

## 5.3 Derivation of level of service statements

The level of service statements presented here are derived from:

- The Mayor's strategies including the London Plan
- TfL's corporate objectives as derived from the Mayor's vision for London, including in particular the Surface Transport strategic themes, issues and goals, and the London Street strategic themes (as described in Section 4.1.2)
- The Street Maintenance Strategy
- The Streetscape Guidance

In addition, levels of service, and level of service statements, are set within the context of relevant legislation. These include not only the acts mentioned in Section 3.2 which drive highway asset management in particular (the Highways Act, the TMA and NRSWA), but also several pieces of legislation which affect the standard of works implementation. Chief among these are:

- The Health and Safety at Work Act 1974
- Management of Health and Safety at Work Regulations 1992
- Construction (Design and Management) Regulations 1994 and 2007
- The Disability Discrimination Act 1995 and 2005

Environmental legislation also affects how and where highway works are carried out. The following are particularly relevant:

- Noxious Weeds Act 1959
- Wildlife and Countryside Act 1981
- Environmental Protection Act 1990

In addition, a number of best practice guidelines underpin the levels of service and level of service statements.

Finally, customer priorities are a vital part of setting levels of service. TfL's Marketing Services are assisting the organisation to establish how it may get a better understanding of customer priority. Future revisions of the HAMP may cover this in greater detail.

However, some customer perception survey data does already exist. TfL and its predecessors have a limited selection of data that has been collected on a continuous basis since 1994. The TLRN Customer Satisfaction Survey aims, among other things, to measure satisfaction with the local environment at the study sites on the TLRN. This gives an insight into people's experience on the highway (including the entire highway right-of-way area) as pedestrians.

In 2005, TfL Surface Transport undertook a partial update of this data.[41] Appendix G contains a summary of the results of this survey, highlighting the changes since 2004.

The survey shows that TfL will need to continue to develop customer outcomes in order better to track and, if appropriate, respond to possible trends in the areas surveyed which are affected by highway asset condition and streetscape design decisions covered by this HAMP. These include:

- Personal safety and security (in relation to street lighting and streetscape design)
- Numbers of seats provided
- Amount of litter
- Tree and other planting
- Quality of pavements

The latter three features should be tracked even though they appear on the limited evidence available to be improving.

In addition, the 2005 Annual London Survey, conducted by the Greater London Authority based on 1,442 face-to-face in-home interviews during autumn 2005, asked participants whether London roads needed improving. Of the 282 who replied in the affirmative, the survey then asked which two or three actions would do the most to improve the roads. Better road maintenance, with 44 per cent of respondents selecting (multiple responses permitted), was the highest of the 14 distinct responses noted in the survey. Fewer/quicker road works/better planning/coordination of road works also accumulated 35 per cent of respondents, while eight per cent selected better lighting on roads.

This survey is also covered in Appendix G.

## 5.4 Listing of outcomes

High-level outcomes have been developed to cover all aspects of Mayoral priorities, as presented in the Mayor's strategies, which are relevant to TfL's management of the TLRN. Table 3 below shows the subset of these outcomes which have been identified as being of relevance to the activities covered in this HAMP. The outcomes are grouped by category and the relevant portion(s) of the Mayor's Transport Strategy are indicated. To the right of each outcome, the level of service statement elaborates each outcome, explaining what TfL will aim to do.

Appendix E contains the full text of all excerpts of the Mayor's Transport Strategy to which this table refers. Although safety is one of the seven London Streets themes, it is not broken out as a separate category in the service management hierarchy. This reflects the fact that safety pervades every aspect of TfL's management of the highway and nearly every desired outcome relates to safety in some way.

Table 3: Outcomes and level of service statements

| Relevant portion of Mayor's Transport Strategy | Category | Outcome | Level of service statement |
|---|---|---|---|
| Policy 4G.1 | SURFACE | A smooth surface | TfL will maintain the surface so as to minimise (within reason) uneven surfaces, rutting and cracking, based on information collected from visual and machine-driven inspections to identify necessary works. Any deformity likely to cause personal injury or damage to property will be repaired as a matter of urgency. |
| Policy 4G.1 | SURFACE | An adhesive, non-skid surface | TfL will monitor and assess areas of skid-resistance deficiency and match the skid-resistance of the carriageway to the site-specific needs of the network. |
| Policy 4G.1 | LIGHTING | Well-lit carriageways | TfL will monitor the lighting stock by means of visual inspections, including in the hours of darkness. Any lighting outages likely to cause loss of quality of driver vision will be repaired as a matter of urgency. |
| Policy 4G.3<br>Policy 4I.1 | LIGHTING | Footways lit to an extent that fosters feeling safe | TfL will monitor the lighting stock by means of visual inspections, including in the hours of darkness. Any lighting outages likely to create a perceived risk to personal safety will be repaired as a matter of urgency. |
| Proposal 4G.22 | SIGNING | Clear and clean signs and road markings | TfL will maintain the sign and marking stock to optimise with due regard to cost, practicality and other concerns the availability, clarity and enforceability of the messages it conveys. |

**Table 3: Outcomes and level of service statements** (continued)

| Relevant portion of Mayor's Transport Strategy | Category | Outcome | Level of service statement |
|---|---|---|---|
| Proposal 4I.10 | ACCESSIBILITY | Footways that are clear and accessible for disabled people and those with mobility difficulties | TfL will maintain footways and pedestrian crossings and public space to optimise with due regard to cost, practicality, and the needs of other users their convenience of movement for disabled people and those with mobility difficulties. |
| Proposal 4G.10<br>Proposal 4I.8 | ENVIRONMENT | A street environment that is uncluttered, clean and cared for | TfL will seek to remove objects put or left in the highway and will work with other authorities to help them carry out their duties in accordance with the Environmental Protection Act 1990 and Clean Neighbourhoods and Environment Act 2005. |
| Proposal 4G.10<br>Proposal 4G.11 | ENVIRONMENT | A green street environment | TfL will manage the network in a way that minimises (within reason) impacts on London's environment and contributes to the amenity and biodiversity aspect of the Capital. |
| Proposal 4G.20 | CONGESTION | Road available and not interrupted by roadworks | TfL will undertake carriageway and other repairs in such a way as to minimise occupation of road space. |
| Policy 4G.2 | CONGESTION | A fair allocation of roadspace in proportion to demand | TfL will seek to balance conflicting demands from different types of users of its network. |
| Proposal 4G.25 | INVESTMENT | Optimal decision in terms of when and how much money is spent on highway maintenance | TfL will determine its investment budgets and programmes based on removing the backlog of repairs and minimising whole-life costs. |
| N.A.[42] | INFORMATION | Well-informed customers | TfL will keep its customers informed about its activities and respond promptly to queries and complaints. |

The level of service statements are phrased as aspirations. It is important to note that no network or service is ever perfect and there will always be a level of defect.

## 5.5 How outcomes are measured

The desired outcomes listed above are measured through 'customer outcomes,' which cover a specific and measurable aspect of an asset or of the maintenance activity performed on it.[43] The desired customer outcome is defined in some cases by reference to TfL's asset condition surveys and modelling (for capital renewal) and in other cases by reference to tabulated maintenance standards (typically for operational management). Measuring outcomes through customer outcomes allows TfL to monitor and demonstrate its performance.

Delivery of the customer outcomes is measured and reported externally by each TfL directorate by means of key performance indicators (KPIs). In some cases these reference Best Value Performance Indicators (BVPIs).

Both BVPIs and KPIs are measures currently used to gauge the performance of the TLRN asset itself and of aspects of TfL's management of it, such as workforce safety and environmental sustainability. BVPIs are measures created by central Government as part of the Best Value initiative to create a scorecard for local and highway authorities, encouraging efficiency and performance and allowing comparison among localities. They take the form of a measure of something, with no explicit external target listed (for instance, BVPI 223 is the percentage of carriageway length with condition defects that total more than 100 points, according to the SCANNER-based condition survey). KPIs, on the other hand, are used within TfL to gauge the performance of each department or directorate, and allow numerical comparison of their performances against agreed targets and year-on-year. They have explicit targets listed, or in development, but are not yet benchmarked against other highway authorities. For instance, KPI 5.8 is the average percentage of streetlights working on the TLRN, and TfL's target is at least 98 per cent.

KPIs are calculated internally and reported either four-weekly, quarterly or annually, as appropriate. BVPIs are required to be published annually as part of TfL's Best Value Performance Plan. When BVPIs are referenced to serve as KPIs, they have targets agreed within TfL and may be calculated more frequently for internal purposes.

Two additional types of indicators are used to measure performance in more detail, within the supply chain management process or within an individual directorate:

- Service performance indicators (SPIs) are used to measure outcomes relating to how the highway maintenance service is carried out by the supply chain. SPIs measure programme delivery as well as aspects such as the environmental sustainability of contractors' vehicles or the diversity of the workforce involved. Like KPIs, they have explicit targets and are not nationally benchmarked. SPIs feed into KPIs, allowing TfL not only to gauge contractors' compliance with the HMW contract and other supply chain contracts, but also to collect the information that can be used in aggregate to determine overall performance against KPI targets.
- In addition to monitoring service delivered by the supply chain, the Directorate of Road Network Management also monitors its own performance through the use of business performance indicators (BPIs) which are reported internally.

Appendix F lists those 2007/08 KPIs for London Streets that govern TfL's discharge of the activities covered by this HAMP. These indicators have been developed to support the London Streets strategic themes and are sorted by relevant theme and then by which customer outcome they measure.

Appendix B also returns to the outcomes summarised above, and presents them one at a time in more detail. Customer outcomes used to measure each outcome are presented, each with accompanying KPI or BVPI and target. Where an SPI feeds into the KPI, this is also indicated.

Through Appendices F and B, the sub-set of KPIs and BVPIs that relate directly to the performance of the asset itself are referenced in this HAMP, as are those SPIs that feed into the referenced KPIs. In addition, certain other SPIs are worthy of inclusion here because, even though only some of them are directly related to asset performance, they are used to demonstrate continuous improvement of the service provided by TfL's supply chain. These SPIs include those which demonstrate actions being taken to deliver targets and objectives contained within each contractor's Quality Plan and plans related to equality and inclusion, as well as in regards to TfL's environmental sustainability objectives. In particular:

- SPI 17 measures each contractor's implementation and achievement of planned objectives and aspirational targets from its Quality Plan for continuous improvement
- SPI 18 monitors each contractor's compliance with planned arrangements for equality and inclusion as contained in its equality and inclusion plans. TfL's approach to equality and inclusion involves focusing on valuing diversity through valuing people. The goal is to be proactive and strategic to create true inclusion, rather than focusing on particular groups or one programme such as positive action.[44] In keeping with this spirit, contractors are each required to prepare a Diversity Training Plan, Supplier Diversity Plan, and Communications Plan. The relevant SPI is then calculated via a score determined by audit of the evidence available to demonstrate implementation and achievement of planned objectives and aspirational targets.
- Another important group of SPIs (most of which feed into closely-related KPIs) are those which measure the environmental impact of contractors' actions. Five indicators (SPIs 22-26) cover:
  - Emissions from contractor vehicle fleets (percentage of vehicles meeting relevant Euro emissions standards for engines)
  - Energy consumption across contractor vehicle fleets (percentage of vehicles meeting relevant energy efficiency labels)
  - Percentage of construction and demolition waste material that is reused or recycled
  - Percentage of construction and demolition waste material that is taken to landfill
  - Percentage of materials used that are recycled or green

These SPIs are monitored by the contractors filling in self-reporting forms, which are then subject to multi-level audit. For the HMWCs, targets for each SPI increase over the six years of the HMW contract to encourage continuous improvement.

The chapters on each asset type (7-11) further explain the performance indicators and targets as they relate to each asset.

# Part III
# Capital renewal and operational management of TfL's highway assets



# 6 Overview of capital renewal, operational management, and high-level decision-making

**This chapter presents an overview of how TfL plans, manages and accomplishes capital renewal and operational management, as many key points apply to all types of highway assets on the TLRN. Also explained here are the tools used to make high-level decisions among different options for management of the network. The subsequent chapters consist of detailed statements of TfL's management of each asset type – carriageways and footways, structures, tunnels, lighting, and other assets.**

## 6.1 Capital renewal

Capital renewal is planned maintenance that prolongs the life of a particular depreciated asset, either by replacing it with a new one, or by some other intervention (such as waterproofing a bridge deck).

Pre-planning of capital renewal requires comprehensive and regular surveys of the condition of the asset. Condition inspections are performed at regular intervals. For example, for carriageway and footway, these include walked and driven condition surveys and skid-resistance (SCRIM) surveys; for bridges, Principal and General Inspections; and for street lighting, detailed visual inspections of all components of the lighting system.

Whenever practicable, condition inspections which require highway or lane closures are carried out in conjunction with other works.

In comparison with safety inspections (described below in the next section, used for detecting needs for day-to-day reactive maintenance to keep the asset safe), condition inspections focus on underlying condition, as their purpose is to allow TfL to determine when assets need full rebuilding or replacement or capital repair.[45] These inspections are useful both for evaluating the condition of each individual asset, and for getting an overall picture of the level of service provided by the entire network.

Using the results of condition inspections/surveys, and where indicated, more detailed site investigations, DRNM conducts forward work programming activities for each asset type, determining the overall network need and the corresponding capital renewal budgets that it estimates would be necessary to meet level of service targets with optimum efficiency. The use of asset investment modelling to assist in this process is covered in Section 6.3.1. Actual budgets are set by a process of negotiation between modelled estimates and available levels of funding for which a number of different business areas are competing. After budgets are determined, individual capital projects are prioritised and scheduled.

## 6.2 Operational management

Operational management is how TfL maintains its assets in a safe, serviceable, available state.

Operational management, also conventionally known as revenue maintenance, is defined precisely in Section 3.4. In brief, it consists of two main types of activities:

- Reactive, safety and serviceability-related operational maintenance, including a regime of safety and service inspections and necessary reactive repairs, as well as winter service
- Scheduled routine maintenance, including routine cleaning of assets and routine end-of-life replacements of small-value assets, such as bulk lamp changes

Under the structure of the HMW contracts operational from 1 April 2007, covering the period of 2007-2013, these activities are managed through partnering between TfL staff engineers and the HMWCs. The contract divides revenue maintenance into 'performance' and 'cyclic' activities. Performance activities are governed by requirements for performance of the asset, rather than a pre-determined maintenance schedule, and cover most reactive items. Cyclic activities occur at regular, pre-determined intervals, and cover most routine maintenance items.

The bulk of revenue maintenance is ordered on a lump-sum basis from the contractors, while for some activities, a schedule-of-rates approach is more appropriate.

Appendix H contains more details about how various operational management activities are ordered under these contracts.

The next two sections contain further detail about the activities which comprise reactive and routine maintenance.

### 6.2.1 Reactive maintenance

Reactive maintenance is conducted in response to detection, through periodic safety and service inspections or as reported by members of the public, of flaws or defects that could adversely affect the safety of, or service offered by, the asset. As explained above, most reactive maintenance activities are performance-based, meaning that they occur when inspections reveal that the performance of an asset has fallen below the required level of safety or serviceability. This section first describes maintenance to address safety issues, and then covers activities addressing serviceability. Finally, it addresses winter service, which is handled slightly differently.

#### 6.2.1.1 Safety

The HMW contracts specify a risk-based regime for the frequency of safety inspections of the network. Additional inspections are made in response to ad hoc reports of a safety defect from the public, the police, or other organisations, or in response to minor incidents or extreme weather. Critical safety defects may also be detected through service inspections or condition surveys, although those inspections deal primarily with overall condition and this would only touch on safety if the structural condition of an asset were very poor. By contrast, the purpose of safety inspections is to detect visible flaws, often those that have occurred more suddenly – potholes, objects blocking the carriageway or footway, guardrail damaged by a vehicle strike, etc.

Safety inspections consist of a trained inspector walking or riding in a slow-moving vehicle along the network observing all types of highway assets for visible safety defects. In addition to covering all the asset types highlighted in this HAMP, these inspections also cover a number of asset types with a long life and few specific routine maintenance needs, such as central islands, kerbs, bollards and fences.

The frequencies of inspections depend on the classification of the road or footway in that location, as shown in Table 4:

Table 4: Frequency of safety inspections for TLRN highway assets

| Assets to be inspected | Road hierarchy | Frequency of daytime safety inspection[46] |
|---|---|---|
| All TLRN highway assets | Rural fringe roads | Weekly |
| | Suburban roads | Monthly |
| | Urban roads | Monthly |
| | Prestige Walking Zone footways | Weekly |
| | Primary Walking Zone footways | Weekly |
| | Secondary walking route footways | Monthly |
| | Link footways | Monthly |
| | Local access footways | Monthly |

Cycleways are inspected at the same frequency as the adjacent or linked footway.

Identified defects are in turn evaluated based on the risk that they pose, and categorised and prioritised for repair accordingly. The procedure for categorising defects is in line with guidance provided in Well Maintained Highways – Code of Practice for Highway Maintenance Management. The HMW contract contains the requirements for type and speed of repair, based on defect category (shown in Table 5):

Table 5: Defect categories and required responses

| Defect categories | Priority response | Description and response |
|---|---|---|
| Emergency Call-out | 1 | A defect that poses a level of risk that requires a response within one hour to attend the location and commence appropriate action |
| Category 1 | 2 | A defect that poses a level of risk that requires rectification by making safe within 24 hours and permanently repaired within 28 days. The contractor is required to monitor the temporary repair to ensure that it remains fit for purpose until a permanent repair is made. |
| Category 2H | 3 | A defect that poses a level of risk that requires it to be rectified within 7 days of the TfL Project Manager's approval to proceed, by permanent repair |
| Category 2M | 4 | A defect that poses a level of risk that requires it to be rectified within 28 days of the TfL Project Manager's approval to proceed, by permanent repair |
| Category 2L | 5 | A defect that poses a level of risk that requires either:<br>• Rectification during the next available programme<br>• Scheduling for a more detailed inspection, or<br>• Reviewing condition at next inspection<br>subject to the TfL Project Manager's approval to proceed |

The contractually-specified inspection frequencies and repair timetables allow TfL to meet or exceed its responsibilities for due care under the Highways Act. The targets for the SPIs (as discussed in Chapter 5), timeframes for remedying identified defects, and quality standards for works completed form the performance requirements for maintaining a safe network through a performance-based contract structure. Performance is monitored via a comprehensive audit process.

To achieve best value, and key to the asset management approach, the inspection and defect-categorisation processes are risk-based. Inspection frequencies differ according to a hierarchy within each of the carriageway, footway and cycleway networks. This hierarchy is based on network usage, speed limit (for

carriageways) and urban/suburban/rural characteristic to take into account the likelihood of defects occurring and the risk that they would pose if undetected and so not fixed. In addition, the categorisation process for each detected defect takes into account not only the severity of the defect, but also the likelihood of the public coming into contact with it or of its disrupting the network.

In general, carriageways and associated assets are inspected more frequently in rural areas, as the consequences of a safety fault are likely to be more severe, since travel speeds are greater (with speed limits of 50 to 70 mph). On the other hand, footways and assets located on the footway are inspected more frequently in Prestige Walking Zones, which are areas with very high foot travel, such as 'the centre of the largest retail areas, approaches to major public transport interchanges such as London termini, [and] other areas of intense pedestrian concentration.'[47] It is an important aspect of the risk-based approach taken that inspection frequencies for assets on carriageways and footways are set independently, based on independent hierarchies.

In addition, TfL aims to keep the network free from graffiti and accumulated detritus to provide a pleasant and safe street environment. To that end, the HMWCs make use of the safety inspections to check for graffiti, and remove messages which are racist, religiously bigoted, inflammatory, sexually explicit or obscene, at the time of the inspection if reasonably practicable. If it is not possible to do this at the time, it is carried out within 24 hours. All other graffiti is removed within 28 days. Illegal advertising, stickers, fly posters, illegal signs and accumulated detritus are dealt with in the same way.

#### 6.2.1.2 Serviceability

In addition to safety inspections, service inspections are also carried out on the network to help ensure that particular assets meet their requirements for serviceability. These inspections are to detect serviceability-related defects, including those linked to network reliability, accessibility and integrity. In general, service inspections are more in-depth than safety inspections, involving, for instance, opening covers to electrical components, checking wiring, etc. They are carried out less frequently, every 12 months for most assets, with exceptions as specified in the HMW contracts.

Risk assessments for serviceability defects are dealt with differently to those for safety defects. In regard to safety-related defects, risk assessments are based purely on the safety aspect, and defects must be rectified in accordance with the timescales appropriate to their significance. In contrast, for serviceability-related defects, there is no statutory duty to rectify the defect. Instead, risks are assessed by reference to best practice for efficiency, effectiveness and economy. Repair budgets are then set based on trade-offs between network need and funding availability, and repairs are undertaken as funding permits.

Service inspections also include inspections which relate to network availability and reliability, including for regulatory purposes such as for NRSWA, as well as other inspections for network integrity.

#### 6.2.1.3 Winter service

As highway authority for the TLRN, TfL is obliged to 'ensure, so far as is reasonably practicable, that safe passage along a highway is not endangered by snow and ice.'[48] In addition, there is a duty to remove obstructions of the highway caused by snow accumulation.

Winter service is a kind of reactive maintenance, but, as it applies only to carriageways and footways, it is covered under that asset-specific chapter (see Section 7.4.1.2).

### 6.2.2 Routine maintenance

Routine maintenance activities are cyclic activities, carried out at defined frequencies as specified precisely in the HMW contracts. For example, metal halide and ceramic metal halide street lamps are changed and cleaned at an interval of 24 months, while high-pressure sodium lamps are changed and cleaned every 36 months.

Routine maintenance activities include (but are not limited to): cleaning of gullies, culverts, ditches and other parts of the carriageway drainage system; cleaning subways, footbridges, and certain structures; maintaining structures and tunnels; and replacing lamps in streetlights and illuminated signs.

In addition, safety and service inspections are themselves routine, cyclic activities, although the defects that they detect are remedied under the reactive maintenance framework.

To maximise efficiency and reduce unnecessary lane closures, routine maintenance activities are coordinated when possible. For example, routine maintenance of illuminated traffic signs and illuminated bollards can be carried out within the same traffic management layout as street lighting routine maintenance.

Before beginning the asset-specific discussions of capital renewal and operational management, the rest of this chapter looks at the high-level decision-making tools used in management of the TLRN.

## 6.3 High-level decision-making

Before programming of particular proposed capital schemes can be tackled, and before allocations for expected reactive maintenance can be set, TfL uses models to help estimate and justify the optimum annual budgets for capital renewal and operational management of a particular asset type.

TfL has demonstrated the success of this approach for setting budgets for carriageways and footways over the past five years. Building on the success of these models, it is making progress towards such modelling for bridges, other highway structures, lighting and other assets.

However, it should be noted that the best option for a single asset or service is not necessarily the best option for the competing demands of the different services and assets across the network. In such cases, a more high-level optimisation method is needed to allow a highway authority to consider the effects of a particular division of available funding not only between capital and operational budgets, but also among different types of assets. Highway valuation is an emerging approach that offers the potential to evaluate all budgetary choices.

Modelling and highway asset valuation support the 'Optimal decision…' outcome from Table 3, as elaborated in Table 6:

Table 6: Key outcome for high-level decision-making

| Outcome | Level of service statement | Performance indicators | Target |
|---|---|---|---|
| Optimal decision in terms of when and how much money is spent on highway maintenance | TfL will determine its investment budgets and programmes based on removing the backlog of repairs and minimising whole-life costs. | **Carriageway** | |
| | | BVPI 96 | 6.7% or less for 2007/08; 0% by 2011 |
| | | BVPI 223 | 9% or less for 2007/08 |
| | | **Footway** | |
| | | Percentage footway with condition index of 50+[49] | 0% by 2011 |

Currently, the only performance indicators available to measure this outcome are those measuring improvement of carriageway and footway condition. When available, indicators measuring improvement in the condition of other asset types will also be added, as one of the main purposes of using an asset management approach is to take a comprehensive view of all assets and explicitly consider trade-offs among funding for different asset types.

This section describes TfL's highway asset modelling activities, and then the preliminary highway asset valuation activities, touching on the ways that these approaches can help the organisation make optimum decisions for managing all the assets on the TLRN.

### 6.3.1 Modelling

Asset investment modelling, although a complicated procedure involving the use of a vast array of data, can be put simply as:

- Determining the current condition of the asset
- Predicting how the asset will perform over time and use
- Identifying what can be done to hold or improve the condition to that set by the levels of service
- Determining what capital renewal investment is needed for this

Based on the predicted overall condition of the entire stock of that asset type likely to be achieved by a given level of capital funding, it

is possible to estimate the total reactive maintenance cost to keep the asset safe and fit for purpose, as the number of defects likely to develop is broadly dependent upon the asset condition. In this way, budgets for operational management can also be reviewed.

If the funding available is less than the optimum level, the model can be used to determine how best to divide what is available between capital and operational expenditure, keeping in mind that under the Highways Act, TfL has a duty of care to all users and to the public in general to maintain the highway in a condition fit for purpose.

While an experienced engineer can readily predict the requirements on a section of road in the short term, identifying longer term problems, assessing the impact brought about by changes of use, and predicting the conditions likely to result from a range of funding or treatment scenarios is better suited to the use of investment modelling.

The relevant models are described further in the chapters about individual asset types.

### 6.3.2 Highway asset valuation

As mentioned in Section 3.2, the central Government initiative towards Whole of Government Accounts for local and highway authorities is one of the major drivers for an asset management approach. As the County Surveyors' Society's Framework for Highway Asset Management states:

> 'WGA accounts will be commercial-style accounts covering the whole of the public sector including local authorities. WGA will be produced on an accruals basis and will use Generally Accepted Accounting Principles (GAAP), adapted where necessary for government. This form of accounting is known as Resource Accounting and Budgeting (RAB). Under these requirements local authorities will be required to value their highway assets.'[50]

In fact, the requirement stated here is still under HM Treasury consultation, but is expected to come into force by 2009/10.

WGA would thus require the use of a current value renewals (net replacement cost) approach to highway asset valuation. Based on inventories, condition surveys and the performance offered by the asset, a current value renewal approach links financial and service indicators. Not only does this improve service planning, but it creates a common currency for planning investments, both to allow linking of highway investment into broader strategies and to permit fair comparison of competing investments between highway and other assets or services.[51]

This section explains how highway asset valuation is achieved, and the benefits it can offer.

The current highway asset valuation refers to the depreciated replacement cost (DRC) of the entire inventory of all assets of all asset types on a highway authority's network (for TfL, this is the TLRN).

The DRC is evaluated as follows:

**DRC = gross replacement cost – accumulated consumption**

As the County Surveyors' Society Guidance Document for Highway Infrastructure Asset Valuation states:

> 'The gross replacement cost (GRC) is determined from a bottom-up calculation using a standardised procedure involving standardised unit rates and GRC models which represent the cost of replacing an existing asset with a modern equivalent

asset. Assets are consumed during service due to ageing, usage, deterioration, damage, a fall in the service provided (assessed through appropriate performance measures) and obsolescence.'[52]

The accumulated consumption (AC) of a particular asset is the monetary value of the amount that it has deteriorated or otherwise declined in condition, ie the depreciation. AC is evaluated based on the condition of an asset where appropriate (eg for carriageways, footways, bridges, and other high-value assets which are likely to deteriorate at a non-constant rate). For lesser-value assets with more predictable deterioration (such as lighting columns), a straight-line approximation of depreciation is sufficient.

As the AC is linked to the condition of the assets it is clear that a fine balance between capital and revenue maintenance, and timing of maintenance, plays a major factor in the overall value of the network.

The current GRC of the assets on the TLRN network is in the region of £5 billion. This figure includes all physical assets on the roads and within structures, plus retaining walls, street furniture, lights, and signs, including variable message signs. 'P sub-group' assets, such as electronic, telecommunication, computer, and camera equipment, are valued separately and are not included in this total. In addition, the value of the land under the TLRN is not included.

A full valuation of the highway asset to support the Whole of Government Accounts process will be undertaken in future as an improvement action to meet the timescales set out by central Government in accordance with guidelines issued by the County Surveyors Society. This will include a calculation of the gross and depreciated replacement costs of the assets following a consistent method year-on-year. TfL has conducted a detailed valuation exercise for one year for the carriageway (shown in Appendix I) and will be expanding it to other types of assets to achieve a more precise valuation figure in further years.

Valuation can be useful in several ways. Tracking changes in depreciated replacement cost is important because, as DRC is linked to the overall condition of the asset stock, it provides a convenient way to monitor TfL's performance in maintaining and improving overall network condition across all asset types. It provides a check on the trade-offs made in funding for various asset types and also on whether the breakdown of funding between capital and revenue maintenance is being made correctly.

Furthermore, gross replacement cost provides a single high-level check on the overall capital budgets required. For instance, the levels of capital investment over the past few years of approximately £50m annually suggest that assets have, on average, a design life of 100 years (ie only after 100 years of such investment levels would TfL have achieved renewal of the entire £5bn GRC of the network). While there are a few assets that do have 100-year design lives, the average is much shorter. In light of this DRNM will be able to monitor overall network condition by calculating the DRC annually.

It is important to note that valuation is expected to have a slightly different role for the green estate (arboricultural and horticultural resources on the TLRN). This is because arboricultural resources especially can be expected to increase in financial value over time, rather than to depreciate. A semi-mature tree, for instance, is more expensive to purchase than a young one. In addition, for the green estate in particular, financial valuation misses much of the real

value of having and maintaining the asset. Further work will be necessary to determine how to account for green asset types in highway valuation.

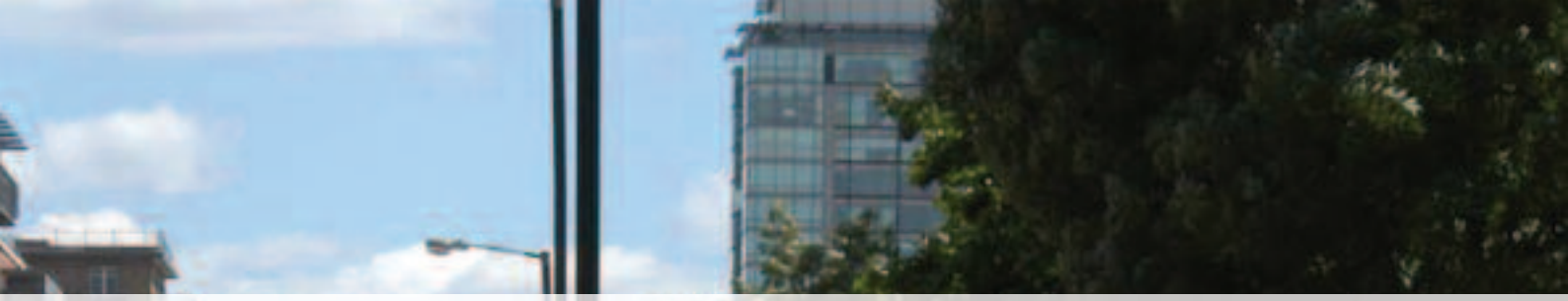
## 6.4 For asset-specific information

The next five chapters of this HAMP consists of asset-type-specific discussions of how TfL accomplishes capital renewal and operational management.

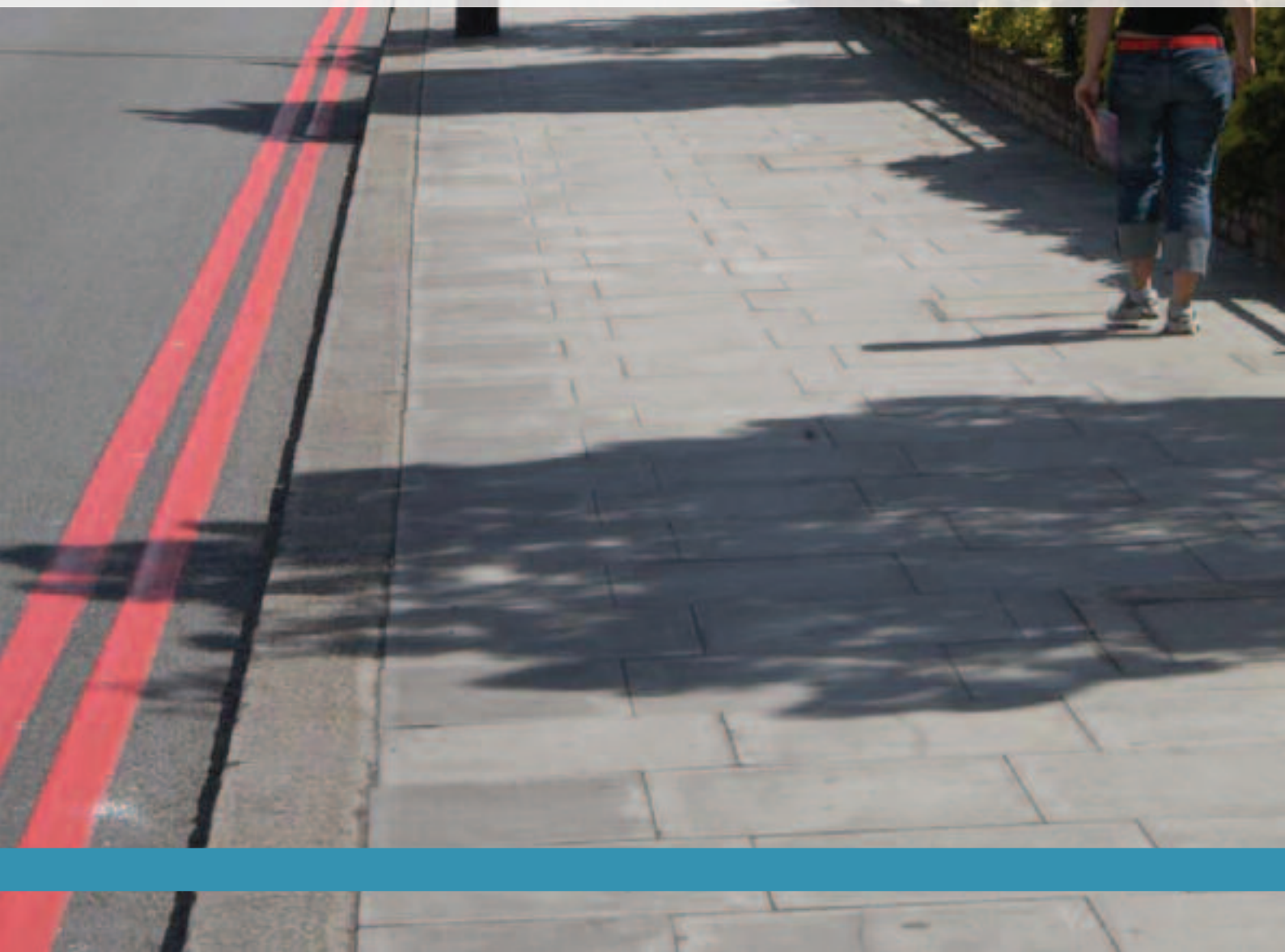
The sections on operational management of each asset type are in turn divided into two sub-sections, which summarise in more detail how TfL manages that kind of asset on a day-to-day basis:

- The safety inspections required and their frequencies, together with any guidance provided on categorisation of defects, appear under the Reactive Maintenance sub-section. Requirements for winter maintenance plans and performance also appear in this sub-section (for carriageway and footway only). For coherence of the text, the regimes for safety inspections are presented within the descriptions of reactive maintenance for each asset type, but it is important to remember that inspections themselves are routine, usually occurring to a fixed frequency
- Schedules for routine maintenance are summarised under the Routine Maintenance sub-section. In addition, as service inspections are often carried out at the same time as routine maintenance, a summary of the applicable requirements is included in this sub-section

The intention here is not to reproduce the HMW contract, and the contract should be consulted in case of query or for further details. As explained in the Introduction, nothing in this HAMP is contractual.







# 7 Carriageways and footways

**The TLRN network consists of 580 km of London's main arterial roads. The carriageway totals about 2,600 lane kilometres, and there are more than 1,000 kilometres of footway. The sections below explain how TfL manages capital renewal of carriageways, capital renewal of footways, as well as day-to-day operational management of both carriageways and footways.**

## 7.1 Objectives and outcomes

Striking the right balance between capital renewal and operational management on carriageways and footways, and programming these schemes to coordinate with others either on the TLRN (such as major improvement schemes) or on nearby Borough roads, can contribute to the goals expressed in the Mayor's Transport Strategy of a rational and efficient approach to a long-term improvement of carriageway and footway condition in London. See in particular Proposals 4G.25 and 4G.26 as shown in Appendix E.

The main requirements of the carriageways and footways are the following:

- Provision of safe and reliable routes for all users
- Offering sufficient capacity to cater for all users and prevent undue delay and congestion while ensuring movement of traffic
- Offering sufficient quality to cope with the general wear and tear caused by the passage of all vehicles including public transport and goods vehicles
- Provision of access routes including for those with mobility difficulties

A number of the outcomes in Table 3 in Chapter 5 are of relevance to the maintenance of carriageways and footways. However, the first two ('A smooth surface' and 'An adhesive, non-skiddy surface') are of particular note and form key goals for TfL's management of the carriageway and footway asset.

Table 7 shows the first of these in more detail. The level of service statement contains two parts (clearly distinguished in the table) which reflect the complementary roles of capital renewal and reactive maintenance in preserving a smooth surface.

**Table 7: First key outcome for carriageways and footways**

| Outcome | Level of service statement | Performance indicators | Target |
|---|---|---|---|
| A smooth surface | TfL will maintain the surface so as to minimise (within reason) uneven surfaces, rutting and cracking, based on information collected from visual and machine-driven inspections to identify necessary works. | **Carriageway** | |
| | | BVPI 96 | 6.7 % or less for 2007/08; 0% by 2011 |
| | | BVPI 223 | 9% or less for 2007/08 |
| | | **Footway** | |
| | | Percentage footway with condition index of 50+[53] | 0% by 2011 |
| | Any deformity likely to cause personal injury or damage to property will be repaired as a matter of urgency. | **Carriageway and footway** | |
| | | SPIs relating to percentage of defects remedied within response times stated in Table 5 | Exact targets to be confirmed |

For capital renewal, TfL's aim is to eradicate the backlog of such work on both TLRN carriageways and footways by 2011, and to keep the network in a steady state of good repair after that. TfL counts as backlog any carriageway with condition index (CI) greater than 70 when collated from Course Visual Inspection (CVI). The percentage of 70+ lane length is also known as the BVPI 96 score. (There is also an interim target for BVPI 223, which is a measure collated from machine survey). These BVPIs are explained in more detail below in Section 7.2.1. For footway, TfL has a target of renewing sections with footway

condition index greater than 50, as explained in Section 7.3.

Achievement of these goals in particular is dependent on sufficient funding being made available.

As shown in the second part of the 'smooth surface' outcome in Table 7, to complement capital investment and keep carriageways and footways safe on a day-to-day basis, TfL's aim through reactive maintenance is to address dangerous defects in accordance with the response times shown in Table 5.

The second key outcome for carriageways and footways is shown in Table 8:

**Table 8: Second key outcome for carriageways and footways**

| Outcome | Level of service statement | Performance indicators | Target |
|---|---|---|---|
| An adhesive, non-skid surface | TfL will monitor and assess areas of skid-resistance deficiency and match the skid-resistance of the carriageway to the site-specific needs of the network. | To be defined in future years as a continuous improvement action | To be defined |

This level of service statement is expected to be addressed by the skid-resistance strategy in development as described in Section 7.2.3. Skid-resistance issues feed into prioritisation of proposed projects for programming of capital works.

The next sections explain how TfL manages carriageways and footways to meet the priorities expressed in the Mayor's strategies and by extension the relevant outcomes and level of service statements.

## 7.2 Capital renewal of carriageways

TfL maintains a complete inventory of the TLRN carriageways and footways in the Asset Inventory and Management System (AIMS) software tool. The first step in managing capital renewal of the TLRN is conducting condition surveys to gather information about the condition of the network. This information is then recorded in AIMS, so fulfilling for these assets the first basic building block of asset management,

which is a complete asset inventory with up-to-date condition data.

Condition survey results offer a standardised method for evaluating road condition, as well as of enabling prioritisation of spending on maintenance to take place.

The condition data is used in aggregate as input to an asset investment model through which TfL predicts current and future funding needs and proposes and justifies capital budgets. Once budgets are set, condition data is used to plan and justify schemes on particular sections of the highway. These schemes are evaluated against set criteria using TfL's Project Identification and Appraisal (PIAP) process.

Skid-resistance is an important safety concern on carriageways. Accordingly, TfL also conducts annual surveys of skid-resistance and uses the results to help prioritise areas for capital renewal.

The processes involved in TfL's management of capital renewal of the carriageway are described in more detail in the following sections.

### 7.2.1 Condition surveys

The entire TLRN carriageway undergoes an annual survey of its condition. Currently TfL conducts three types of annual survey:

- Detailed Visual Inspection (DVI): This is a comprehensive walked survey of all lanes on the TLRN conducted by an in-house team of trained and accredited Highway Condition Surveyors.[54] The survey is conducted and the results processed in accordance with the United Kingdom Pavement Management System (UKPMS), the national standard for survey techniques and post-survey processing.

  DVI results are presented in the form of a condition index (CI) value for each 20-metre sub-section of the network. The higher the indicator, the worse the condition of the road. Sections with a CI of 0 are in pristine condition, while those with condition indices above 70 are in a poor condition, indicating that some form of structural maintenance should be considered. When DVI is converted to Course Visual Inspection (CVI) results, then the percentage of the carriageway network with a CI of 70 or above (referred to as '70+') is recorded as BVPI 96, and is considered by TfL as a backlog of capital renewal work required on the network.[55]

- SCANNER survey (Surface Condition Assessment of the National Network of Roads): This is an automated condition survey performed by sensor systems mounted on a vehicle. Data is collected by the sensors while the vehicle is travelling at normal traffic speed. The survey is carried out in the main running lane in each direction. For the TLRN, this equates to approximately 1,100 lane-kilometres.

  The SCANNER data is used to calculate the Road Condition Indicator (RCI) value for each 10-metre sub-section of the network. The RCI has a range of 0 to 370. As with condition index, the higher the RCI value, the worse the condition of the road. The RCI values are used to produce BVPI 223, which is the percentage of the surveyed carriageway network (main running lanes) with an RCI value of 100 or above. This reflects the percentage of the network which is 'likely to require planned maintenance soon.'[56]

  Collection and processing of SCANNER data is also in accordance with UKPMS.

- SCRIM survey (Sideways-force Coefficient Routine Investigation Machine): This is an automated condition survey performed by a vehicle travelling at an optimum test speed

of 50kph. The survey is carried out in the main running lane in each direction. The SCRIM survey measures the key safety parameter of skidding resistance to help TfL determine priority areas for capital renewal. However, it has a different role from SCANNER and DVI surveys as it also influences safety-related planning

The procedures for conducting these surveys and the methodology for processing the information collected are in accordance with nationally-standardised methods. At present, TfL does not routinely collect data (such as Deflectograph or ground-penetrating radar data) that might point at deeper structural deterioration. Rather, such data is collected as appropriate as part of design of individual schemes. TfL may in the future consider options for collecting such data more routinely.

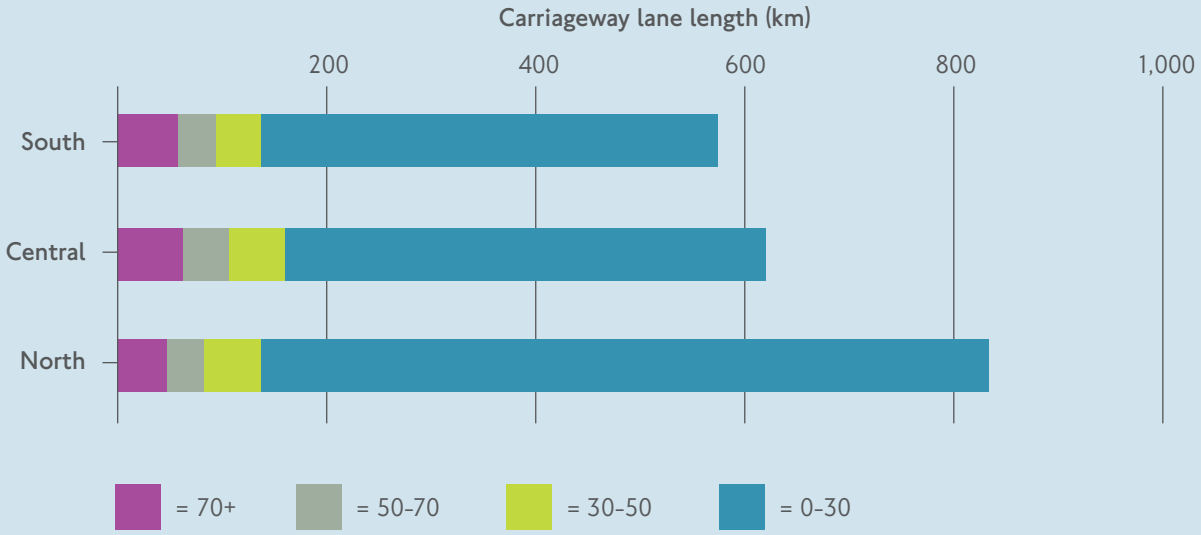
As SCANNER surveys are new and their results have not yet been fully calibrated against historical trends in DVI data, the DVI condition survey data is currently more appropriate for TfL's internal planning purposes. Accordingly, DVI data is used:

- As input to asset investment modelling (see Section 7.2.2)
- For development of the forward work programme (see Section 7.2.4)
- For monitoring performance by measuring both improvement and deterioration of the network (see Section 7.5)

SCANNER data is used in parallel with DVI data for the last of these purposes.

Figure 5 shows the results of the latest available complete DVI condition survey, by area within the TLRN.

Figure 5: Length of carriageway in different CI bands, by area, from 2005/06 DVI survey




### 7.2.2 Carriageway modelling

The first use of the condition data is for modelling of the investment required to meet London Streets' target of eradicating the carriageway capital renewal backlog by 2011.

A model has been developed to determine the most cost-effective maintenance pattern in order to clear the backlog in the specified timeframe. Levels of funding required in each year to meet the target are calculated using the model. The results provide DRNM with an objective and consistent method for establishing maintenance needs for the TLRN network and so informing business planning and budget decisions.

The model can evaluate the following:

- How much investment is required, over time, to clear the backlog
- How long it would take to clear the backlog given a certain funding pattern
- What level of investment is required to maintain carriageways in a state of good repair after the backlog is cleared

The model establishes a rational basis to express the very real funding need for capital renewal of TLRN carriageways. The model also demonstrates for business planning purposes the value of an asset management approach, which considers explicitly the trade-offs between capital investment and revenue maintenance funding.

The model demonstrates that:

- (1) If the level of funding for capital renewal is not adequate, then the backlog will increase as will the pressure on revenue maintenance funding
- (2) Treating roads with a condition index of 50-70 is the most economical intervention level for maintaining the road network in a steady state of good repair, allowing TfL to prevent a future backlog from developing once the current 70+ sections have all been treated

This second point is also in accordance with paragraph 4G.124 of the Mayor's Transport Strategy, which emphasises the need for a fast programme to 'focus on the immediate priorities and to reverse the pattern of past inadequate investment,' followed by a more long-term approach to maintenance.

The model confirms that inadequate capital investment would lead to poorer road conditions and higher spending on revenue maintenance to keep poorly-maintained roads safe for the travelling public. In other words, not only is carriageway condition better with appropriate levels of capital investment, but overall costs are lower.

This model has been used over five financial years so far, and has been shown to be both an accurate predictor of BVPI 96, and an effective tool in assisting TfL to work towards the goal of eradicating the backlog of 70+ roads by 2011. Both points are shown in Table 9, which shows the predicted and actual values of BVPI 96 over this period:[57]

**Table 9: Predicted and actual values of BVPI 96 (calculated from CVI results)**

| BVPI 96 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 |
|---|---|---|---|---|---|
| Predicted | 15% | 12% | 8% | 7% | 6% |
| Actual | 14.4% | 11.5% | 7% | 6.7% | 5.7% |

The predictions were based on that year's actual investment in carriageway capital renewal.

This table shows that TfL has reduced the backlog by 60 per cent in just the first five years of the model-based planning and budgeting programme.

Appendix J provides more detail about the form and calibration of the model and summarises ongoing improvement activities.

The second main use of condition survey data is for developing the forward work programme as covered in Section 7.2.4. Development of the forward work programme is, however, also influenced by SCRIM, which is described first in the next section.

### 7.2.3 Skid-resistance strategy

SCRIM results are used in addition to condition survey data to help refine forward work programming for capital schemes.

The fundamental principle of SCRIM is that the raw survey data is compared with investigatory levels based on a site-specific categorisation to determine if further investigation, and possible remedial works, are needed. Up to now, the site categorisation and investigatory levels have been set in accordance with Standard HD 28/04 within the Design Manual for Roads and Bridges.[58] TfL is now reviewing the appropriateness of the standard investigatory levels to London and intends to build on them by setting out a more comprehensive approach to skid resistance policy in the form of a strategy. This strategy, currently in the process of development, will define matters such as:

- The categorisation of the network taking account of traffic flow, characteristics and accident risk (for instance, as indicated from casualty records)
- Method of survey to be used to provide an estimate of the summer skid resistance
- The approach to setting investigatory levels (should be based on the table in HD 28/04 but can be revised or amended following review of existing SCRIM survey and accident data)
- Frequency of re-assessment of investigatory levels
- Which staff are authorised to set or approve investigatory levels
- Further site investigation when indicated
- How remedial works will be prioritised in relation to available funding
- Documentation to be retained to enable implementation of policy to be demonstrated and/or audited[59]

### 7.2.4 Developing the Forward Work Programme

Condition and SCRIM data are used for prioritising proposed capital projects to create the forward programme for capital works on the carriageway. The output of this process is the DRNM work programme for carriageway capital renewal.

The work programme is prepared on a rolling multi-year basis. Each year's programme contains schemes for that current year, which are set and confirmed (barring unforeseen circumstances). Indicative certainty for the schemes to be carried out the next year after that is near 80 per cent; for the following year, about 50 per cent; and so forth. Each year, the newly published programme includes final confirmation of schemes for the current year, and represents the beginning of planning the slate of schemes to be carried out in another outward year.

Uncertainty in the total size of the future programme is due to the fact that budgets are not yet confirmed past the end of the current TfL Business Plan period, which runs through 2009/10. In addition, a large part of the uncertainty as to which individual schemes are programmed in which future year comes from DRNM's desire to achieve value for money and minimise disruption to the travelling public by coordinating with other schemes. These can include other TfL schemes (for instance, major safety schemes or major improvement schemes, expected in the future to be planned within the NMP framework), openings of the pavement planned by statutory undertakers, and work on nearby Borough roads. Coordination means that programming changes are often required nearer to the time.

The LondonWorks system, as described in Section 4.1.1.3.4, can be helpful in coordinating schemes.

In considering a proposal to reschedule a scheme for coordination purposes, TfL is always mindful of safety and ensures that roads receive required safety-related reactive maintenance in the meantime.

The capital renewal programme for carriageways for 2007/08 (confirmed) and 2008/09 (certainty to 80 per cent confidence level) is shown in Appendix C.

## 7.3 Capital renewal of footways

TLRN footways undergo annual condition surveys by DVI as machine-based surveys are not applicable. The data is processed in accordance with nationally-standardised UKPMS rules and methodology to produce footway CI values for each 20m sub-section of the network. The higher the CI value, the worse the condition of the footway.

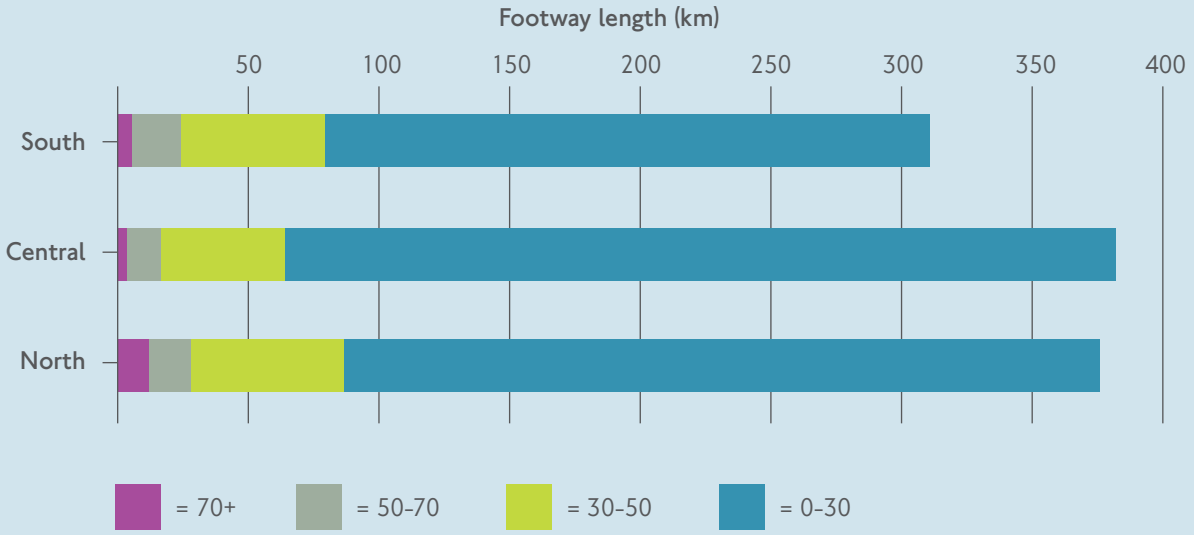
However, as user needs are different than on carriageways, the trigger values and targets are different.

The nationally-recognised trigger value is a condition index of 20 or above on a footway, which indicates that further investigation is required to determine whether maintenance is needed to preserve the footway serviceability. The percentage length of the most heavily-used footway network only (ie footway hierarchy category 1,1a or 2) with a CI of 20+ is reported as BVPI 187.

TfL's target is to replace all footways with CI values greater than 50 by 2011, and then to keep the network in a steady state with no 50+ sections.

Figure 6 shows the results of the latest DVI condition survey of footways, by area within the TLRN.

Figure 6: Length of footway in different CI bands, by area, from 2005/06 DVI survey




In designing footway capital renewal schemes, TfL attempts to minimise the potential for damage by tree roots and vehicle overrunning, as these are significant causes of footway deterioration, along with statutory undertakers' openings.

Modelling for the footways is carried out in a similar fashion as for carriageways. Footway schemes can be prioritised independently for capital renewal, especially when a need to improve pedestrian safety or layout of street furniture is present. In addition, when a carriageway scheme is approved, footway renewal can be programmed at the same time in order to improve efficiency and minimise disruption associated with delivering schemes separately.

Table 10 shows predicted and actual values for BVPI 187 as derived from the footway model and condition survey.

Table 10: Predicted and actual values of BVPI 187

| BVPI 187 | 2002/03 | 2003/04 | 2004/05 | 2005/06 | 2006/07 |
|---|---|---|---|---|---|
| Predicted | N/A | 22% | 25% | 20% | 18% |
| Actual | 24% | 21% | 28.5% | 18% | Not yet available |

The capital renewal programme for footways for 2007/08 (confirmed) and 2008/09 (certainty to 80 per cent confidence level) is shown in Appendix D.

## 7.4 Operational management of carriageways and footways

Operational management activities for carriageways and footways consist of reactive, safety-related operational maintenance, including the winter service, and scheduled routine maintenance.

### 7.4.1 Reactive maintenance

This section first covers the inspection frequencies for safety-related reactive maintenance, and then covers winter service.

#### 7.4.1.1 Safety inspections

Carriageways and footways are inspected for safety at frequencies as specified in the HMW contracts and as shown in Table 4 in Section 6.2.1.1.

In addition to planned inspections, ad hoc inspections are required to be carried out on receipt of a report which requires investigation on-site.

#### 7.4.1.2 Winter service

Winter service is guided by a Winter Service Statement (which will be prepared by TfL) and a Winter Service Plan (to be prepared by each HMWC).

The Winter Service Statement will establish objectives, priorities, and procedures for winter service. It will set out priorities (by carriageway or footway network characterisation) for pre- and post-event treatment of carriageways, footways, and cycleways, which the HMWCs must use in developing their Winter Service Plans.

The Winter Service Plans in turn will set out in more detail exactly how winter service will be performed. Requirements for pre-season arrangements, information gathering, cooperation with other authorities, and decision-making are provided in the HMW contract, as are requirements for material use and communications, records, and performance reporting.

Winter service is by its nature a reactive activity. It is ordered by TfL from the HMWCs at each weather event for which it is deemed necessary.

Although severe weather is not predictable, and demands for winter maintenance vary considerably from year to year, TfL believes that it has invested sufficiently in the equipment and resources to provide a comprehensive winter service for all carriageways regardless of location on the TLRN. However, it may not always be reasonably practicable to achieve 'spotlessness'.

Most footways must be cleared of snow by hand. Owing to the amount of labour required to clear footways, winter service for footways is prioritised based upon the footway network hierarchy mentioned above under Section 6.2.1.1, to focus resources on the most-heavily-used footways. Target response times for footways range from four hours for Prestige Walking Zones and Primary Walking Routes, to 24 hours for Secondary Walking Routes, to 48 hours for all other footways. These treatment times are targets only, and circumstances may prevent their attainment for all winter weather events.

### 7.4.2 Routine maintenance

Scheduled routine maintenance covers those activities that add value to the service offered by the highway asset but do not add value to the asset, do not extend its life significantly, and are generally undertaken on a regular cycle, annually or more frequently. For carriageways, street cleansing is the main routine maintenance activity. Although TfL is the highway authority for the TLRN, the Environmental Protection Act stipulates that local authorities (in this case, London's boroughs) are responsible for litter removal and cleansing of all public areas, including streets. Therefore, this maintenance activity is usually conducted by boroughs. TfL will on occasion engage in street cleansing activities, but does not hold legal responsibility for keeping the streets clean.

## 7.5 Monitoring performance

This section describes how TfL monitors performance for capital renewal and operational management activities.

### 7.5.1 Monitoring performance for capital renewal

TfL updates AIMS to reflect all schemes completed at the end of each annual cycle of planning, programming and implementing capital renewal schemes. The renewed sections have their condition indices reset to reflect their pristine condition. When considered in partnership with the next cycle of complete annual surveys, this allows the organisation to evaluate its progress in improving asset condition.

In addition, however, DRNM undertakes further analysis of carriageway and footway capital schemes on completion in order to close the work programming cycle and incorporate lessons learned, refinements, and updated unit rates for works into its modelling and forward programming processes. This analysis is also used to update the asset valuation.

As a summary of the methods used to evaluate performance in managing capital renewal on carriageways and footways, the following local and national performance indicators are used:

- Completeness and timeliness of condition survey completion
- Completeness and timeliness of updating of inventory as reflected in AIMS
- BVPI 96
- BVPI 223
- BVPI 187

Figure 7 shows a summary of the latest available carriageway and footway condition survey results across the entire network.

Figure 7: Summary of latest carriageway and footway condition survey results

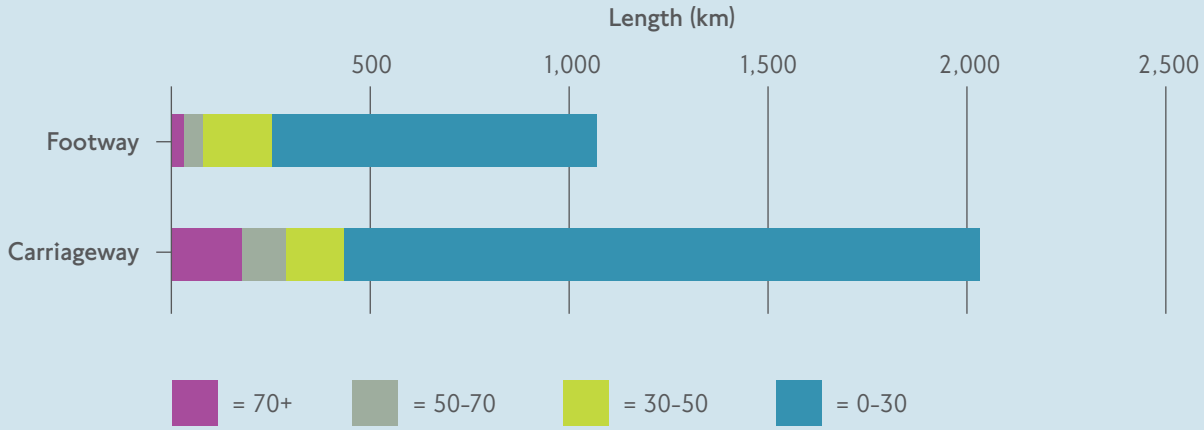
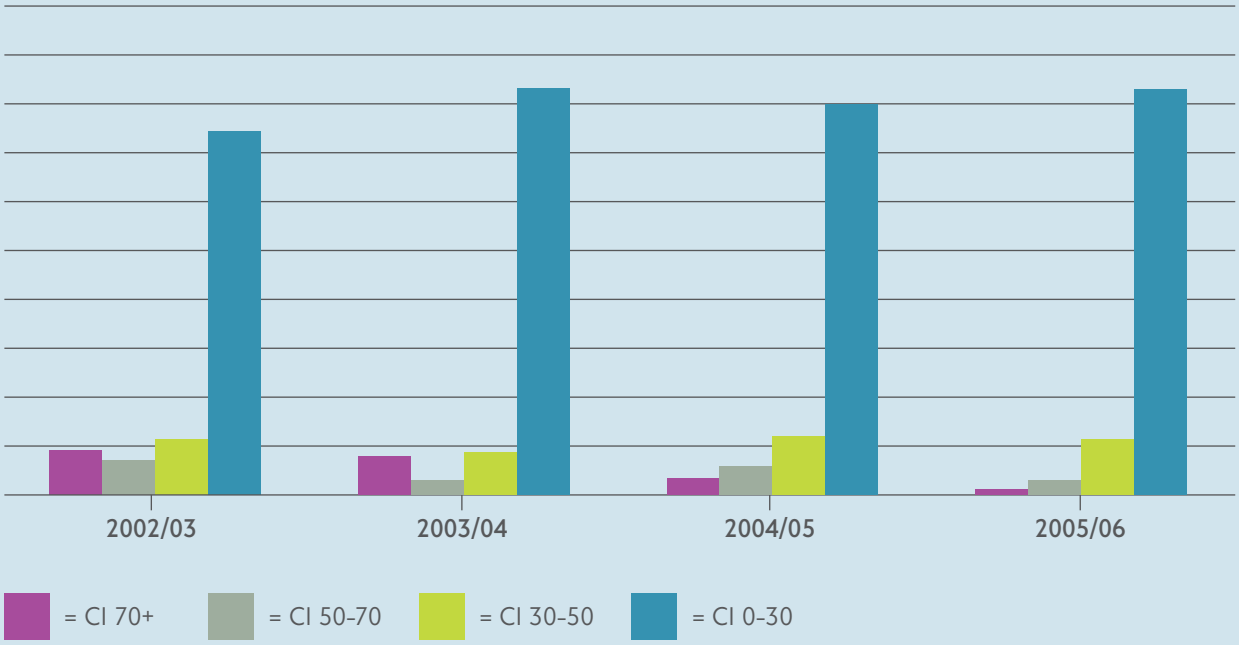



Figure 8 and Figure 9 show trends in carriageway and footway condition over the past four years and show that the backlogs (70+ for carriageway and 50+ for footway) are decreasing.

Figure 8: Trends in carriageway condition (by DVI survey)


Figure 9: Trends in footway condition (all footways)




Note: For 2005/06, the threshold between magenta and olive green has been changed from CI=30 to CI = 20 in accordance with the revised trigger value.

### 7.5.2 Monitoring performance for operational management

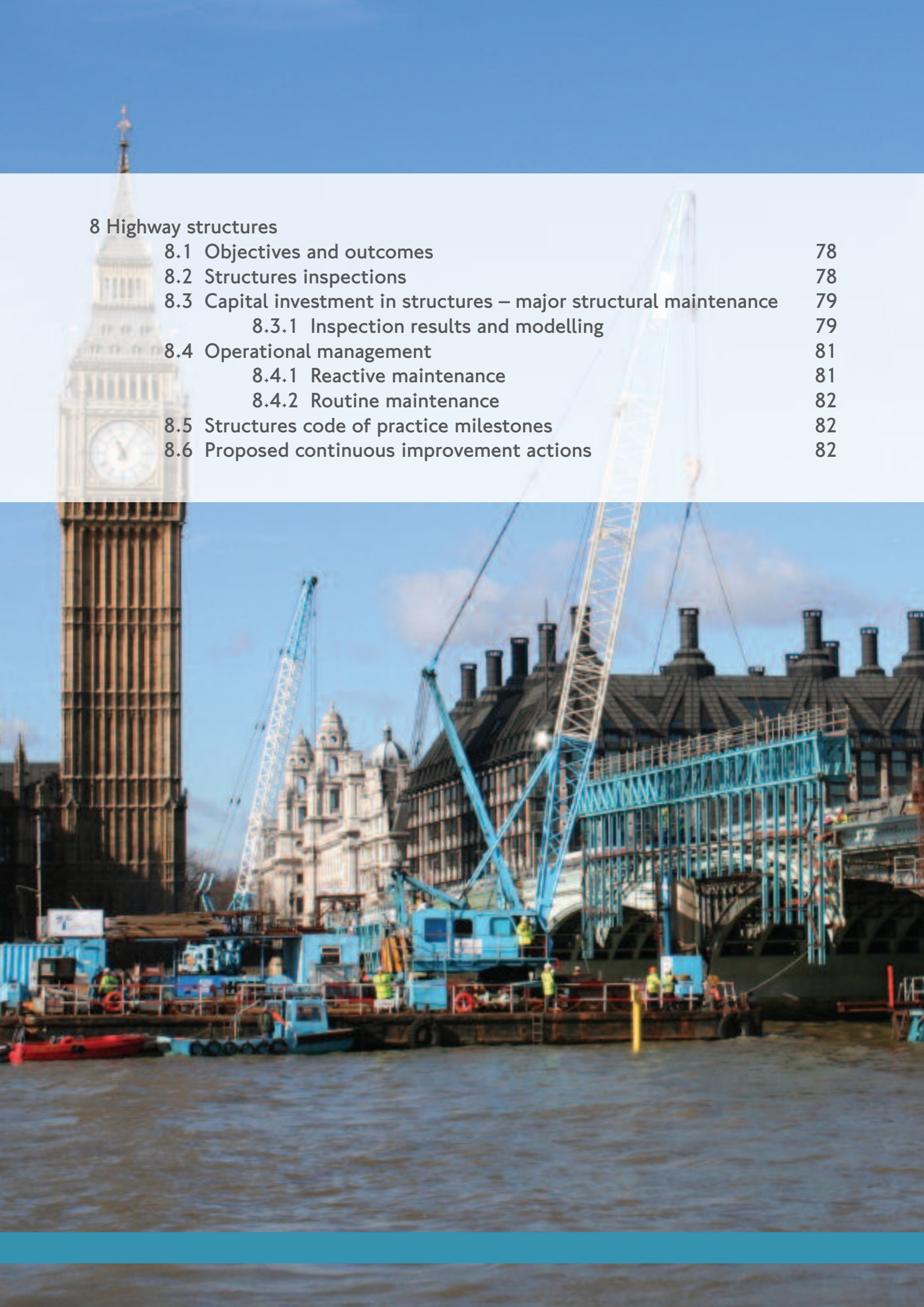
TfL monitors performance for operational management of carriageways and footways by tracking the following performance indicator:

- Percentage of categorised defects remedied within the corresponding response time limit as shown in Table 5

## 7.6 Proposed continuous improvement actions

The following actions have been proposed to help improve TfL's management of carriageway and footway assets in the future:

- Further develop level of service regime to represent multiple options
- Further develop internal capital project prioritisation processes including whole-life-costing approach
- Refine prioritisation of footway schemes to take into account the footway hierarchy
- Complete development of a skid-resistance strategy and introduce policy
- Develop a policy regarding use of low-noise surfacing
- Work with HMWCs to improve opportunities to recycle waste materials
- Further refine the models as reflected in Appendix J
- Explore opportunities to prolong the life of the asset through preservation treatments



8 Highway structures

# 8 Highway structures

**There are around 1,800 structures on the TLRN, including bridges, footbridges, retaining walls, subways, culverts and tunnels. This chapter covers all of these types of highway structures except for tunnels, which are covered in Chapter 9. Major structures, such as Thames bridges and tunnels, the Hammersmith Flyover, etc, may have additional requirements to those described in this HAMP, which will in due course be covered in an individual maintenance manual/asset management plan for each major structure as appropriate.**

## 8.1 Objectives and outcomes

Well-managed highway structures contribute to:

- Accessibility and free movement for all users (bridges and subways allow people to cross features such as rivers, rail lines, or large roads or junctions)
- Reduction of congestion (bridges of sufficient width and load-bearing capacity can handle the necessary traffic without closures or diversions)
- A feeling of personal security (designing pedestrian subways with access points in busy areas, providing sufficient interior lighting, and keeping the walls as free of graffiti as reasonably practical can make a substantial difference)

The ultimate purpose of highway structures, of course, is to carry the people that wish to use them, not the carriageways and footways that go across. However, one key function of the structure is to enable the carriageway and footway to carry out their objectives safely.

Highway bridges support the road above an inaccessible feature, while subways and tunnels provide a structurally-sound passageway through something. Other structures, such as retaining walls and culverts, help keep the carriageway and footway stable and well-drained.

As nearly every desired outcome in the service management hierarchy relates to safety in some way, highway structures directly or indirectly contribute to many of these outcomes.

## 8.2 Structures inspections

All highway structures are subject to routine inspections in accordance with best practice. These include two main types of inspections, general and principal. General inspections (GIs) are usually undertaken every two years for each structure, and principal inspections (PIs) every six.

In addition, special inspections are ordered when an issue requiring further investigation has been identified.

Over time, the intention is to vary the frequency of inspections for individual structures or groups of structures depending on a number of factors including safety, availability and condition.

As with other asset types, cyclical (routine) maintenance and planned inspections fall under revenue maintenance budgets. However, the dividing line between the planning processes for reactive maintenance and capital renewal is somewhat less distinct than it is for carriageway and footway assets. In particular, the same types of routine inspections are used as part of managing both types of investment.

In other words, inspections of structures have a dual purpose. They serve to confirm that routine maintenance is being done properly and effectively and that maintenance schedules are

correctly calibrated. They also serve to identify capital maintenance requirements.

The findings of inspections can be collated to give a condition score for each structure, group of structures, or the whole stock of structures.

Inspections are an important tool in identifying recommended repairs. For many structures a forward programme of planned capital maintenance is created, accompanied by a fully itemised and comprehensive budget plan. A prioritised schedule of capital maintenance works for all structures on the network is then developed.

General, principal and special inspections are programmed for each structure by TfL but carried out under a separate structures inspection contract.

## 8.3 Capital investment in structures – major structural maintenance

Any maintenance work likely to extend the life of the asset for more than one year is conventionally regarded as capital investment. Activities such as re-waterproofing a highway structure, repainting steel structures and replacing bearings are therefore capital work.

TfL plans capital investment in the structures on the TLRN based on the results of inspections, various assessments and other pertinent information, and is developing an asset investment model to improve budgeting and project prioritisation.

As with carriageways and footways, proposed capital schemes on structures are also evaluated and prioritised via a consistent method.

### 8.3.1 Inspection results and modelling

In a similar fashion as for carriageways and footways, DRNM uses the results of structures inspections to represent the state of the structure stock on the TLRN when conducting business planning for capital investment.

Based on the results of the inspections, structures are assigned two numerical Bridge Condition Index (BCI) ratings: an Average BCI score ($BCI_{ave}$) and a Critical BCI score ($BCI_{crit}$). These reflect, respectively, the overall condition of the structure based on all elements surveyed, and the condition of the most structurally- and safety-critical (load-bearing) elements of the structure. These are rated separately, as a bridge with an acceptable overall condition could still require priority capital maintenance to address sub-standard critical elements.

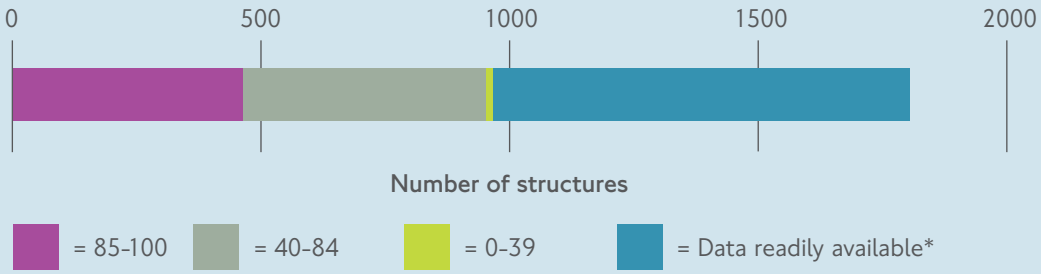
Unlike DVI/CVI and SCANNER ratings for carriageways and footways, for BCI, a higher index represents better condition of the asset. Condition index bands and rankings for risk assessment purposes are shown in Table 11:

Table 11: Bridge condition indices and risk ranking

| BCI Score Range | Structure condition based on $BCI_{ave}$ | Structure condition based on $BCI_{crit}$ | Risk ranking |
|---|---|---|---|
| 95-100<br>Very good | No significant defects in any elements; structure is in a very good condition overall | Insignificant defects/ damage; capacity unaffected | Low |
| 85-94<br>Good | Mostly minor defects/ damage; structure in good condition overall | Superficial defects/damage; capacity unaffected | |
| 65-84<br>Fair | Minor-to-moderate defects/damage; structure is in a fair condition overall; one or more functions of the bridge may be significantly affected | Superficial defects/ damage; capacity may be slightly affected | Medium |
| 40-64<br>Poor | Moderate-to-severe defects/damage; structure is in poor condition overall; one or more functions of the structure may be severely affected | Moderate defects/ damage; capacity may be significantly affected | |
| 0-39<br>Very poor | Severe defects/damage on a number of elements; one or more elements have failed; structure is in very poor condition; structure is unserviceable | Possible failure or actual failure of critical element; severe defects/damage; capacity may be severely affected; structure may need to be weight restricted or closed to traffic | High |

Figure 10 shows the distribution of structures on the TLRN in these bands:

**Figure 10: Summary of available $BCI_{av}$ data**




*Inspections have been conducted for all structures, but for some the data has not yet been collated into a readily accessible format

TfL is in the process of developing a model, based on BCI, to assist in setting and justifying the budget needed to improve the bridge stock to the required level and to maintain it at that level.

Owing to their special requirements, any structures with significant cultural, heritage or economic value (including, but not limited to, the Thames crossings) may skew the validity of the model for the remaining structures, and are therefore not included.

## 8.4 Operational management

As for other highway asset types, operational management of structures consists of reactive maintenance and routine maintenance.

### 8.4.1 Reactive maintenance

If an urgent safety defect is discovered in the course of the periodic inspections described above, it will be prioritised for urgent repair under the reactive maintenance framework.

Due to the long design life of highway structures, it is unlikely that serious structural defects will arise suddenly. However, additional safeguards are in place:

- Annual safety inspections of each structure are carried out as part of the HMW contracts
- The carriageways and footways over bridges are inspected for safety defects to the overall network safety inspection schedule shown in Table 4 in Section 6.2.1.1. The presence of these inspectors, as well as personnel conducting cleaning and other routine maintenance of gullies, drainage etc, along structures offers an additional opportunity for urgent safety defects to be noted. These defects can then be categorised and prioritised for remediation
- All pedestrian subways are inspected weekly, on foot

In addition to safety-related reactive maintenance, TfL aspires to maintain a high standard of appearance on all its structures as part of maintaining a high level of

serviceability. Graffiti (especially offensive or explicit messages) is removed promptly, and surfaces, handrails, cupboards, steps and street furniture visible to the public are cleaned or re-coated. This work contributes not only to a neat appearance but also, in the cases of pedestrian subways, a well-kept asset is an important contributor to a feeling of personal security for pedestrians.

### 8.4.2 Routine maintenance

Routine maintenance is carried out in accordance with the pre-determined routine maintenance schedules included in the HMW contracts.

All mechanical plant and apparatus are cleaned, greased and maintained in good working order and, where manufacturer's specifications are available, to these as well.

## 8.5 Structures code of practice milestones

Appendix K presents TfL's progress as of spring 2007 towards Milestone One of recommended practice as published in Management of Highway Structures: A Code of Practice ('the Code').[59]

The Code has been developed 'around an asset management approach which allows bridge management activities to be brought together into a systematic and holistic framework for all the highway infrastructure assets.'[60] The Code allows highway authorities and other owners of structures to compare their current activities against best practice for cost-effective provision of highway structures that deliver required levels of service. Authorities can then identify gaps and prioritise their needs in filling these gaps.

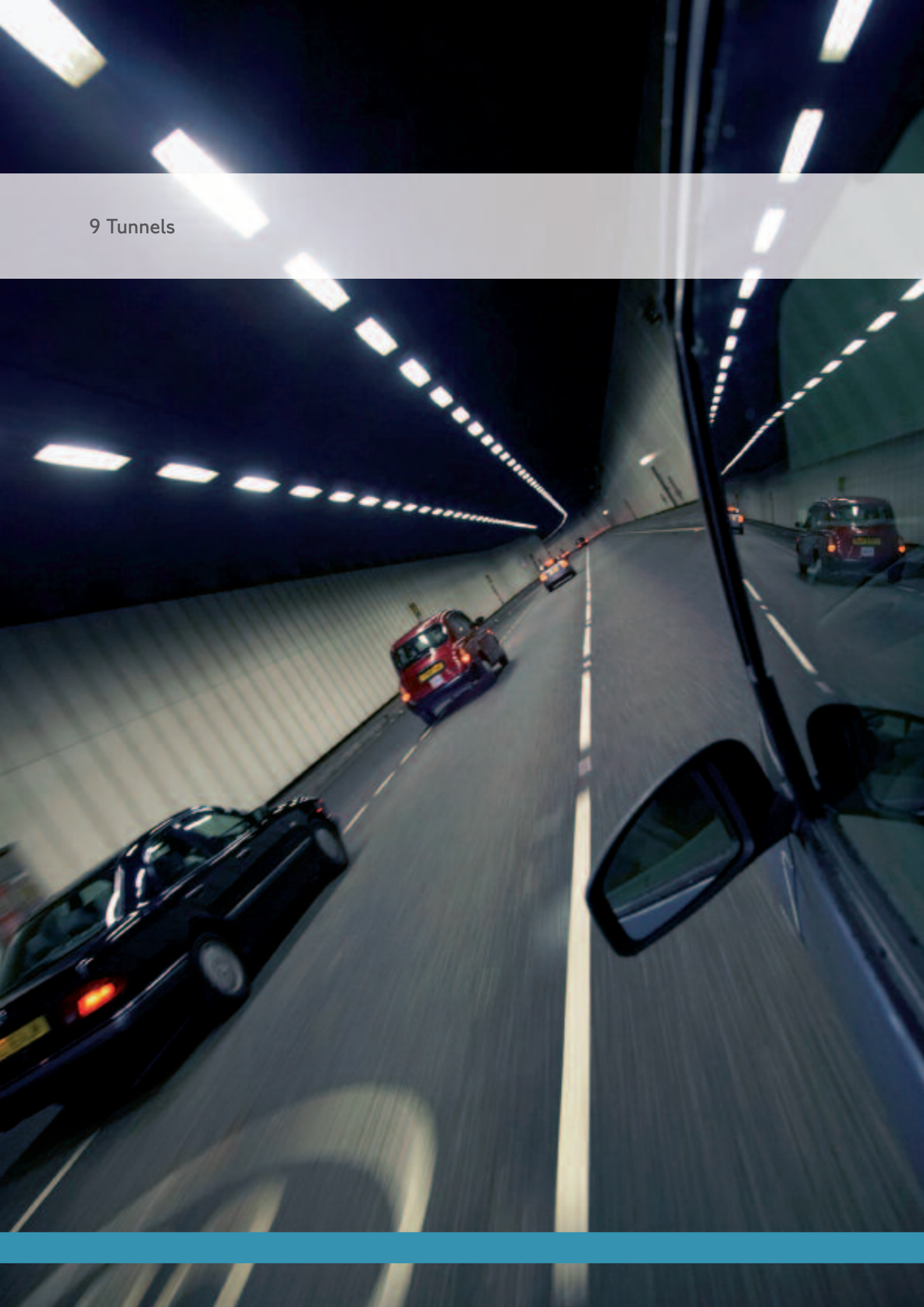
The Code provides a checklist for self-evaluation in terms of progress towards three milestones in adoption of best practices. Broadly speaking TfL has achieved at least satisfactory completion of nearly every item within Milestone One and is moving on to Milestones Two and Three. However, as it is often most efficient to focus concerted effort on a few types of Milestone actions, rather than scattering resources too broadly, TfL has in fact exceeded Milestone One in some functions, and expects now to turn its attention to others.

## 8.6 Proposed continuous improvement actions

The following actions have been proposed to help improve TfL's management of structures assets in the future:

- Verify existing records and update inventory
- Collate and analyse BCI for all structures
- Develop a risk-based approach to inspecting structures
- Further develop asset investment model for structures to help guide development of budgets
- Develop works prioritisation
- Develop forward programme of works for structures
- Set technical standards within TfL for works on structures
- Develop levels of service and performance monitoring framework for structures, including KPIs with targets for structure condition, availability and reliability

# 9 Tunnels



# 9 Tunnels

**TfL manages 13 road tunnels. This is more than any other highway authority in the UK. TfL has a responsibility to ensure that the safety of tunnel users is protected and tunnel equipment is kept up-to-date. Owing to the special safety and operational considerations regarding tunnels, this chapter discusses tunnels separately from other structures.**

Two key issues in tunnels should be addressed: consideration of measures directed at the preservation of life; and those designed to protect the asset or protect the integrity of the road network.

In the case of preservation of life issues, TfL is subject to the Health and Safety at Work Act, 1974, and subsidiary regulations. These require that if a risk exists it must be managed in order to reduce it 'as low as reasonably practicable'. This test is commonly referred to by its acronym ALARP. It is usually assumed that it is reasonably practicable to reduce a risk unless the cost is grossly disproportionate to the benefits. This approach will in many cases, therefore, result in projects proceeding with a Benefit/Cost Ratio of less than one.

Measures to protect the physical assets will be considered using the normal business case procedures.

Although its tunnels have a low accident rate, TfL proposes developing a process and programme to identify residual risks and address them. Since it will inevitably take a number of years to address all the outstanding risks in the road tunnels, a process is needed to compare the value on investment in improvements to personal safety compared with investment in asset protection and work is currently in hand to develop such a process.

To assess the scope of the work needed, a report was commissioned from Capita Symonds which compared the physical condition, equipment and management of TfL's tunnels with national, European and international standards and best practice. This work took particular account of the 2004 European Tunnel Safety Directive, which – although it is not mandatory for any of TfL's tunnels because it only applies to tunnels on the Trans European Road Network over 500m in length – can be considered to be a statement of good practice. The specific recommendations of the Capita Symonds report have been used to develop a list of potential projects for upgrading TfL's road tunnels.

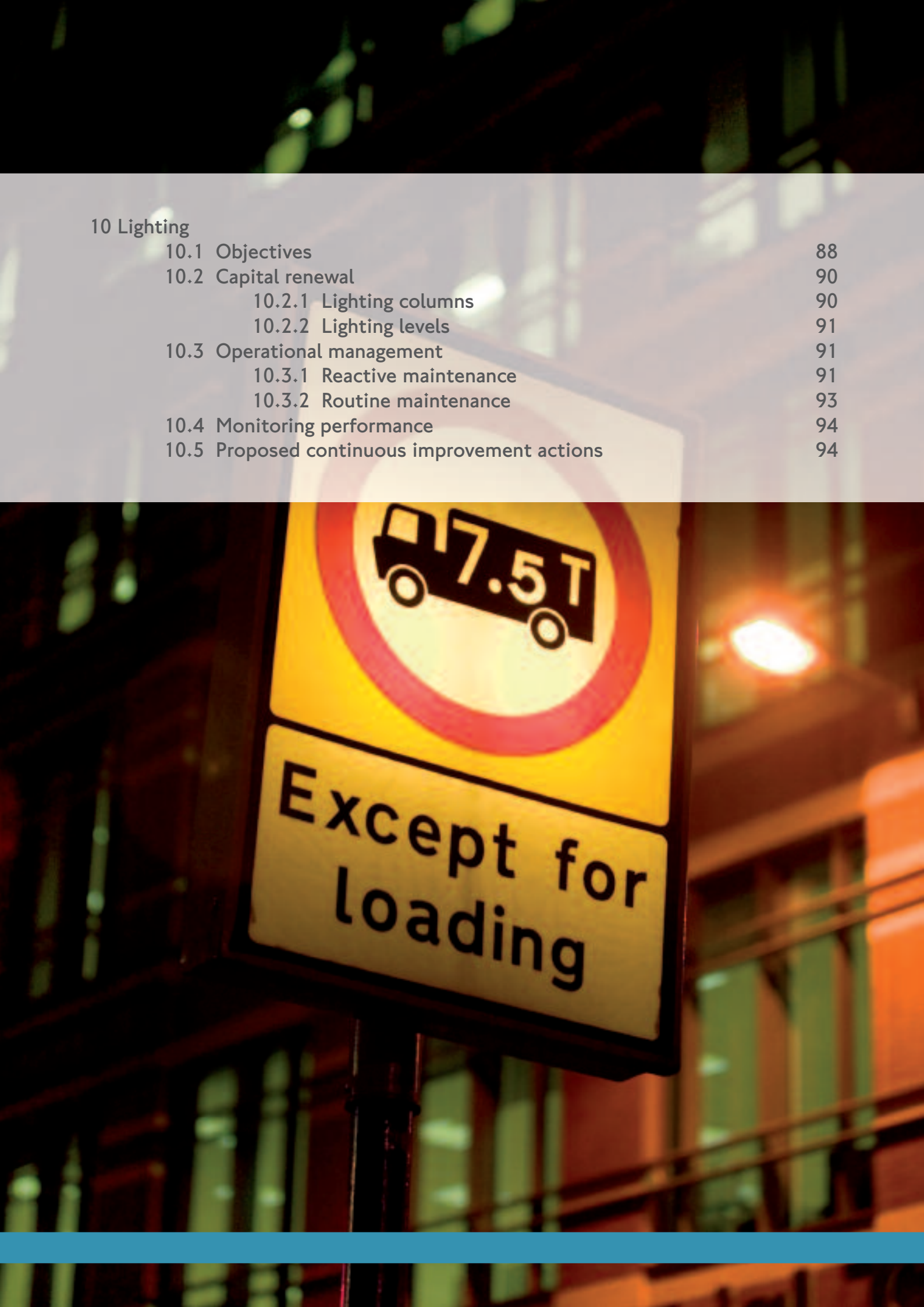
A Tunnels Programme Board has been set up to oversee the overall programme of tunnel safety projects and operational improvements.

Specific projects currently underway or recently completed are:

- The Tunnels Fire Resilience Study: This identifies possible works to protect tunnel structures against the effect of fire. The draft report has been received and is being reviewed by tunnel managers
- Study of mobile phone safety in tunnels (completed end November 2006): This aims to provide the best current information on the safety issues around mobile phone use in tunnels and the potential benefits, particularly to disabled drivers. Currently some tunnels do have mobile phone coverage and others do not. The outcome of the study should enable a reasoned policy decision to be made as to whether this coverage should be provided. This policy would then apply to all TfL tunnels
- A study of the safety and effectiveness of tidal flow in Blackwall Southbound tunnel: Tidal flow is currently introduced for up to three occasions (dependant on demand and

queue length) during the morning peak. It aims to accommodate northbound demand by reversing one lane of the southbound tunnel to operate northbound. A study is currently underway to assess whether the increased risks due to the intermittent introduction of two way traffic are outweighed by the capacity benefits

- SCADA Upgrades: SCADA (Supervision, Control and Data Acquisition) systems are computers which monitor information from tunnel equipment and report it, or in some cases act on it. For example, if the level of atmospheric pollution reaches a predetermined level the SCADA will adjust the ventilation system accordingly. A number of TfL's tunnels have SCADA systems which use out-of-date computer hardware and software and as a result limited or no support is available from suppliers. A project is underway to replace legacy systems with modern, supported systems
- An incident in Blackwall Tunnel highlighted that the office telephones did not function during a power cut. This showed that although tunnel systems are protected by back-up power supplies, some equipment in the control room is not. A study is underway to identify any key systems in any TfL tunnels which have no back-up electrical supplies, and propose remedial action



# 10 Lighting

**There are more than 45,000 lit assets on the TLRN, including street lighting columns, catenary lighting, high mast lighting, and illuminated traffic signs and bollards. This chapter lays out how TfL manages capital investment in lighting, and then details operational management activities.**

## 10.1 Objectives

TfL's objectives with regards to lighting are:

- To provide suitable and adequate street lighting to meet the needs of all network users
- To improve the night-time safety of all network users
- To reduce crime and fear of crime

Properly managed lighting on the TLRN helps to meet the Mayor's objectives in the following ways:

- Accessibility – improving access and enhancing opportunities to reach a full range of facilities and activities
- Economy – supporting economic growth, promoting regeneration and improving prosperity
- Safety – improving road safety
- Personal security – reducing the fear of crime
- Environment – encouraging modal shift from private vehicles as people feel safer on the streets and at bus stops; active management of energy consumption and reduction of light pollution

In short, a well-maintained street lighting infrastructure will help support:

- Access for all
- Walking
- Cycling
- Public transport
- Safety and security
- Environmental objectives (energy efficiency)

Lighting supports a number of the outcomes in Table 3. Table 12 highlights those that are particularly relevant in measuring TfL's success in management of lighting. While the outcomes and level of service statements differ for lighting on carriageways and footways, reflecting the differing objectives of lighting on the two areas, performance indicators and targets are the same for both.

Table 12: Key outcomes for lighting

| Outcome | Level of service statement | Performance Indicators | Target |
|---|---|---|---|
| On carriageways | | | |
| Well-lit carriageways | TfL will monitor the lighting stock by means of visual inspections, including in the hours of darkness. Any lighting outages likely to cause loss of quality of driver vision will be repaired as a matter of urgency. | Average percentage of streetlights working on the TLRN | At least 98 per cent |
| | | BVPI 215(a) – Average days taken by HMWC to repair a defective street light under TfL control. | 12.5 days or less |
| | | BVPI 215(b) – Average days taken by Distribution Network Operator (DNO) to repair a defective street light under DNO control | 42.4 days or less |
| On footways | | | |
| Footways lit to an extent that fosters feeling safe | TfL will monitor the lighting stock by means of visual inspections, including in the hours of darkness. Any lighting outages likely to create a perceived risk to personal safety will be repaired as a matter of urgency. | Average percentage of streetlights working on the TLRN | At least 98 per cent |
| | | BVPI 215(a) – Average days taken by HMWC to repair a defective street light under TfL control. | 12.5 days or less |
| | | BVPI 215(b) – Average days taken by Distribution Network Operator (DNO) to repair a defective street light under DNO control | 42.4 days or less |

While these indicators and targets measure only the level of service provided by the lamps themselves, the outcomes and level of service statements also cover sound management of the structural needs of lighting columns. Structural integrity is 'a means to an end' that is necessary in order to provide lit lamps and as such is implicit in meeting the targets stated.

## 10.2 Capital renewal

This section is divided into two parts. The first part covers the structural needs of lighting columns, while the second addresses the lamps themselves and level of lighting supplied.

### 10.2.1 Lighting columns

To support its management of capital renewal of lighting columns, TfL conducts condition inspections of structural and electrical components of columns. To improve the business planning process and forward work programming processes, DRNM is working to develop further a basic asset deterioration model. These two aspects are discussed below.

#### 10.2.1.1 Condition inspections and inventory

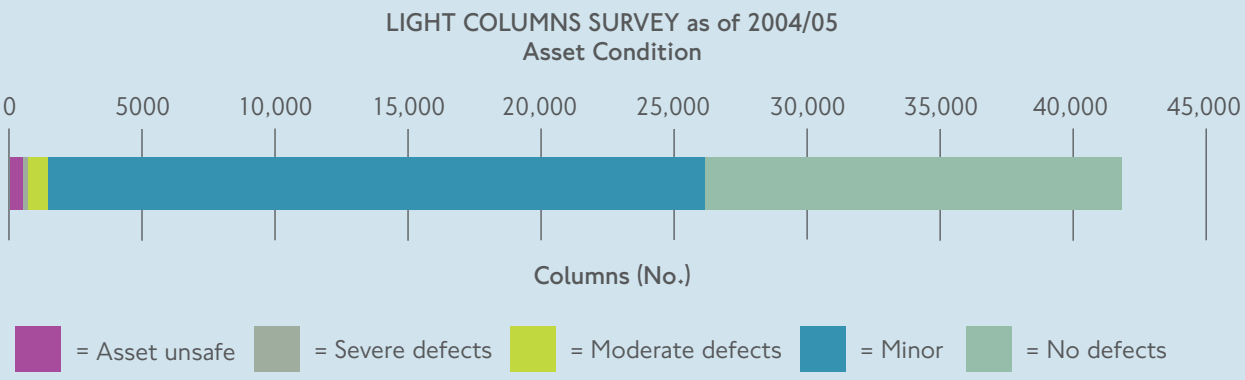
Periodic inspections are made of all the lighting columns on the TLRN to update the condition information in the inventory.

The inventory of lighting column infrastructure is held on AIMS. The system holds such attributes as physical characteristics (height, width and diameter), type (mounting method, number of posts, etc), estimated installation date (if not known precisely), as well as condition information.

However, TfL acknowledges that it does not have all necessary attributes in its database. It has commissioned additional inspections over the past few years to collect missing data in line with Well-lit Highways: Code of Practice for Highway Lighting Management.[61]

A summary of the condition of the lighting stock on the TLRN based on inspections completed through 2004/05 is shown in Table 13.

**Table 13: Number of lighting assets by condition**



#### 10.2.1.2 Planning the Forward Work Programme

Lighting columns are assessed either as needing 'to be renewed' or 'deemed to comply' with the required condition standard.

Assets which are to be renewed are prioritised as part of developing the forward capital renewal programme. Options include replacing lighting columns or conducting some other type of capital renewal, such as painting or replacing a waterproof finish.

In addition, capital renewal includes upgrading lighting to meet current design standards, as well as changing the location of lighting as necessitated by new carriageway, footway or streetscape schemes.

TfL has developed a model of deterioration rates for lighting columns and is refining it as compilation of condition data is completed. Columns are being classified by age and by replacement cost, based on the type of column. It is important to note that because of the wide range of types of columns and the significant cost differences among them, information about types and costs of columns will be necessary in order to estimate budgets appropriately.

Once data collection is complete, the model can be calibrated and put into use for planning capital investment in lighting on the TLRN.

### 10.2.2 Lighting levels

As well as the physical condition of the column, a key attribute of lighting is of course the lighting level supplied by the lamp. The current level of service statements on lighting refer to the maintenance of the lighting stock in terms of an almost binary distinction between units that are in lighting and those that are not. In future, work will be done to better identify a more route- and location-specific guide to optimal lighting levels, particularly where those levels are capable of being optimised through capital renewal and other maintenance activity.

## 10.3 Operational management

Operational management activities for lighting consist of reactive maintenance to keep lamps in lighting, and scheduled routine maintenance, covering changing of lamps and cleaning, inspecting, and performing necessary repairs to luminaires, lamp columns, and feeder pillars. The HMW contracts specify inspection and routine maintenance regimens for various lit assets. Other specialist lighting systems require reference to various other standards and specifications and to manufacturer recommendations.

### 10.3.1 Reactive maintenance

Reactive maintenance for lighting consists of replacing lamps that have gone out between bulk lamp changes, as well as repairing damage to columns and other components detected through safety inspections.

This section summarises the frequencies and requirements for safety inspections of lit assets on carriageways and footways, and requirements for addressing identified defects.

Lighting columns receive safety inspections during the day as part of the overall network inspections at the frequencies shown in Table 4 in Chapter 6. In addition, lighting points are inspected at night, with inspection frequencies dependent on the characterisation of the carriageway or footway on which the asset is found, as shown in Table 14:

Table 14: Frequencies for night-time safety inspections of lit assets

| Assets to be inspected | Road hierarchy | Night-time safety inspection frequency |
|---|---|---|
| Lighting points[62] | Rural fringe roads | Every two weeks (during GMT); monthly (during BST) |
| | Suburban roads | Weekly |
| | Urban roads | Weekly |
| | Prestige Walking Zone footways | Weekly |
| | Primary Walking Zone footways | Weekly |
| | Secondary walking route footways | Weekly |
| | Link footways | Weekly |
| | Local access footways | Weekly |

Night-time inspections take place from a moving vehicle with a driver and an observer.

Lighting in pedestrian subways is inspected on foot and during daytime hours.

The main purpose of these inspections is to detect luminaire failures, but any other defects noticed are also recorded and addressed on a reactive basis. These may include obscuration or misalignment, and other notable defects, such as structural damage or missing doors. In addition, while inspecting pedestrian subways for lighting defects, inspectors check for graffiti (especially offensive graffiti), blocked drains or inoperative pumps.

Lighting outages are rectified by the HMWCs as a performance activity to aim to ensure that a minimum of 98 per cent of lighting points are operating at all times. In addition, the HMWCs are required to rectify outages in any lighting point within 24 hours where:

- Any two or more consecutive lighting units are not working within 50 metres of any junction or pedestrian crossing
- Any two or more in five lighting units are not working within 50 metres of any junction or pedestrian crossing
- Any three or more in 10 lighting units in any location are not working

Additional electrical testing of lighting points and inspection of associated cabling, feeder pillars, switchgear and other distribution points is carried out every six years in accordance with the Institution of Lighting Engineers Code of Practice for Electrical Safety in Highway Electrical Operations.[63] The HMWCs also inspect lighting columns for any structural or mechanical defect every six years in accordance with the Institution of Lighting Engineers Technical Report Number 22, Managing a Vital Asset: Lighting Supports.[64]

### 10.3.2 Routine maintenance

Street lamps receive bulk lamp changes at various intervals, depending on lamp type, as shown in Table 15:

**Table 15: Bulk lamp change and clean intervals**

| Lamp type | Designation | Bulk lamp change and clean interval | |
|---|---|---|---|
| Metal halide and ceramic metal halide | MH | 24 months | |
| | CDM | | |
| | CDO | | |
| Low pressure sodium | SOX | 24 months | |
| Low pressure sodium | SOX-E | 36 months | |
| | SOX PLUS | | |
| High pressure sodium | SON | 36 months | |
| | | **Continuous operation** | **All-night operation** |
| High pressure mercury | MBFU | 8,000 hours | 24 months |
| Fluorescent and compact fluorescent | MCFU | 8,000 hours | 24 months |
| | SL | | |
| | PL | | |

During bulk lamp changes, the HMWCs also perform the following activities:

- Clean the luminaires
- Test and maintain feeder pillars in accordance with paragraph 5.35 of TD23 of the Design Manual for Roads and Bridges
- Clean, visually inspect, and adjust, lubricate, or repair (as applicable) luminaire and base component electrical and mechanical components, wiring, and protective coatings; reference markings; and doors and fixings
- Inspect all support systems for structural integrity and secure fixings and covers, etc, in pedestrian subways
- Inspect and test the operation of an alternating 50 per cent of emergency luminaires in pedestrian subways, in accordance with the general principles of BS 5266

## 10.4 Monitoring performance

At the end of each yearly cycle of planning, programming, and carrying out capital renewal, TfL updates AIMS to reflect all lighting assets renewed or upgraded during that year. Removed assets are 'end-dated' to mark their removal from the network. When considered in partnership with the next cycle of condition inspections, this allows TfL to evaluate its progress in improving asset condition.

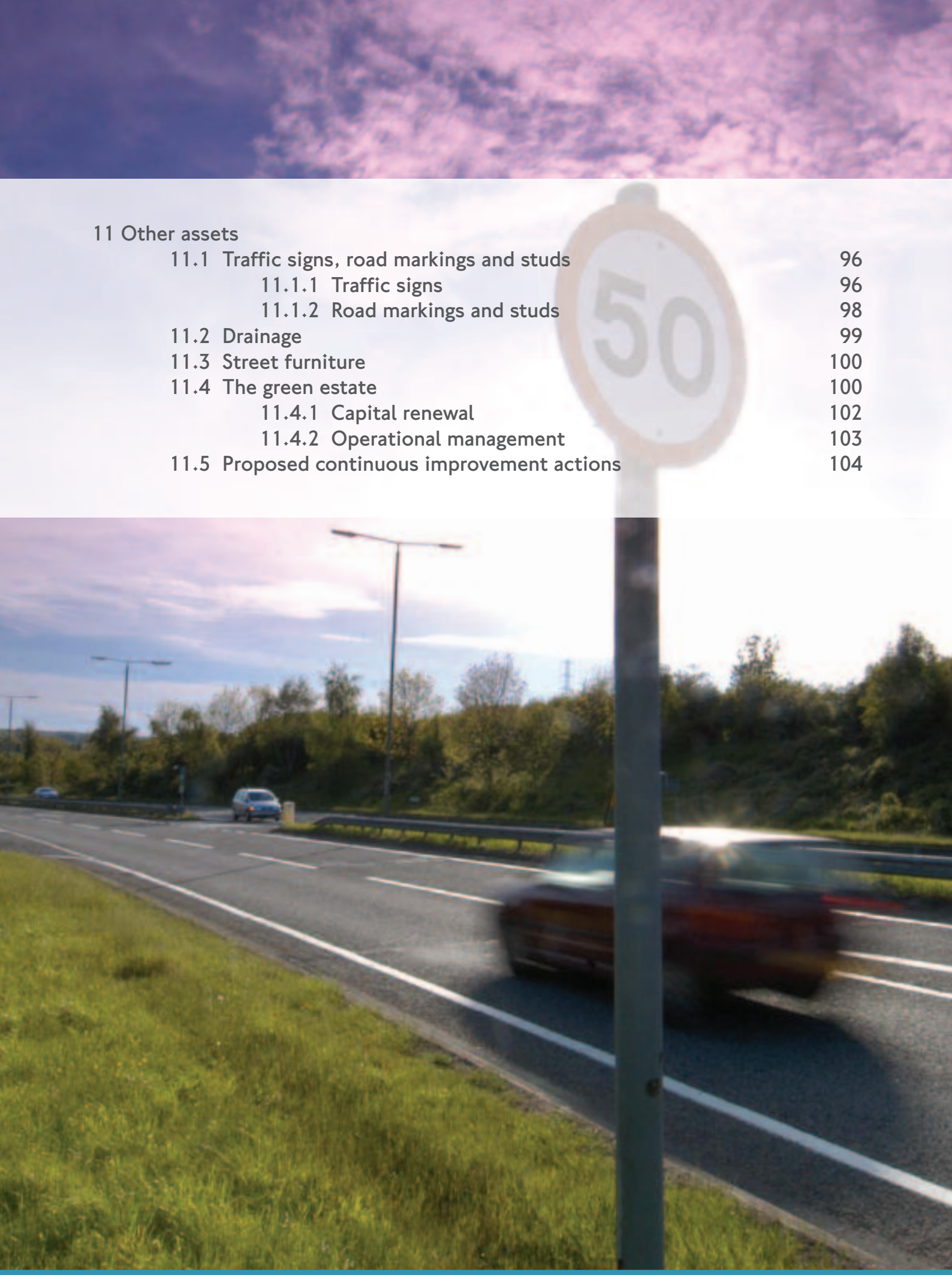
TfL anticipates undertaking further analysis of lighting capital schemes on completion in order to provide closure to the work programming cycle and incorporate lessons learned and refinements into its modelling and forward programming processes. This analysis will be similar to that currently done for carriageways and footways and will be possible for lighting only after the organisation has gathered the missing inventory data mentioned above in Section 10.2.1.1.

The indicators listed in Table 12, which are currently used to evaluate TfL's performance in managing lighting, focus largely on revenue maintenance. To facilitate monitoring of capital condition throughout all highway authorities, Central Government is expected in the near future to bring in a new BVPI relating to condition of lighting assets.

## 10.5 Proposed continuous improvement actions

The following actions have been proposed to help improve TfL's management of lighting assets in the future:

- Populate AIMS with all additional attributes necessary for modelling
- Continue to update the information held as renewal works progress
- Development/refinement of a costing model may be possible in 2007/08 following updating with the latest condition survey and records of work programmes delivered in 2006/07
- Introduce a data audit taskforce to ensure that data collected on work delivered and survey data is sufficiently accurate, in order to increase the validity of the investment model
- Implement a policy to minimise structural and electrical risk for columns, and employ a risk assessment strategy for prioritising columns for testing and replacement or removal



# 11 Other assets

**This chapter describes how TfL manages a range of other assets on the TLRN. The asset types included here are:**

- **Traffic signs, road markings and studs**
- **Drainage**
- **Street furniture**
- **Trees, planted and grassed areas (the green estate)**

These assets are covered by the safety inspections of all assets on the network carried out to the frequencies shown in Table 4 in Section 6.2.1.1. Some of these assets also undergo particular service inspections or specialised additional testing as detailed below. These inspections contribute both to forward planning of capital renewal and to ensuring that the asset remains safe and fit for purpose.

Reactive and routine maintenance activities are also explained here.

## 11.1 Traffic signs, road markings and studs

Well-maintained traffic signs, road markings and studs contribute to:

- Safe and orderly movement of all highway users
- Consequent reduction in congestion
- Enforceability of traffic regulations

With these objectives in mind, the outcome for these assets is as shown in Table 16.

The next two sub-sections detail TfL's management of these asset types.

### 11.1.1 Traffic signs

All illuminated and non-illuminated traffic signs are maintained in compliance with relevant codes of practice. Traffic signs undergo service inspections to check the following:

- Visual performance
- Electrical safety
- Structural integrity
- and that they convey the intended message to road users

Inspection frequencies depend on the classification of the carriageway or footway on which the sign is found, as shown in Table 17.

Routine maintenance of signs is also carried out at these frequencies.

During the course of their inspections the HMWCs also photograph all regulatory signs. TfL archives these, with dates, as evidence of the condition of the sign at that time.

Sign faces and posts are cleaned twice a year, once during October and November and once during March and April.

Additional maintenance, testing, and inspection regimes apply to illuminated traffic signs. While all signs are included in the overall network safety inspections carried out during daylight hours, illuminated signs, like highway lighting, also undergo additional night-time safety inspections to the frequencies shown in Table 14 in Chapter 10.

Bulk lamp replacements for illuminated signs are carried out at the intervals stated in Table 18.

Table 16: Key outcome for traffic signs and road markings

| Outcome | Level of Service Statement | Performance Indicator | Target |
|---|---|---|---|
| Clear and clean signs and road markings | TfL will maintain the sign and marking stock to optimise with due regard to cost, practicality, and other concerns the availability, clarity and enforceability of the messages it conveys. | Relevant SPI (SPI 16) to be defined during HMW contract mobilisation. This SPI is not a KPI. | To be determined |

Table 17: Frequency of service inspections for traffic signs

| Assets to be inspected | Road hierarchy | Service inspection frequency |
|---|---|---|
| Traffic signs | Rural fringe roads | Annually |
| | Suburban roads | Every two years |
| | Urban roads | Every two years |
| | Prestige Walking Zone footways | Every two years |
| | Primary Walking Zone footways | Every two years |
| | Secondary walking route footways | Every two years |
| | Link footways | Every two years |
| | Local access footways | Every two years |

Table 18: Bulk lamp change intervals for illuminated signs

| Lamp Type | Abbreviation | Bulk lamp change interval in burning hours | Bulk lamp change interval in months[65] |
|---|---|---|---|
| Fluorescent | MCFE; SL; PL | 8,000 | 24 |
| Pressed glass lamps | PAR | 2,000 | 6 |
| High pressure mercury | MBFU | 8,000 | 36 |
| Tungsten filament | Long Life GLS | 2,000 | 3 |
| | | Or in accordance with manufacturer's instructions | Or in accordance with manufacturer's instructions |

Illuminated sign lanterns are cleaned when lamps are changed.

As for lighting, additional electrical testing of illuminated signs and inspection of associated cabling, feeder pillars, switchgear and other distribution points is carried out every six years using the method as specified in the Code of Practice for Electrical Safety in Highway Electrical Operations. The HMWCs also inspect sign posts for any structural or mechanical defect every six years in accordance with Technical Report Number 22, Managing a Vital Asset: Lighting Supports.

Any outages of illuminated signs caused by any defect within the traffic sign unit or associated electricity supply equipment are rectified by the relevant HMWC under the performance requirement lump sum, within seven days for rural fringe roads and 14 days for suburban roads and urban roads.

### 11.1.2 Road markings and studs

Service inspections of carriageway road markings are carried out annually to check retro-reflectivity, wear, luminance factor, and skidding resistance in accordance with the relevant sections of the Design Manual for Roads and Bridges. Inspections also check that markings convey the intended message to road users.

Road studs undergo night-time visual service inspections every six months to check for wear, corrosion and damage to studs, inserts, retro-reflective lenses, casings and housings, as well as for loose or missing studs and studs damaged or misaligned by traffic loading.

The primary purpose of these inspections is to prioritise stretches of road for capital renewal of road markings and studs. However, if missing or damaged markings or studs create an immediate safety hazard, the defect can be categorised as a safety defect and prioritised for reactive maintenance. In addition, the reflectivity of road markings and studs undergoes night-time safety inspections to the same frequencies as other lit assets as detailed in Table 14 in Chapter 10.

## 11.2 Drainage

Drainage is managed in order to contribute to safe movement of all highway users, as well as to a pleasant pedestrian environment.

Service inspections are carried out every five years of gullies, interceptors, catchpits, chambers and soakaways, linear drainage systems, culverts, and ancillary drainage items. This allows defects that are likely to affect long term serviceability to be identified at an early stage so as to inform the development of the capital works programme.

Routine maintenance for drainage includes cleaning of all components, at frequencies as shown in Table 19:

**Table 19: Cleaning frequencies for drainage components**

| Component | Cleaning frequency | Note |
|---|---|---|
| Ancillary drainage items, including:<br>• Trash screens<br>• Watergates<br>• Grills<br>• Sluices<br>• Tidal flaps<br>• Penstocks<br>• Valves | Once in the spring and once in the autumn each year | |
| • Gullies<br>• Interceptors<br>• Catchpits<br>• Chambers<br>• Soakaways | Annually | While cleaning these assets, HMWC personnel also verify that linear drainage systems (piped drains, feeder pipes, channels, etc) are operating satisfactorily |
| Ditches | Every two years | Includes removal of all accumulated silt, detritus, vegetation, and roots from inverts and banks of ditches |
| Culverts | Every three years | |
| Filter drains | Every three years | Includes cleaning drains, loosening filter material, applying weedkiller, and removing detritus |

## 11.3 Street furniture

As explained above, this HAMP covers maintenance and limited design activities for street furniture. These activities contribute to:

- The highway as a 'social space' (Proposals 4G.10 and 4G.11 and Policy 4G.1 in the Mayor's Transport Strategy)
- Attractiveness and 'feel' of London's streets, achieved through use of quality durable materials and equipment that offer long-term value for money (as laid out in the Streetscape Guidance)
- Safety of all road users
- Pedestrian security and perception of security

TfL aims to design and maintain streetscapes, including street furniture, to improve accessibility for all, including disabled people, people with vision difficulties, and those with prams, luggage, etc.

Safety inspections for street furniture occur as part of the overall network safety inspections. In addition, to plan for capital maintenance, visual and tactile service inspections for street furniture are carried out annually.

In general, these assets are replaced when the junction or roadway at which they appear is rebuilt or redesigned, when they are beyond their useful life, or when they are damaged or removed by third parties.

## 11.4 The green estate

This section explains the principles and mechanisms behind both capital renewal and operational management of the green estate on the TLRN. The green estate includes the landscape and arboricultural assets on the TLRN. These include:

- Trees, including street trees
- Landscaped areas (planted and grassed areas)
- Wildlife areas (areas of biodiversity value)
- Other horticultural features, such as ornamental bedding

Proper management of the green estate is important both for the human and the natural environment. Green and natural areas are both a welcome respite in a city and can help to reduce temperature extremes, filter airborne particles, and provide other environmental benefits. In particular the wildlife habitat potential of highway verges is taken into account in accordance with Proposal 35 of the Mayor's Biodiversity Strategy.

At the same time the green estate is also managed to further TfL's aims of providing a safe highway environment, with inspections to ensure that trees, especially those in falling distance of the carriageway or footway, do not present a risk to highway users.

TfL has filled three new positions of Arboriculture and Landscape Manager, one for each of the network areas (North, Central, and South). These staff lead management of the green estate in their respective areas including supervision of inspections and surveys, management of the inventory, development of work programmes, and supervision of works and maintenance in accordance with relevant legislation, best practice, and the HMW contract specifications. In addition, these roles include assessing proposed highway landscape improvement proposals (promoted by TfL or third parties) to ensure they are practical, achievable and sustainable and meet Mayoral and TfL environmental objectives.

Table 20 shows the key outcomes for the green estate. The performance indicators shown here relate to TfL's management of the carriageway and footway in order to minimise negative impact upon the green estate. In future, performance indicators may be developed to measure proactive management of the green estate itself.

Table 20: Key outcomes for the green estate

| Outcome | Level of service statement | Performance indicators | Targets |
|---|---|---|---|
| A green street environment | TfL will manage the network in a way that minimises (within reason) impacts on London's environment and contributes to the amenity and biodiversity aspect of the Capital | NOx and Pm10 (total tonnes) aggregated across contractor fleets from details supplied by each contractor<br><br>$CO_2$ (total tonnes) aggregated across contractor fleets from details supplied by each contractor | New indicators – targets to be confirmed |
| | | The percentage of the aggregated volume of construction and demolition waste generated by all HMWCs that is re-used | At least 85 per cent combined |
| | | The percentage of the aggregated volume of construction and demolition waste generated by all HMWCs that is recycled | |
| | | The percentage of recycled and/or 'green' products procured out of the total tonnage of procured material | At least 35 per cent |
| | | Percentage of new surface laid on the TLRN that contains lower-noise surface material [included here as it is part of the suite of indicators for this outcome, although it is not relevant to protection of the green estate] | New indicator – targets to be determined |

### 11.4.1 Capital renewal

The asset management principles affecting capital investment in the green estate, either with respect to replacement or enhancement, are similar to those for other asset types on the TLRN. Namely, investments are planned considering the following:

- Whole life cost of the feature in order to meet the basic criteria of safety, serviceability, and sustainability
- Ability to meet these criteria within the confines of current revenue plans and budgets

However, unlike human-made assets, the green estate requires additional planning to account for the lead times required to allow natural features to grow. Therefore, it is important to consider timescales or lead-in times for capital renewal of individual landscape features. These times may vary depending on:

- The age of the feature
- The biological complexity of the habitat or feature

The timescales given in Table 21 set out lead-in times for replacement to re-establish the character or appearance of a feature on the network.

**Table 21: Lead-in times for replacement of features on the green estate**

| Landscape Feature | Lead-in time for replacement |
|---|---|
| Street tree | 20 to 30 years |
| Woodland | Minimum 10 years |
| Ornamental shrubs | Five years |
| Hedge | Five years |
| Wildflower grass | Five years |
| Waterbodies | Three years |
| Grass verge | One year |

To input into capital renewal programming, a full tree condition survey is carried out for all street trees every five years. In addition, an inspection of each street tree is carried out annually, and where appropriate, this is used to update the data from the five-year survey. The annual inspection is also used to identify dangers from trees which could fall onto carriageways, footways or cycleways.

Landscaped areas, ie grassed areas, planted areas (mixed tree and shrub plots), hedges, ornamental shrub beds, bedding, and other features are inspected at least twice annually (winter and spring), to review their condition and plan seasonal maintenance programmes. Information from these inspections is also used to update condition and performance requirements for each landscape region in AIMS.

Ecological inspections to evaluate the risk of harm to sensitive habitats and species are also conducted as needed.

### 11.4.2 Operational management

This section discusses reactive maintenance and routine maintenance.

#### 11.4.2.1 Reactive maintenance

In addition to the condition inspections and surveys described above, safety inspections of the green estate are required in order to detect and remedy obvious safety problems related to dead, diseased, or damaged street trees; vegetation causing visibility or obstruction problems; or obvious evidence of pest, disease or weed infestation (for example, browntail moth caterpillars, honey fungus or Japanese knotweed). These are carried out during the standard network safety inspections, and safety defects are categorised and remedied appropriately.

When remedying defects, the Arboriculture and Landscape Manager advises on and, when necessary, seeks specialist ecological input, to ensure that the legal obligations of the highway authority are honoured in respect to protected species of plants and animals and statutory sites.

#### 11.4.2.2 Routine maintenance

Because of the limited inventory information currently available for the green estate, routine maintenance of these assets is excluded from the lump-sum performance requirements under the HMW contract. Instead, these activities are instructed work under the schedule of rates. The contract contains the facility for adding new items as lump-sums in the future if this is agreed by both parties as appropriate.

The planning of routine seasonal maintenance of the green estate is informed by the twice-annual inspections detailed above under the capital investment section.

Street trees are maintained in accordance with five-year maintenance programmes agreed with TfL.

Grassed areas are inventoried and each AIMS region is categorised as one of close mown, parkway, amenity, verge or wildflower grass. Cutting frequencies and heights are specified for each category.

Planted areas and hedges receive annual maintenance. The standard of maintenance depends on many factors, including the location, age, condition and function of the area or feature.

Frequencies for watering, weeding, and other routine activities for bedding, raised planters, and hanging baskets (which are permitted on the TLRN under special circumstances) are planned and agreed by the Arboriculture and Landscape Manager.

This manager, taking advice from ecologists as necessary, advises on appropriate maintenance regimes for ditches, balancing ponds, other water bodies, and wetlands. Risk assessments and periodic inspections are also agreed in appropriate locations to ensure no threat is posed to public health and safety.

TfL will ensure compliance with the legal obligations of the highway authority in respect to:

- Protected species and habitats
- Injurious weeds
- Control of pests and diseases
- Use of herbicides and pesticides
- Planning designations

## 11.5 Proposed continuous improvement actions

The following potential actions have been proposed to further guide TfL's future management of the assets covered in this chapter.

For road markings:

- Consider feasibility of development of an asset deterioration model for guiding capital investment in road markings

For drainage

- Complete inventory of drainage including underground pipes and soakways
- Check that existing drainage can cope with possible increased frequency of extreme weather conditions in the future
- Investigate feasibility of moving to a risk-based approach to frequency of inspections of drainage components

For the green estate

- Produce a fuller Landscape, Arboricultural, and Biodiversity Management Plan to follow on from biodiversity surveys commissioned in 2003

# 12 Conclusion and outlook

# 12 Conclusion and outlook

**This HAMP is designed to be organic; it will change and adapt over time to remain in line with the way that TfL manages and invests in its highway assets. There are few definitive conclusions to be drawn; rather, this chapter makes reference to and gives an outlook on a number of topics that are to be further developed in the future and reflected in future editions of the HAMP.**

The broad structure of the HAMP is to summarise the framework of Mayoral plans and strategies which set the high-level context for the decisions made in order to manage the assets. These high-level commitments are connected to mid-level strategies, guidance, and contractual documents. The HAMP distills desired outcomes sorted by broad category of activity and relevant section of the Mayor's Transport Strategy. For the future, there is clear scope to emphasise and strengthen the way that highway maintenance activities also offer 'collateral' benefits that are outside the core structure. As well as the key outcome categories identified in the HAMP, highway maintenance activities contribute to TfL's record in equality and inclusion, safety, and even combating climate change. These themes will be further explored in later editions.

At a more practical level, work is already in hand to develop a more explicit regime of continuous improvement in the areas covered by the HAMP. Refinement of the model-based option selection and value management of future programmes of capital renewal and maintenance investment is in hand and improvement actions are listed under several asset types.

To support performance monitoring, development of additional customer outcomes and identification of suitable performance indicators to measure certain customer outcomes have been identified as continuous improvement actions as indicated in the asset-specific chapters. Gaps in indicators have been noted in Appendix B. As with modelling, the framework of performance indicators and monitoring is well developed for carriageways and footways while further development is required particularly for other asset types.

The calibration of the leverage between budget levels and performance indicators for asset types other than carriageways and footways continues, assisted by further model development. The scope for this in, for example, structures and lighting is obvious; less obvious but worthy of exploration is the potential scope for planned capital investment in, for instance, road markings and crash barriers. Chapter 11 contains framework guidance on the capital investment in and routine maintenance of the green estate; TfL will consider the production of a fuller Landscape, Arboricultural, and Biodiversity Management Plan.

Much work will be undertaken in the short-to-medium term to mesh the delivery programmes of renewal works with the delivery of safety enhancement and network improvement works, including those specified by NMPs. This will allow for savings and benefits by, for example, minimising disruption works on the network. In due course the HAMP may be expanded in scope by the inclusion of other TfL transport infrastructure assets, notably traffic signals and other traffic control technology.

The HAMP does not commit to commissioning research, but future editions will be able to reflect on work done on sustainable materials, their relationship with

asset service standards, and innovative techniques in, for example, reduction in energy usage for lighting. Any such work is also expected to consider best practice as revealed by the experiences of other highway authorities both within the UK and internationally.

The HAMP is intended to develop to provide a mechanism for making explicit the trade-offs that usually have to be struck when expending limited resources on a multi-faceted asset base subject to constant wear. For example, there may be times when there is competition for funding between investment in carriageway renewal at the optimum time and a peak in the lighting renewal programme caused by a cohort of assets reaching the end of their design life at the same time. Advanced tools for measuring trade-offs in terms of value for money and risk would be advantageous and would support the 'Investment' category of outcomes.

With this in mind, additional work on highway asset valuation is planned.

In future, as the highway asset management process within TfL matures, later editions of the HAMP may be able to cover more thoroughly the process of reviewing and revising levels of service and targets in response to available funding. In particular, as a fuller suite of performance indicators is developed, it will become possible to carry out more sophisticated analysis of the relative impacts of different levels of service in terms of fulfilling Mayoral policies and proposals. This will allow the framework advanced schematically in Figure 4 to be put to maximum use to enrich TfL's ability to prioritise work.

The HAMP reflects the customer survey data which currently exists. Future editions will seek to develop much greater customer input and feedback. This is important as the HAMP is a public-facing statement of the highway service which TfL aims to offer to all its customers.

**Readers are invited to comment on TfL's HAMP by email at hamp@tfl.gov.uk**

# 13 References

# 13 References

**All internet links listed have been accessed as of 13 August 2007.**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Appendices

# Appendices

## Appendix A: Five-year aspirational capital renewal budget and programme

Table 22 provides the current and forward budgets for capital renewal of all asset types, and lists major schemes which have already been programmed. It should be read in conjunction with Appendices C and D, which offer a complete programme of work for the first two years for carriageway and footway.

For a number of reasons explained above in this HAMP, the outward years of these budgets are necessarily preliminary and subject to revision, especially 2010/11 and 2011/12, which are outside the horizon of TfL's current Business Plan (a further Business Plan, covering the period to 2015, is in development). In addition, a full list of schemes for the outer years, and for all asset types, is yet to be confirmed.

While the overall totals for the current Business Plan period are in line with the latest TfL Business Plan and Investment Plan, the breakdown of figures here may differ from figures in those plans because of changes to costs of individual projects.

This programme shows the guideline figures expected to be invested in the highway assets over the next five years. To complete the picture, revenue maintenance amounts are also indicated.

The figures are worthy of commentary both by asset type down the table and by financial year across the table:

## Comments by asset type

**Carriageways and footways**
Capital investment is typically bundled into programmes of individual schemes designed to optimise beneficial effect on condition indicators while maximising efficient use of resources and minimising disruption to the network.

**Structures and lighting**
Basic condition modelling gives a baseline annual asset renewal requirement of around £7.5m for structures and £4.5m for lighting. This sum is fully populated with individual schemes with a value of up to £2m; larger schemes are based on structure-specific modelling and option selection and are shown separately in the Major Projects section of the programme.

**Tunnels**
A separate tunnels budget has been established to begin the task of matching investment in asset service standards more closely with modern requirements with particular reference to ventilation and safety systems.

## Trends by financial year

**Phasing detail**

Certainty of the programme decreases over time, for reasons explained further in the main text. For carriageway the focus is on stretches with high concentration of sections with condition index of 50+. This means that TfL targets not only sections in the worst condition, but also those likely to deteriorate to that state soon.

Through scheme phasing TfL will also support London's hosting of the 2012 Olympic Games and Paralympic Games. In the run-up to the Games, when considering all schemes likely to be required over the next five years, TfL may move forward required schemes in areas likely to feature prominently in the Games or related transport so that they can be implemented before, rather than after, the event.

Table 22: Draft five-year forward works programme

| | 07/08 | 08/09 | 09/10 | 10/11 | 11/12 |
|---|---|---|---|---|---|
| | Covered in current TfL TfL Business Plan | | | Outside horizon of current Business Plan | |
| | Figures in millions of pounds | | | | |
| **Revenue maintenance** | **54.58** | **55.72** | **50.34** | **51.32** | **52.31** |
| **Capital maintenance** (For schemes valued up to £2m) | | | | | |
| Percentage of programme already made up of schemes | 100 | 80 | 65 | 0 | 0 |
| Carriageway | 17.45 | 21.50 | 21.50 | 24.00 | 25.00 |
| Footway | 3.65 | 5.50 | 5.70 | 6.50 | 7.00 |
| Structures | 7.64 | 8.50 | 8.50 | 9.50 | 10.00 |
| Tunnels | 2.35 | 2.32 | 2.34 | 2.50 | 2.50 |
| Lighting | 5.65 | 4.50 | 4.50 | 5.00 | 5.00 |
| Other (drainage, street furniture, landscaping, etc) | 1.62 | 1.58 | 1.52 | 2.50 | 3.00 |
| Olympic Routes carriageway | 0.00 | 0.50 | 0.60 | 1.00 | 1.20 |
| **Capital renewal total** | **38.35** | **44.40** | **44.66** | **51.00** | **53.70** |
| **Major projects** (Individual schemes above £2m) | | | | | |
| Olympic Route Junction improvements | - | 2.30 | 2.40 | 2.45 | 2.55 |
| Coulsdon Relief Road | 3.78 | 0.12 | - | - | - |
| Lambeth Bridge Waterproofing | 0.30 | - | - | - | - |

**Table 22: Draft five-year forward works programme** (continued)

| | 07/08 | 08/09 | 09/10 | 10/11 | 11/12 |
|---|---|---|---|---|---|
| | Covered in current TfL Business Plan | | | Outside horizon of current Business Plan | |
| | **Figures in millions of pounds** | | | | |
| A316 Country Way Flyover | 5.07 | – | – | – | – |
| Hanger Lane 0.88 7.00 10.28 – – | | | | | |
| Western Avenue 9.24 7.22 0.91 – – | | | | | |
| Blackwall Tunnel Northbound Refurbishment | 19.85 | 19.76 | 0.63 | – | – |
| Fore Street Tunnel | 2.13 | 2.03 | 2.06 | – | – |
| Rotherhithe Tunnel | 0.30 | – | – | – | – |
| Westminster Bridge | 6.72 | 2.74 | – | – | – |
| Ardleigh Green Railway Bridge | 1.44 | 1.40 | – | – | – |
| Upper Holloway Bridge | 1.02 | – | – | – | – |
| **Major projects total** | **50.73** | **42.57** | **16.29** | **2.45** | **2.55** |

**Business Plan**

Although phasing of funding among the remaining years within the current Business Plan is flexible, the total investment sums for these years are fixed. In order to come close to meeting TfL's target of removing the backlog of road maintenance by 2011 the carriageway and footway sums in 10/11 and 11/12 would need to be considerably higher than before. Funding for 10/11 and 11/12 will be clearer as the next Business Plan (covering the period to 2015) is finalised.

## Appendix B: Detailed outcome tables

This appendix expands on Table 3 in Section 5.4, covering each outcome in more detail. The customer outcomes used to measure the outcome, accompanying performance indicator(s), and target(s) are included in a table below the outcome and level of service statement.

The service management hierarchy represents TfL's aspirations and is still a work in progress. Some customer outcomes have yet to be developed, and therefore the applicable table has been omitted. In addition, even where customer outcomes and performance indicators are listed, some targets are not yet available. In these cases those boxes have been left blank.

When available, the full set of customer outcomes, performance indicators and targets will be included in subsequent revisions of this HAMP.

This outcome relates to **Policy 4G.1 of the Mayor's Transport Strategy**, which emphasises the importance of managing London's streets to assist the movement of people, goods and services.

| Category | Outcome |
|---|---|
| SURFACE | A smooth surface |

**Level of Service Statement:**
**TfL will maintain the surface so as to minimise (within reason) uneven surfaces, rutting and cracking, based on information collected from visual and machine-driven inspections to identify necessary works. Any deformity likely to cause personal injury or damage to property will be repaired as a matter of urgency.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 5.5 | n/a | Road lane surfaces achieve a serviceable standard. A safe road surface provides a smooth ride | Former BVPI 96 – percentage of carriageway lane length with condition index worse than 70, as collated from DVI survey data converted to CVI[66] | DVI data converted to CVI (former BVPI 96) | 6.7 per cent or less<br><br>(The longer-term goal is for BVPI 96 to be reduced to 0 per cent by 2011, kept at 0 after that (ie to eradicate backlog of capital work by 2011 and then keep network in steady state of good repair) |
| 5.6 | n/a | Road lane surfaces achieve a serviceable standard. A safe road surface provides a smooth ride | BVPI 223. – percentage of carriageway length that is worse than condition index 100, as collated from SCANNER machine survey | SCANNER machine survey (BVPI 223) | Nine per cent or less |

| | | | | | |
|---|---|---|---|---|---|
| 5.7 | n/a | Footways achieve a serviceable standard. | BVPI 187 – percentage length of footway category 1, 1a, and 2 on the TLRN network with a footway condition index greater than or equal to a threshold value of 20 in line with UKPMS procedures | BVPI 187 – collated from DVI | 17 per cent or less |
| 5.11.1 | 12 | Safe road network free of non-lighting defects, and disruption minimised through reduction of need for repeat site visits | Percentage of defects classified at the Category 1 level of urgency made safe within 24-hour response time[67] | Inspection data and repair records | New indicators – reporting process and target to be determined in partnership with HMWCs |
| 5.11.2 | 13 | | Percentage of Category 1 defects permanently repaired within 28 days | | |
| 5.11.3 | 14 | | Percentage of Category 2H defects permanently repaired within the seven-day response time | | |
| 5.11.4 | 15 | | Percentage of Category 2M defects permanently repaired within the 28-day response time | | |

This outcome relates to **Policy 4G.1 of the Mayor's Transport Strategy**, which emphasises the importance of managing London's streets to assist the movement of people, goods and services.

| Category | Outcome |
|---|---|
| SURFACE | An adhesive, non-skid surface |

**Level of service statement:**
**TfL will monitor and assess areas of skid-resistance deficiency and match the skid-resistance of the carriageway to the site-specific needs of the network.**

Customer outcomes and relevant performance indicators to be defined in future years as continuous improvement actions.

This outcome relates to **Policy 4G.1 of the Mayor's Transport Strategy**, which emphasises the importance of managing London's streets to assist the movement of people, goods and services.

| Category | Outcome |
|---|---|
| LIGHTING | Well-lit carriageways |

**Level of service statement:**
**TfL will monitor the lighting stock by means of visual inspections, including in the hours of darkness. Any lighting outages likely to cause loss of quality of driver vision will be repaired as a matter of urgency.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 5.8 | 9 | Well-lit carriageways – that foster feeling safe | Average percentage of streetlights working on the TLRN | Outage and inspection data | At least 98 per cent |
| 5.9.1 | 10 | Light safety defects are responded to quickly | BVPI 215(a) – Average days taken by HMWC to repair a defective street light under TfL control | Fault reporting and repair records | 12.5 days or less per year |
| 5.9.2 | 10 | Light safety defects are responded to quickly | BVPI 215(b) – Average days taken by Distribution Network Operator (DNO) to repair a defective street light under DNO control | | 42.4 days or less per year |

This outcome relates to **Policy 4G.3 of the Mayor's Transport Strategy**, which is a commitment to improving personal security , and **Policy 4I.1**, which deals with the pedestrian environment.

| Category | Outcome |
|---|---|
| LIGHTING | Footways lit to an extent that fosters feeling safe |

**Level of service statement:**
**TfL will monitor the lighting stock by means of visual inspections, including in the hours of darkness. Any lighting outages likely to create a perceived risk to personal safety will be repaired as a matter of urgency.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 5.8 | 9 | Well-lit carriageways – that foster feeling safe | Average percentage of streetlights working on the TLRN | Outage and inspection data | At least 98 per cent |
| 5.9.1 | 10 | Light safety defects are responded to quickly | BVPI 215(a) – average days taken by HMWC to repair a defective street light under TfL control. | Fault reporting and repair records | 12.5 days or less per year |
| 5.9.2 | 10 | Light safety defects are responded to quickly | BVPI 215(b) – average days taken by Distribution Network Operator (DNO) to repair a defective street light under DNO control | | 42.4 days or less per year |

This outcome relates to **Proposal 4G.22 of the Mayor's Transport Strategy**, which regards improved street name signing.

| Category | Outcome |
|---|---|
| SIGNING | Clear and clean signs and road markings |

**Level of service statement:**
**TfL will maintain the sign and marking stock to optimise with due regard to cost, practicality, and other concerns the availability, clarity and enforceability of the messages it conveys.**

Relevant SPI (SPI 16) to be defined during HMW contract mobilisation. This SPI is not a KPI.

This outcome relates to **Proposal 41.10 of the Mayor's Transport Strategy**, which deals with best practice on pedestrian facilities and accessibility.

| Category | Outcome |
|---|---|
| ACCESSIBILITY | Footways that are clear and accessible for disabled people and those with mobility difficulties |

**Level of service statement:**
**TfL will maintain footways and pedestrian crossings and public space to optimise with due regard to cost, practicality, and the needs of other users their convenience of movement for disabled people and those with mobility difficulties.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 3.4 | | Footways that are clear and accessible for disabled people and those with mobility limitations. Increase the proportion of pedestrian crossings on the TLRN with facilities for disabled people | BVPI 165 (the percentage of controlled pedestrian crossings with facilities for disabled people, as a proportion of all crossings on the TLRN) | BVPI 165 – from database of pedestrian crossings | At least 67 per cent |
| 5.7 | | Footways achieve a serviceable standard | BVPI 187 – percentage length of footway category 1, 1a, and 2 on the TLRN network with a footway condition index greater than or equal to a threshold value of 20 in line with UKPMS procedures | BVPI 187 – collated from DVI | 17 per cent or less |

This outcome relates to **Proposal 4G.10 of the Mayor's Transport Strategy**, which proposes managing appropriate streets as social spaces, and **Proposal 4I.8**, which deals with making the street environment more pedestrian-accessible.

| Category | Outcome |
|---|---|
| ENVIRONMENT | A street environment that is uncluttered, clean and cared for |

**Level of service statement:**
**TfL will seek to remove objects put or left in the highway and will work with other authorities to help them carry out their duties in accordance with the Environmental Protection Act 1990 and Clean Neighbourhoods and Environment Act 2005.**

Development is in progress of a monitoring framework for this outcome, based upon aggregation of individual HMWC Environmental Amenity Scores.

This outcome relates to **Proposal 4G.10 of the Mayor's Transport Strategy**, which proposes managing appropriate streets as social spaces, and **Proposal 4G.11**, which proposes environmental street improvement schemes in London's town centres.

| Category | Outcome |
|---|---|
| ENVIRONMENT | A green street environment |

**Level of service statement:**
**TfL will manage the network in a way that minimises (within reason) impacts on London's environment and contributes to the amenity and biodiversity aspect of the Capital.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 6.2 | 22 | Reduce pollutant emissions to air. Demonstrate that DRNM is contributing to the objective by monitoring the contribution of HMWCs and other contractors through the use of fleet vehicles | NOx and Pm10 (total tonnes) aggregated across contractor fleets from details supplied by each contractor | Contractors' records of number of vehicles, total mileage and fuel usage sorted by European emissions classification and Vehicle Excise Duty band where applicable for each vehicle used for TfL contracts | New indicators – targets to be confirmed |
| 6.3 | 23 | Reduce greenhouse gas emissions | CO2 (total tonnes) aggregated across contractor fleets from details supplied by each contractor | as above | as above |
| 6.4.1 | 24 | Manage waste responsibly – reduce waste and promote re-use and recycling | The percentage of the aggregated volume of construction and demolition waste generated by all HMWCs that is re-used | Contractors' weighbridge records and reports | At least 85 per cent combined |
| 6.4.2 | 25 | | The percentage of the aggregated volume of construction and demolition waste generated by all HMWCs that is recycled | | |

| | | | | | |
|---|---|---|---|---|---|
| 6.4.3 | 26 | Reduce consumption of resources by using recycled materials | The percentage of recycled and/or 'green' products procured out of the total tonnage of procured material | Contractor invoices and purchasing/ inventory records and reports | At least 35 per cent |
| 6.5 | | Maintain and enhance the quality of the built environment – reduce impact of noise | Percentage of new surface laid on the TLRN that contains lower-noise surface material<br><br>[Lower noise surface material is defined as a material with negative texture (for example stone mastic asphalt (SMA) and ULM Thin Surfacing)] | Outputs/ deliverables reports | New indicator – target to be determined |

This outcome relates to **Proposal 4G.20 of the Mayor's Transport Strategy**, which deals with remedying congestion bottlenecks.

| Category | Outcome |
|---|---|
| CONGESTION | Road available and not interrupted by roadworks |

**Level of service statement:**
**TfL will undertake carriageway and other repairs in such a way as to minimise occupation of road space.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 1.6 | 1 | Maximise work output per unit of physical capacity closed | BVPI 100 – number of days of temporary traffic controls or road closure on the TLRN. | BVPI 100 | No more than 51 days per year |

This outcome relates to **Policy 4G.2 of the Mayor's Transport Strategy**, which deals with balancing the use of streetspace.

| Category | Outcome |
|---|---|
| CONGESTION | A fair allocation of roadspace in proportion to demand |

**Level of service statement:**
**TfL will seek to balance conflicting demands from different types of users of its network.**

Customer outcomes and relevant performance indicators to be defined in future years as continuous improvement actions.

This outcome relates to **Proposal 4G.25 of the Mayor's Transport Strategy**, which proposes production of a three-year priority street maintenance plan.

| Category | Outcome |
|---|---|
| INVESTMENT | Optimal decision in terms of when and how much money is spent on highway maintenance |

**Level of service statement:**
**TfL will determine its investment budgets and programmes based on removing the backlog of repairs and minimising whole-life costs.**

| | Customer Outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI | Linked to SPI | | | | |
| 5.5 | | Road lane surfaces achieve a serviceable standard. A safe road surface provides a smooth ride | Former BVPI 96 – percentage of carriageway lane length with condition index worse than 70, as collated from DVI survey data converted to CVI[67] | DVI data converted to CVI (former BVPI 96) | 6.7 per cent or less<br><br>(The longer-term goal is for BVPI 96 to be reduced to 0 per cent by 2011, kept at 0 after that (ie to eradicate backlog of capital work by 2011 and then keep network in a steady state of good repair) |
| 5.6 | | Road lane surfaces achieve a serviceable standard. A safe road surface provides a smooth ride | BVPI 223 – percentage of carriageway length that is worse than condition index 100, as collated from SCANNER machine survey | SCANNER machine survey (BVPI 223) | Nine per cent or less |
| 5.7 | | Footways achieve a serviceable standard | BVPI 187 – percentage length of footway category 1, 1a, and 2 on the TLRN network with a footway condition index greater than or equal to a threshold value of 20 in line with UKPMS procedures | BVPI 187 – collated from DVI | 17 per cent or less |

Additional performance indicators may be added when available to represent the condition of other asset types as well.

This outcome does not relate to any specific portion of the Mayor's Transport Strategy but rather reflects an overall commitment to responsiveness and customer service.

| Category | Outcome |
|---|---|
| INFORMATION | Well-informed customers |

**Level of service statement:**
**TfL will keep its customers informed about its activities and respond promptly to queries and complaints.**

| | Customer outcome | | Performance Indicator | Type of data used | 2007/08 Target |
|---|---|---|---|---|---|
| KPI No. | SPI No | | | | |
| 5.1.2 | 3 | The satisfactory resolution of London Streets' customers' complaints regarding the TLRN | Percentage of defects categorised at the Emergency Call Out level of urgency responded to within one hour[68] | Correspondence/call records and HMWC repair records | 96 per cent |

## Appendix C: Programme of carriageway capital schemes for 2007/08 and 2008/09

This appendix shows the confirmed programme of carriageway schemes planned for 2007/08 and the proposed programme for 2008/09. Some of these schemes also include a footway component and this is indicated where applicable.

TfL may need to alter this list should circumstances dictate that this is the more reasonable and prudent course of action.

The total budget for capital renewal of carriageways is £17.8m for 2007/08 and £21.5m for 2008/09.

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Kingston | A3 White lining and studs replacement | | |
| Redbridge | A406 Woodford Viaduct | Complete length of Woodford Viaduct | Resurfacing of carriageway |
| Redbridge | Gants Hill Roundabout | | c/w, f/w, lighting, structures work |
| Tower Hamlets | A12 Percolation | | |
| Tower Hamlets | A12 Slip Roads | | |
| Southwark | A3202 Westminster Bridge Road | St George's Road to St George's Circus | Design and works (carriageway) |
| Lambeth | A3036 Lambeth Palace Road | Lambeth Road to Westminster Bridge Road | Carriageway resurfacing |
| Merton | A3 Bushey Road South Bound On Slip resurfacing | On slip from under flyover to entry slip to A3 southbound | Carriageway resurfacing |
| Croydon | A232 Epsom Road and its junction with Stafford Road carriageway and footway resurfacing | A23 Purley Way to A232 Duppas Hill Road | Carriageway & footway resurfacing |
| Croydon | A232 Duppas Hill Road carriageway reconstruction and footway resurfacing | Epsom Road to Croydon Flyover | Carriageway reconstruction and footway resurfacing |
| Sutton | A232 Croydon Road Bridges Lane to Cedars Road carriageway works | A232 Croydon Road Bridges Lane to Cedars Road | Carriageway reconstruction |
| Sutton | A217 Northey Ave resurfacing/ anti-skid carriageway | A217 Belmont Rise junction of Northey Ave | Renewal of carriageway surfacing/anti-skid surfacing |
| Lambeth | A205 Hardel Rise | Christchurch Road to Norwood Road | Carriageway resurfacing |
| Southwark | A201 London Road | Elephant and Castle roundabout to St. Georges Circus | Design only |
| Richmond | A205 Mortlake Road | Kew Road – Retail Park | |
| Bromley | A21 Bromley Common Oakley Road to Crown Lane Spur – carriageway resurfacing | Oakley Road to Crown Lane Spur | Carriageway resurfacing |
| Wandsworth | A24 Balham High Road | Balham Station to Dinsmore Road | Carriageway resurfacing |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Kingston | A3 Service Roads carriageway resurfacing – Elm bridge to South Lane | TRN (Elmbridge Ave to South Lane) | Design and construct (TRN – Elmbridge to South Lane) |
| Sutton | A24 London Road – Glyn Road to Staines Avenue | Glyn Road to Staines Avenue | Carriageway resurfacing |
| Bromley | A21 Farnborough Way, Farnborough Hill roundabout – carriageway resurfacing | Farnborough Hill roundabout to 100m north | Carriageway resurfacing |
| Wandsworth | A3220 Latchmere Road | Battersea Park Road to Lavender Hill | Carriageway resurfacing |
| Hillingdon | Newport Road junction | Newport Road junction | Re-profiling and resurfacing |
| Sutton | A24 London Road, Garth Road to Hamiliton Avenue carriageway works | London Road, Garth Road to Hamiliton Avenue | Carriageway resurfacing as part of Bus/Cycle Toucan scheme |
| Wandsworth | A3 Westhill | Upper Richmond Road to Merton Road | Carriageway resurfacing |
| Bromley | A21 Farnborough Common, Farnborough Hospital Ninhamas Wood to Wellbrook Road | Farnborough Hospital Ninhamas Wood to Wellbrook Road | Carriageway resurfacing |
| Wandsworth | A24 Upper Tooting Road Phase 2 | Hebdon Road to Garratt Lane | Carriageway resurfacing and design |
| Westminster | Old Marylebone Road carriageway resurfacing | Marylebone Road to opposite 229 OMR | Reconstruction, resurface and anti-skid |
| Croydon | A23 Fiveways Junction and Stafford Road Approach carriageway resurfacing | A23 Purley Way to Stafford Road | Carriageway resurfacing |
| Westminster | Park Road/Baker Street carriageway resurfacing | Rossmore Road to Marylebone Road | Reconstruction, resurface and anti-skid |
| Lewisham | Stanstead Road – carriageway resurfacing junction Ravensbourne Park | At the junction of Ravensbourne Park and Stanstead Road | Carriageway resurfacing – At the junction of Ravensbourne Park |
| Hackney | A107 Lower Clapton roundabout to Powercroft Road | Leabridge roundabout to Powercroft Road | Carriageway maintenance and reconstruction |
| Barnet | A41 Greyhound Hill to The Boroughs resurfacing | Greyhound Hill to The Boroughs resurfacing | Carriageway resurfacing |
| Kingston | A243 Leatherhead Road carriageway resurfacing – Bridge Road to Garrision Lane (design) | Bridge Road roundabout to Garrision Lane | Design only (Bridge Road to Garrision Lane) |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Hackney | A10 Stamford Hill to Amhurst Park | 50 metres in each direction from centre of junction | Carriageway maintenance and reconstruction |
| Greenwich | A102 Woolwich Road southbound on/off slips | A102 Woolwich Road southbound on/off slips | Carriageway resurfacing |
| Lewisham | Molesworth Street northbound carriageway repair | Molesworth Street northbound, 200m north of southern roundabout | Repair of northbound carriageway including survey design and drainage |
| Tower Hamlets | A101 Branch Road resurfacing | A13 to tunnel entrance | Carriageway resurfacing (over run) |
| City | Blackfriars underpass and Victoria Embankment | Temple Place to Puddle Dock | Reconstruction and resurfacing design |
| Sutton | A217 Cheam crossroads carriageway works | A217 Belmont Rise junction of A232 Cheam Road | Renewal of carriageway surfacing/anti-skid surfacing |
| Merton | A24 Priory Road junction carriageway resurfacing | Priory Road JW High Street Collierswood | Carriageway resurfacing |
| Camden | A41 Finchley Road anti-skid | Various locations on the A41 Finchley Road | 0 |
| Camden | A503 Camden Road anti-skid | Various locations on the A503 Camden Road | 0 |
| City | Gracechurch Street | King William Street to Cornhill | Reconstruction and resurfacing |
| Bromley | A21 Sevenoaks Road, Stonehouse Lane to Old London Road – carriageway resurfacing | Stonehouse Lane to 250m east | Carriageway resurfacing |
| Barnet | A41 Brent Cross slip road resurfacing | Brent Cross slip roads | Resurfacing to slip roads |
| Hounslow | Henleys and Waggoners | Henleys and Waggoners | Resurface and new signage |
| Barnet | Hendon Central to The Burroughs | Hendon Central to The Burroughs | Carriageway resurfacing and structural repair |
| Ealing | A406 Popes Lane/ Uxbridge Road | Popes Lane junction and Uxbridge Road junction | Resurfacing |
| Kingston | A243 Leatherhead Road carriageway resurfacing – Malden Rushett | Fairoak Lane to 600m from SCC boundary | Design only from Fairoak Lane to 600m from SCC boundary |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Richmond | A316 Whitton Road roundabout | Twickenham | Resurfacing |
| Barnet | A1 Mill Hill RDB and approaches | A1 Mill Hill | Resurfacing |
| Islington | Archway Road carriageway resurfacing | Between Shephard's Hill and Winchester Road | Carriageway resurfacing south of Shephard's Hill |
| Hounslow | The Parkway north of M4 to Bulls Bridge | The Parkway north of M4 to Bulls Bridge | Resurfacing northbound carriageway (anti-skid 08/09) |
| Camden | Camden Road carriageway reconstruction Phase 2 | Between Sandal Road and Royal College Street | Partial full depth carriageway reconstruction and complete carriageway resurfacing between Sandall Road and Royal College Street |
| Hounslow | Syon Lane to Canal Bridge – resurfacing | Syon Lane to Canal Bridge | Eastbound carriageway only |
| Haringey | Seven Sisters, Gourley Street to A10 Tottenham High Road | Between Gourley Street and A10 | Carriageway reconstruction and resurfacing |
| Hounslow | Thornbury Road to Syon Lane – resurfacing | Thornbury Road to Syon Lane | Lane 1 both directions |
| Greenwich | A102 Blackwall Lane northbound on/off slips | A102 Blackwall Lane northbound on/off slips | Carriageway resurfacing |
| Barnet | A1 Great Northway resurfacing | A1 between A406 and Hendon Lane | Resurfacing |
| Westminster | Marble Arch carriageway resurfacing | Whole of gyratory | Reconstruction, resurface and anti-skid |
| Islington | Upper St Mary's carriageway resurfacing | Between Barnsbury Road and St Mary's Church (opposite Waterloo Terrace) | Carriageway surfacing south of Barnsbury Street |
| Greenwich | A102 BWTSA southbound resurfacing | A102 southbound exit from BWT | Carriageway resurfacing (over run) |
| Kingston | A3 Malden roundabout carriageway resurfacing | Malden roundabout | Works – (multi funded) – It is imperative that all elements of this scheme (structures, lighting, carriageway, CCE) receive funding to enable it to proceed. Very high priority due to condition. Speak to D Edser for details |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Enfield | GCR roundabout Phase 2 | Whole roundabout and every arm | Improve roundabout according to safety audit |
| Hillingdon | A40 Polish to Long Lane | PWR to Long Lane | Westbound resurfacing |
| Ealing | A40 crack repairs | Various | Maintenance of pavement |
| Redbridge | A406 Waterworks to Charlie Browns | Waterworks to Charlie Browns | Surface joint repairs |
| Redbridge | A1400 Tesco's junction | Lechmere Approach to A1400 | Carriageway resurfacing |
| Southwark | A201 London Road | St George's Road to Elephant and Castle | Works (carriageway) |
| Southwark | Dulwich common noise and vibration study | | Resurface and anti-skid |
| Westminster | Paddington to Marylebone | Paddington offslip to Marylebone flyover | Resurfacing |
| Bromley | A232 Croydon Road carriageway resurfacing | Coney Hill to Poll Cat Alley | Continuation of 06/07 scheme including anti-skid |
| Southwark | A201 Blackfriar's Road Phase 3 | Union Street to Webber Street | Works (carriageway and footway) |
| Southwark | A201 Blackfriar's Road | Southwark Street to Webber Street | Design review |
| Greenwich | Shooters Hill Road (West Heath) Recon | Shooters Hill Road between Cade Road and Goffers Road | Reconstruction of carriageway and footway |
| Southwark | A2 Great Dover Street | Borough High Street to Bricklayers Arms | Works (carriageway and footway and lighting) |
| Wandsworth | A205 Upper Richmond Road | Ravenna Road to Carlton Drive | Carriageway and footway works |
| Southwark | A302 St George's Road | Elephant and Castle roundabout to Westminster Bridge Road | Design only |
| Lewisham | Westhone Avenue – carriageway resurfacing west of Woodyates Road to railway bridge | Junction with Westhorn Avenue and Woodyates Road, westbound to railway bridge | Carriageway resurfacing west of Woodyates Road to railway bridge |
| Wandsworth | A3 Robin Hood roundabout | Roundabout | Carriageway resurfacing |
| Lambeth | A3 Streatham High Road | Penfold Road to Drewstad Road | Carriageway resurfacing |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Southwark | A302 St George's Road | Elephant and Castle to Westminster Bridge Road | Works (carriageway) |
| Bromley | A232 Wickham Road carriageway resurfacing | The Alders to Cavendish Crescent | Carriageway resurfacing |
| Wandsworth | A3220 Elspeth Road | Lavender Hill and Clapham Common North Side | Carriageway resurfacing |
| Kensington & Chelsea | Cheyne Walk resurfacing Millman Street to Battersea Bridge | Millman Street to Battersea Bridge | Carriageway reconstruction and resurfacing |
| Sutton | A232 Croydon Road/Plough Lane carriageway works | A232 Croydon Road junction of Plough Lane | Carriageway resurfacing – design |
| Merton | A24 Morden Road from Dorset Road to Merantun Way | Morden Road from Dorset Road to Merantun Way | Carriageway resurfacing (design only) |
| Wandsworth | A306 Roehampton Lane | Clarence Lane to Langside Avenue | Carriageway resurfacing |
| Kingston | A3 service roads carriageway resurfacing – Hook to Tolworth northbound and southbound (design) | Tolworth to Hook northbound and southbound | Design only |
| Southwark | A3200 Southwark Street Phase 3b | Sumner Street to Great Guildford Street | Design and works (carriageway, footway and lighting) |
| Lewisham | Brownhill Road – carriageway resurfacing, Jutland Road to 200m east of St Fillan Road | Junction of Brownhill Road and Jutland Road to 200m east of junction with St Fillans Road | Carriageway resurfacing – Jutland Road to 200m east of St Fillan Road |
| Croydon | A23 Thornton Heath pond roundabout carriageway and footway resurfacing | A23 London Road to A23 Thornton Road | Carriageway and footway resurfacing and reconstruction of central wall |
| Sutton | A232 Cambridge Road to Windsor Castle | Cambridge Road to Windsor Castle | Carriageway resurfacing |
| Westminster | Marylebone Road carriageway resurfacing | Westbound between Baker Street/ Gloucester Place | Reconstruction, resurface and anti-skid |
| Merton | A297 Morden Hall roundabout carriageway resurfacing | Morden Hall roundabout | Carriageway resurfacing |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Sutton | A217 St Dunstan's Hill Carriageway | A217 between Cheam Road and Gander Green Lane | Resurfacing of carriageway |
| Lambeth | A205 Christchurch Road | Cotherst Road to Hillside Road | Carriageway resurfacing |
| Kingston | A3 service roads carriageway resurfacing – Huntley Way to Coombe Lane northbound (design) | Huntley Way to Coombe Lane northbound | Design only |
| Hackney | A10 Kingsland High Street | Dalston Lane to Arcola Street | Carriageway maintenance and reconstruction |
| Islington | Wakely Street carriageway resurfacing | Between City Road and Goswell Road | Carriageway and footway resurfacing between City Road and Goswell Road |
| Havering | A127 Eastern Avenue: Bird Lane to Hall Lane | Lane 1 westbound from west side of Bird Lane to west end of westbound onslip from Hall Lane | Carriageway resurfacing |
| Tower Hamlets | A11 Bow roundabout carriageway, kerbing, footway | 50 metres in each direction from centre of junction | Carriageway resurfacing |
| Camden | Camden Street carriageway reconstruction | 5 junctions | Partial full depth carriageway reconstruction and complete carriageway resurfacing |
| Camden | Camden Road carriageway reconstruction Phase 3 | Between Royal College Street and Kentish Town Road | Partial full depth carriageway reconstruction and complete carriageway resurfacing between Royal College Street and Kentish Town Road (final design) |
| Greenwich | Yorkshire Grey roundabout | Yorkshire Grey roundabout, Greenwich | Resurfacing and anti-skid of entire roundabout |
| Southwark | A202 Peckham Road | Camberwell Church Street to Havill Street | Works (carriageway, footway and lighting) |
| Enfield | A406 Bull Lane carriageway reconstruction | A406 Sterling Way by Bull Lane | Carriageway reconstruction |
| Merton | A24 Merantun Way junction with Mordern Road carriageway resurfacing | Merantun Way junction with Mordern Road westbound to stop line | Carriageway resurfacing (design only) |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Southwark | A202 Peckham Road | Havill Street to Southampton Way | Works (carriageway, footway and lighting) |
| Barnet | Fiveways junction | Fiveways junction – slip road | Resurfacing |
| Sutton | A232 Carshalton Road. St Barnabas Road to Carshalton Grove carriageway works | A232 Carshalton Road. St Barnabas Road to Carshalton Grove | Carriageway reconstruction |
| Newham | A117 Newham Albert Road – resurfacing | Pier Road to Woodman Street | Resurfacing |
| Merton | A24 London Road northbound carriageway resurfacing | Crown Road to Morden Hall Road | Carriageway resurfacing |
| Lewisham | Molesworth Street – carriageway resurfacing, both dual carriageways | From a point at the southern roundabout on Molesworth Street to the northern roundabout | Carriageway resurfacing – both dual carriageways between both roundabouts |
| Hillingdon | A4180 | All A4180 | Tendered carriageway resurfacing |
| Southwark | A3 Elephant and Castle link road | Link between the north and south roundabouts, southbound only | Design and works |
| Bromley | A21 Farnborough Way, High Street to Farnborough Hill – carriageway resurfacing | High Street to Farnborough Hill | Resurfacing/reconstruction of highway where UKPMS is >70 |
| Bexley | A2 ERW carriageway resurfacing | Various locations on the A2 ERW carriageway | Carriageway resurfacing at various locations on the A2 ERW |
| Lambeth | A23 Brixton Hill | Christchurch Road to Acre Lane (various locations) | Carriageway resurfacing |
| Bromley | A232 High Street carriageway resurfacing | Station Road to Rose Walk | Carriageway resurfacing |
| Southwark | A205 Dulwich Common | College Road to Queen Mary's Gate | Works (carriageway) |
| Kingston | A3 carriageway resurfacing – Hook to Tolworth (design) | Hook to Tolworth roundabouts | Design only |
| Bromley | A21 Kentish Way northbound carriageway north and Bromley South station | 0 | Carriageway resurfacing |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Enfield | A10 Great Cambridge Road Bullsmoor Lane to Carterhatch Lane carriageway resurfacing | A12 GCR between Bullsmoor and Caterhatch Lane | Carriageway resurfacing |
| Hammersmith and Fulham | Hammersmith flyover to Northend Road | Hammersmith flyover to Northend Road | Resurfacing |
| Lambeth | A3036 York Road | Westminster Bridge Road to Waterloo Road | Carriageway resurfacing |
| Camden | Camden Road carriageway reconstruction Phase 4 | Torriano Avenue and York Way | Partial full depth carriageway reconstruction and complete carriageway resurfacing between |
| Croydon | A23 Purley Way and Imperial Way carriageway resurfacing | Imperial Way to 90m north of Imperial Way | Carriageway resurfacing |
| Greenwich | Blackheath Hill carriageway reconstruction | Blackheath Hill from junction Greenwich South Street and Cade Road | Reconstruction of entire carriageway |
| Tower Hamlets | A11 Mile End Road – Southern Grove to Burdett Road | Southern Grove to Burdett Road | Relocate existing decommissioned pelican crossing |
| Bromley | A21 Sevenoaks Road, Pratts Bottom – carriageway resurfacing | Pratts Bottom roundabout eastwards for 100m | Carriageway resurfacing |
| Havering | A12 Eastern Avenue: east of Whalebone Lane | Lanes 1 and 2 eastbound from east side of Whalebone Lane junction | Carriageway resurfacing |
| Merton | A24 London Road junction with Epsom Road southbound | London Road junction with Central Road southbound 200m south | Carriageway resurfacing (design only) |
| Bexley | A20 Sidcup Bypass carriageway resurfacing | Lane 1, from a point 120m west of GLA boundary to a point 145m west of GLA boundary | Carriageway resurfacing on A20 Sidcup bypass |
| Barnet | A41 Edgware Way/Apex Spur Road | Apex Corner to Spur Road | Carriageway resurfacing, historical 06/07 scheme cut due to funding prioritisation |
| Havering | A127 Hall Lane to Tomkyns | Hall Lane to Tomkyns Lane | Carriageway resurfacing |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Brent | A406 Staples Corner flyover: resurfacing | A1 Staples Corner flyover | Resurfacing (carry over from 06/07 due to funding cuts). Additional scheme to be included is the joint repairs. Design completed in 06/07 |
| Havering | A12 Whalebone Lane to Mawney Road eastbound | Whalebone Lane to Mawney Road eastbound | Carriageway resurfacing |
| Kensington and Chelsea | Cremorne Road/ Cheyne Walk resurfacing | 19 Cremorne Road to Blantyre Street | Carriageway resurfacing |
| Southwark | A202 Peckham Road/ Peckham High Street | Southampton Way to Rye Lane | Design and works (carriageway and footway and lighting) |
| Bromley | A21 Sevenoaks Road, Knockholt Bridge to Hewitts roundabout – carriageway resurfacing | Knockholt footbridge to Hewitts roundabout (eastbound only) – carriageway resurfacing | Carriageway resurfacing |
| Bromley | A21 Farnborough Way, Turbbenden Lane to Cherrycot Hill – carriageway resurfacing | Turbbenden Lane to Cherrycot Hill | Carriageway resurfacing |
| Bromley | A21 Sevenoaks Road, Hewitts roundabout to Knockholt Bridge – carriageway resurfacing | Hewitts roundabout to Knockholt Bridge (westbound only) – carriageway resurfacing | Carriageway resurfacing |
| Hammersmith and Fulham | A40 Woodlane to Terrick Street | A40 Woodlane to Terrick Street | Resurfacing |
| Islington | Kings Cross Road footway and carriageway resurfacing design | Between Acton Street and Calthorpe Street | Carriageway and footway resurfacing design between Penton Rise and Rosebery Avenue |
| Ealing | Ealing Hanger Lane underpass | Hanger Lane underpass | Resurfacing |

## Appendix D: Programme of footway capital schemes for 2007/08 and 2008/09

This appendix shows the confirmed programme of footway schemes for 2007/08 and the proposed programme for 2008/09.

A few schemes also contain a carriageway component, indicated where applicable.

TfL may need to alter this list should circumstances dictate that this is the more reasonable and prudent course of action.

The total budget for capital renewal of footways is £3.75m for 2007/08 and £5.5m for 2008/09

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Islington | A503 footway paving design | Isledon Road and Seven Sister Road, various locations between Rock St and Berriman Road | Footway design |
| Croydon | A23 Brighton Road footway Resurfacing | Purley Road to Windermere Road | Footway resurfacing |
| Bromley | A232 Breamer Garden to Ravenswood Avenue | Breamer Garden to Ravenswood Avenue | Footway resurfacing |
| Redbridge | Roding Lane to Herent Drive | Roding Lane to Herent Drive | Footway maintenance |
| Sutton | Croydon Road, Derek Avenue to Rectory Lane footway resurfacing | 0 | Resurfacing footways |
| Westminster | Grosvenor Road footway resurface | Between Claverton Terrace and a point opposite Shelley House | Footway resurface |
| Sutton | Oldfield Road and Reigate Avenue footway resurfacing | 0 | Resurfacing footways and cycleways |
| Croydon | A23 London Road Norbury Station to Thornton Heath Pond footway resurfacing | Norbury Station to Thornton Heath Pond | Footway resurfacing |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Westminster | St Johns Wood Road footway resurface | o/s Blazer Court | Footway resurface |
| Hackney | A102 Homerton High Street, Kenworthy to Urswick | Kenworthy Road to Urswick Road | Footway maintenance and reconstruction |
| Kensington and Chelsea | Earls Court Road footway reconstruction | Earls Court Square to Old Brompton Road | Footway resurfacing |
| Westminster | Lower Grosvenor Place footway resurfacing | Between Grosvenor Place and Victoria Square | Footway resurfacing |
| Kingston | A243 Leatherhead Road footway resurfacing | Bridge Road to Merritt Gardens | Design and construct (Bridge Road to Merritt Gardens east and west) |
| Camden | Camden Road footway reconstruction Phase 2 | Between Rochester Mews and Royal College Street | Reconstruction of the footway between Rochester Mews and Royal College Street |
| Barnet | A1 Great North Way to Hendon Lane | A406 to Hendon Lane | Resurfacing of this section would complete the scheme |
| Westminster | St Johns Wood Road footway resurface | O/s Harrow Lodge | Footway resurface |
| Barnet | A41 Spur Road to Brockley | A41 Spur Road to Brockley Hill | Footway renewal |
| City | A3211 Lower Thames Street Footway | London Bridge – Bywaid | Footway works |
| Lewisham | Loampit Hill – footway renewal, Tressillian Road to Sandrock Road | Loampit Hill J/W Tressillian Road to J/W Sandrock Road | Footway renewal – Tressillian Road to Sandrock Road. To replace aging footway with new, in accordance with TfL Streetscape Guidance. Relaying existing kerbs where necessary. |
| Bromley | A232 Croydon Road | Quiet Nook to Lakeside Drive | Footway resurfacing |
| Tower Hamlets | Prescott Street and Leman Street | Mansell Street to Alie Street | Repaving and minor improvement works |
| Greenwich | Shooters Hill Road footways | Between Kidbrooke Park Road and Vanburgh Terrace | Footway renewal between Kidbrooke and Vanburgh |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Lewisham | Loampit Hill – footway renewal, Sandrock Road to Jerrard Street | Loampit Hill J/W Sandrock Road to J/W Jerrard Street | Footway Renewal – Sandrock Road to Jerrard Street. To replace aging footway with new, in accordance with TfL Streetscape Guidance. Relaying existing kerbs where necessary |
| Redbridge | A12 Redbridge Gants Hill | Redbridge roundabout to Gants Hill roundabout | Footway maintenance |
| Lambeth | A216 Mitcham Lane | Tooting Bec to Ambleside Road | Footway and kerb reconstruction |
| Bromley | A232 Croydon Road, Commonside to Oakley Road footway works | Commonside to 146 Croydon Road footway works | Footway resurfacing |
| Kingston | A3 Service Roads footway works | TRN (Elmbridge Ave to South Lane) | Associated footway works to carriageway scheme |
| Islington | Upper St 222 footway repaving | Between Islington Park Street and Laycock Street | Footway between Islington Park Street and Highbury Corner |
| Hounslow | White Hart to Cranford Lane | White Hart to Cranford Lane | Footways |
| Merton | A24 London Road between Crown Road and Central Road | Crown Road and Central Road | Footway repairs to poor lengths on south east side |
| Merton | A24 London Road from Morden South Station to Central Road footway | London Road from Morden South Station to Central Road footway | Footway repairs to poor lengths on south east side |
| Merton | A297 St Helier Avenue cycle footway renewal | St Helier Ave cycle footway renewal 300m north of Morden Hall Road | Footway repairs to poor lengths of green surfacing (part only) |
| Wandsworth | A3 East Hill (part of Wandsworth Town project) | Contra-flow bus lane | Footway design |
| Southwark | A3200 Southwark Street Phase 4 | Red Cross Way to Borough High Street | Design and works (Carriageway and footway) |
| Hackney | A10 Stamford Hill – various locations | Northwold Road to Olinda Road | Footway maintenance and reconstruction |
| Hillingdon | A4180 | Various along length | Resurfacing |
| Camden | Hamsted Road footway reconstruction | Euston Road to William Street | Reconstruction of the footway |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Westminster | St Johns Wood Road footway resurface | Junction with Edgware Road | Footway resurface |
| Westminster | Knightsbridge footway resurfacing | North side b/w a point opp. Old Palace Yard and Wilton Place | Footway resurface |
| Westminster | Gloucester Place footway resurfacing | West side b/w Marylebone Road and Dorset Square | Footway resurface |
| Westminster | Finchley Road footway resurfacing | East side b/w Queens Grove & Queens Terrace | Footway resurface |
| Westminster | Victoria Embankment footway resurfacing | Between Cleopatra's Needle and Embankment Pier | Footway resurface |
| Kingston | A3 Footway Resurfacing – Grassmere F/B to Robin Hood Land S/B | Grasmere F/B to Robin Hood Lane S/B | Design and construct – Grassmere F/B to Robin Hood Lane |
| Ealing | A406 Hanger Lane Bridge footway (south) | Hanger Lane Bridge footway | Ponding repairs |
| Tower Hamlets | A11 Whitechapel Road from Greatorex Street to Aldgate | 0 | Footway maintenance and reconstruction |
| Haringey | Roundway footway reconstruction/public realm | Between Flexmere Road and Hall Road | Footway reconstruction/ trip rails/verges/paint street furniture |
| Bexley | A20 Sidcup Bypass footway resurfacing | Various locations along the A20 Sidcup Bypass Footways | Footway resurfacing, various locations along the A20 Sidcup Bypass |
| Brent | A41 Hendon Central to The Burroughs | Hendon Central to The Burroughs | Footway Renewal |
| Newham | A117 Woolwich Manor Way | Milk Street to Woodman Street | Footways renewals due to ponding |
| Bexley | A2 ERW footway resurfacing | Various locations on the A2 ERW footways | Footway resurfacing, various locations along the A2 ERW |
| Bromley | A21 Hastings Road, Gravel Road to Park Avenue, footway resurfacing | Southbound footway, from Gravel Road to Jacksons and from Lakeside Drive to Knowlehill Farm | Footway resurfacing |
| Redbridge | A1400 Longwood Gardens, Gants Hill | Longwood Gardens to Gants Hill Roundabout | Footway Maintenance |

| Borough | Project name | Location of work | Further description of proposed works |
|---|---|---|---|
| Enfield | A406 North Circular Road, Footway Reconstruction | From Green Lanes to GCR Roundabout | Footway |
| Wandsworth | A3 Clapham Common Northside | Battersea Rise to Victoria Rise | Footway |
| Wandsworth | A3220 Latchmere Road | Battersea Park Road to Lavender Hill | Footway design |
| Tower Hamlets | RHT Branch Road footpath renewal | 0 | Implement footpath works |
| Brent | A406 Brent Street to Brent Cross | Brent Street to Brent Cross | Footway renewal |
| Enfield | A10 GCR footway improvements | Between Bullsmore Lane and Junction 25 of M25 | Footway |

## Appendix E: Relevant paragraphs, proposals and policies from the Mayor's Strategies

This appendix contains all of the paragraphs (see Table 23), proposals (Table 24), and policies (Table 25) from the Mayor's Transport Strategy (published 2001) which are relevant to the management of highway assets and referenced anywhere within the HAMP. In addition, referenced relevant excerpts from other Mayoral strategies are included in Table 26.

**Table 23: Referenced paragraphs from the Mayor's Transport Strategy**

| Paragraphs | |
|---|---|
| **Number** | **Text** |
| Paragraph 4G.122 | 'Real improvements need to be made to the quality of street maintenance within London on both the TLRN and borough roads. Proper planned maintenance can improve street conditions, and save money in the long run.' |
| Paragraph 4G.123 | 'The most serious street maintenance issue in London, as in much of England, is the backlog of work resulting from years of under-funding. This is highlighted on the borough roads by a survey conducted for the Government Office for London by the London Borough of Hammersmith and Fulham. This suggested that the backlog required to bring London's principal roads up to standard is over £100 million.' |
| Paragraph 4G.124 | 'A long term strategy for maintenance must be developed by TfL and the boroughs. However, a faster programme is required to focus on the immediate priorities and to reverse the pattern of past inadequate investment. These initial priorities should be reflected in three year maintenance plans produced by TfL, for the TLRN, and by the boroughs, for all borough roads. The implementation of these plans should be programmed jointly to minimise disruption.' |

Table 24: Referenced proposals from the Mayor's Transport Strategy

| Proposals | |
|---|---|
| **Number** | **Text** |
| Proposal 4G.10 | 'The London boroughs will be encouraged to design and manage appropriate local streets as Streets-for-People areas emphasising their function as social spaces. Priority will initially be given to areas of high deprivation, regeneration areas and in particular areas of high density neighbourhood renewal. Transport for London will cooperate with these initiatives where they are likely to affect the operation of the Transport for London Road Network (TLRN).<br>(Programme to start in 2003.)' |
| Proposal 4G.11 | 'Transport for London will work with the London boroughs to develop a plan setting out a programme of environmental street improvement schemes to improve the attractiveness of London's town centres.<br>(Plan to be produced by 2003.)' |
| Proposal 4G.20 | 'Transport for London (TfL) will identify the major congestion bottlenecks on the Transport for London Road Network (TLRN) and develop a programme of options for consideration. The London boroughs should identify the worst congestion bottlenecks on those parts of the road network that fall under their control in their Local Implementation Plans.<br>(The congestion bottlenecks should be identified by the end of 2002.)' |
| Proposal 4G.22 | 'Transport for London will work with the London boroughs to produce guidance by 2003 on secondary and local signing and street name signing; followed by an investment programme to implement new signing initiatives as resources permit.<br>(Costs and appropriate timescale will be identified in preparing the investment programme.)' |
| Proposal 4G.25 | 'As the first stage in a new approach to street maintenance, Transport for London and the London boroughs will each produce a three year priority street maintenance plan to cover bridges and principal carriageways reflecting the objectives of the Transport Strategy and available resources.<br>(First plans to be produced by April 2002.)' |
| Proposal 4G.26 | 'Transport for London will work with the London boroughs to develop a long term approach to the funding and management of all aspects of street maintenance throughout London.<br>(Long term approach to be developed by 2003.)' |

**Table 24: Referenced proposals from the Mayor's Transport Strategy** (continued)

| Proposals | |
|---|---|
| **Number** | **Text** |
| Proposal 4I.8 | 'Programmes of improvements will be developed by Transport for London and the London boroughs to make the street environment more accessible, removing barriers and obstructions that make it difficult or unsafe for pedestrians to use the street.<br>(Programmes to be developed by the end of 2002.)' |
| Proposal 4I.9 | 'Transport for London, in partnership with the London boroughs and voluntary groups with expertise in walking and disability issues, will establish streetscape guidelines to encourage consistent good practice and design. These will include minimum footway widths related to usage, and set minimum standards for the maintenance and management of London's streets, including repair of footways, signing, avoiding clutter, removing graffiti and rubbish, keeping streets adequately illuminated and the provision of CCTV.' |
| Proposal 4I.10 | 'Transport for London, in conjunction with the London boroughs, will develop best practice guidance on audits of pedestrian facilities and accessibility, including issues related to safety and the needs of disabled people, for:<br>• All new major highway and traffic management proposals<br>• Streets-for-People areas<br>• Local town centres and other major trip generators, including stations and schools<br>• Public buildings and community facilities<br>Following the pedestrian audits, implementation plans will be drawn up to make the necessary improvements.<br>(Guidelines to be developed by the end of 2002.)' |

Table 25: Referenced policies from the Mayor's Transport Strategy

| Policies | |
|---|---|
| **Number** | **Text** |
| Policy 4G.1 | 'London's streets should be managed to assist the movement of people, goods and services – safely, expeditiously, reliably, securely and with minimum negative environmental impact; to ensure reasonable access to property, and to recognise their use as social spaces.' |
| Policy 4G.2 | 'In balancing the use of street space, account should be taken of the objectives of the Transport Strategy and the current London road hierarchy. On the Transport for London Road Network (TLRN) and most other 'A' Roads there is a general presumption in favour of distribution, particularly for those making business journeys, bus passengers and commercial vehicle operators. On other London roads there is a presumption in favour of access and amenity, particularly for residents, buses, pedestrians and cyclists, and where necessary, business access.' |
| Policy 4G.3 | 'Transport for London and the boroughs will work together with the police to address personal security issues, reducing crime and the fear of crime on London's streets.' |
| Policy 4I.1 | 'The Mayor, through Transport for London and the London boroughs, and working with other relevant organisations, will aim to create and promote a connected, safe, convenient and attractive environment that encourages people to walk and enriches their experience of being out and about, making London one of the most walking friendly cities for pedestrians by 2015.' |

Table 26: Referenced proposals and polices from other Mayoral strategies

| Strategy | Number | Text |
|---|---|---|
| Mayor's Biodiversity Strategy | Proposal 35 | The Mayor will work with Transport for London and will encourage the Highways Agency, Railtrack, the borough councils and other transport bodies to ensure that the potential for wildlife habitat on the verges of roads, footpaths, cycleways and railways is realised wherever possible. |
| Mayor's Air Quality Strategy | Proposal 55 | The Mayor will ensure that Transport for London's green procurement strategy includes measures for procuring goods and services that seek to meet sustainability targets in line with the Mayor's environmental Strategies. |
| Mayor's Air Quality Strategy | Proposal 56 | The Mayor will ensure that Transport for London Street Management encourages its contractors to reduce emissions from their vehicle fleets. As a first step, information about the fleets is being sought from current contractors and they will be encouraged to ensure their vehicles meet a minimum of Euro III standards by 2004. |
| Mayor's Air Quality Strategy | Policy 13 | The Mayor and Transport for London will work with the boroughs and the Highways Agency to adopt a coordinated approach to reducing air pollutant emissions on London's roads. |

## Appendix F: Relevant 2007/08 KPIs

This appendix lists all of the key performance indicators (KPIs) which are used to measure customer outcomes that are relevant to TfL's discharge of the activities covered by this HAMP. The customer outcomes and accompanying KPIs are sorted by which London Streets strategic theme they support.

'Area of influence' indicates in a few words in what way the activities covered by this HAMP can contribute to achievement of the strategic theme.

Numbering of KPIs refers to that used when identifying these KPIs within the list of all KPIs and business performance indicators (BPIs) used for external and internal reporting of all the activities carried out within the Directorate of Road Network Management (DRNM). A number of KPIs are based on an aggregation of service performance indicators (SPIs) from various contractors, and where applicable this is indicated in a similar fashion.

A monitoring frequency of 'periodic' means that the indicator in question is monitored and reported in line with TfL's four-weekly financial periods.

These tables include the KPIs in their most up-to-date version as of March 2007, but are subject to revision during mobilisation of the new Highway Maintenance Works (HMW) contracts that have begun in April 2007. In particular, a number of the performance indicators are new and targets will need to be set in partnership with the new Highway Maintenance Works Contractors (HMWCs).

Additional KPIs are likely to be added in future years as appropriate.

## Strategic theme – Minimising disruption

Area of influence – Events that disrupt traffic

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 1.6 | 1 | Maximise work output per unit of physical capacity closed | Best Value Performance Indicator (BVPI) 100 (Number of days of temporary traffic controls or road closure on the TLRN) | No more than 51 days per year | Periodic/ Annual |

## Strategic theme – Sustainability of transport utilisation: cycling, walking, and mode shift

Area of influence – Network accessibility

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 3.4 | | Footways that are clear and accessible for disabled people and those with mobility limitations. Increase the proportion of pedestrian crossings on the TLRN with facilities for disabled people | BVPI 165 (the percentage of controlled pedestrian crossings with facilities for disabled people, as a proportion of all crossings on the TLRN) | At least 67 per cent | Quarterly |

## Strategic theme- Asset state of repair and responsiveness

Area of influence – Customer satisfaction

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 5.1.2 | 3 | The satisfactory resolution of London Streets' customers' complaints regarding the TLRN | Percentage of defects categorised at the Emergency Call Out level of urgency responded to within one hour[68] | 96 per cent | Periodic |

Area of influence – Asset maintenance

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 5.5 | | Road lane surfaces achieve a serviceable standard. A safe road surface provides a smooth ride | Former BVPI 96 – percentage of carriageway lane length with condition index worse than 70, as collated from DVI survey data converted to CVI[69] | 6.7 per cent or less | Annual |
| 5.6 | | Road lane surfaces achieve a serviceable standard. A safe road surface provides a smooth ride | BVPI 223 – percentage of carriageway length with condition index worse than 100, as collated from SCANNER machine survey | Nine per cent or less | Annual |

**Area of influence – Asset maintenance** (continued)

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 5.7 | | Footways achieve a serviceable standard. | BVPI 187 – Per cent length of footway category 1, 1a, and 2 on the TLRN network with a footway condition index greater than or equal to a threshold value of 20 in line with UKPMS procedures | 17 per cent or less | Annual |
| 5.8 | 9 | Well-lit carriageways – that foster feeling safe | Average percentage of streetlights working on the TLRN | At least 98 per cent | Periodic |
| 5.9.1 | 10 | Light safety defects are responded to quickly | BVPI 215(a) – average days taken by HMWC to repair a defective street light under TfL control | 12.5 days or less per year | Periodic |
| 5.9.2 | 10 | | BVPI 215(b) – average days taken by Distribution Network Operator (DNO) to repair a defective street light under DNO control | 42.4 days or less per year | |

**Area of influence – Asset maintenance** (continued)

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 5.11.1 | 12 | Safe road network free of non-lighting defects, and disruption minimised through reduction of need for repeat site visits | Percentage of defects classified at the Category 1 level of urgency made safe within 24-hour response time. | New indicators – reporting process and targets to be determined in partnership with HMWCs | Periodic |
| 5.11.2 | 13 | | Percentage of Category 1 defects permanently repaired within 28 days | as above | |
| 5.11.3 | 14 | | Percentage of Category 2H defects permanently repaired within the seven-day response time | as above | |
| 5.11.4 | 15 | | Percentage of Category 2M defects permanently repaired within the 28-day response time. | as above | |

## Strategic theme- Environment

Area of influence – 'Green' practices

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 6.2 | 22 | Reduce pollutant emissions to air. Demonstrate that DRNM is contributing to the objective by monitoring the contribution of HMWCs and other contractors through the use of fleet vehicles | NOx and Pm10 (total tonnes) aggregated across contractor fleets from details supplied by each contractor on number of vehicles, total mileage, and total fuel usage (by type of fuel) | New indicator – target to be confirmed | Annual |
| 6.3 | 23 | Reduce greenhouse gas emissions | CO2 (total tonnes) aggregated across contractor fleets from details supplied by each contractor | New indicator – target to be confirmed | Annual |
| 6.4.1 | 24 | Manage waste responsibly – reduce waste and promote re-use and recycling | The percentage of the aggregated volume of construction and demolition waste generated by all HMWCs that is re-used | At least 85 per cent combined | Quarterly |
| 6.4.2 | 25 | | The percentage of the aggregated volume of construction and demolition waste generated by all HMWCs that is recycled | | Quarterly |

**Area of influence – 'Green' practices** (continued)

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 6.4.3 | 26 | Reduce consumption of resources by using recycled materials | The percentage of recycled and/or 'green' products procured out of the total tonnage of procured material | At least 35 per cent | Quarterly |
| 6.5 | | Maintain and enhance the quality of the built environment – reduce impact of transport-related noise | Percentage of new surface laid on the TLRN that contains lower noise surface material<br><br>[Lower-noise surface material is defined as a material with negative texture (for example stone mastic asphalt (SMA) and ULM Thin Surfacing)] | New indicator – targets to be determined | Annual |

## Strategic theme – Business performance and programme adherence

Area of influence – Internal delivery process

| KPI | Linked to SPI | Customer outcome | Indicator | 07/08 Target for KPI | Monitoring frequency |
|---|---|---|---|---|---|
| 7.2.1 | | Reduce variance between benefits delivered and benefits forecast | The absolute and percentage variance in outputs delivered by period against year-start baseline plans for key deliverables, eg:<br>• Square metres of carriageway laid<br>• Square metres of footway laid<br>• Lamp columns installed<br>• Structures work completed | To be determined | Annual |

## Appendix G: Summary of existing public perception results

This appendix provides a summary of two existing sources of public perception data for the TLRN, as introduced in Section 5.3. These are the TLRN Customer Satisfaction Survey and the Annual London Survey.

**I. The TLRN Customer Satisfaction Survey**
TfL has conducted a pedestrian street interview since 1994 with the aim of measuring change in activity at retail centres on the TLRN. In the past this has been achieved via substantial annual surveys.

The 2005 survey covered here was substantially different both in scope and size compared with previous surveys. In comparison with earlier surveys, the 2005 survey consisted of 10 questions instead of 27 and included a sample of approximately 2,000 respondents instead of approximately 10,000. The timing of the survey also differed, from May to mid-July in 2004, to mid-September to mid-October in 2005. However, the same basic methodology was used, with on-street personal interviewing at 25 specified locations along the TLRN and use of pedestrian counts to obtain sampling intervals.

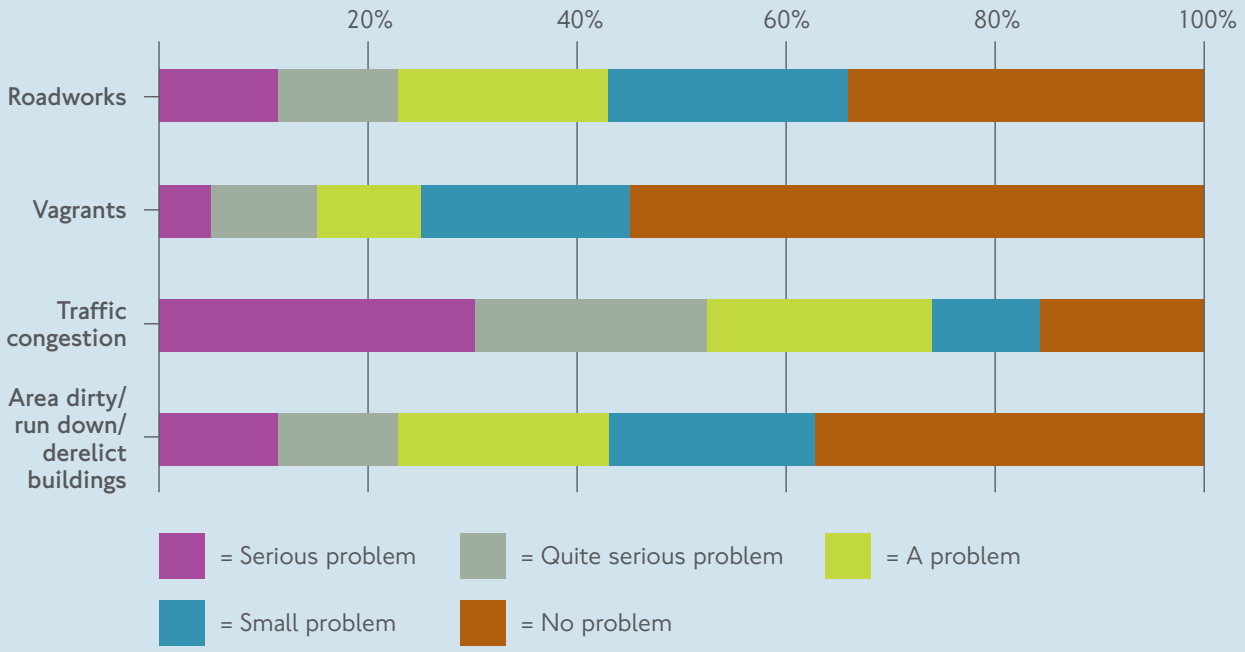
The 2005 survey concentrated on aspects of satisfaction among users of the TLRN in relation to cycling, motorcycling and walking. The portion of the survey about the quality of the pedestrian environment is most relevant to monitoring performance of the highway asset. In 2005, respondents were asked to rate the following aspects of the pedestrian environment in terms of how problematic they perceived each to be:

- Traffic congestion
- Roadworks
- Area dirty/run down/derelict buildings
- Vagrants

The statements were rotated so that order bias was minimised.

Figure 11 shows respondents' ratings of how problematic each aspect was in 2005.

Figure 11: Results of 2005 survey of aspects of the pedestrian environment (base: 166 respondents for each statement)




As in 2004, traffic congestion was seen as the only significant problem. Just over half (51 per cent) of respondents said that traffic congestion was a serious or quite a serious problem, compared to 33 per cent in 2004 and 35 per cent in 2003. Roadworks were also perceived as a significantly greater problem than in the previous year, with 23 per cent of respondents saying these were a serious or quite a serious problem in 2005, compared to 11 per cent in 2004. Area dirty/ run down/ derelict buildings and vagrants also worsened, though to a lesser extent.

Although demographics of respondents are not shown in this summary table, there were some differences based on characteristic of respondent or location of survey area. Traffic congestion was most likely to be seen as a serious or quite a serious problem by the over-65 age group (58 per cent). It was also regarded as a greater problem by those who do not use public transport; those who had reached the surveyed area on foot were most likely to regard traffic congestion as a problem (56 per cent). There is little difference between Inner and Outer London.

Vagrants were seen as more of a problem to respondents of social economic groups C2DE (working class, as classified in the NRS social grade system; 15 per cent saw vagrants as a problem) than for members of ABC1 (middle class; 11 per cent saw vagrants as a problem). This issue was also more likely to be seen as problem by more frequent visitors to the area surveyed and by those in Inner London. The areas of London where vagrants are seen as most problematic are South Central (22 per cent) and North & East (20 per cent).[70]

Mean scores for each aspect of the pedestrian environment were calculated where one equalled a serious problem, and five equalled no problem. These ratings are shown for the two most recent survey years in Table 27.

**Table 27: Ratings of aspects of the pedestrian environment, 2004 and 2005**

| Aspect | 2004 | 2005 | Change |
|---|---|---|---|
| Traffic congestion | 3.10 | 2.62 | -0.48 |
| Roadworks | 4.03 | 3.54 | -0.49 |
| Area dirty/run down/ derelict buildings | 3.65 | 3.58 | -0.07 |
| Vagrants | 4.25 | 4.08 | -0.17 |

Each of the aspects was viewed as having worsened slightly in 2005 compared to the previous year's research, although there was a distinct difference between the two 'transport' issues, where the difference was significant, and the two 'non-transport' issues, where the difference was not significant.

Table 28 breaks down the 2005 results by area and by several characteristics of respondents. Green means that the score has improved since 2004, while red means that it has declined.

Table 28: Ratings of features of local environment by area and respondent's age, gender and whether live/work within 10 minutes (mean scores)

| | Traffic congestion | Roadworks | Area dirty/ run down/ derelict buildings | Vagrants |
|---|---|---|---|---|
| **Inner/outer London** | | | | |
| Inner London | 2.63 | 3.51 | 3.33 | 3.76 |
| Outer London | 2.62 | 3.58 | 3.85 | 4.42 |
| **Age** | | | | |
| 16 to 24 | 2.85 | 3.75 | 3.57 | 3.97 |
| 25 to 44 | 2.61 | 3.54 | 3.54 | 3.98 |
| 45 to 64 | 2.57 | 3.46 | 3.56 | 4.19 |
| 65+ | 2.43 | 3.36 | 3.82 | 4.41 |
| **Gender** | | | | |
| Male | 2.69 | 3.60 | 3.59 | 4.00 |
| Female | 2.56 | 3.48 | 3.57 | 4.15 |
| **Within 10 minutes of area** | | | | |
| Live | 2.59 | 3.50 | 3.56 | 4.08 |
| Work | 2.73 | 3.52 | 3.42 | 3.84 |
| Neither live nor work | 2.61 | 3.63 | 3.76 | 4.26 |

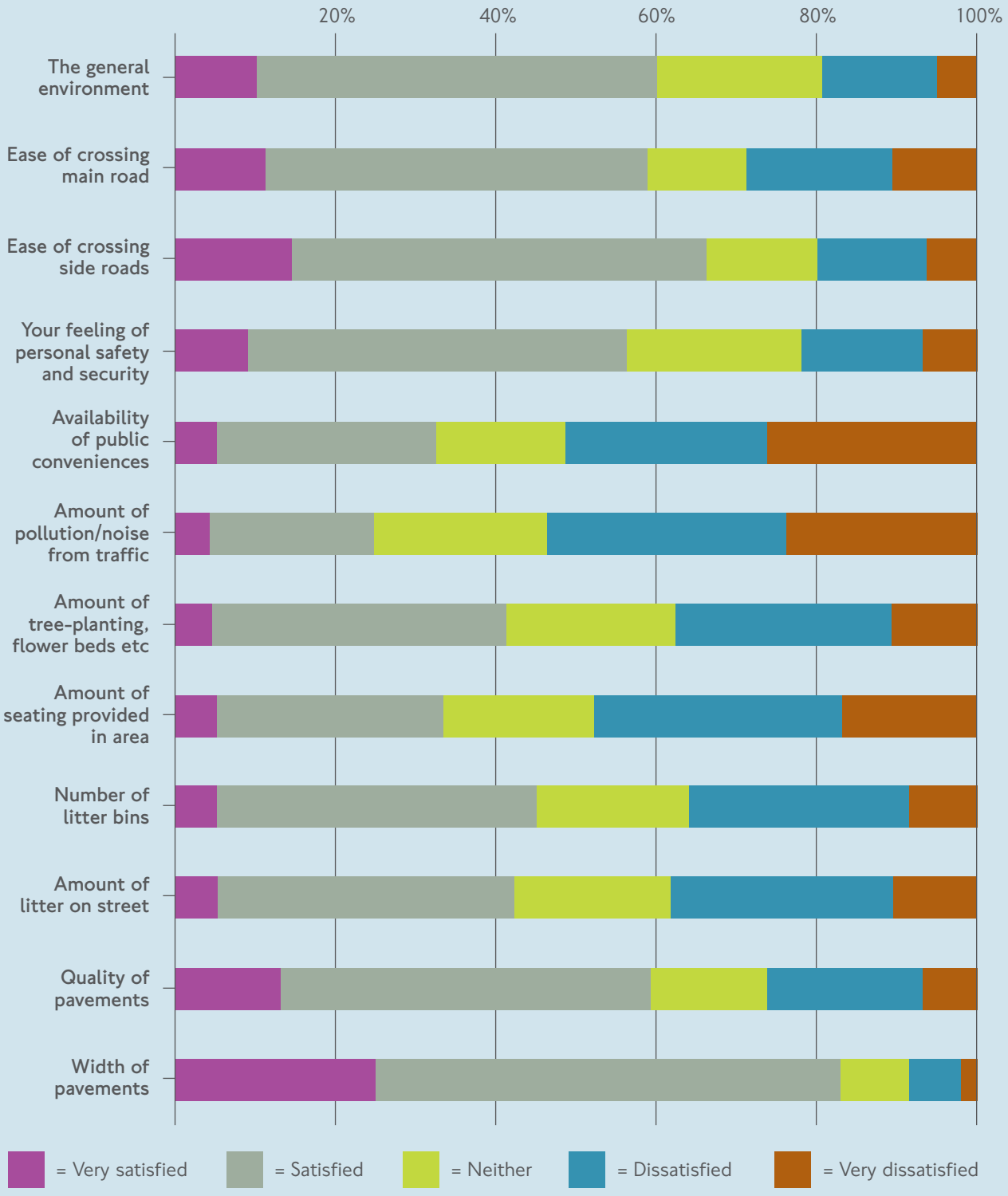
As regards transport issues, younger people considered them to be less serious issues, and perceptions of seriousness generally increase with age. In contrast, older people found the other two issues to be less of a problem than did younger respondents.

As in 2004, the difference between the two gender groups was modest.

Finally, and again similar to 2004, those who live or work within 10 minutes of the surveyed centres tended to be more negative than those who do not.

Figure 12 shows ratings for satisfaction with specific features of the local environment, for 2005.

Figure 12: 2005 results for specific features of the local environment (base: 2025 respondents for each statement)



Respondents were most satisfied with the width of the pavements (82 per cent were satisfied or very satisfied) and the ease of crossing side roads (65 per cent).

The aspects that received the lowest scores were the same as in 2004. Respondents were least satisfied with the amount of pollution/noise from traffic (53 per cent were dissatisfied or very dissatisfied in 2005, and 54 per cent in 2004); the availability of public conveniences (48 per cent dissatisfied/very dissatisfied in 2005; 55 per cent in 2004); and the amount of seating provided in the area (46 per cent in 2005; 45 per cent in 2004).

The amount of seating is perceived as more dissatisfactory by females (48 per cent, compared with 43 per cent of males) and also by those of the C2DE socio-economic group (49 per cent, compared to 43 per cent of ABC1s).

Mean scores for the features of the local environment were calculated, where Very Satisfied equalled five and Very Dissatisfied equalled one. Table 29 lists mean scores for 2004 and 2005.

**Table 29: Ratings of features of local environment by year (mean scores)**

| Aspect | 2004 | 2005 | CHANGE |
|---|---|---|---|
| Width of pavements | 3.88 | 3.96 | +0.08 |
| Ease of crossing side roads | 3.62 | 3.55 | -0.07 |
| General environment | 3.51 | 3.45 | -0.06 |
| Quality of pavements | 3.37 | 3.41 | +0.04 |
| Your feeling of personal safety and security | 3.48 | 3.36 | -0.12 |
| Ease of crossing main road | 3.51 | 3.32 | -0.19 |
| Number of litter bins | 3.11 | 3.03 | -0.08 |
| Amount of litter on street | 2.93 | 2.98 | +0.05 |
| Amount of tree planting, flower beds, etc. | 2.94 | 2.96 | +0.02 |
| Amount of seating provided in the area | 2.78 | 2.74 | -0.04 |
| Availability of public conveniences | 2.38 | 2.58 | +0.2 |
| Amount of pollution/noise from traffic | 2.53 | 2.51 | -0.02 |

Table 30: Percent respondents selecting each of several maintenance-relevant responses

| Response | Percentage selecting (multiple responses were permitted) |
|---|---|
| Better road maintenance | 44 |
| Fewer/quicker road works/better planning/ coordination of road works | 35 |
| Better lighting on roads | 8 |

Not all of these features are affected by highway asset condition. However, the survey shows that TfL will need to continue to develop levels of service in order to be better able to track and, if appropriate, respond to the possible trends in the areas surveyed which are affected by management of the highway asset itself. These include:

- Personal safety (in so far as it regards street lighting)
- Amount of seating provided
- Amount of litter
- Tree and other planting
- Quality of pavements

The latter three features are worth tracking even though they appear on the limited evidence available to be moving in a positive direction.

**II. The Annual London Survey**

The 2005 Annual London Survey, conducted by the Greater London Authority based on 1,442 face-to-face in-home interviews during autumn 2005, asked participants whether London roads needed improving. Of the 282 who replied in the affirmative, the survey then queried which two or three actions would do the most to improve the roads.

A number of choices were offered. Table 30 shows the percentages of respondents choosing each of the responses which is relevant to TfL's highway maintenance activities:

It should be noted that better road maintenance, at 44 per cent, was the highest of the 14 distinct responses noted in the survey.

It is impossible to determine a trend in this data to 2005 as the question format was changed significantly since the 2004 survey such that those results are not comparable. However, it is clear that TfL will need to follow this survey in future years to focus on the trend.

## Appendix H: Breakdown of operational management activities under the 2007-2013 HMW Contracts

This appendix offers further detail on lump-sum and schedule-of-rates activities under the HMW contracts, covering performance and cyclic activities as appropriate.

### I. Lump-sum activities

Lump-sum activities are those for which TfL pays a fixed annual fee for each individual type of service (grass-cutting, sign cleaning, inventory updates, etc) and checks the contractors' compliance with the contracted requirements through a three-part audit programme.

Lump-sum activities in the contract are divided into performance and cyclic activities:

- Performance activities paid for by lump sum are those which are governed by performance requirements. These include safety-related reactive maintenance (where the performance requirement is to repair dangerous defects within a certain timeframe) and serviceability-related activities such as grass-cutting, which is not reactive to a safety defect but nonetheless has its frequency more efficiently defined by performance standards on grass heights than by regular cutting intervals.
- Cyclic activities paid for by lump sum include planned maintenance which re-occurs at regular intervals, such as gully cleaning and sign cleaning. Safety and service inspections themselves, and updating of inventories to reflect work completed on the network, are also in this category.

When safety defects are identified, they are categorised based on risk posed, and the most urgent defects (classified as Emergency Call Out defects and Category 1 defects) must be made safe within the performance-requirement-based lump sum within time limits specified in the contract.

### II. Schedule-of-rates activities

Certain activities are excluded from the lump-sum system and are instead paid for according to a schedule of rates. These include:

1) Maintenance of items for which TfL's asset inventory or condition data is incomplete,

2) Permanent repair of urgent safety defects after temporary repairs have been made under the lump sum

3) Remediation of less urgent safety defects (Category 2 defects) identified during safety inspections

A schedule-of-rates approach is cost-effective for (1) above because limited information on the asset means the amount of work is less predictable. In this case, letting the work as a lump sum would likely have cost more due to contractors' pricing of their risk.

For (2), a schedule-of-rates approach is appropriate as the amount of work needed is based on the defect in question and could range from a small repair to a large scheme.

For (3), less urgent safety defects highlighted during inspections, the schedule of rates approach allows TfL engineers to prioritise and programme works individually and to capitalise small-value asset replacements. The contractor is responsible for highlighting to TfL any such maintenance needs or safety defects detected which do not fall under the lump sum.

In general, schedule-of-rates activities can range from fairly minor maintenance activities to larger schemes developed in response to safety defects. These latter, though arising from safety inspections undertaken as part of the revenue maintenance cycle, are in fact capital renewal and can be capitalised.

Schedule-of-rates maintenance can also be cyclic, as the contract allows for recurring items to be ordered on a schedule-of-rates basis as the need is identified. However, in the future as the completeness of condition data for certain assets improves, so allowing more precise prediction of the amount of operational maintenance expected, the contract allows for such items to be negotiated as additional lump-sum activities if TfL and the contractor agree.

## Appendix I: Valuation calculations

This appendix shows how gross replacement cost (GRC), accumulated consumption (AC), and depreciated replacement cost (DRC) are calculated for the carriageway based on network condition data from the 2005/06 condition survey and average unit rates. Numbers are those available at time of press and are indicative.

In summary, for carriageways, GRC is calculated by multiplying the average cost of full-depth reconstruction of a unit length of network, by the total length of the TLRN. (The unit costs of capital renewal of each layer of the carriageway come from analysis of a number of recently-completed capital schemes, undertaken as part of TfL's performance monitoring.) In this way, GRC truly represents what the cost would be to completely replace the entire carriageway.

Accumulated consumption for carriageways is calculated by multiplying the average cost of capital renewal of a unit length of carriageway in a certain condition index band, by the total length of carriageway in that band as revealed by the latest condition survey. This is summed up over all the bands to represent what the cost would be to return all existing carriageways to pristine condition. By this process, AC represents, in monetary terms, the deterioration that has taken place on the network.

Finally, the depreciated replacement cost is calculated by subtracting the accumulated consumption from the gross replacement cost, thereby leaving the cost that would be required to rebuild the carriageway 'from scratch' to its current state – in other words, its current value.

GRC, AC and DRC are shown in units of thousand pounds.

## Carriageway

| Calculation of Gross Replacement Cost (GRC) | |
|---|---|
| Total Lane Length of Network (lane-km) | 2,594 |

| Average unit rates for capital renewal, by construction layer: | (£000's/lane-km) |
|---|---|
| Anti Skid | 80.26 |
| Wearing Course | 76.86 |
| Base Course | 73.87 |
| Road Base | 100 |
| Sub-base | 90 |

| Gross replacement cost is calculated by what it would cost to rebuild the entire carriageway anew: | |
|---|---|
| If assuming 5% of carriageway is treated with anti-skid coating:<br>GRC =(76.9 + 73.87 + 100 + 90 + 5% * 80.26) * 2594 = 344.7 * 2594 = | 894,263 |
| If assuming 15% of carriageway is treated with anti-skid coating:<br>GRC = (76.9 + 73.87 + 100 + 90 + 15% * 80.26) * 2594 = 352.8 * 2594 = | 915,083 |

| Calculation of Accumulated Consumption (AC) | |
|---|---|
| Overall Carriageway DVI condition index for 2005/06 | lane-km in that band |
| CI 0 | 979 |
| CI 0+-30 | 627 |
| CI 30-50 | 149 |
| CI 50-70 | 90 |
| CI 70+ | 174 |
| Total Surveyed Lane Length (km)* | 2,019 |

*A small percentage of the carriageway network does not undergo a walked survey as it is not safely accessible on foot

| Accumulated consumption (AC): | Pro-rated length** (km) | | Average treatment costs (£000's/lane-km) | | | |
|---|---|---|---|---|---|---|
| CI 0 | 1258 | | | | 10% * 344.7 * 1258 | 43,361*** |
| CI 0+-30 | 804.9 | * | 150 | = | | 120,728 |
| CI 30-50 | 192 | * | 185 | = | | 35,524 |
| CI 50-70 | 115.5 | * | 185 | = | | 21,375 |
| CI 70+ | 223.8 | * | 245 | = | | 54,834 |
| | 2,594 | | | | | 275,822 |

**Assumes that the portions of the network inaccessible to our surveyors are distributed among the condition bands in the same proportion as the surveyed portion of the network
***Assumes that carriageway with CI = 0 has nonetheless depreciated on average 10%

| Calculation of Depreciated Replacement Cost (DRC) | | |
|---|---|---|
| DRC = GRC-AC = 894,263 - 275,822 - | = | 618,442 |

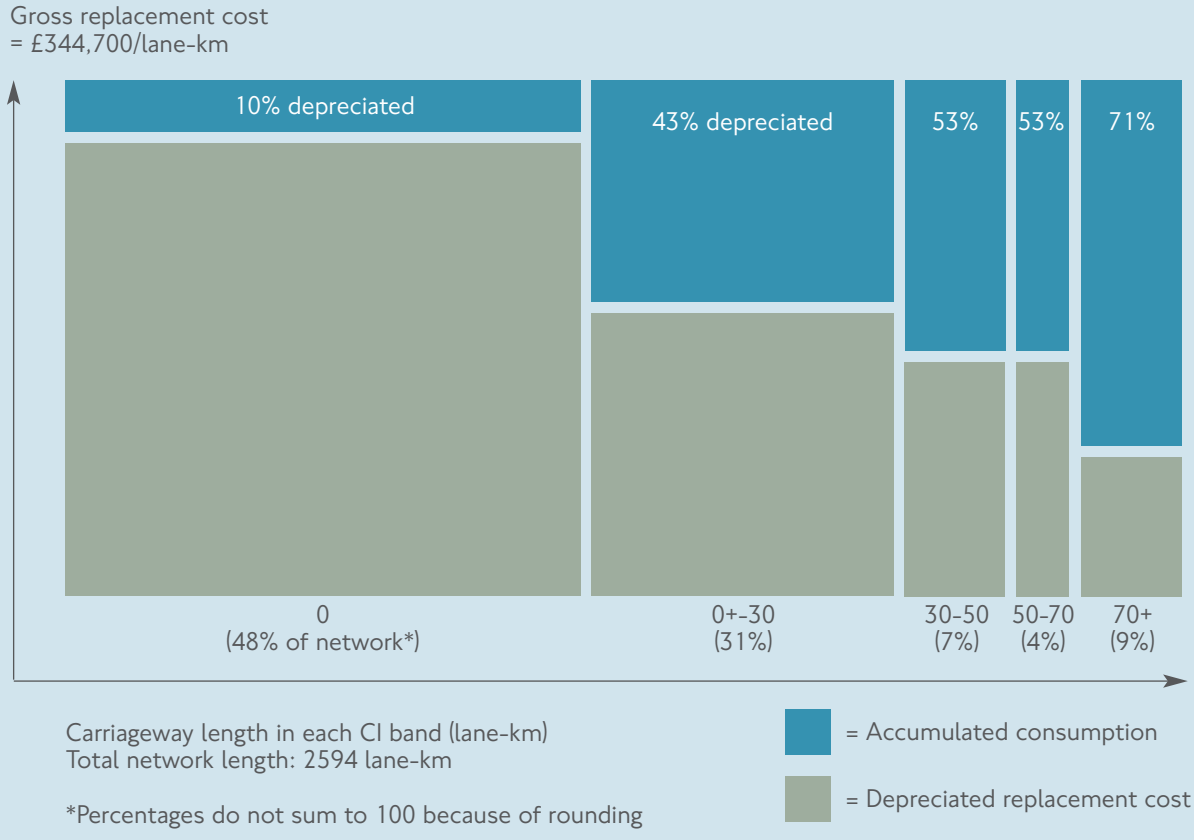
Figure 13 below shows the calculations in a graphical manner, as follows:

- The area of the entire rectangle is the gross replacement cost of the carriageway
- The sum of the checked areas gives the accumulated consumption
- The sum of the areas with diagonal hashing gives the depreciated replacement cost

The depreciation percentages are calculated by dividing the average cost for reconstruction of carriageway in that condition band, by the full-depth reconstruction cost (~£345,000/lane-km). The CI=0 band is an exception as it is assumed to have an average of 10 per cent depreciation as explained above.

Scale on the figure is approximate.

**Figure 13: Graphical representation of valuation calculations for TLRN carriageway (indicative and not to scale)**



## Appendix J: Model form, calibration, and ongoing development

The carriageway asset investment model was developed in 2001/02 using a deterministic approach to asset deterioration and design life. Carriageway is assumed to have a particular design life, in years, and to degrade at a set pace, spending a certain number of years in each CI band 0-30, 30-50, and 50-70 before falling into 70+.

Figure 14 shows an indicative deterioration curve of a typical carriageway on the TLRN, as reflected in asset investment modelling. The decline in condition indices represents a decline in the level of service offered by the carriageway.

TfL's target is to eradicate the backlog of capital work on the carriageway and maintain the network in a steady state of good repair. In other words, this means to renew all carriageway with CI above 70 and continue with a capital renewals programme such that the network is maintained with no CI greater than 70+.

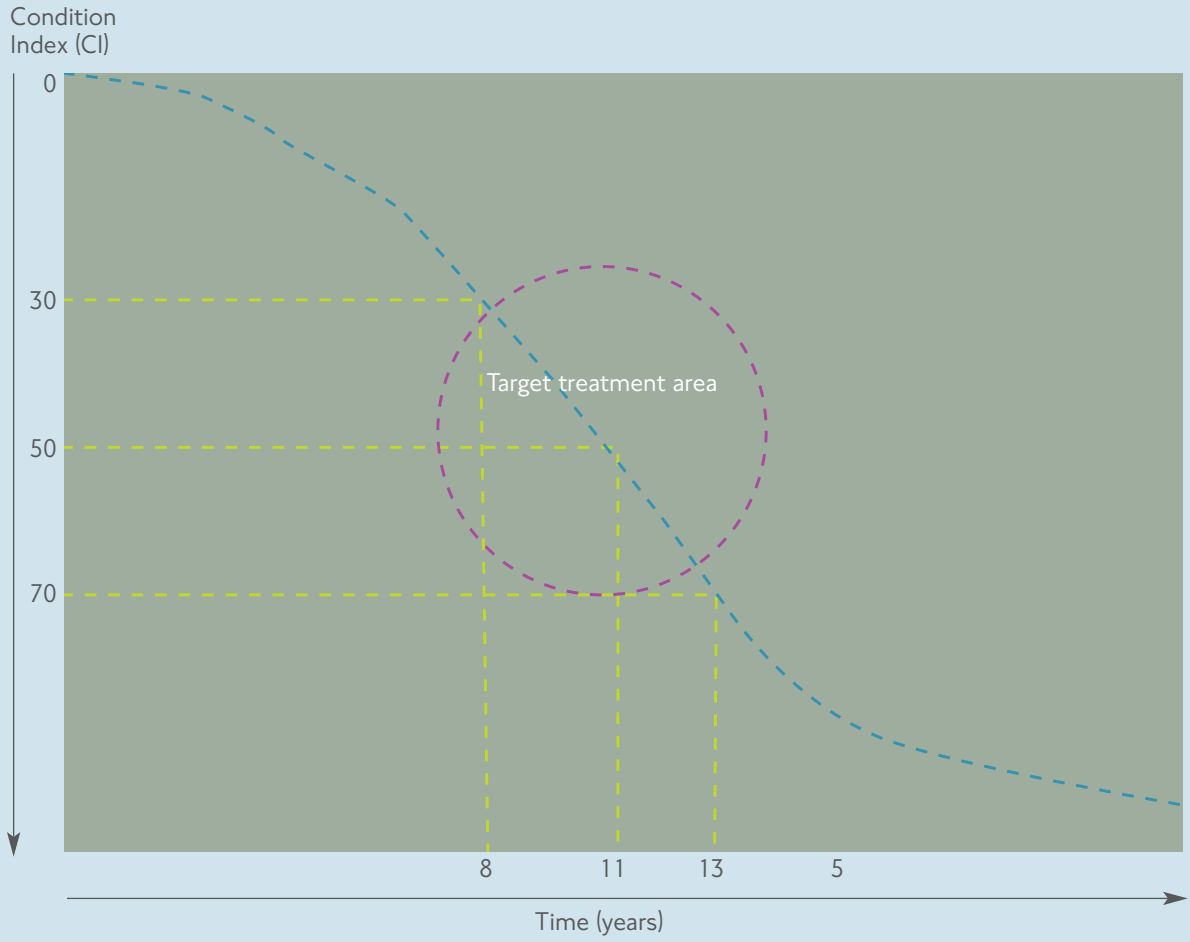
The portion of the curve for which treatment gives the best value for money is marked on Figure 14.

TfL is now undertaking several activities as part of its continuous improvement work on the model (these also assist the organisation in calculating the asset valuation):

- Updating unit rates: Through DRNM's output analysis initiative, it provides closure to the scheme planning cycle by calculating for many completed capital schemes how many lane-metres have been renewed and at what cost, including actual design, supervision, and traffic management costs. This allows TfL to update the rates assumed in the model for renewal of carriageway in each condition band
- Further calibration of deterioration rates: DRNM is reviewing historical trends in condition index data at a selection of sites where capital renewal was completed in the past several years. This will allow it to refine further assumptions on how quickly carriageway deteriorates and possibly to account for differences in deterioration rates depending on factors such as location (Inner/Outer London) or road usage if further investigation reveals these to be significant. These activities will improve the model's predictive power even further

Additional future work may also include evaluating when the correlation between DVI and SCANNER data is well enough established that it is possible and appropriate to convert the modelling over to using SCANNER-based condition data. This would increase efficiency by allowing the DVI programme to be less comprehensive, employed only to investigate further when the need is indicated by SCANNER results.

Figure 14: Deterioration curve of TLRN carriageway (time is approximate as carriageways deteriorate at different rates)



## Appendix K: Milestone One actions for structures management

Milestone One in Management of Highway Structures – A Code of Practice 'is intended broadly to include the adoption of processes necessary to provide highway structures that are safe to use, inspect and maintain'.[71]

TfL has rated its current practice in a number of aspects of structures management (corresponding to Sections 2 to 10 of the Code of Practice) on a scale of one to five in accordance with the following guidance:

"…[E]ach action should be assigned to one of the following categories and assessed against the ratings given in Table 31:

- Processes and Systems – the processes, procedures, tools and systems required for highway structures management.
- Data – the data/information required to support highway structures management.
- People – the number and competence of staff responsible for highway structures management"[72]

Table 31: Category rating guidance for evaluations against milestones

| Category ratings | | | |
|---|---|---|---|
| Rating | Processes and Systems | Data | People |
| 1 | **Not in place** – the need has not been recognised or the need has been recognised but no action has been taken. | **Poor** – data quality and quantity are below the level required to undertake basic management activities. | **Unsatisfactory** – competence below minimum requirements many areas and/or in severe staff shortages. |
| 2 | **Implementation** – the need has been recognised and a plan for implementation is currently being developed or is already being implemented. | **Basic** – inventory is adequate but condition and performance data is poor and incomplete. | **Needs Improvement** – staff competence below minimum requirements in some areas and/or some staff shortages. |
| 3 | **Recently implemented** – has been recently implemented and the authority is in the early stages of training and usage. | **Fair** – inventory is complete and there is sufficient condition and performance data to support basic asset management. | **Satisfactory** – meet minimum competence and resources requirements, but skills and capacity for innovation may be insufficient. |
| 4 | **Established** – has been in place for a number of years and as such is documented and associated training is in place, but it may not be fully integrated with other processes. | **Good** – inventory is complete and quantity and quality of condition and performance data is improving. | **Competent** – competence and/or resource above minimum requirements, and skills and capacity available to promote innovation and improve efficiency. |
| 5 | **Fully embedded** – mature and fully documented, associated training is in place and it is integrated with other processes. | **Comprehensive** – all data is accurate, up-to-date and complete and sufficient to support advanced asset management. | **Excellent** – competence and resources above minimum requirements with suitable skills and capacity to actively innovate and improve efficiency. |

Table 32 presents TfL's progress as of June, 2007. Section numbers refer to sections within the Code of Practice.

**Table 32: Progress towards Milestone One actions for structures on the TLRN**

| Milestone One actions | Processes and systems | Data | People | Notes |
|---|---|---|---|---|
| **Section 2: Structure management context** | | | | |
| i. Employ suitably qualified, experienced and trained personnel (Section 2.2). | 4 | - | 3 | Minimum resource requirements and gaps identified. Recruitment started. |
| ii. Provide a programme of CPD and training for bridge managers, engineers and other staff to enable them to understand and implement the processes necessary to provide highway structures that are safe to use, inspect and maintain (Section 2.2). | 5 | - | 4 | Training and development needs identified through the appraisal process which is embedded in TfL procedures. |
| iii. Require agents and contractors to demonstrate their personnel are adequately qualified and experienced and are provided with appropriate CPD and training (Section 2.2). | 4 | - | 4 | New inspection and maintenance contracts are now in operation. Minimum requirements for consultant's staff are included in the new contract specification. Facility to accept or decline consultant's proposed staff. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| iv. Maintain up-to-date documents on Government transport policy and plans (Section 2.3) and Best Value, or equivalent, legislation (Section 2.4). | 5 | - | 4 | Also maintain documents specific for London and TfL, including Mayor's Transport Strategy, TfL Business Plan, etc. |
| v. Maintain information on legal and procedural requirements (Section 2.6). | 4 | - | 3 | Highways Act and highway law are well-established.<br><br>Consultation with TfL property department is ongoing to confirm extent and boundaries of TfL ownership. |
| vi. Maintain a Health & Safety policy and associated guidance notes tailored for the specific operations involved in the management of highway structures (Section 2.7). | 4 | - | 3 | TfL H&S policy is well established.<br><br>Recent attendance on CDM courses by TfL Structures Management Team members and 'Toolkit' training undertaken.<br><br>Review of generic risk assessments relating to structures works has also been completed. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| vii. Maintain appropriate standards for maintenance (Section 2.8). | 4 | - | 4 | Use of DMRB well established. However, move to Eurocodes will need to be managed and training given.<br><br>TfL to draft bespoke designers' manual for highways and structures. |
| viii. Maintain a Technical Approval Procedure with an organisation or individual formally appointed as Technical Approval Authority (TAA) (Section 2.8). | 4 | - | 4 | TfL Structures Management Team to act as TAA.<br><br>Procedure and process for internal and external consultation have been drafted. |
| **Section 3: Structures asset management framework** | | | | |
| i. Nominate a highway structures representative to the asset management team (Section 3.3). | 5 | - | 5 | Completed – June 2006. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| **Section 4: Financial planning and resource accounting** | | | | |
| i. Establish proper policies and procedures for the capitalisation of expenditure on structures maintenance, renewal and enhancement (Section 4.6). | 4 | - | 4 | Revenue and capital works defined. All work which needs to be undertaken on an annual basis is revenue. All other works are capitalised.<br><br>Procedure/process for identifying and prioritising capital maintenance works is newly developed and being implemented. |
| **Section 5: Maintenance planning and management** | | | | |
| i. Check that the inputs to the maintenance planning and management process are in place (Section 5.6). | 3 | - | 4 | Inputs have been identified and are being implemented. |
| ii. Implement a formal emergency response process (Section 5.7). | 4 | - | 4 | Completed. |
| iii. Implement a formal process for identification of needs (Section 5.10). | 4 | 3 | 4 | Feeds into TfL's business planning process. |
| iv. Develop and implement an annual work plan that covers reactive maintenance (Section 5.14). | 4 | 3 | 4 | Completed. Reactive maintenance requirements incorporated into new HMWC contracts along with routine maintenance. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| v. Identify how maintenance work should be classified (Section 5.5). | 5 | - | 4 | Completed. Classifications can be found under the new set of Contracts for HMWC and Structures Inspections. Also see the notes under section 4 (i) of this table. |
| **Section 6: Inspection, testing and monitoring** | | | | |
| i. Implement a regime of routine, safety, special and acceptance inspections covering all highway structures and any necessary testing and monitoring (Section 6.4). | 4 | - | 4 | Completed. Three contracts for structures inspections covering the three geographical areas of London have been let. The inspection regime for individual structures will depend on influencing factors such as condition, importance on the network etc. |
| ii. Implement a regime of general inspections at an interval of not more than two years, covering all highway structures (Section 6.4). | 5 | 4 | 4 | Completed. |
| iii. Implement a process whereby the inspector has a clearly defined duty to inform the bridge manager, at the earliest possible opportunity, of any defects that may represent an immediate risk to public safety (Section 6.5). | 3 | - | 4 | Completed. New inspection contract details the consultant's obligations to report safety related issues. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| iv. Implement a monitoring regime for all sub-standard structures (Section 6.7). | 3 | 3 | 4 | Identify sub-standard structures.<br><br>Commence implementation of monitoring regime. |
| **Section 7: Assessment of structures** | | | | |
| i. Complete the already-defined national programme for 40 tonne assessment loading and take appropriate actions arising from the assessments, including any interim measures. | 4 | - | 4 | Assessment programme substantially complete, with interim measures identified.<br><br>Collection of relevant data is under way to enable identification of outstanding works. |
| ii. Check that assessments results are properly recorded and kept up-to-date (Section 7.6). | 2 | 2 | 4 | TfL was set up in May 2000 and inherited structures from many different predecessor organisations. Assessment records have generally not been made available. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| **Section 8: Management of abnormal loads** | | | | |
| i. Establish the roles of Abnormal Loads Officer, Structures Adviser and Road Space Coordinator as specified in the Code (Section 8.2). | 4 | - | 4 | Completed. Abnormal Loads Officer and Structures Adviser appointed. |
| ii. Establish procedures to check the suitability of a specific abnormal load to cross a particular structure, broadly in accordance with the procedures given in Annex D of BD86 (Sections 8.5 and 8.6). | 4 | - | 4 | Procedures for dealing with abnormal load enquiring are under review. |
| iii. Establish an Elementary System for the management of abnormal loads (Section 8.6). | 4 | - | 4 | See 8(i)i above. |
| **Section 9: Asset information management** | | | | |
| i. Identify data and information needs (Sections 9.5 and 9.6). | 4 | - | 4 | Completed. |
| ii. Review current data and information (Section 9.5). | 3 | 3 | 4 | All records have been transferred back to TfL and are being catalogued. |
| iii.Undertake a gap analysis and schedule data capture (Section 9.5). | 4 | 3 | 4 | Gap analysis is being undertaken in parallel with the review of current data. |

**Table 32: Progress towards Milestone One actions for structures on the TLRN** (continued)

| | | | | |
|---|---|---|---|---|
| iv. Establish data capture, verification, transfer and storage processes and practices (Section 9.5). | 3 | - | 4 | Storage requirements being determined. Essential data to be stored electronically with non-essential data to follow. |
| v. Capture essential data (Section 9.6). | 4 | 3 | 4 | Ongoing. Missing data to be captured as part of the inspection programme. |
| vi. Establish Structure Files (Section 9.7). | 3 | 3 | 4 | Ongoing. Structure Files being established as part of the transfer of documents from the consultants under the previous contract. |
| **Section 10: Framework for a Bridge Management System (BMS)** | | | | |
| i. The BMS should have a database with a listing of all highway structures with basic inventory details recorded for each asset. It would be preferable to store inspection results on the BMS (Section 10.8). | 3 | 3 | 4 | Basic structure of database has been established. Gap analysis of asset data and population of the database is under way. |

## Endnotes

**All internet links listed have been accessed as of 13 August 2007.**

[1] Roads Liaison Group, Maintaining a Vital Asset, 2005, p3.

[2] From the Streets section of the Mayor's Transport Strategy website: http://www.london.gov.uk/mayor/transport/streets.jsp. Please note that London's other roads are maintained by the 33 boroughs and thus will be covered in the HAMPs of the appropriate boroughs. An exception is the motorways, which are managed directly by the Highways Agency within the UK Department for Transport.

[3] Surface Transport is the modal department within Transport for London which coordinates all aspects of management of the TLRN, road traffic, and street-level public transport, including buses, trams, and taxis. London Streets is the division of Surface Transport responsible for management of the physical highway network. It was formerly known as TfL Streets and as TfL Street Management.

[4] Transport for London (Streets), Streetscape Guidance, Version 1, August 2005. 'Streetscape' is the collection and arrangement of the components of the built environment within the highway boundary or visual boundary of the street. Streetscape includes street furniture, natural elements such as street trees, and the materials and markings which make up the pedestrian and vehicular infrastructure. It is more constrained than 'landscape' or 'townscape', which take into account the wider natural or built environment. The Streetscape Guidance is discussed in Section 4.1.3.

[5] County Surveyors' Society, Framework for Highway Asset Management, April 2004, p1.

[6] From Framework for Highway Asset Management, p1. Note: Asset management does cover enhancement of the asset as delineated here – ie, in so far as enhancement is a collateral benefit of meeting increased levels of service for future needs. Network improvements however are, as explained earlier, covered within TfL by the Network Management Plan framework rather than by asset management.

[7] Organisation for Economic Co-operation and Development, as quoted in Framework for Highway Asset Management, p61.

[8] Framework for Highway Asset Management, p5. The Code of Practice referred to is Roads Liaison Group, Well-Maintained Highways: Code of Practice for Highway Maintenance Management, 2005 Edition, London: The Stationery Office, July 2005. Copyright of the Queen's Printer and Controller of HMSO.

[9] Maintaining a Vital Asset, 2005.

[10] Department for Transport, Full Guidance on Local Transport Plans: Second Edition, December 2004, sections 258-262 (Transport Asset Management Plans) within Part 4. Available online at http://www.dft.gov.uk/pgr/regional/ltp/guidance/fltp/fullguidanceonlocaltransport3657.

[11] The HAMP is not intended as a detailed operational manual; from 2007/08 that role will for TfL staff be fulfilled largely by the guidance accompanying the Highway Maintenance Works (HMW) contracts with TfL's term maintenance contractors.

[12] Framework for Highway Asset Management, p4.

[13] Adding a new asset also counts as capital investment. However, as this HAMP is concerned with maintenance of the existing highway network, additions of new assets covered here are mainly confined to addition of street furniture, trees, etc as a collateral benefit within a larger capital renewal scheme.

[14] The terms 'defect' or 'fault' are used interchangeably throughout this HAMP to refer to any sort of problem that appears or has developed within an asset for any reason rather than solely to an original defect arising from the manufacturing or installation processes.

[15] While these replacements represent capital renewal, they are not of sufficient scale to be worth capitalising.

[16] Greater London Authority, London Plan: Spatial Development Strategy for Greater London, February 2004 and as slightly amended by the addition of Early Alterations, December 2006. Available online at http://www.london.gov.uk/mayor/planning/strategy.jsp

[17] Greater London Authority, The London Plan: A Summary, February 2004, p3. Available online at http://www.london.gov.uk/mayor/planning/strategy.jsp

[18] Greater London Authority, The London Plan: A Summary, February 2004, p9. Available online at http://www.london.gov.uk/mayor/planning/strategy.jsp

Obviously, the activities covered by this HAMP cannot deliver all of these objectives alone; rather, the HAMP is about explaining how highway maintenance contributes to and influences their fulfilment.

[19] The London Plan: A Summary, p28.

[20] The London Plan: A Summary, p6.

[21] Greater London Authority, The Mayor's Transport Strategy, July 2001. Available online at http://www.london.gov.uk/mayor/strategies/transport/index.jsp

[22] Greater London Authority, Connecting with London's Nature: The Mayor's Biodiversity Strategy, July 2002. Available online at http://www.london.gov.uk/mayor/environment/biodiversity/index.jsp

[23] Greater London Authority, Cleaning London's Air: The Mayor's Air Quality Strategy, September 2002. Available online at http://www.london.gov.uk/approot/mayor/environment/air_quality/index.jsp

[24] Greater London Authority, Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, September 2003. Available online at http://www.london.gov.uk/approot/mayor/environment/waste/

[25] Greater London Authority, Sounder City: The Mayor's Ambient Noise Strategy, March 2004. Available online at http://www.london.gov.uk/mayor/strategies/noise/

[26] For instance, the Street Maintenance Strategy offers worthwhile commentary on the relevance of another of the Mayor's strategies, which is important to understanding why that Mayoral strategy is not covered further in this HAMP. The Street Maintenance Strategy makes the point that the Mayor's Economic Development Strategy is relevant to street maintenance, though not directly so: "The Mayor's Economic Development Strategy has no policies that directly affect street maintenance. However, an efficient and well-maintained road network is likely to encourage economic growth, an essential element to the promotion and delivery of all Mayoral strategies." (Transport for London Street Management, Street Maintenance Strategy, February 2003, p9)

[27] Street Maintenance Strategy, p7.

[28] This proposal also includes the boroughs developing plans for their roads, and Paragraph 4G.124 makes clear that implementation of these plans 'should be programmed jointly to minimise disruption.'

[29] As quoted in Street Maintenance Strategy, p9. This mission statement will shortly be superceded by an overall mission statement for all of TfL Surface Transport ('To deliver a world class Surface Transport System for

London'), but the idea that the purpose of London Streets' work is for people is still very relevant to all that it does.

[30] From Street Maintenance Strategy, p7.

[31] Street Maintenance Strategy, pp7-8.

[32] The numbered Euro emissions standards refer to a set of progressively more stringent European Union standards on vehicle emissions.

[33] Greater London Authority, Sounder City: Highlights of the Mayor's Ambient Noise Strategy, March 2004, p4.

[34] Sounder City: Highlights of the Mayor's Ambient Noise Strategy, p9.

[35] Sounder City: Highlights of the Mayor's Ambient Noise Strategy, p7.

[36] Street Maintenance Strategy, p6.

[37] Street Maintenance Strategy, pp11-12. The figure shown is Figure 4 in that document.

[38] Both quotations from the Foreword by the Commissioner in the Streetscape Guidance.

[39] All three quotations from Streetscape Guidance, p8.

[40] TfL does fund Safe Routes to Schools programmes through the Borough Spending Plans (BSPs), but does not administer them directly.

[41] TfL Streets, TLRN Customer Satisfaction Survey: Summary Report, February 2006.

[42] This outcome does not relate to any specific portion of the Mayor's Transport Strategy but rather reflects an overall commitment to responsiveness and customer service.

[43] In some ways there is little difference, as the condition of the asset is largely dependent on the maintenance or renewal activities performed on it.

[44] Transport for London, Valuing People through Fairness and Inclusion [coursebook for Equality and Inclusion training course for staff], no date, p9.

[45] For structures and lighting columns, underlying condition is of course closely connected with structural safety, and in this case condition inspections do include a focus on long-term safety concerns, and capital works do maintain safety as well as prolong asset life.

[46] Illuminated and reflective assets undergo additional night-time safety inspections to check that bulbs are lit properly and reflectivity is satisfactory. These inspections are detailed within the relevant asset chapters (10 and 11).

[47] Transport for London Street Management, Highway Maintenance Manual: Stewardship Term Contract 2002-2007, Volume 4, Issue 2, July 2004, pp8-9.

[48] Section 41(1a) of the Highways Act 1980 (inserted by the Railway and Transport Act 2003), as quoted in the Highway Maintenance Manual, p89.

[49] The KPI reported to measure this outcome for footways is the one required as BVPI 187, which measures the percentage of main footways only with condition index of 20+. The target for this for 2007/08 is 17 per cent or less. However, TfL's longer-term aspiration for the period to 2011 is better represented as stated in Table 7 to overcome the backlog of 50+ segments on all footways.

[50] Framework for Highway Asset Management, p4.

[51] Kieran Rix, Head of Government Financial Information and Reporting, HM Treasury, Why Asset Valuation Matters, presentation at 2nd Highways Asset Management Conference, London, 26 January 2006.

[52] Roads Liaison Group; County Surveyors Society/TAG Asset Management Working Group, Guidance Document for Highway Infrastructure Asset Valuation, 2005 Edition,

London: The Stationery Office, July 2005. Copyright of the Queen's Printer and Controller of HMSO, p4.

[53] As mentioned above, the KPI reported to measure this outcome for footways is in fact BVPI 187, which measures the percentage of main footways only with a condition index of 20+, but TfL's longer-term aspiration for the period to 2011 is better represented as stated here: to overcome the backlog of 50+ segments on all footways.

[54] 11 per cent of the carriageway network, including for example flyovers, underpasses, and high-speed roads, is deemed to be inaccessible for a walked survey due to the non-presence of any footway or verge from which to conduct the survey safely. Areas of the carriageway which do not undergo DVI survey are assessed solely by SCANNER machine survey.

[55] Strictly speaking this is a former BVPI, as, for purposes of reporting requirements to central Government, BVPI 96 has been superseded by BVPI 223. However, TfL still collects and calculates BVPI 96 to provide consistency with historical data for purposes of planning and performance monitoring.

[56] Department for Transport, Guidance for surveys for BV223 and BV224(a) in 2006/07, available online at http://www.dft.gov.uk/pgr/roads/network/local/servicelevels/guidanceforsurveysforbv223an3871

[57] As a reminder, BVPI 96 is based on DVI results converted into CVI. Therefore, the numbers in this table differ from those shown in Figure 5, which presents DVI.

[58] Site categorisation and investigatory levels are contained in Table 4.1 of Volume 7, Section 3, Part 1 of HD 28/04, within the Design Manual for Roads and Bridges, published August 2004 by the Highways Agency, Scottish Executive, Welsh Assembly Government, and the Department for Regional Development, Northern Ireland.

[59] Roads Liaison Group, Management of Highway Structures: A Code of Practice, 2005 Edition, London: The Stationery Office, September 2005. Copyright of the Queen's Printer and Controller of HMSO.

[60] Management of Highway Structures: A Code of Practice, p11.

[61] Roads Liaison Group; UK Lighting Board, Well-lit Highways: Code of Practice for Highway Lighting Management, London: The Stationery Office, November 2004.

[62] Illuminated signs, as well as the reflectivity of road markings and road studs, are also inspected to these frequencies, although these assets are covered in Chapter 11.

[63] Institution of Lighting Engineers, Code of Practice for Electrical Safety in Highway Electrical Operations, Fifth Edition, 2006. Formerly called the Code of Practice in Public Lighting Operations.

[64] Institution of Lighting Engineers, Technical Report Number 22 Managing a Vital Asset: Lighting Supports, Third Edition, 2007. Formerly called Technical Report Number 22 – Lighting Columns and Sign Posts: Planned Inspection Regime.

[65] The bulk lamp change interval in months is given for 'dusk to dawn' operation (or, in the case of tungsten filament lamps, for Belisha beacon operation); lamps on 24-hour operation are changed at half this interval.

[66] Condition indices, DVI, CVI, and SCANNER are defined and explained fully in Chapter 7. BVPI 96 has been superseded by BVPI 223 for government reporting purposes but is still used internally to track TfL's progress towards this customer outcome.

[67] Risk-based categorisation of defects is explained in Table 5.

[68] Risk-based categorisation of defects is explained in Table 5.

[69] Condition indices, DVI, CVI, and SCANNER are defined and explained fully in Chapter 7. BVPI 96 has been superseded by BVPI 223 for government reporting purposes but is still used internally to track TfL's progress towards this customer outcome.

[70] These were two of TfL RNM's five network management areas at the time of the survey; the others were North & West, North Central and South & East. Network management has now been consolidated into three areas: North, Central, and South.

[71] Management of Highway Structures: A Code of Practice, p. 242.

[72] Text and table from Management of Highway Structures: A Code of Practice, p. 248.

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