Valuing Footways and Cycle Tracks in Relation to Whole of Government Accounts Principles 2006 Edition

by S J Reeves

PPR 028

Contract 3/302_061

PUBLISHED PROJECT REPORT

TRL Limited

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VALUING FOOTWAYS AND CYCLE TRACKS IN RELATION TO WHOLE OF GOVERNMENT ACCOUNTS PRINCIPLES
2006 Edition

Version: 2.0

by S J Reeves (TRL Limited)

Prepared for: Project Record: **Footways and Cycle track Management Research (3/302_061)**

Client: **Highways Agency**

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Executive summary

This report is a record of research carried out under Contract 3/302_061, *Footway and Cycle track Management Research.* It is part of the work on Asset and Risk Management and covers the production of guidance on methods for valuing footway and cycle track assets in relation to Whole of Government Accounts (WGA) Principles. This document is meant solely as guidance and unless specifically stated actions are recommendations only, not legal duties.

The system known as Whole of Government Accounts (WGA) is in the process of being introduced in the UK. WGA will provide an overall evaluation of all of the Government's assets and enable its accounts to be more transparent to the general public. It is a commercial style of accounting that uses generally accepted accounting principles, treating the Government as a single entity with departments rather than as separate public bodies. This report provides a summary of the relevant guidance documents relating to WGA.

The introduction of WGA creates a change in the method by which the infrastructure network is valued in the accounting procedure. WGA includes changing to accruals accounting, so that cost is accounted for from the point at which the value of the asset is obtained rather than the point at which it was paid for. All Local Authority (LA) assets need to be valued according to the Treasury's guidance. The CSS have produced a Guidance Document for Highway Infrastructure Asset Valuation in July 2005 designed to help LAs in implementing this.

This report focuses on valuation of footways and cycle tracks, but also provides a brief description of the different methods of valuation and depreciation and their advantages and disadvantages. Examples are provided of past accounting procedures used by Local Government together with some international infrastructure valuation methods. For the new WGA system, it is recommended that infrastructure assets are valued according to their current cost not their historic cost, and that renewal accounting is used in place of straight-line depreciation.

Renewal accounting is used for assets which require regular maintenance to keep the same level of condition indefinitely, for example gas, electricity, sewage networks, roads and footways. Renewal accounting is most effectively applied where a system is in a mature and steady state. A significantly growing or shrinking system will require adjustments to reflect changes in its service potential, which complicate the renewal approach.

Along with the other highway assets footways and cycle tracks need to be valued for inclusion in WGA. This is likely to be more problematic than valuation of roads as usually less information is recorded on these assets. According to WGA principles, the value of a footway or cycle track is taken as the cost of construction to modern standards at the time of valuation (excluding earthworks and land value).

For valuation of the highway network, information is required on the type of asset and the amount of that asset. Examples are given in this report that solely concentrate on the footway and cycle track component, which is taken to include the footway surface, sub-base and associated kerbing, but excludes earthworks and land value. The information required for each section of footway or cycle track includes the type of surfacing, the construction thickness, the amount of kerbing and the length and width of the footway or cycle track. Costs are required for each type of surfacing and category of footway and also for the various types of kerbs used. To value the whole asset the length of the network is required as are the lengths of each construction type.

The report provides some information on the sensitivity of the valuation to the various parameters. It suggests that depreciation, in the form of maintenance costs, could be linked to the condition index, for example, as produced using the United Kingdom Pavement Management System (UKPMS). The condition index can be used to indicate the level of maintenance required, and the average cost of this maintenance can be obtained from construction tenders.

It is envisioned that valuation and depreciation methods will be crude at first, but will gain in accuracy as more information is obtained. It is hoped that the better knowledge of the footway and

cycle track network gained through this valuation procedure will aid LAs in maintaining the network. The effect of neglecting to maintain infrastructure assets will also be exposed as the value decreases.

The Footway and Cycle track Management Group (FCMG), whose members are drawn from government departments, a range of highway authorities and consultants, provided guidance throughout this work. The current FCMG members are:

Dr A Murray	- DRD Road Service (N I) (Chairman)
Mrs T Willway	- TRL (Project Manager and Secretary)
Mr C Christie	- Highways Agency
Mr C Spong	- Chris Britton Consultants
Mr L Kaderbhai	- Rhonda Cynon Taff County Borough Council
Mr A Pickett	- Chris Britton Consultants
Mr P McCready	- London Borough of Bromley
Mr P Walton	- Wolverhampton City Council
Mr K Fuller	- Hampshire County Council
Mr D I Pearson	- Consultant
Mr J De Souza	- Transport for London
Mrs C Francis	- Glasgow City Council

1 Introduction

The UK Government is in the process of changing the way it manages its accounts. Instead of each local authority and government body valuing its assets according to different techniques and publishing their results separately, a concept referred to as Whole of Government Accounts (WGA) is being introduced. WGA will provide an overall evaluation of all of the Government's assets and enable its accounts to be more transparent to the general public according to the Code of Fiscal Stability (HM Treasury, 1998) made law by Section 155 of the Finance Act 1998 (Act of Parliament, 1998). It is a commercial style of accounting that will use generally accepted accounting principles, treating the Government as a single entity with departments rather than as separate public bodies as in the past.

Up until 2001/2002 government accounts were based on the cash spent and received, called appropriation or cash accounting. The Government Resources and Accounts Act 2000 (Act of Parliament, 2000) replaced this by resource accounting, which is accrual based. This means income and expenditure are charged at the time they occur not when paid or received. For example when an asset is bought the value spent is not expended, but lost gradually over the lifetime of the asset as it depreciates. Resource accounting provides more information than appropriation accounting and encourages longer term planning and more informed decisions.

The first step towards WGA was the production of Central Government Accounts (CGA). This is a consolidation of the accounts of all the Central Government departments, non-departmental public bodies and the Government's debt and reserves into a single commercial style report. A "dry run" of CGA was performed for the financial years of 2001/2002 and 2002/2003 and the first published CGA accounts were produced for 2003/2004. The number of public bodies included in the accounts is being increased in a phased approach. More than 1200 bodies, such as local authorities, NHS trusts, fire authorities and public corporations will eventually be included in published WGA.

In 2004/2005 local authorities were asked to submit data for their first dry run (HM Treasury, 2004a). The Treasury considered this process a success and the amount information requested was increased for 2005/2006 and this time the accounts were audited. For 2006/2007 the Government aims to publish fully audited Whole of Government Accounts, covering the entire UK public sector including LAs.

These changes in government accounting methods have led to the introduction of resource based financial management to LAs. LAs are now required to value their assets using Depreciated Replacement Cost (DRC) and to apply renewal accounting, to obtain greater consistency in their accounts. Along with other parts of the highway network footways and cycle tracks are included in this valuation. The CSS have published a guidance document (CSS, 2005) designed to provide LAs with advice on calculating the value of their highway network in the form suitable for WGA. This report aims to provide similar guidance, but focused on footway and cycle track assets.

2 Current accounting methods

2.1 Overview

In the past there was no fixed method for the valuation of LA highway networks. Some guidance documents were available such as the Statement of Recommended Practice (SORP) for Local Government Accounting, but each authority valued their assets using whichever system they decided was appropriate and was accepted by their auditors. This led to the use of a variety of methods. For example, some LAs did not include infrastructure assets in their accounts and attributed highway maintenance costs to services, whereas others valued their

entire road network including lighting and signs. These large discrepancies between the methods of valuing assets make comparison difficult.

For the inclusion of LA accounts in WGA a single accounting system needs to be applied and valuation of assets needs to be consistent. To aid this, an update of the SORP (CIPFA, 2006) has been published giving guidance on preparing accounts in a form that can be included in WGA. CSS has also published guidance approved by the Treasury, on valuing infrastructure assets.

2.1.1 Valuation methods

There are a number of different bases used for the valuation of assets; historic cost, appreciated historic cost, current cost, "performance in use" cost (the value of the asset to the user), deprival cost (the loss that would occur without the asset) and market value. The valuation of assets is often based on their market value, but this is not possible for such specialised assets as roads and footways. The two methods of valuation normally used for road assets are:

Historic Cost - This is the cost of an asset at the time it was acquired or constructed. It is the simplest and most commonly used method of valuation. It is usually less than the current cost. It may be adjusted for inflation; when it is referred to as appreciated historic cost.

Current Cost - This is the cost it would take to buy or construct the asset at the time of valuation. This can either be the:-

Replacement Cost- This is the cost to build the asset to the modern standard using current technology.

Reproduction Cost- This is the cost to build the asset to its present standard, so that it delivers the same level of service.

For highways it is considered inefficient for the original asset to be reproduced, so replacement cost is normally used. The current replacement cost can be obtained either through surveyor valuations or based on the charges of local construction companies. It should be noted that some parts of the construction such as earthworks and clearing costs, need not be repeated so should not be included in the replacement cost. Also if the asset is not replaced it should be included at its residual value.

Table 1 (Government of Ontario, 2003) provides a comparison of historic and current cost methods of valuation.

Table 1: Comparison of historic and current valuation methods

	Advantages	**Disadvantages**
Historic Cost Approach	Simple. Low compliance and administrative costs. Low regulatory uncertainty. Not easily manipulated.	Difficult for comparisons. Does not promote efficient investment and technological advancement. No link to current economy.
Current Cost Approach	Leads to relatively stable prices in nominal terms.	May be difficult to determine current cost.

Easier comparisons.	Greater regulatory uncertainty.
Encourages technological advancement.	Greater compliance and administrative costs.
More information for managers to take decisions.	Weights LA's balance sheet heavily towards roads.

The valuations obtained from historic or current cost are then modified to take account of the decrease in value of the asset due to age, use, obsolete technology etc. This is referred to as depreciation.

2.1.2 Depreciation methods

The depreciation of the asset value can be calculated using several methods.

1. Straight-line method

The straight-line method is the simplest and most common method of depreciation. An estimate is made of the total lifetime of the asset at the end of which the value is said to be zero or a residual value is appointed. The value of the asset is assumed to decrease by the same amount each year until the end of its life.

2. Reducing balance

This method reflects the decrease in usefulness of the asset as it becomes older. The lifetime of the asset is divided into a number of periods of time and during each period the asset is depreciated by a different amount. A rate of depreciation is determined depending on the number of time periods, so that there is less depreciation at the earlier part of the asset's life than at the end.

3. Modified straight-line method

Modified straight-line depreciation is often used for infrastructure assets. This allows the cyclic maintenance performed on these assets to be taken into account. Instead of a residual value at the end of an asset lifetime, an intervention level is set. The value of the road at the time of the planned maintenance is used instead of a residual value.

4. Condition based valuation

Condition based valuation is another method commonly used for infrastructure assets. This involves an annual survey on the condition of the asset in order to assess its expected lifetime.

5. Renewal accounting

In this method the depreciation value is said to be the estimated amount of money required to maintain the asset to the required standard. The amount of money actually spent on maintenance for that year is added to the value of the asset. Therefore if the road is continuously maintained to the same standard the value of the asset remains constant.

2.2 Case studies of local authorities

In the past most LA's valued their infrastructure network using an historic cost basis and the straight-line method of depreciation as advised in the SORP. Some examples of the methods of highway valuation previously used by LAs are given in Table 2.

Table 2: Variation in the valuation of infrastructure assets

Organisation	Valuation	Depreciation
Newark and Sherwood District Council (Newark & Sherwood DC, 2002)	No infrastructure assets included in the valuation of assets. Infrastructure maintenance costs included as services.	Not relevant.
Greenwich County Council, (Greenwich CC, 2002)	Roads valued at historic cost.	Depreciation charged according to the straight-line method.
Devon County Council (Devon CC, 2003)	Historic cost. Valuations every five years.	Straight-line over a lifetime of 10 to 40 years.
Buckinghamshire County Council (Bucks CC, 2003)	Historic cost.	Depreciated using straight-line method over 40 years.
Wokingham District Council (Wokingham DC, 2002)	Historic cost.	Depreciation taken as cost of repairs that year and then added to value of asset (renewals accounting).
Bath and North East Somerset Council (Bath & NE Somerset, 2003)	Historic cost.	Depreciation method not specified.
Hampshire County Council (Hibbert, 2004)	Historic cost. Cost of any work done added onto value of asset.	Depreciated using straight-line method using lifetimes of; principal roads 20 years, classified roads 50 years and unclassified roads 100 years.
Wrexham County Council (Wrexham CC, 2004)	Historic cost.	Depreciated using straight-line method over a lifetime of 50 years.
National Assembly for Wales (Welsh Assembly, 2000)	Computer modelling system used to estimate the value of the road network using the principles in the AVM (RICS, 2002).	Depreciation based on the annual maintenance cost, calculated depreciation of road structures and computer modelling of the permanent road deterioration in the year using the results from the last survey.
Northern Ireland (DRD, 2002 and 2002)	Roads valued at net current replacement cost. Re-valued annually using a model which uses the Baxter Index to update the rates to current prices. The land on which roads are built valued using indicative land rates supplied by the Valuation and	Bridges, culverts, gantries, retaining walls and communications depreciated using the straight-line method. Motorways and trunk roads depreciated by using condition data in the model and the valuations by VLA.

	Lands Agency (VLA). Other road assets valued by VLA on a five year rolling programme. Values uplifted in the interim years by indices provided by VLA.	
Leicester County Council (Leicester CC, 2006)	Historic cost.	Straight line over 40 years.
Transport for London (TfL, 2006)	replacement cost	Straight line over 15 years for road pavements, 50 years for road foundations and 100 years for bridges and tunnels.

The road network is valued on the basis of current replacement cost, adjusted to reflect the current condition of the road component and the depreciation of structures and communications components of the network. The road network is depreciated at rates calculated to write off the valuation of structures and communications components by equal instalments over their estimated useful lives, which are normally between 20 and 120 years. Changes in value due to variations in the condition of the road element of the network are reflected in the Consolidated Departmental Outturn Statement. Assets under construction are not depreciated, but included in the accounts at cost or a proportion of the value of the completed asset.

It can be seen from these examples that methods of valuing road networks varied between LAs and regions in the UK. Since the process of introducing WGA has begun LAs have started to move towards using current replacement cost and renewals accounting. For example in Devon they now use net depreciated replacement cost and renewals accounting for their Transport Asset Management Plan (TAMP) (Provisional Devon Local Transport Plan 2006-2011). During the past few years many authorities have made great progress towards creating detailed inventories of their highway assets and carrying out valuations in preparation for WGA. However others are further away from collating all the information required for WGA.

2.3 International examples of road valuation

New Zealand, Australia, Canada, USA, Sweden and Iceland all use some form of WGA. The UK, along with Australia and New Zealand, is one of the forerunners of asset management and will be the first country to include local government in its accounts. Some international examples of the methods used to value roads and footways are given below.

2.3.1 Hurunui, New Zealand

In New Zealand (Hurunui 2002) it has been a statuary requirement for local authorities to produce asset management plans and to value their assets for the past eight to ten years. They use resource accounting and value their assets using the optimised depreciated replacement cost. However they use straight-line methods for depreciation, using the condition of the asset (rated from 1 to 5) to model the estimated lifetime of the asset.

Road assets have been valued at depreciated replacement cost in Hurunui, New Zealand from June 2002. The road valuation includes land under the road network, which is valued based on the average rateable value of land in the area. The valuation of roads and associated road assets is conducted internally by a registered engineer and based on earlier verification by a registered valuer. The value of the asset is then depreciated as follows:-

Roads

Land under roads:	Not Depreciated
Road formation:	Not Depreciated
Pavement layer (sealed):	Straight-line with a lifetime of 100 years
Pavement layer (unsealed):	Not Depreciated
Pavement surface (sealed):	Straight-line with an average lifetime of 16 years
Pavement surface (unsealed):	Straight-line with a lifetime of 12 years

Bridges & Culverts

Timber:	Straight-line with a lifetime of 70 years
Concrete & other:	Straight-line with a lifetime of 100 years
Culverts:	Straight-line with a lifetime of 25 - 50 years

Other

Kerb & channel:	Straight-line with a lifetime of 50 – 80 years
Footpaths:	Straight-line with a lifetime of 20 – 75 years
Retaining walls:	Straight-line with a lifetime of 50 years
Street lights:	Straight-line with a lifetime of 15 – 25 years
Traffic signs:	Straight-line with a lifetime of 12 years

2.3.2 Australia

In 2003 local governments in Australia (Queensland Audit Office, 2003) did not value road assets, but the state government did. The land under the road is not included in the valuation and unformed roads and formed roads without gravel are not counted as assets. Any money spent on them is considered maintenance of services. Other roads are considered as assets and are split into:

- Initial earthworks, cuttings etc (where material)
- Formation
- Pavement
- Seal
- Kerb and Channelling
- Road Furniture (networked)
- Footpaths

This is an example of the valuation of a road section:

Road Furniture	
1 x traffic island @ $200 each	$200
2 x traffic control devices @ $120	$240
1 x Left-hand side Car Park Bay @ $300	$300

Road Itself

Bitumen – two coats – flush seal

Segment length (m) 100 x surface width (m) 10.9,

@ $4.50 per sq metre $4,905

Base material

Segment length (m) 100 x surface width (m) 10.9

@ $3 per sq metre $3,270

Sub-base material

Segment length (m) 100 x surface width (m) 10.9

@ $2 per sq metre $2,180

Road Drainage

Right hand side length only (m) 100 @ $8 per metre $800

Kerb & Channel

Semi mountable kerb & channel

Right hand side length (m) 100 @ $5 per metre $500

Left hand side length (m) 46 @ $5 per metre $230

Mountable kerb & channel

Left hand side length (m) 54 @ $7 per metre $378

Total Direct Costs are therefore $13,003

Indirect Costs are then added. Assuming these to be 20% of the total direct costs, this gives:

Current replacement cost = $13,003 x 1.20 = $15,603.60

There is then an adjustment for the current condition of the asset:

Overall road condition factor for this road segment = 2

Assuming that a condition factor of 2 = 75% value of a perfect road

Adjusted Total Road Valuation = $15,603 x 75% = $11,702.70

Direct costs are the construction costs to build the road and can be obtained from contractor quotes etc. The indirect costs are a percentage of the direct costs added for aspects such as administration and design, on-site supervision, consultant services, survey and investigation, construction safety, personnel costs, and uninsured losses.

2.3.3 USA

Since June 1999, state and local governments of the USA have had to value their infrastructure assets (McNeil, 2000). Before then cash accounting was used and investments and assets were not reported. Now the Government Accounting Standards Board (GASB) of the United States (state and local governments) recommends that infrastructure assets are valued at historic cost minus depreciation or modified cost, which means that if they can prove that the roads are being maintained to a degree at which it can be said no depreciation occurs, none need be charged. The majority of the councils use financial records to provide the historic cost, but when this information is not available they use current construction figures and deflate them to their estimated construction date. The straight-line method is used for depreciation (Maze and Smadi, 2003).

This example of road network valuation was obtained from the USA.

> "In 1998, a government has sixty-five lane miles of roads in a secondary road subsystem, and the current construction cost of similar roads is $1 million per lane-mile. The estimated total current replacement cost of the secondary road subsystem of a highway network, therefore, is $65 million. The roads have an estimated weighted average age of fifteen years. Therefore, 1983 is considered to be the acquisition year. Based on US Department of Transportation, Federal Highway Administration's "Price Trend Information for Federal Aid Highway Construction for 1983 and 1998", 1983 constructions costs were 69.03 percent of 1998 costs. The estimated historical cost of the subsystem, therefore, is $44,869,500. In 1998, the Government would have reported the subsystem in its financial statements to have an estimated cost of $44,869,500 less accumulated depreciation for fifteen years based on that deflated amount." "…assume that the road system had a total useful life of twenty-five years. Assuming no residual value at the end of the time, the straight-line depreciation expense would be $1,794,780 per year, and accumulated depreciation in 1998 would be $26,921,700."

It can be seen that the road network is valued on estimated historic cost (referred to as the book value) and depreciated using the straight-line method. Land is valued at open market value.

2.3.4 Canada

In April 2003 Canada changed from modified accrual accounting to full accrual accounting. This has been backdated to include the reissue of 2002-2003 accounts.

At present Canada values infrastructure assets at historic cost and uses straight-line depreciation with a lifetime of 20 to 40 years (Canadian Standard 3.1, Treasury Board of Canada, 2001).

2.3.5 Wyndham City Council, Australia

Infrastructure assets are valued using current replacement cost including the cost of all materials included in construction, direct labour on the project, any associated costs such as design costs, architectural fees, contract management costs and any associated supervision salary costs in accordance with the Council policies. Appropriate overheads are also included in accordance with Council's normal overhead costing allocation policies.

The value is depreciated by the straight-line method, although a computer model will be used at some point in the future. The life of the concrete footway is assumed to be approximately 40 years. Asphalt footways have an assumed life of 25 years, while brick footways have an assumed life of 40 years. Depreciated lifetimes are reviewed annually. Footways are surveyed on a three year cycle and the data entered into a database (Wyndham CC, 2003).

2.3.6 Summary

There is a general trend, with the advancement of asset management, away from cash based accounting towards accrual accounting for government accounts. This is leading to the inclusion of infrastructure assets in accounts and research into the most appropriate methods of valuation. Internationally there is a large variety of valuation and depreciation methods, but there is a trend towards countries adopting current replacement cost and renewal accounting in place of historic cost and straight-line depreciation. A summary of the way government accounts are used world-wide is given in Table 3.

Table 3: Summary of government accounting methods

(Hong Kong Treasury Department, 2002)

Practises	Australia	Canada	New Zealand	Singapore	UK	USA
Financial Reporting	Accrual basis since 1996-97	Modified accrual basis since 1980s Full accrual basis starting from 2001-02	Accrual basis since 1991-92	Cash basis	Departmental Resource Accounts, extended to all departments since 1998-99, are prepared on the accrual basis to supplement the cash-based Appropriation Accounts Dry runs (not audited) WGA on the accrual basis for 2004/05 and 2005/06, with fully audited WGA for 2006/07	Accrual basis since 1996-97
Budgeting	Accrual basis since 1999-2000	Intends to adopt accrual-based budget, and timing of implementation is yet to be announced	Accrual basis since 1991-92	Cash basis	Accrual-based estimates starting from 2001-02 in addition to cash budget	Mainly on cash basis

3 The Government's WGA programme

3.1 Overview

The decision of Ministers to incorporate local authorities into WGA was announced on the 10 December 2003 in the Pre-Budget Report (HM Treasury, 2003). For England and Wales the Treasury publishes a designation order of the bodies to be included in Government Accounts in advance of the accounting year to which it applies (Statutory Instrument, 2002).

The introduction of WGA aims to standardise the way in which all local authorities value their assets according to UK Generally Accepted Accounting Principles (GAAP). This will include the valuation of infrastructure assets. The assets will be valued at the cost of providing a replacement constructed to modern standards according to the Appraisal and Valuation Manual (AVM) and depreciation will be charged using renewal accounting (see Section 4). The Government On Line Data (GOLD) consolidation system was set up to allow government bodies to enter their data into a central database. This was an interim system that

was replaced by the Combined Online Information System (COINS) system for the preparation of the 2004/05 CGA and dry run WGA. A new Standard Chart of Accounts (SCOA) was available for 2004/05 to facilitate input into the new COINS system.

3.2 Application of WGA to infrastructure assets

The introduction of WGA creates a change in the method by which the infrastructure network is valued in the accounting procedure. WGA includes changing to accruals accounting, so that cost is accounted from the point at which the value of the asset is obtained rather than the point at which it was paid for. Although the SORP 2006 recommends valuation of highways using historic cost this issue is under debate and the guidance document produced by CSS states that this is likely to change to current cost in the near future. It also suggested that consistency with the Treasury's Resource Accounting Manual (RAM) would be beneficial. The RAM has been replaced by the FReM which recommends current replacement cost. The Highways Agency follows the FReM. This means valuing infrastructure assets according to their current cost not their historic cost, and using renewal accounting in place of straight-line depreciation.

4 Explanation of renewal accounting

4.1 Overview

For WGA the guidelines suggest that valuation is carried out using net Depreciated Replacement Cost. This is the cost of replacing the asset to modern standards depreciated to take account of the present condition. Renewals accounting is used, which means that the estimated amount of money needed to maintain the asset to the required standard for the year is said to be equivalent to the depreciation value. This means that if the road is maintained to the correct standard, a steady state is reached where the value of the asset remains constant. If the required maintenance is not carried out, the condition of the asset deteriorates and therefore the asset drops in value.

Most LAs in the past used the straight-line depreciation method. The introduction of WGA means that they are compelled to change this to renewal accounting. Renewal accounting is used for assets which require regular maintenance to keep the same level of condition indefinitely, for example gas, electricity, sewage networks, roads and footways. Renewal accounting is most effectively applied where the system is in a mature and steady state. A significantly growing or shrinking system will require adjustments to reflect changes in its service potential, which complicate the renewal approach. Renewals accounting has been used by the UK water industry since 1988 (OFWAT, 2001). A comparison between depreciation and renewal accounting is given in Table 4.

Table 4: Comparison of depreciation and renewal accounting

Depreciation Accounting	Renewal Accounting
Maintenance extending an asset's lifetime is allocated to capital expenditure. This means tax is paid on it.	Maintenance work that does not enhance the service is used as a proxy for depreciation and is tax deductible.
Only requires knowledge of historical cost and an estimate of the asset's lifetime.	Requires a more detailed knowledge of the assets condition in order to estimate maintenance required.
Focuses on acquisition of new assets.	Focuses on maintaining existing assets.
Depreciation is charged on all assets depending on their lifetime.	Depreciation should only be charged on assets which are not maintained.
Crude, but simple.	More complicated, but provides greater knowledge.
Underestimates the value of asset.	Better reflection of true value of asset.
Short term view.	Enables longer term view.
Less manipulation due to timing of maintenance, smoother expense reporting.	Overstates value as no depreciation with time.
More accurate, as when a component is replaced its new value will be taken whereas in renewal accounting the old value will stand.	Depreciation method may not reflect the deterioration of the asset and may be arbitrary.
Estimated lifetimes for each component are required giving an idea of when they need replacing.	Renewal method will reflect the loss in service potential due to condition of asset.
Accounts for deterioration in asset condition in the estimation of lifetime.	

4.2 Renewal accounting and the Highways Agency

The Highways Agency (HA) has had to include all infrastructure assets in its accounts since the introduction of CGA in 2001/2002 (HA, 2002).

The HA road network is professionally valued every five years and for years between these valuations the appropriate indices and the condition of the network are used to calculate the value. These indices are applied to modify the values of highway work for inflation using the Highways Agency Valuation System (HAVs).

The highway is valued using current replacement cost, but certain large structures are valued at historic prices appropriately indexed, or insurance valuations as the best approximation of replacement cost. Up until 2001/2002 the HA applied the Road Construction Tender Price Index (RCTPI) in their valuations. The RCTPI is based on the cost of tenders from contractors for road maintenance, obtained from the HA and other highway authorities in England, Scotland and Wales, and is adjusted for region. The Department for Trade and Industry publish the figures quarterly. This was changed to the Resource Cost Index of Road Construction (ROCOS) from the year 2001/2002 which is a modified index less influenced by short term fluctuations in road construction prices and more suited to resource accounting methods. The ROCOS gives a measure of the notional trend of costs for labour, materials and

plant by application of the Price Adjustment Formulae for Civil Engineering Works (1990 Series) to a cost model for a Road Construction Project. Further research is to be carried out by the Chartered Institute of Public Finance and Accountancy (CIPFA) on the accuracy of using indexes for periods between valuations.

The HA use renewals accounting to calculate the depreciation of their network for those assets which meet the renewals criteria, in accordance to the FReM. An annual condition survey is used to estimate the change in value of the asset. For the assets which do not meet these criteria the depreciation is calculated in accordance with the accounting Financial Reporting Standard 15 (Accounting Standards Board, 1999) using the straight-line method.

The renewals criteria (from FRS 15) are that:

- the infrastructure asset is a system or network that as a whole is intended to be maintained at a specified level of service potential by the continuing replacement and refurbishment of its components;
- the level of annual expenditure required to maintain the operating capacity (or service capability) of the infrastructure asset is calculated from an asset management plan that is certified by a person who is appropriately qualified and independent;
- the system or network is in a mature or steady state.

The HA have split the road network into components, depending on which criteria apply, in order to value them. The method used to calculate the depreciation for each component is given in Table 5.

Table 5: Components of HA road network and the accounting procedure used to value them

Road Network Component	Accounting Method
Surface layer of flexible pavements	renewals accounting
Sub pavement layer of determinate life pavements	renewals accounting
Fencing, drainage, lighting, signage, kerbs**,** footways	renewals accounting
Road markings and studs	renewals accounting
Rigid concrete pavements	renewals accounting
Road bridges, tunnels and underpasses	20 to 120 years, straight-line
Road culverts	20 to 120 years, straight-line
Retaining walls	20 to 120 years, straight-line
Gantries	20 to 120 years, straight-line
Road communications assets	15 to 50 years, straight-line

The HA consider the following network components to have an indefinite life and so these are not depreciated (Table 6).

Table 6: HA road components not depreciated

Road Network Component	Accounting Method
Freehold land	no depreciation
Sub pavement layer of long life pavements	no depreciation
Earthworks	no depreciation

5 Guidance on renewal accounting and asset valuation

The following documents provide guidelines and advice relevant to renewal accounting and asset valuation.

5.1 Guidance Document for Highway Infrastructure Asset Valuation

The Guidance Document for Highway Infrastructure Asset Valuation was published by the County Surveyors' Society/TAG Asset Management Working Group in July 2005. It is companion document to the CSS Framework for Highways Asset Management and is endorsed by the Treasury, the Office of the Deputy Prime Minister (ODPM), the Department for Transport (DfT), the County Surveyors' Society (CSS), the Local Government Technical Advisors Group (TAG) and the Society of Chief Officers of Transportation in Scotland (SCOTS). The document provides generic guidance for LAs on the valuation of highway assets according to Government guidelines and accounting standards. It aims to provide a common framework for implementing highway valuation for LAs in the UK. It gives the background to WGA, describes the accountancy standards and valuation requirements and advice on the different types of highway assets. Renewals accounting is recommended for roads, segregated footpaths and cycle routes and structures with depreciation based on condition/performance. The document highlights the conflict between SORP and RAM (now FReM) in valuation method which was also identified in this study. It states that the authors expect the current value to be the basis of valuations in the future.

The document recommends LAs follow the implementation timescales:

- interim valuation of a sample of assets in Financial Year 2005-06.
- benchmark valuation in Financial Year 2006-07 (provides opening book value for 2007-08).
- calculate in-year movements (e.g. depreciation) in Financial Year 2007-08.Interim valuation

5.2 Financial Reporting Manual (FReM)

The Government Financial Reporting Manual (FReM) (HM Treasury, 2006) is the technical accounting guide for public funds. The FReM is prepared following consultation with the Financial Reporting Advisory Board and is issued by the relevant authorities in England and Wales, Scotland and Northern Ireland. It sets out the annual accounting and disclosure requirements for departments preparing resource accounts under the relevant legislation; executive agencies; executive non-departmental public bodies and trading funds in England and Wales; Scotland and Northern Ireland. The FReM replaced the Resource Accounting Manual (RAM), Non-Departmental Public Bodies Annual Reports and Accounts Guidance

and the Trading Funds Accounts Guidance from 2005/2006. It is constantly under review with the version for a financial year being available before the year begins.

The 2006/2007 Version of FReM in Section 5.2.8 states that renewal accounting as defined in the Financial Reporting Standard (FRS) 15 (see Section 5.3) should be adapted for use with highways, even if the calculation of annual maintenance is not linked to an asset maintenance plan. The FReM says the current replacement cost adjusted to reflect the condition should be used. It states it should be calculated by carrying out a full valuation of the network at least every five years and be supplemented by annual condition surveys. Also that:

"*The condition surveys must be undertaken on a consistent basis and cover a significant and representative proportion of the road network. All renewals expenditure should be charged to the operating cost statement. If a condition survey reveals that the network has been maintained in a steady state since the previous survey, then no depreciation charge is required. However, if the condition of the network has deteriorated/improved between condition surveys, the value of the deterioration/improvement, if material, should be charged/credited to the operating cost statement and the carrying value of the assets adjusted accordingly.*

In the years between the full valuations, the value of the network should be adjusted to reflect:

a) movements in prices using appropriate published indices;

b) any expenditure on new schemes or enhancements which increase the capacity of the network;

c) detrunkings."

The cost operating statement is a statement showing how resources have been consumed in relation to any income earned for a given period. Where the balance sheet carries forward its balances from year to year the operation cost statement starts each period with nil balances. It is one of the three main financial statements produced under Resource Accounting and Balancing (Balance sheet, Operation Cost Statement, Cash Flow Statement).

Renewals accounting can only be applied if the amount spent on maintenance is equal to the reduction in value due to depreciation. If these are different the new value of the asset has to be entered in the accounts. For example if the road network was not well maintained and the cost of any repairs was less than the amount of depreciation, the value of the asset would have to be decreased to account for the current condition of the road.

5.3 Financial Reporting Standard 15

The financial reporting standards (FRS) (Accounting Standards Board, 1999) comprise a series of documents published by the Accounting Standards Board (ASB) on various accounting subjects (Gowthorpe, 1999). FRS15 covers tangible fixed assets. It sets out the principles of accounting for the initial measurement, valuation and depreciation of tangible fixed assets.

Valuation

The FRS15 defines the aspects taken into account when valuing the asset. These are:

- The labour costs of own employees arising directly from the construction or acquisition of the tangible fixed asset;
- The incremental costs to the entity that would have been avoided only if the tangible fixed asset had not been constructed or acquired.

It follows from this that administration and other general overhead costs would be excluded from the cost of a tangible fixed asset. The FRS gives a list of examples of directly

attributable costs such as site preparation and clearance. Abnormal costs, such as those arising from industrial disputes or wasted materials should not be included. Once the asset is ready for use, any costs incurred can no longer be included and the asset starts to depreciate. This is true even if the asset is not yet actually in use.

Repairs and maintenance expenditure should be capitalised if:

- It enhances the asset in excess of the last valuation;
- A component of the asset has been replaced or restored;
- A major overhaul is performed that restores the economic benefits of the asset.

The FRS recommends either a full valuation every five years with a less detailed interim valuation in the third year, or a rolling five year full valuation with interim annual valuations where there has been a material change in value for a portfolio of similar assets.

A full valuation involves a detailed inspection, measurement of area, inspection of locality, enquiries of the local planning authority, enquires of the asset holder, and research into market trends. It should be performed by a qualified person on a cross-section sample of the assets.

An interim valuation also performed by a qualified valuer consists of research into market trends, confirmation that no changes have occurred and an inspection if it is deemed necessary, for example if a change has occurred.

An index can be used to value the asset if it takes into account the type of asset, asset location, asset condition and any technological changes. It also has to have a proven record of regular publication.

Specialised assets should be valued at depreciated replacement cost. This should be a realistic estimate of the current cost of constructing an asset that has the same service potential as the existing asset. The lower of the recoverable amount and replacement cost should be used, where the recoverable amount is the higher of net realisable value and the value in use. If the asset is not replaced, the net realisable value is used. The valuation must be consistent; if some of the assets are re-valued, they must all be re-valued.

Depreciation

Components with different lifetimes should be accounted for separately. Depreciation does not have to be charged if the lifetime exceeds 50 years or the asset is regularly maintained to the standard it was valued at (costs for this are recognised in a profit and loss account). The lifetime should be reviewed each year and the depreciation amended. Depreciation should include:

- Physical deterioration: wear and tear, erosion, rust, rot, decay;
- Economic factors: obsolescence;
- Time factor: expiry of leases, patents (referred to as amortisation);
- Depletion: wasting assets e.g. mines, quarries, oil wells.

The actual deterioration of individual roads can vary due to a variety of factors. Factors which can lead to a more rapid deterioration than originally estimated include:

- Poor standard of design and construction;
- Greater traffic volume and axle weight loadings;
- Adverse weather conditions such as heavy flooding and severe frosts in a year;
- Failure to carry out regular maintenance.

Renewals accounting can be used for infrastructure assets. The network should be treated as one asset (except for definable major components with fixed lives). The annual cost of maintaining the asset should be relatively constant. The criteria outlined above apply. The value of a part of the asset which is replaced or repaired must be removed from the value of the asset and the amount spent on it added.

5.4 The Prudential Code

The Prudential Code for Capital Finance in LAs has been developed by CIPFA to replace the old legislation governing capital investment. The Prudential Code requires LAs to consider the short term and medium term affordability and long term sustainability of their investments. It allows LAs to regulate themselves and decide on their own spending and borrowing within boundaries set by Central Government. This is designed to allow LAs to become involved in more long term projects, which while requiring a large initial investment will in the long term save money. The Prudential Code should make the legislation simpler and closer to GAAP. The code was published in October 2003 and came into operation on 1 April 2004. A guidance document on the prudential code has also been published by CIPFA (CIPFA, 2003).

The Prudential Code is particularly suited to depreciation accounting as it is designed to charge to the revenue account the value from the deterioration in the condition of fixed assets. This also links in with the Government's fiscal strategy. In particular, depreciation has an explicit role to play in the operation of the 'golden rule', which is that over the economic cycle the Government will only borrow to invest and not to fund current expenditure. The Government defines the current budget as the difference between current receipts and current expenditure including depreciation (CIPFA, 2002).

Full depreciation accounting will be an important element in the inclusion of local authority accounts within WGA. It is intended that WGA will provide audited data to underpin the operation of the golden rule, and will allow the public sector balance sheet to be used in fiscal management.

The Prudential Code and other applicable documents are made law in the Local Government Act 2003 (Act of Parliament, 2003) and the Local Authorities (Capital Finance and Accounting) (England) Regulations 2003 (Statutory Instrument, 2003).

5.5 Statement of Recommended Practise for Local Government Accounting (SORP)

The Statement of Recommended Practise for Local Government Accounting (SORP) is published by CIPFA and became "proper accounting practice" under the Local Government Act 2003. It applies to local authorities, police authorities, fire authorities, probation committees, joint committees and joint boards of principal authorities and (in England and Wales) parish, town and community councils with budgeted income of more than £1,000,000. In Northern Ireland it applies to all district councils. The latest version is for 2007/2008 is currently open for consultation and will replace that published in July for the year 2006/2007.

In SORP 2006 and the draft 2007 version (CIPFRA, 2006 and 2007), most assets are valued at current cost, but exceptions are made for infrastructure and community assets which are valued at historic cost, net of depreciation. When capital accounting for local authorities was developed in the early 1990s, a decision was taken to recognise infrastructure assets at historical cost net of depreciation. This was done because of the expense of performing full valuations and because of the view that "expenditure on infrastructure represented a sunk cost with unquantifiable value in terms of service provision." (Stanford, 2004).

However, the FReM requires infrastructure to be measured at current value. Both these approaches are compliant with FRS15, but for WGA and consistency between trunk roads and local authority roads this conflict needs to be resolved.

The 2007 SORP says depreciation of infrastructure network can be calculated using renewals accounting if the aim is to obtain a steady state of service and that the level of expenditure required to do this is calculated by a qualified person.

5.6 Appraisal and Valuation Manual (AVM) of the Institute of Chartered Surveyors (The Red Book)

The AVM published by the RICS (2003) provides guidelines and best practice for its members for performing valuations of properties and land. It includes Best Practice Statements, which it is mandatory for members of the RICS to follow and Guidance Notes which give further advice during specific circumstances. The sections most relevant to WGA and highways are Guidance Note 5 - Accounting for Depreciation, and Guidance Note 11 - Valuation for Local Authority Assets for Financial Statements (including Balance Sheets).

GN5 covers the principles given in FRS15 (see Section 5.2). It states that tangible fixed assets can be valued as:-

- Cost less depreciation - This is the price paid for the completed asset plus attributed costs minus depreciation.
- A professional valuation less depreciation.
- A current valuation (taking into account condition).

Highways are classed as infrastructure assets or tangible, fixed, non-current, specialised, operational assets.

Land should be valued as if it has planning permission for the same uses as the land in the locality of the site, if this is likely to be granted. Alternatively it should be valued on how much it would cost to buy, if it is near the site. The valuation should take into account the fact that it has already been developed. There is no depreciation on land.

The definition of the Depreciated Replacement Cost is the aggregate amount of the value of land for the existing use or a notional replacement site in the same locality.

The AVM requires all local authorities to value their assets, but not infrastructure assets (notably highways) which are valued at historical cost.

5.7 Valuation software

The Roads Asset Valuation System (RAVS) is a database and model compiled for the Scottish Executive Consolidated Account. The basis for valuation is depreciated replacement cost adjusted to reflect the current condition of the road component, and the depreciation of structures and communication components. There are similar systems for England- Highways Agency Valuation System (HAVS), Wales- Wales Asset Valuation System (WAVS and Northern Ireland – Northern Ireland Road System (NIRS). The replacement cost from professional surveys is entered into the system and indices and condition data are used in between valuations to calculate the annual value required for WGA.

Some developers of asset management software have introduced software to assist in valuation of highway assets based on the CSS guidance, usually as a sub-module to the asset register and networks module. These normally allow different levels of detail to be used in calculating the value by grouping assets together. For example all footways can have the same cost per km or be costed according to surfacing type. Assets can be valued using asset details and their attributes, and also using all of the data available in the Street Gazetteer and Network Referencing modules. They calculate the gross replacement value, depreciated value and consumption of the asset per year.

6 Valuing footways and cycle tracks

Along with the other highway assets footways and cycle tracks will have to be valued for inclusion in WGA. This is likely to be more problematic than valuation of roads as usually less information is recorded. The Guidance Document for Highway Infrastructure Asset Valuation (CSS, 2005) gives advice to highway authorities on valuing highways for WGA. This section focuses specifically on applying this to footways and cycle tracks, in what is judged to be reasonable accuracy, using the information LA's normally record for other purposes, such as maintenance management and for reporting BVPI's.

The proposed method is described in more detail using worked examples in Section 7. This also gives guidance on information required and assumptions that may be made in order to derive this information where data is lacking. The sensitivity of the evaluation to the range of various parameters is considered in Section 7.4.

According to WGA principles, the value of a footway or cycle track is taken as the cost of construction to modern standards at the time of valuation (this excludes earthworks and land value). It would be possible to use a system such as UKPMS (UKPMS, 2003) to obtain information on the condition of the footway or cycle track and from this the cost of the depreciation could be calculated. However, at present authorities are only required to assess the condition index of Category 1a, 1 and 2 footways. Footway hierarchies (categories) are defined in the Code of Practice for Highway Maintenance Management (Roads Board, 2005) as shown in Table 7.

Table 7: Footway categories

Hierarchy (Category)	Name	Description
1a	Prestige Walking Zone	Prestige Areas in towns and cities with exceptionally high usage.
1	Primary Walking Route	Busy urban shopping and business areas and main pedestrian routes linking interchanges between different modes of transport.
2	Secondary Walking Route	Medium usage routes through local areas, feed in into primary routes, local shopping centres, large schools and industrial centres etc.
3	Link Footway	Linking local access footways through local areas and busy rural footways.
4	Local Access Footway	Footways associated with low usage short estate roads to the main routes and *culs de sac.*

6.1 Valuation

For valuation of the network, information is required on the type of asset and the amount of that asset. Valuation of the whole highway network will include lighting, signs, roundabouts, bridges, drainage etc. The examples in this report solely concentrate on the footway and cycle track component, which is taken to include the footway surface, sub-base and associated kerbing, but excludes earthworks and land value.

The information that will be required for each section of footway or cycle track includes the type of surfacing (asphalt, slabs, etc.), the construction thickness, the amount of kerbing and the length and width of the footway or cycle track. Costs are required for each type of

surfacing and category of footway and also for the various types of kerbs used. To value the whole asset the length of the network is required and the lengths of each construction type.

Summary of information required for valuation:

Footway and cycle track inventory

1. Length of total network.
2. Average width of network.
3. Length and width of footway for each type of surfacing
4. Length and width of each specification (related to category) within each type.

Construction costs

1. Cost of constructing each footway category with each surfacing type.
2. Cost of the different types of kerbs.

6.2 Depreciation

To obtain a depreciation value the condition of the asset has to be known. This could be obtained from UKPMS. UKPMS provides condition indicators based on Detailed Visual Inspection (DVI) measurements. A condition index between 0 and 100 is calculated depending on the number of trips, percentage of area with cracks etc. A condition index (CI) of 0 indicates an asset with no work required and a CI of 100 reflects an asset which needs replacing. A condition index above the threshold level of 20 indicates that the footway condition needs further investigation.

Maintenance treatment is often based on the condition index; therefore the CI could be linked to the cost of the maintenance required. This cost is taken off the value of the asset as depreciation. The London Footway Condition Survey (Fulham and Hammersmith, 2001) gives information showing the relationship between maintenance treatment and condition index for the different footway types and categories (see Figures 1 to 4). In these examples a condition index of 15 indicates that some maintenance is required with reconstruction being required for asphalt footways when the condition index reaches 80.

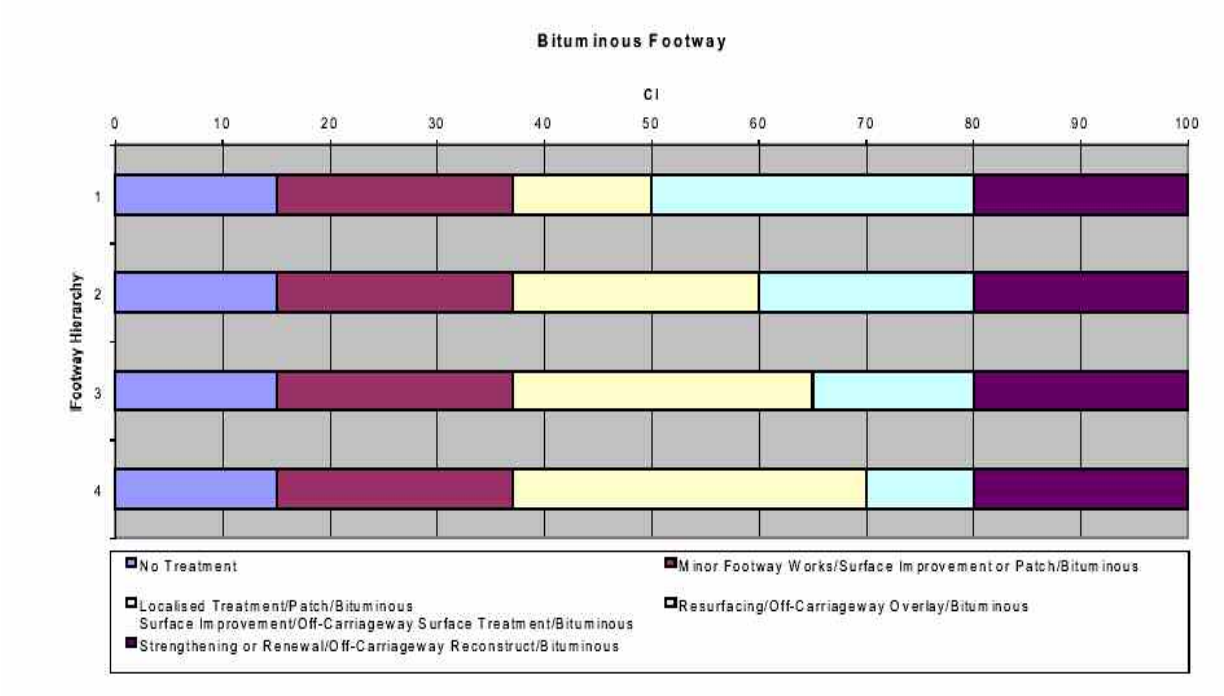

Figure 1: Maintenance of bituminous footway based on condition index (Fulham and Hammersmith, 2001)

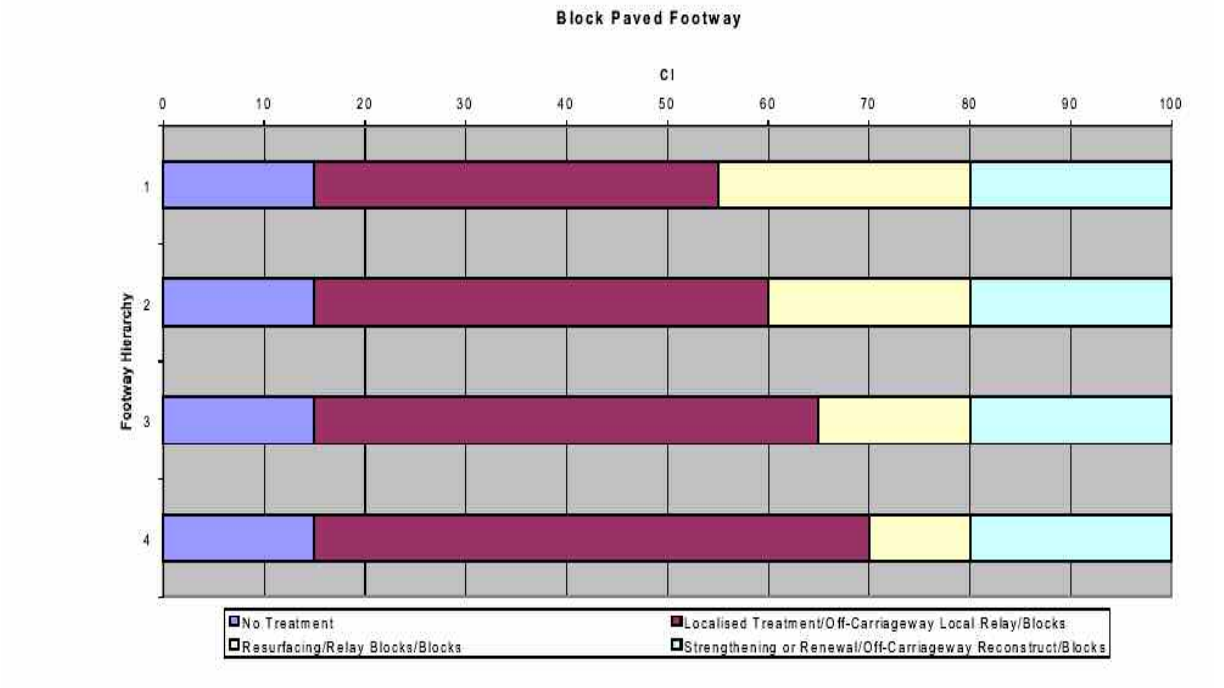

Figure 2: Maintenance of blocked paved footway based on condition index (Fulham and Hammersmith, 2001)

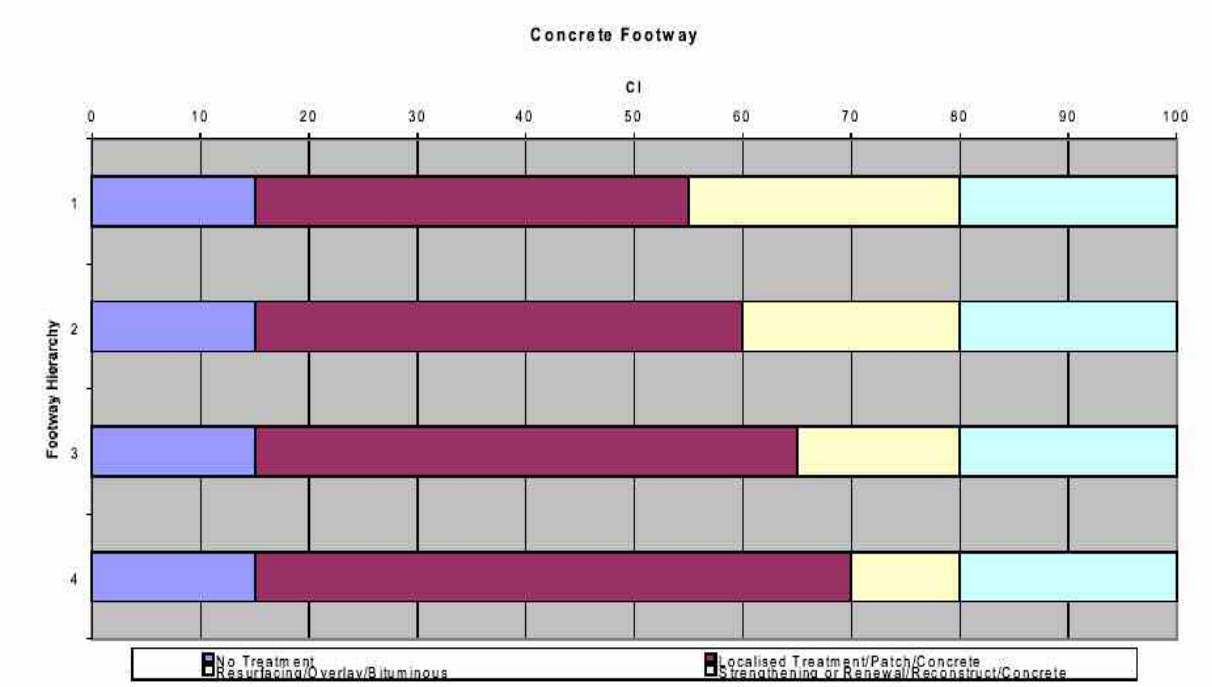

Figure 3: Maintenance of concrete footways based on condition index (Fulham and Hammersmith, 2001)

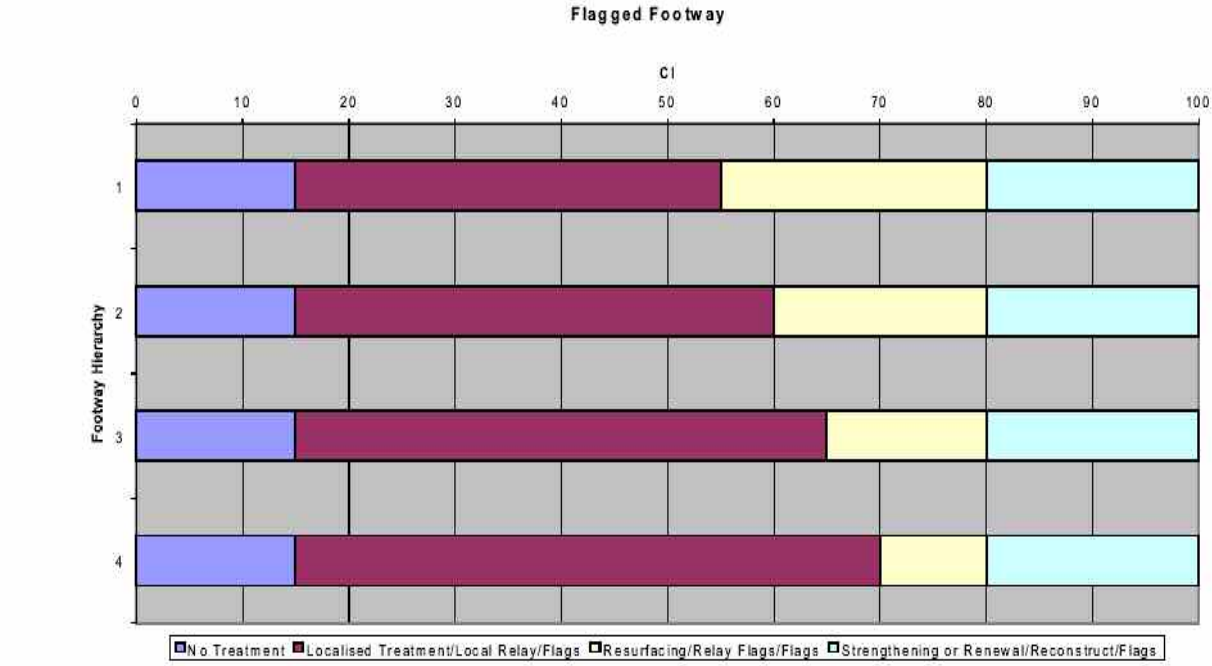

Figure 4: Maintenance of flagged footways based on condition index (Fulham and Hammersmith, 2001)

Alternatively a simpler method could be used with the network divided into only 3 categories; good, average and poor (possibly equating to a CI <20, 20- 60, > 60), with associated costs. However this would provide less information on the maintenance required and produces a less accurate estimation of the network value.

Summary of information required for depreciation:

Inventory

1. Proportion of each type of surface and each specification with each condition index or in each of the good, average, poor bands.

Costs

1. Average costs of maintenance for each type of surfacing and specification with each condition index or for each band, e.g. 0 (good), 1-19 (average) and ≥ 20 (poor)) to return it to a CI of zero. Maintenance required for each CI is given by UKPMS (Fulham and Hammersmith, 2002).

6.3 Current information

The information LAs possess on footways and cycle tracks varies considerably. The introduction of BVPI 187 (DfT 2003b) has resulted in the acquisition of more data on footways than previously held. At present the following information is required for UKPMS (UKPMS, 2006*)*:-

- Start Chainage
- End Chainage
- Cross Section Position
- Width
- Hierarchy

Construction type is optional.

To calculate the BVPI the following information is needed:-

1. Network length, given as:

    a. The number of sections with a Section Footway Hierarchy of 1a, 1 or 2.

    b. The length in km of these sections.

2. Surveyed network length, given as:

    a. The number of sections surveyed.

    b. The length in km of these sections.

    c. The percentage network surveyed, calculated as the number of surveyed sections divided by the number of network sections. This figure should be 50% or greater in the first year.

d. The length percentage may also be given (the length of surveyed sections as a percentage of the length of the network sections).

3. Surveyed footway length, given as the surveyed length of footways, based on the footway inventory for those surveyed.

4. The footway length within CI band:

a. Overall CI ≥ 20

b. 20 > Overall CI > 0

c. Overall CI = 0

d. Not Assessed Lengths

BVPI 187 is calculated as the length of footway with Overall CI ≥ 20, divided by the surveyed footway length less the Not Assessed Lengths.

An example of the information to be reported (UKPMS, 2006) is given in Table 8.

Table 8: CI Band Processed footway length within CI band

Hierarchy:	***1a (km)***	***1 (km)***	***2 (km)***	***1a,1 & 2 (km)***
20 and greater	0.3	1.7	4.6	6.6
Under 20	1.7	4.5	12.8	19.0
Zero	3	9.3	20.3	32.6
Not Assessed	0.2	0.4	0.2	0.8
All	5.2	15.9	37.9	59

As can be seen from Table 8 some of the information required for valuation and depreciation is already collected for BVPI 187.

7 Examples of valuing footways for WGA

The following section provides examples of the valuation and depreciation of footways. The basic information required for valuation is listed, together with examples from typical networks.

1. Network length

The calculations are based on three network lengths; 200km (i.e. a mostly urban network), 600km and 4000km (i.e. a mostly rural network). These were chosen to represent the typical network lengths, ascertained from a survey of 168 local authorities, carried out during previous unpublished research by TRL, reported in PR/CE/186/96 *Condition assessment of footways; interim report.*

2. Surfacing material

The same survey of local authorities provided data on the variation of the proportion of each type of footway surfacing with the network length, shown in Figure 5. If a LA has no information on this, Figure 5 could be used to estimate the footway surface type, given the total network length.

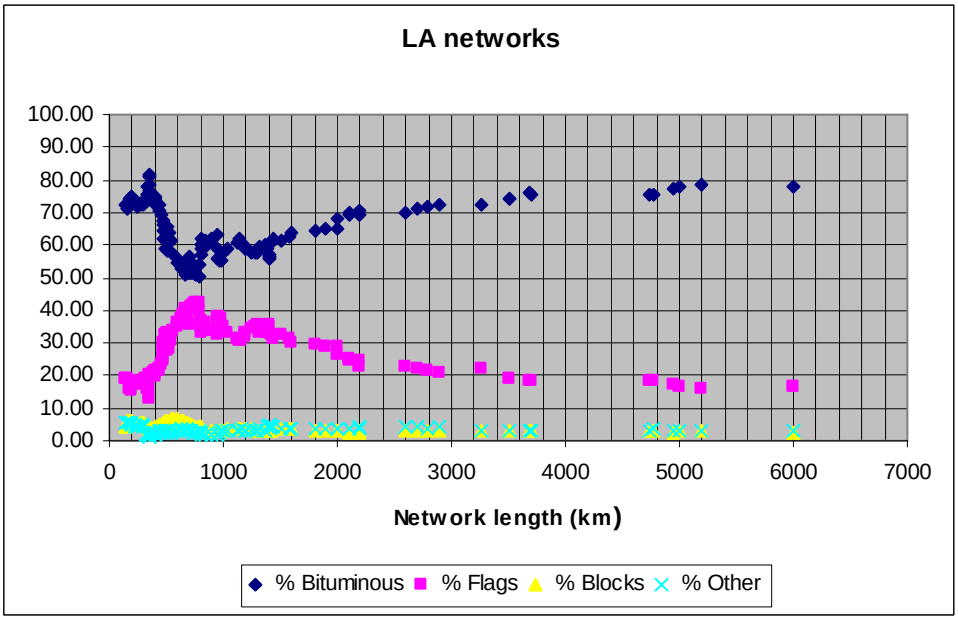

Figure 5: Variation of footway surfacing material with network length

For the three example network lengths, Figure 5 has been used to ascertain the type of surfacing as a percentage of the network length, as given in Table 9.

Table 9: Footway surfacing type as percentage of network length

Network length (km)	200	600	4000
Asphalt	72	55	75
Flags	18	40	20
Block paving	6	3	3
Other (assume concrete)	4	2	2

3. Footway category

A typical split of footway categories with network length is suggested in Table 10 and was compiled from discussion with selected local authorities.

Table 10: Footway categories as a percentage of network length

Category	200km	600km	4000km
1	5	5	3.5
2	15	10	3.5
3	40	35	23
4	40	50	70

It is assumed that all of the categories contain all the types of surfacing in the proportions given in Table 9, except that category 4 of the 4000km network is 95% asphalt.

4. Construction thickness

The thickness of the footway is taken as that specified by AG26 (Roads Board, 2003) for footways classified as pedestrian only, light vehicle footways, occasional overrun and heavy overrun. For this example it is assumed that the majority of category 1 and 2 footways are constructed for occasional vehicle overrun and category 3 and 4 footways are constructed for pedestrians only. In practise a LA would use the information in its inventory for the length of the various types of footway construction.

5. Kerbing

In England and Wales there is approximately 1.1 km of kerbing (330,000km) to 1 km of footway (300,000km) (DfT, 2005). There are four main types of kerb; bull-nosed, splayed, half battered and drainage. There are also various types of decorative kerbs. They are normally produced in lengths of 915mm or 610mm and can be straight or curved. The most commonly used is the half-battered type (McCormac, 2004). Kerbs are normally made from natural stone (e.g. granite) or pre-cast concrete.

7.1 Calculation of costs to current standards

The length of each type of footway, for the three example networks, is given in Table 11, Table 12 and Table 13.

Table 11: 200km network – length of each footway type

Category	Asphalt(km)	Flags(km)	Block(km)	Concrete(km)	Total(km)
1	7.2	1.8	0.6	0.4	10
2	21.6	5.4	1.8	1.2	30
3	57.6	14.4	4.8	3.2	80
4	57.6	14.4	4.8	3.2	80

Table 12: 600km network– length of each footway type

Category	Asphalt(km)	Flags(km)	Block(km)	Concrete(km)	Total(km)
1	16.5	12	0.9	0.6	30
2	33	24	1.8	1.2	60
3	115.5	84	6.3	4.2	210
4	165	120	9	6	300

Table 13: 4000km network– length of each footway type

Category	Asphalt(km)	Flags(km)	Block(km)	Concrete(km)	Total(km)
1	105	28	4.2	2.8	140
2	105	28	4.2	2.8	140
3	690	184	27.6	18.4	920
4	2660	112	16.8	11.2	2800

The average costs for each type of construction for the standard categories of footways are given in Table 14. The prices quoted include labour etc as well as materials and are obtained from local authority construction tenders from 2003 to 2005. In practise valuations should use information from tenders in the relevant local area, averaged over three years.

Table 14: Estimated costs of footway construction (£/m^2)

Description		Details (AG26)	Estimated cost £/m^2
Pedestrian-only	Asphalt	20mm surface course 40mm binder course 100mm sub-base	21.0
	Pavers	50mm pavers 30mm bedding sand 100mm sub-base	29.0
	Flags	50mm flags 25mm bedding sand 100mm sub-base	24.0
Light-vehicle footways	Asphalt	20mm surface course 50mm binder course 100mm sub-base	22.0
	Pavers	50mm pavers 30mm bedding sand 200mm sub-base	33.0
	Flags	50mm flags 25mm bedding sand 200mm sub-base	36.0
	Concrete	150mm C30P concrete 75mm sub-base	18.3
Light-vehicle footways, very Occasional overrun	Asphalt	20mm surface course 50mm binder course 225mm sub-base	36.0
	Pavers or flags	50mm pavers or flags 30mm bedding sand 70mm DBM 150mm sub-base	43.0
Heavy-vehicle footways	Asphalt	25mm surface course 90mm DBM base 365mm sub-base	40.0
	Pavers or flags	50mm pavers or flags 30mm bedding sand 75mm DBM 365mm sub-base	48.0

The different types of kerbs have different costs. The rate can also depend on the length of kerb being laid, but the average charge is £15 per metre of kerb.

Assuming the width of a footway is 2m, which is the minimum width recommended in AG26, the area of footway for each category and type can be calculated. The cost per square metre can then be calculated using the average costs. The calculations for the three example networks are given in Table 15, Table 16 and Table 17.

Table 15: 200km network – area and cost

	Asphalt	Flags	Block	Concrete	Total value (£million)
Area of category 1 and 2 (m^2)	57600	14400	4800	3200	
Area of category 3 and 4 (m^2)	230400	57600	19200	12800	
Cost for 1 and 2 (£million)	2.1	0.6	0.2	0.1	
Cost for 3 and 4 (£million)	4.8	1.4	0.6	0.2	
Total (£million)	6.9	2.0	0.8	0.3	10.0

Table 16: 600km network – area and cost

	Asphalt	Flags	Block	Concrete	Total value (£million)
Area of category 1 and 2 (m^2)	99000	72000	5400	3600	
Area of category 3 and 4 (m^2)	561000	408000	30600	20400	
Cost for 1 and 2 (£million)	3.6	3.1	0.2	0.1	
Cost for 3 and 4 (£million)	11.8	9.8	0.9	0.4	
Total (£million)	15.3	12.9	1.1	0.4	29.8

Table 17: 4000km network – area and cost

	Asphalt	Flags	Block	Concrete	Total value (£million)
Area of category 1 and 2 (m^2)	420000	112000	16800	11200	
Area of category 3 and 4 (m^2)	6700000	592000	88800	59200	
Cost for 1 and 2 (£million)	15.1	4.8	0.7	0.2	
Cost for 3 and 4 (£million)	140.7	14.2	2.6	1.1	
Cost (£million)	155.8	19.0	3.3	1.3	179.4

For this example an average kerb price is used. In practise the inventory may include the length of each type of kerb and the appropriate cost can be used. Using the average ratio of 1.1 for kerb length to footway length (DfT, 2005), the cost of kerbs will be:

200km network: £3.3 million

600km network: £9.9 million

4000km network: £66.0 million

Therefore the total values of the three example networks are:

200km network: £13.3 million

600km network: £39.7 million

4000km network: £245.4 million

The valuation process is iterative. It is suggested it is kept as simple as possible in the beginning and more detail is added as highway authorities become accustomed to the procedures involved and obtain more detailed information on their network and its condition.

7.2 Depreciation

To calculate depreciation the condition of the network needs to be known. If UKPMS is used a condition indicator is produced for each 20m sub-section of the footway area surveyed.

Since 2003/2004 the DfT (2003) state that 50% of category 1, 1a and 2 footways should be surveyed each year, so that in two years the whole category 1, 1a and 2 footways should be surveyed. Currently the requirement to calculate the condition index is only applied to category 1, 1a and 2 footways although there are plans to include all footways in the future. Footways with a condition index equal of 20 or more are said to be in a condition that requires further investigation and Local Authorities report the percentage of footways with a CI equal to or above 20. Table 18 shows the percentage of footways with a CI above the threshold value of 20 for a number of County Council networks (obtained from Shropshire County Council Highway Maintenance Review 2002/2003 (Shropshire County Council, 2003)).

Table 18: BVPI 187 - Condition of footway 2002-2003 (Shropshire Council Highway Maintenance Review 2002/2003)

County	% above CI of 20
Cheshire	28.4%
Derbyshire	0.0%
Herefordshire	71.3%
Lancashire	31.0%
Leicestershire	1.4%
Lincolnshire	31.6%
Northamptonshire	15.0%
Nottinghamshire	20.6%
Rutland	0.0%
Shropshire	50.6%
Staffordshire	13.6%
Warwickshire	82.0%
Worcestershire	66.0%

The national average of the percentage of footways with a CI ≥ 20 for England in 2002/2003 was 30% (Worcester County Council, 2004).

The condition index of each 20m section of footways that has been obtained for BVPI 187 can be used in conjunction with Figures 1 to 4 to obtain the maintenance treatment required for each section. The average cost of these maintenance treatments can be obtained from local

tenders. Thus enabling the maintenance costs to be calculated and used as the depreciation value.

If this detailed information is not available. The proportion of the network in each band and its most likely treatment could be used. For example Good (CI of 0-20) – no maintenance required; Average (CI of 20 to 35) - Minor surface improvements; Poor (CI of 35 to 80) - resurfacing required; Very Poor (CI>80) strengthening or reconstruction required.

This could be simplified even further to just two bands, below the threshold level of 20 (no treatment) and above the threshold (treatment required with an average cost depending on the type of surface). In this way each LA could provide some estimation of its footway network condition and as it gains more information can improve its method of calculation.

Example

In London the average percentage of footways above the threshold was given as 25% in 2001 (Fulham and Hammersmith, 2001). The proportion of each type of footway requiring treatment (above the 20 threshold) was:-

Paved = 11%

Asphalt = 26%

Concrete = 28%

Flagged = 26%

Average costs of the maintenance per metre of footway said to be in need of treatment for London were given as:-

Asphalt = £76 per metre

Block = £109 per metre

Concrete = £78 per metre

Flagged = £91 per metre

The average percentage of kerbs suffering from deterioration in England and Wales in 2002 was 4% (DFT, 2003a) (3.3% in 2005). The average cost of replacing kerbs is around £15 per metre (LA tenders). Using these values for kerbs and the London example of footway values the deprecation values produced for the three valuation example networks are:

200km network:	£3.98 million + £0.19 million = £4.2 million
600km network:	£12.51 million + £0.58 million = £13.1 million
4000km network:	£79.19 million + £3.87 million = £83.2 million

Giving a total valuation for the footway network of:

200km network:	£13.3 million – £4.2 million = £9.1 million
600km network:	£39.7 million - £13.1 million = £26.6 million
4000km network:	£245.4 million - £83.2 million = £162.3 million

7.3 Summary

The valuation and depreciation process is summarised in the flow chart in Figure 6. The information required for the valuation and depreciation of footway/cycle track network is summarised in Table 19. Also included are a possible estimation that could be used if the information is not available and the probable range of values for this parameter.

Figure 6: Flow chart of the valuation and depreciation process

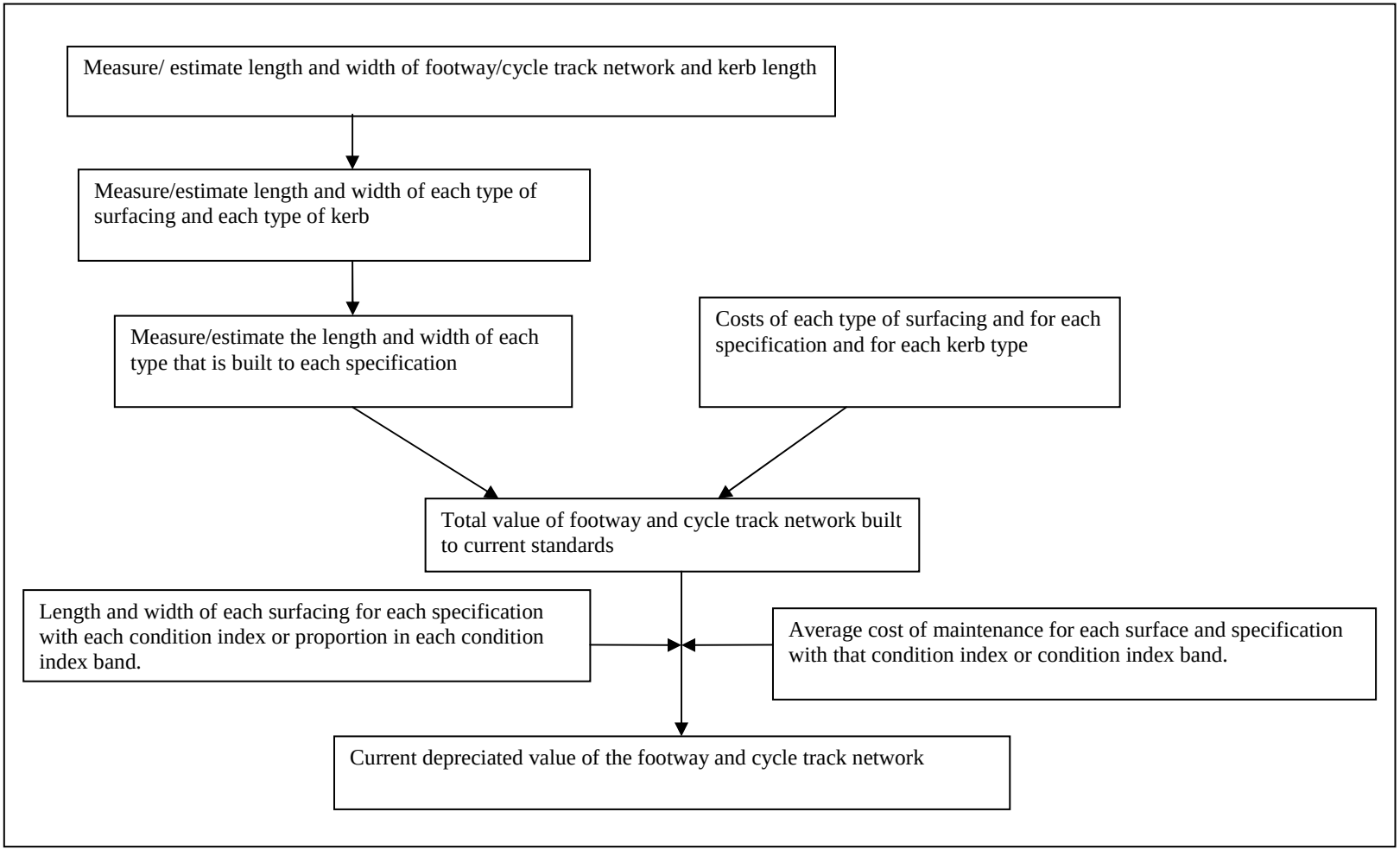

Table 19: Summary of information required for valuation and depreciation of footway and cycle track networks

Information Required	Possible Assumption	Range of Possible Values
Valuation		
Length of footway/cycle track network	Urban- 1.8 × centre line length Rural- 0.7 × centre line length	Ratio- 0.2 to 2 (average for England is 0.93)
Width of footway/cycle track network	Assume the design width from AG26 (2m).	Width- 1.3m to 4.5m
Split of surface types	Use typical proportions for network length using graph of other networks, Figure 5.	Asphalt- 50% to 82% Flags- 11% to 44% Blocks- 2% to 9% Concrete- 2% to 7%
Split of categories	Related to categories, if length of each category not known use typical split.	Category 1- 2% to 5.2% Category 2- 2% to 11.5% Category 3- 14.3% to 26% Category 4- 40% to 70%
Construction costs (three year average)	Use national average or values from a nearby county.	Pedestrian only (per m^2) Asphalt- £14.02 to £27.3 Blocks- £24.16 to £34.45 Flags- £20.93 to £27.2 Concrete- £15.8 to £20.8 Occasional Vehicle Over run (per m^2) Asphalt- £26.68 to £45.18 Blocks- £34.65 to £52.13 Flags- £34.65 to £52.13 Concrete- £15.8 to £20.8
Kerb length	1.1 (average) × length of footway	Ratio- 1.0 to 1.3
Type of Kerb	Assume most used type.	Decorative and curved to standard.
Cost of Kerb (three year average)	Use national average or values from a nearby county.	£9 to £20 per metre
Depreciation		
Condition index	Make assessment to as proportion of network that is good, average, poor or use percentage with a CI above 20.	BVPI 187- 0% to 80% of footway network. England and Wales average (2005) is 24.9%.
Maintenance costs (three year average)	Use national average or values from a nearby county.	Varies according to type of maintenance as well as location.

7.4 Parameter sensitivity

Each of the parameters used for valuation was examined for its likely range (Table 19) and the impact this would have on the valuation. Figure 7 shows the likely range in valuation for each parameter using the 600km network as an example.

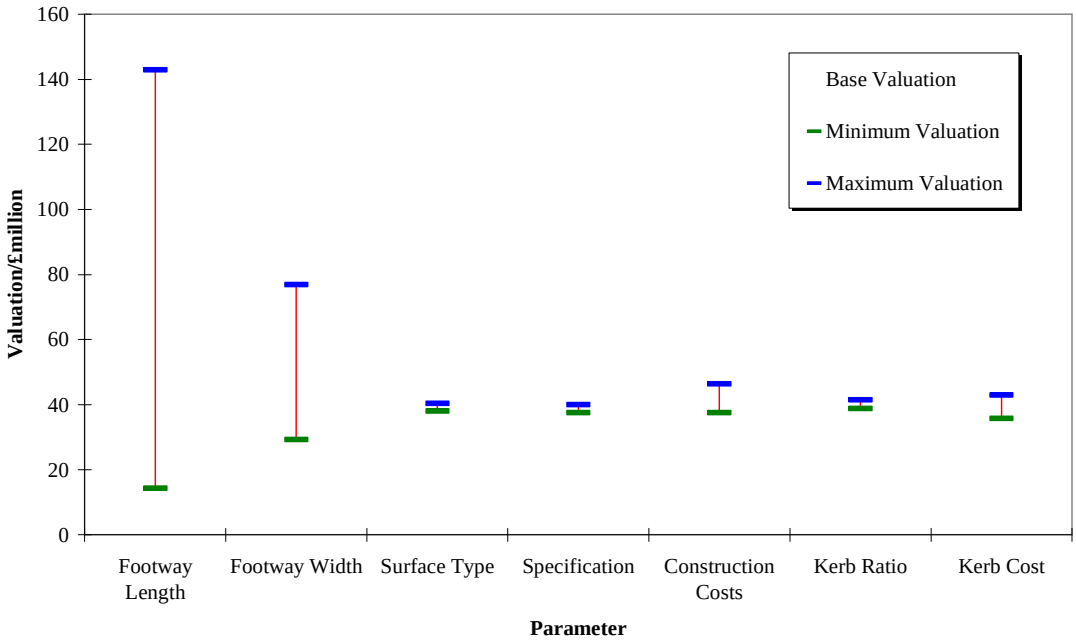

Figure 7: Sensitivities for 600km network

From this it can be seen that the most important parameter to obtain as accurately as possible is footway network length. Although the average urban footway length is 1.8 times the carriageway length and the average rural footway network is 0.7 times the carriageway length there is a large variation in this ratio. LAs with a mixture of urban and rural environments in their area may have difficulty in assigning one appropriate assumption to their network. The width also has a large effect, but this may be misleading. The costs obtained are quoted in square metres, but in reality a small increase in width has little effect on construction cost if the land is readily available and costs are normally dictated by length.

Surface type, specification and kerb type have the least effect on the valuation and construction costs have a medium impact. It appears that obtaining the footway length, width and average construction costs for the local area are more important than knowing the exact amount of each surface type or the specification. As footway length and construction costs are likely to be more easily obtained this seems a fortuitous result.

Similarly the depreciation value is more greatly affected by the quantity of footway which requires maintenance, rather than the actual surface type and specification of the footway in need of attention. However, in the case of maintenance the construction cost varies considerably depending on the type of maintenance required, e.g. localised surface patching or complete reconstruction. Therefore it is important to know both the length of footway needing maintenance and the level of maintenance required.

8 Conclusions

Local authorities had the first dry run of WGA and are in the midst of preparing their accounts for the second. As part of this local authorities have to value their infrastructure assets to comply with resource accounting. The County Surveyor's Society and the TAG Asset Management Working Group published a Guidance Document for Highways Infrastructure Asset Valuation in July 2005. This is a companion document to the CSS Framework for Highways Asset Management.

This report has attempted to provide LAs with some additional information on WGA and, how in particular this will affect footways and cycle tracks. It has also provided some examples of methods LAs could use in order to value their footways and cycle tracks. It is envisioned that valuation and depreciation methods will be crude at first, but gain in accuracy as more information is obtained. It is hoped that the better knowledge of the footway and cycle track network gained through this valuation procedure will aid LAs in maintaining the network. The effect of not maintaining infrastructure assets will also be clearly seen as the value decreases.

9 Acknowledgements

The work described in this report was carried out in the Asset Management of TRL Limited. The Project Manager was Teresa Willway. The author is grateful to Val Atkinson who carried out the quality review and auditing of this report. The author would also like to thank the FCMG for their helpful comments.

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