Lifecycle Planning

A component document of the Highways Infrastructure Asset Management Plan

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Table of Contents

1. EXECUTIVE SUMMARY

Best practice asset management as described by the Highway Maintenance Efficiency Programme (HMEP) is achieved by adopting a life-cycle approach which uses transparent, informed decision-making processes. Life-cycle planning is a key asset management concept that takes into account the whole-of-life implications of acquiring, operating, maintaining and disposing of highway assets. It should be used when making decisions at both strategic and operational levels of capital works investment and routine maintenance management.

Well Managed Highway Infrastructure: A Code of Practice [1] recommends that highway authorities should take lifecycle costs into consideration when assessing options for maintenance, new and improved highway schemes. The future maintenance costs of such new infrastructure are therefore a prime consideration.

In simple terms, investing in routine maintenance and replacement of certain aspects of an asset will help prolong the service life span beyond its original design life therefore offering maximum value for money.

An analogy would be the maintenance of a house. Should a few tiles be missing from the roof, then it is possible to keep the roof water tight and serviceable by spending a limited amount on replacing those tiles, even if the rest of the roof looks in poor condition. Timely repairs will prevent water damage leading to the deterioration of the timbers supporting the roof, delaying the time when the whole roof will need to be replaced.

The same principle is applied to our roads and footways. Condition surveys identify those sections of the highway that are failing and in poor condition. Repairs to those sections will keep the highway network in a serviceable condition and help delay the deterioration of the rest of the network.

This report documents the lifecycle planning approach established and adapted for carrying out the lifecycle analysis for each major asset group – carriageways, footways, structures, drainage, lighting, and street furniture/signs. Key categories of activity deployed in the modelling are detailed in this document and include: Data Capture, Lifecycle modelling, Scenario Analysis and Validation.

This document explains our approach to lifecycle planning, the assumptions made and the lifecycle models used to meet the performance requirements and maintenance needs described in the HIAMP Performance Management Framework and the HIAMP Asset Management Policy, Strategy and Levels of Service documents.

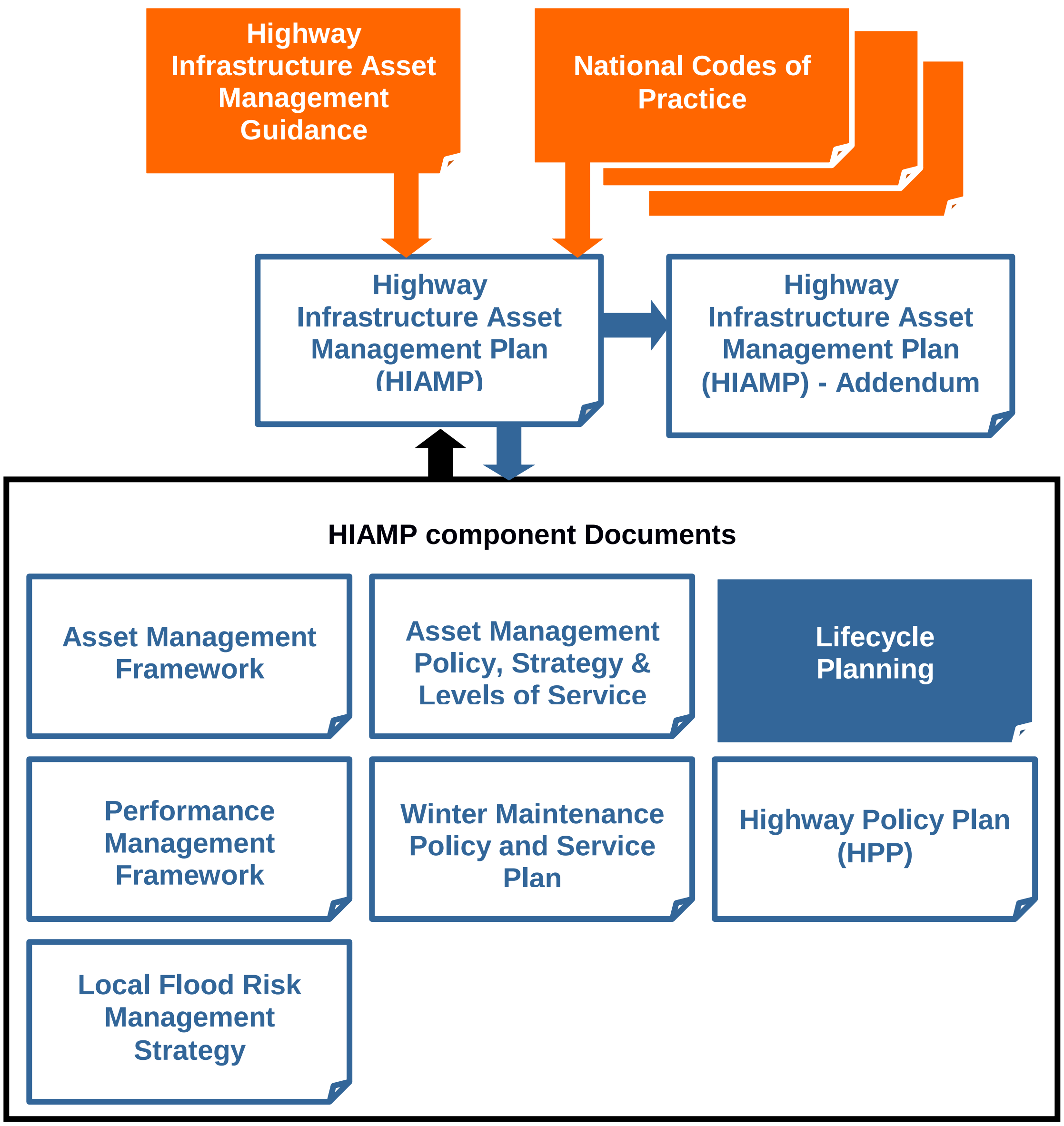
[1] Well-managed Highway Infrastructure: A Code of Practice, UK Roads Liaison Group, October 2016.

2. INTRODUCTION

Relationship of Lifecycle Planning with Highway Infrastructure Asset Management Plan (HIAMP) Documentation

The HIAMP is intended to provide a framework to support the implementation of effective asset management in Southwark, while ensuring that a number of component documents can be successfully developed. This document is a component document of the HIAMP setting the background and processes for undertaking whole life costing and lifecycle planning to optimise the service life of highway assets.

Figure 1 - Relationship of HIAMP Documentation



3. PRINCIPLES AND OBJECTIVES OF LIFECYCLE PLANNING

3.1 Lifecycle and Designing for Maintenance

Well Managed Highway Infrastructure; a Code of Practice[2] recognises that new highway schemes and facilities form an increasing proportion of the highway network over time. The future maintenance costs of this new infrastructure will need to be afforded from existing budgets. Careful consideration during the design stage can avoid or mitigate the use of materials requiring a disproportionately high frequency of maintenance, access difficulties for routine maintenance (such as drainage cleaning, planting beds in central reservations, traffic calming features with a high rate of deterioration, disproportionately high traffic management or user disruption costs or operatives exposed to working close to live traffic or at height).

Given that works of highway improvement are usually funded from capital and that subsequent maintenance works will often be funded from revenue, the potential financial impact may be greater than first perceived. The benefit of whole life designs and lifecycle planning can help balance between capital and revenue expenditure.

The Code of Practice recommends that lifecycle costs be taken into account when assessing options for maintenance, new and improved highway schemes

3.2 Objectives of Lifecycle Planning

Asset lifecycle planning provides the following objectives:

- provide informed decision making for providing an investment business case
- identify long-term investment for infrastructure assets and develop an appropriate maintenance strategy
- predict future performance of highway infrastructure assets for different levels of investment and different maintenance strategies
- determine the level of investment required to achieve the required performance
- determine the performance that will be achieved within available funding and/or future investment
- support the case for investing in maintenance activities, and demonstrate the impact of different funding scenarios
- minimise costs over the lifecycle, whilst maintaining the required performance

[2] Well-managed Highway Infrastructure: A Code of Practice, UK Roads Liaison Group, October 2016.

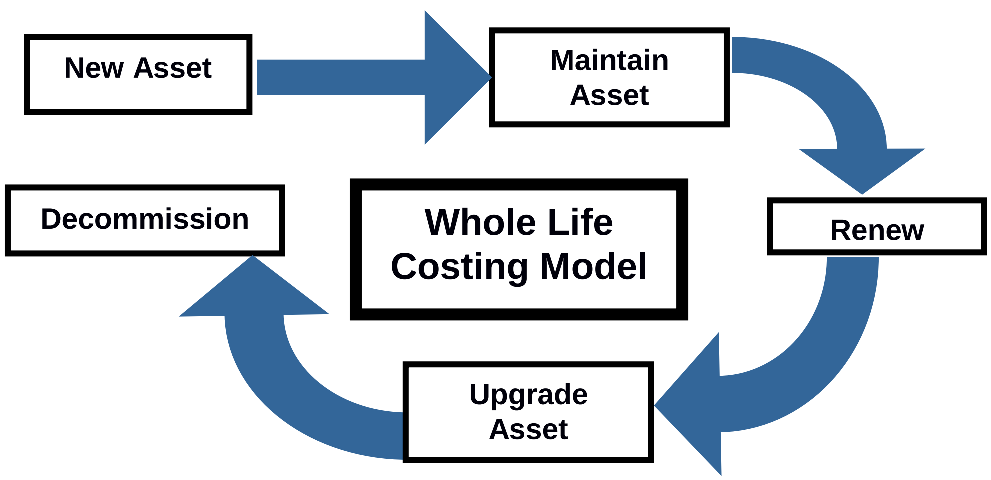
3.3 Lifecycle Planning

The Highway Maintenance Efficiency Programme[3] published by the UK Roads Liaison Group defines lifecycle planning as comprising the approach to the maintenance of an asset from construction to disposal. It is the prediction of future performance of an asset, or a group of assets, based on investment scenarios and maintenance strategies. The lifecycle plan is the documented output from this process.

Lifecycle plans may be used to demonstrate how funding and/or performance requirements are achieved through appropriate maintenance strategies with the objective of minimising expenditure, while providing the required performance over a specified period of time.

Lifecycle planning can be applied to all highway infrastructure assets. However, its application may be more beneficial to those assets that have the greatest value, require considerable funding, are high risk or seen as critical assets. In some cases, complex approaches may be applied and in these circumstances higher quality data and predictive modelling techniques will often be needed. Where minimal data is available, a risk based approach may be adopted.

Figure 3. Lifecycle of an asset.



The lifecycle of an asset covers the following stages:

Create new assets: This may include a single asset such as a new bridge, new lamp column or sign post, or a series of new assets in the construction of a new road.

Routine maintenance: This is the reactive and cyclic activity to maintain the asset over time. Examples include pothole repairs, tensioning of safety fencing and cleaning of drainage and signs. It should be noted that strategies for routine maintenance may affect the long term performance of the relevant asset. The approach to routine maintenance needs to be considered as part of the lifecycle planning process. Effective routine maintenance has the potential to extend asset life.

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[3] Highway Infrastructure Asset Management Guidance Document, HMEP, UK Roads Liaison Group, May 2013.

Renew or replace: This is the process required to bring the asset back to the required performance after it has deteriorated. This generally requires capital expenditure, unless it is a smaller item of highway inventory, in which case it could be replaced as part of routine maintenance.

Upgrade asset: The asset or its specific components could be upgraded above its original standard to meet future needs or capacity.

Decommission assets: Most highway infrastructure assets are rarely decommissioned. However, there are instances where some assets are removed from service. This is likely to include the legal process of “stopping up” areas of the highway, closing bridges or removing street lighting, signs and barriers.

3.4 Whole Life Costing

Historically, maintenance decisions in Southwark were based on short-term, subjective criterion. These typically ignored any future costs of operating and maintaining the asset. Furthermore, they also failed to optimise the timing of maintenance interventions to deliver maximum value. Any money spent on highway maintenance should be treated as an investment and as such should be subject to a rigorous assessment process. In recent years a whole life cost approach has been adopted taking into consideration the maintenance requirements throughout the lifecycle of the asset to ensure long term value for money benefits.

Whole life costing involves the evaluation of treatment costs for a range of maintenance options over a consistent time period. This process allows the costs and any benefits to be estimated for each option assessed on a comparable basis. The option with the lowest cost to benefit provides the most advantageous investment.

Assets, such as footways and roads deteriorate over time and various maintenance options can be undertaken to restore condition. The following are typical examples of footways condition, defects and remedial measures.

Table1. Examples of footway remedial actions.

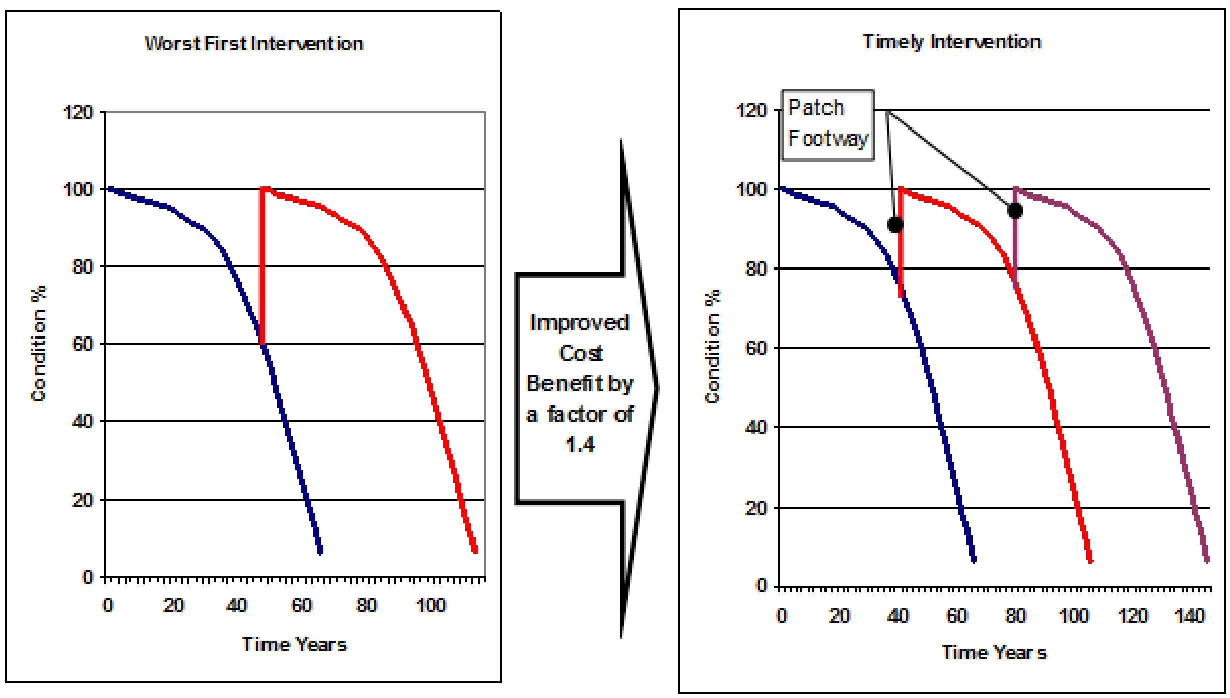
Condition	Typical Defects	Possible Action	Typical Cost (1)	Potential Benefit in Years
Poor	Minor cracking of blacktop surface and minor loss of surface material. Cracking of paving slabs resulting in an uneven surface.	Deep footway patching	£67/m^2	40 years extension in life
Very Poor	Heavy cracking of blacktop surface and major loss of surface material. Cracking of paving slabs and minor displacement.	Resurface or re-slab footway	£48/m^2	30 years extension in life
Potentially Hazardous	Deep potholes and uneven blacktop surface. Heavily Displaced, rocking or missing paving slabs	Rebuild footway	£116/m^2	50 years extension in life

(1) Based on 2018 typical costs.

The whole life costing approach considers the cost of each maintenance option and the potential benefits of each option over the life of the asset.

The following example shows the comparative cost benefit of performing a 'Worst First Intervention' where a footway has to be rebuilt when compared with a 'Timely Intervention' where patching is undertaken. The 'Timely Intervention' has a cost benefit of a factor of 1.4 or a potential 40% more effective use of resources.

Figure 4. Whole life cost benefit.



Footway deteriorates to an extremely poor condition and needs rebuilding at a cost of £116/m^2 to extend the life of the asset by 50 years.

Cost Benefit = £116/50years = £2.32/year

Footway deteriorates to a poor condition and can be patched (both surface course and binder course) at a cost of £67/m^2 which will extend the life by 40 years, patching then repeated after 40 years to extend life by 80 years.

Cost Benefit = £134/80years = £1.68/year

On roads and footways the whole life cost approach inevitably leads to work being targeted towards only those areas that need to be treated, using the most cost effective method of treatment. In practice this leads to short sections of road and footway being patched or resurfaced as this is the most effective use of resources.

3.5 Risk Based Evaluation

A programme of comprehensive data collection requires significant investment. However, if planned and managed effectively and the data is fully used to support asset management, then it offers good value for money and supports the longer term benefits of asset management.

Where the cost of data collection outweighs the business benefit or may not be affordable, a risk based approach may be considered. In doing so, each asset group should be considered separately and consideration given to:

- any historic concerns over existing performance
- how it supports statutory requirements
- the reputational consequence of network disruption, reduction in serviceability, etc. which may have been avoided if data existed
- critical parts of the network
- the likely increasing long term cost of maintenance with inadequate asset data to make long term investment decisions
- the critical nature of the asset in supporting the function of the network

Critical assets are those that are essential for supporting the social and business needs of both the local and national economy. They will have high consequence of failure, but not necessarily a high likelihood of failure. These assets should be identified separately and assessed in greater detail as part of the asset management planning process.

By identifying critical assets, authorities can target and refine investigative activities, maintenance plans and financial plans at the most crucial areas. Such assets may include special and major structures, or assets owned by third parties such as substations where accessibility is critical.

The most commonly understood risks affecting the highway relate to safety. However, there are a wide range of other risks and their identification and evaluation is a crucial part of the asset management process. Risks may include:

- safety
- reputation
- asset loss or damage
- service reduction or failure
- operational
- environmental
- financial
- contractual

Successful implementation of the asset management framework requires a comprehensive understanding and assessment of the risks and consequences involved. Understanding risk enables the asset management process to address the issues identified.

4. ASSET LIFECYCLE MODELLING

4.1 HMEP Toolkit

4.1.1 Lifecycle Planning Toolkit

The Highways Maintenance Efficiency Programme (HMEP) developed a lifecycle planning toolkit for carriageways, footways and ancillary highway assets. The HMEP asset management working group consisted of leaders from the industry, including representatives from Highways England (then Highways Agency), Department for Transport and a number of local authorities.

The lifecycle planning toolkit[4] is a probabilistic model that enables network level long term planning for the highway assets by assessing long term performance and funding requirements to meet levels of service.

4.1.2 Homogeneous Asset Groups

The toolkit advises that engineering judgement is applied to organise asset data into homogeneous asset groups. These are assets that are assumed to deteriorate in a similar manner, so that the same deterioration model and treatment strategies can be applied. For example, the carriageway road network may be aggregated into the following ten homogeneous asset groups based on hierarchy and environment:

- rural strategic roads
- rural main distributor roads
- rural secondary distributor roads
- rural link roads
- rural local access roads
- urban strategic roads
- urban main distributor roads
- urban secondary distributor roads
- urban link roads
- urban local access roads

Clearly Southwark Council would not use “rural” as a key attribute to define a homogeneous asset group, but other attributes such as asset type (lighting columns, street furniture, carriageway or footway), geographical location (e.g. districts: world centre, heritage, village or docks) and road hierarchy (strategic route, link road, local access) may apply.

[4] Lifecycle Planning Toolkit Incorporating Default Carriageway Deterioration Models, User Guidance, HMEP, November. 2012.

4.1.3 Condition Assessment Methodology

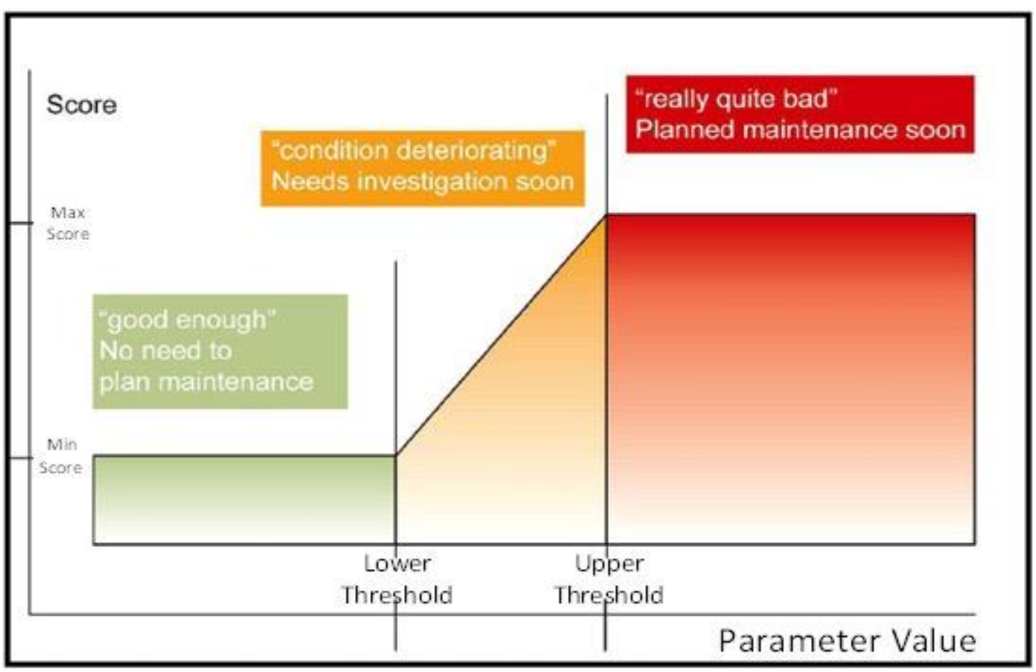
In England the SCANNER RCI is the only method used for the calculation of performance indicators for the reporting of condition of the classified road network, initially as BV223 and BV224a, and (from 2008/9) as National Indicators NI168 ('A' roads) and NI169 (other classified roads). As of 2011 the National Indicator set was abolished and replaced by the Single Data List where the former National Indicators 168 and 169 are listed as 130-01 and 130-02 respectively. For HMEP modelling purposes, it has been assumed that the pavement condition data obtained from SCANNER surveys represents the latest condition of the network.

The following pavement condition parameters are used in the SCANNER RCI calculation.

- rut depth (transverse profile)
- 3m profile variance (short wavelength longitudinal profile)
- 10m profile variance (long wavelength longitudinal profile)
- texture depth (macrotexture)
- whole carriageway cracking (areas of cracked surface)

In the RCI calculation specification (for each of the defect parameters above) a condition score is calculated based on specified Lower Threshold (LT) and Upper Threshold (UT) levels. If the parameter value is in better condition than the LT, its contribution is zero; if the value is in worse condition than the UT, its contribution is 100. Between LT and UT, the contribution is calculated by linear interpolation using the equation 100 x (UT – parameter value) / (UT-LT). This scoring principle is illustrated in the figure below. Further technical details of the methodology, including the parameters, thresholds and weightings that define the calculation of the RCI can be obtained from the Department for Transport website (www.pcis.org.uk).

Figure 5. Lifecycle of an asset.



In the official specification the overall SCANNER Road Condition Indicator (RCI) score for each 10m subsection is categorised into one of three condition bands; Red, Amber, or Green, as described below.

"RED" - lengths in poor overall condition which are likely to require planned maintenance soon (i.e. within a year or so) on a "worst first" basis (high RCI values). Red lengths have an RCI score of 100 or over.

"AMBER" - lengths where some deterioration is apparent which should be investigated to determine the optimum time for planned maintenance treatment (mid-range RCI values). Amber lengths have an RCI score over 40 and below 100.

"GREEN" - lengths where the carriageway is generally in a good state of repair (low RCI values). Green lengths have an RCI score below 40.

For this HMEP model, five condition bands were introduced, where the official RCI Amber category was further divided into three bands. This enables to distinguish between sections that are nearing the Very Poor band and sections that have just tipped over the Good band into Amber. The five condition banding criteria are shown below. The Very Poor proportions in the Classified Networks are the 130-01 (Principal Roads, A) and 130-02 (Non-principal Roads, B and C) National Indicators.

Table 2. SCANNER classified road condition indicator categories.

HMEP Model Category	SCANNER RCI Category	SCANNER RCI Score Band
Very Good (VG)	Green	<40
Good (G)	Amber (Lower)	>=40 and <60
Fair (F)	Amber (Mid)	>=60 and <80
Poor (P)	Amber (Upper)	>=80 and <100
Very Poor (VP)	Red	>=100

Since 2008, the assessment of condition of unclassified roads in England has been provided by the Coarse Visual Inspection (CVI) surveys. The CVI is a coarse, rapid survey, usually carried out from a slow-moving vehicle, which allows a large part of the road network to be assessed each year.

The CVI was adopted as the only method of reporting best value performance indicators (BVPI) in England on unclassified roads in 2002 (BV97b). The BVPI for the condition of unclassified roads from CVI surveys was renamed BV224b in 2005, and not required as a National Indicator since 2008. Nevertheless, many authorities continue to use the surveys as a routine inspection method on unclassified roads, to obtain condition data for maintenance planning.

BV224b uses the defect lengths to determine the proportion of the (surveyed) length of the unclassified network for which at least one of the Condition Index thresholds shown in the following table has been equalled or exceeded. The value is reported as the total length exceeding the thresholds divided by the total length of unclassified carriageway network surveyed, expressed as a percentage.

Table 3. Coarse Visual Inspection condition thresholds.

CVI Condition Index	Threshold Value
Structural CI	85
Edge CI	50
Wearing Course CI	60

For this HMEP model for Unclassified Roads, three condition bands were introduced, where the official RCI Red sections remained the same, but the non-Red sections were divided into Amber and Green using the criteria shown below. For the Unclassified model the condition bands were named Red/Amber/Green (not Poor/Fair/Good) so that they do not get mixed up with the classified model condition bandings. The Red proportion in the Unclassified Network is the BV224b National Indicator.

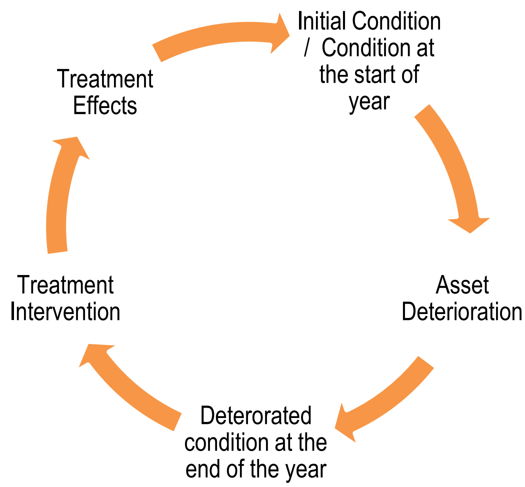
Table 4. SCANNER unclassified condition indicator categories.

SCANNER RCI Category	SCANNER RCI Score Band
Red	Structural CI >=85, Or Edge CI >=50, Or Wearing Course CI >=60
Amber	If section is not already in Red band Structural CI between 0 and 85, Or Edge CI between 0 and 50, Or Wearing Course CI between 0 and 60
Green	If section is not already in Red or Amber band Structural CI = 0, Or Edge CI = 0, Or Wearing Course CI = 0

4.1.4 Treatments, Budgets and Performance Targets

For each homogeneous asset group, a set of treatments can be defined, together with provisional unit cost. It is important to understand what effect each treatment will have on the asset. For example, deep in-situ recycling of a carriageway would be expected to reset the condition from very poor to very good, while surface dressing the carriageway may only transfer road sections into the amber condition.

Figure 6. Sequence deterioration, treatment intervention and treatment effects.



Similarly, budget constraints for each treatment type can be associated to homogeneous asset groups and performance targets can be set on each condition band in a homogeneous asset group

4.1.5 Transition Probability Matrices

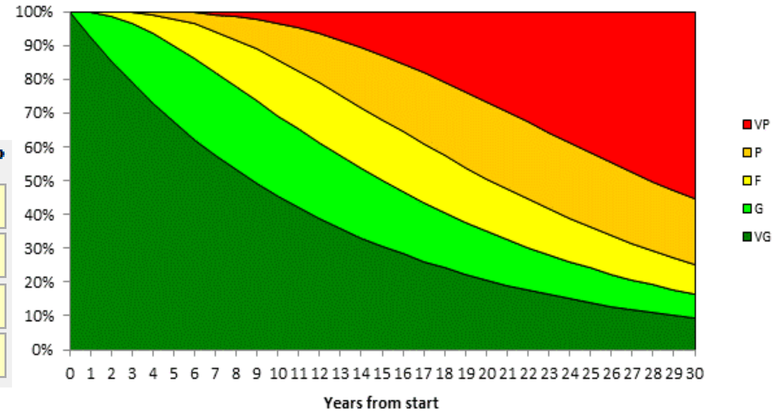
Transition Probability Matrices (TPMs) define the deterioration rates / behaviour of Homogeneous Asset Groups. The matrices below show, for each homogeneous asset group, the probability of road sections in a particular condition band in a given year moving on to a poorer condition band in one-year cycle of deterioration. To understand the numbers in the matrices, the adjacent graphs are provided to illustrate the effect of the TPM deterioration rates. The graphs show the scenario where 100% of the asset group is in "Very Good" condition in Year 0. Then, assuming no maintenance has been undertaken in the year, the expected yearly network condition distribution is plotted for Year 1. Likewise, expected condition distributions for Year 2, 3, 4, and so on, up to 30 have been plotted against each year.

These demonstrate the principle of varying rates of deterioration resulting in varying condition distributions during the 30-year analysis period, and provide an indication of life expectancy and characteristics of deterioration, by each asset group used in the model.

Principal Roads, A-Class

Figure 7. Deterioration Model for SCANNER: Urban strategic routes and main distributors

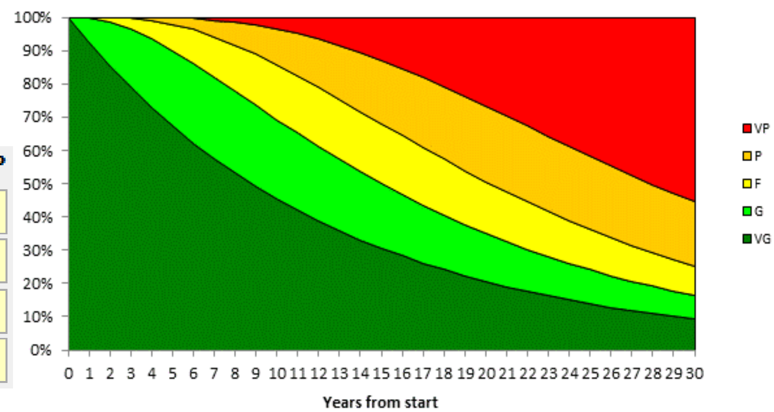
	-> VG	-> G	-> F	-> P	-> VP
VG	0.924	0.076	0	0	0
G		0.828	0.172	0	0
F			0.797	0.203	0
P				0.868	0.132



Non-Principal Roads, B-Class

Figure 8. Deterioration Model for SCANNER: Urban secondary distributors.

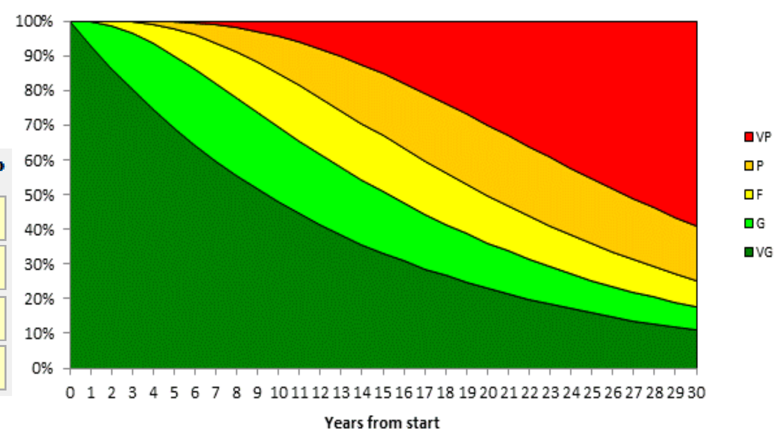
	-> VG	-> G	-> F	-> P	-> VP
VG	0.929	0.071	0	0	0
G		0.814	0.186	0	0
F			0.775	0.225	0
P				0.846	0.154



Non-Principal Roads, C-Class

Figure 9. Deterioration Model for SCANNER: Urban link roads.

	-> VG	-> G	-> F	-> P	-> VP
VG	0.937	0.063	0	0	0
G		0.796	0.202	0.002	0
F			0.756	0.244	0
P				0.88	0.12



<u>Unclassified Roads, U-Class</u>

Figure 10. Deterioration Model for SCANNER: Urban link roads

	-> GRN	-> AMB	-> RED
GRN	0.95	0.04	0.01
AMB		0.94	0.06

4.1.6 Lifecycle Model Outputs

The HMEP lifecycle planning toolkit does not produce a programme of identified road sections for repair, but it does produce the following outputs:

- condition by year (and condition graph)
- work quantity (and work quantity graph)
- expenditure by condition (and expenditure by condition graph)
- areas or asset quantities by year

Different scenarios can be run to provide graphs describing the outputs of “Do Nothing”, “Steady State”, Budget Constraint” and Performance Target”. For example, in Figure 11 “Do Nothing” scenario below, the proportions of assets in the very poor condition band increases with time. This illustrates the impact of not carrying out any treatment interventions on the road network that was modelled.

Figure 11. “Do Nothing” Scenario.

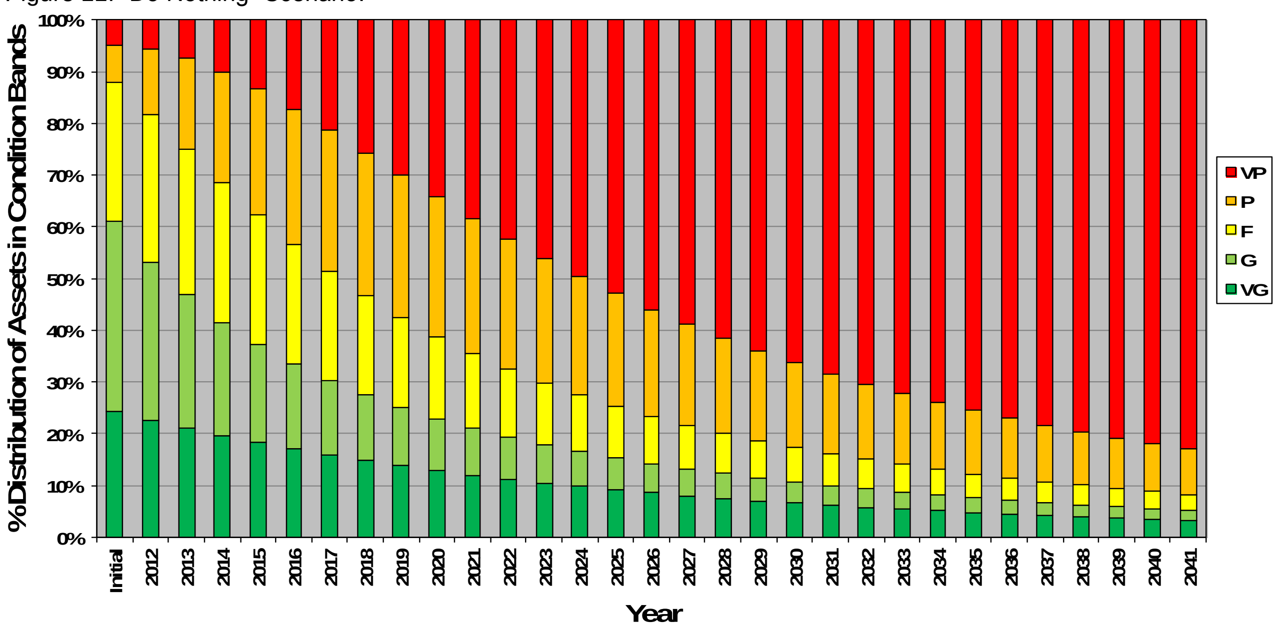
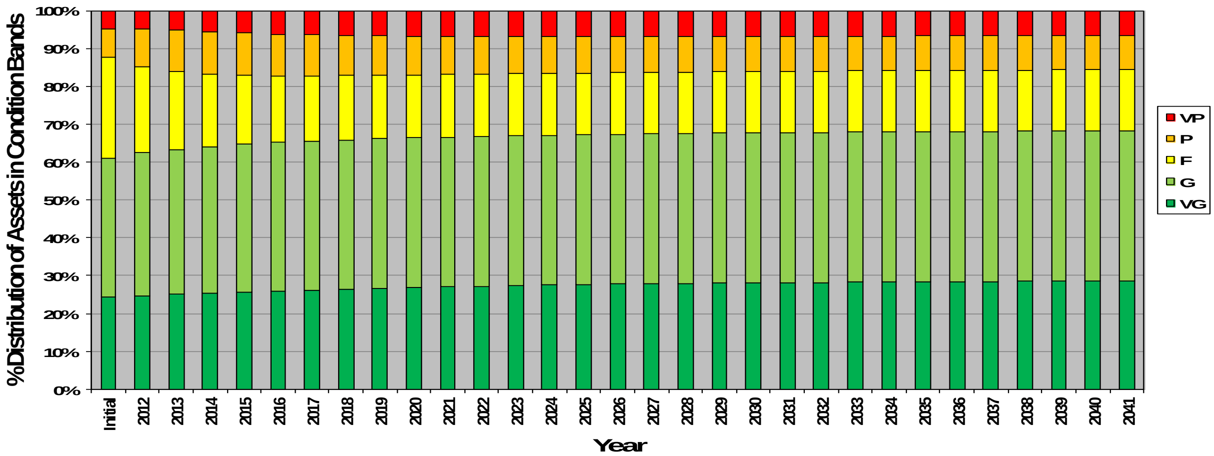
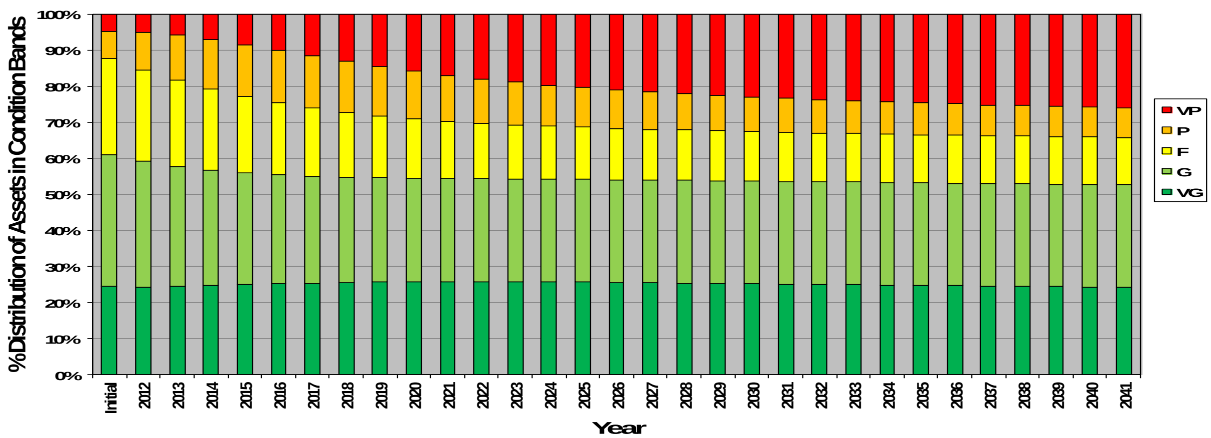


Figure 12. "Steady State" Scenario.



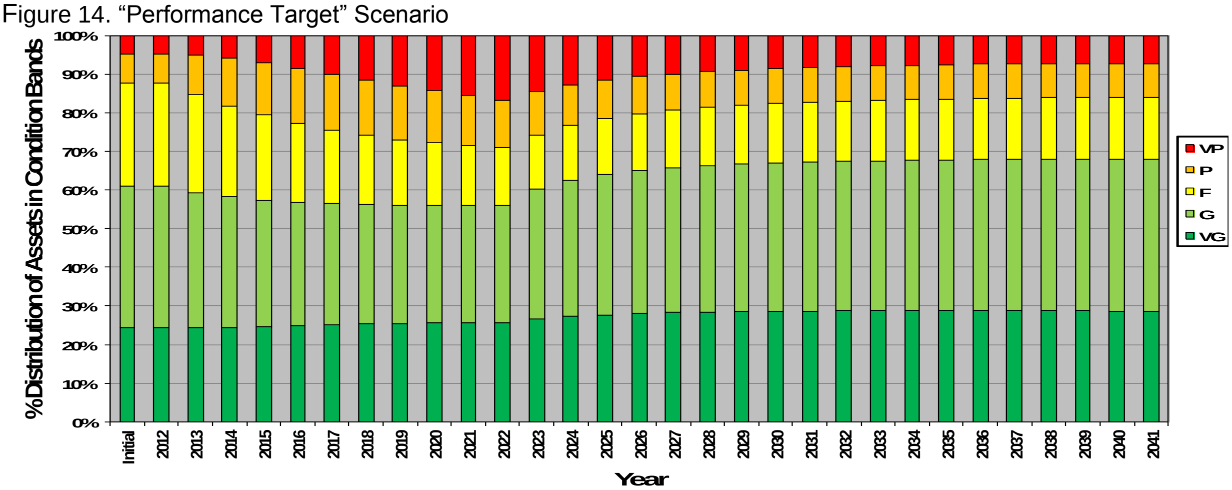
In the "Steady State" scenario above, budgets are not set, and sufficient money is spent on treatment to keep the asset from deteriorating further.

Figure 13. "Budget Constraint" Scenario.



In the "Budget Constraint" scenario above, intervention treatments keep assets in the good and very good condition at the expense of assets in the fair, poor and very poor conditions.

Figure 14. "Performance Target" Scenario



In the "Performance Target" scenario above, funding is made available to improve the asset into the good condition.

Figure 15. Poor or very poor asset condition by analysis scenario.

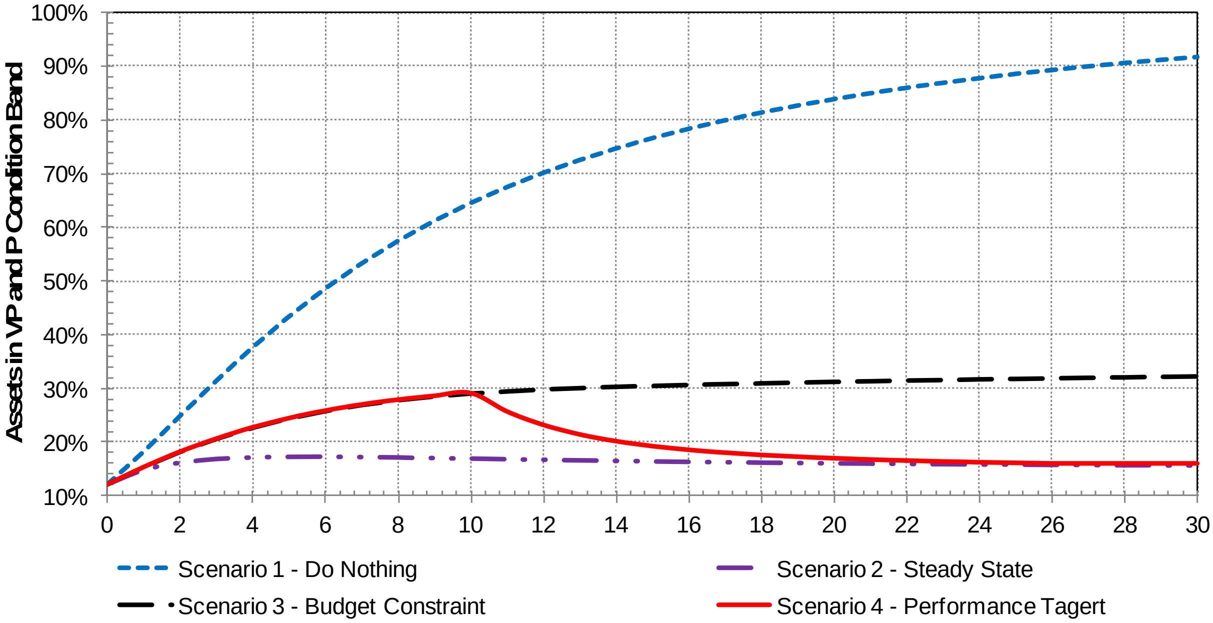


Figure 15 above compares the different scenarios predicted by the transition probability matrices. In the "Do Nothing" scenario, the percentage of assets in the poor and very poor condition increases rapidly during the first ten years, then slowing up until approximately 92% of assets are in the poor condition by the end of the thirty year model period.

In the "Steady State" scenario for this example, the percentage of assets in the poor and very poor condition levels out at around 13% indicating that the budget is sufficient to maintain the assets in their current condition.

In the "Budget Constraint" scenario, assets deteriorate for the first twenty years until 32% or so are in the poor or very poor condition. Thereafter, there is little further deterioration, indicating that the budget allocated is sufficient to maintain the remaining assets.

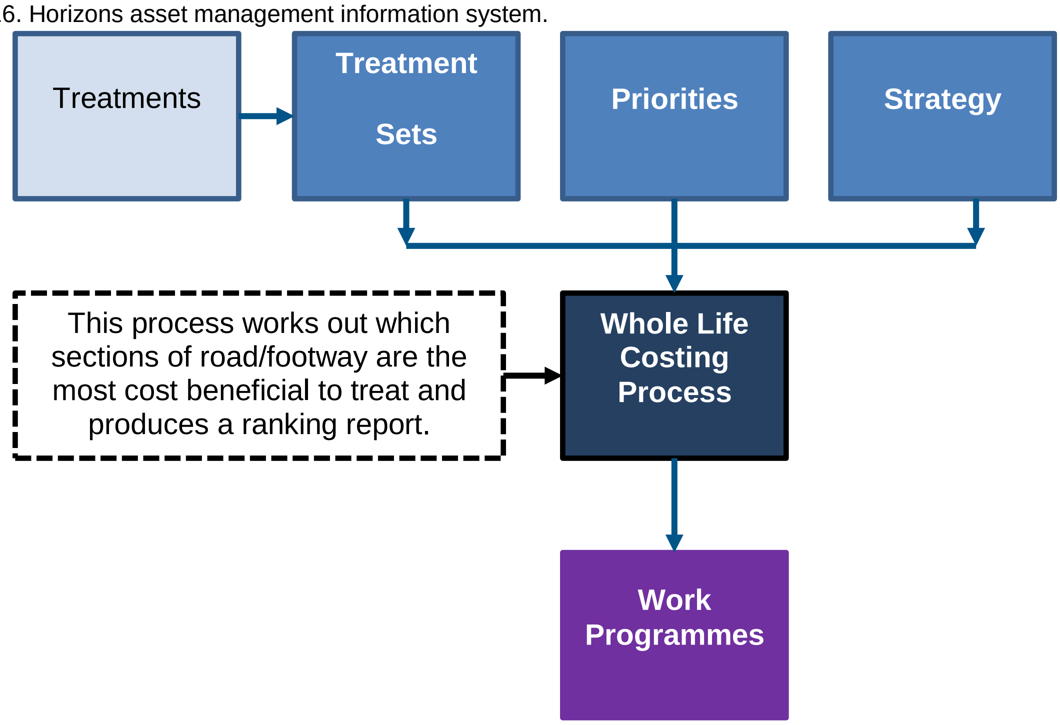
In the "Performance Target" scenario, assets deteriorate at the same rate as the Budget Constraint scenario for the first ten years, then a performance target strategy is adopted to reduce the assets in poor or very poor condition back down to the original 13%. This indicates that the budget is sufficient to reduce the number of assets in poor and very poor condition back to the initial levels and thereafter prevent further deterioration.

4.2 Horizons Asset Management Information System

The 'Horizons' Asset Management Information software package is being utilised to adopt the Whole Life Costing approach to prepare and select an investment programme based on condition and replacement requirements. Horizons requires the following parameters:-

- **Treatment Costs**: These are defined by Southwark and tailored to meet our needs as Horizons allows for total flexibility in the treatments that can be defined.
- **Treatment Sets:** Treatments can be grouped together into a 'Set' for use within the whole costing module. This grouping of treatments can allow for a hierarchical method of determining the priority of treatment.
- **Local Priorities:** Local priorities, relevant to Southwark, can be imported into Horizons and made available for the whole cost processing, these currently include:-
  - Cycle Network
  - Priority Bus Network
  - Category 1 & 2 Defects (numbers of defects are apportioned by the length of road or footway)
  - Claims
- **Strategies:** Different strategies can be defined and then used within the whole life costing process, there are two types of strategy:-
  - Budgetary: Budgets can defined and set to cover a number of years.
  - Condition Data: Targets can be set to improve condition data over a number of years.
- **Work Plans:** The final stage where all the parameters are combined together and submitted into the whole life costing process to produce work programmes.

Figure 16. Horizons asset management information system.



The following tables contain the parameters used within Horizons for whole life costing works programming.

Table 5. A, B and C Road Treatments, Costs and Triggers

Treatment – Description of works
Treatment Cost – typical rate per square metre to undertake works.
Condition Trigger – condition threshold used to trigger remedial works (see Treatment Triggers Table)

Treatment	Treatment Cost (m^2)*	Rule	Condition Trigger
Renewal (rebuilding)	£126	9	Ride Quality (LV3)
			Rutting
		10	Ride Quality (LV10)
			Rutting
		12	Rutting
Structural Surfacing (thick inlay)	£44	7	Cracking Whole Carriageway
			Rutting
		8	Ride Quality (LV10)
			Ride Quality (LV3)
			Rutting
Thin surfacing (resurfacing)	£19	4	Ride Quality (LV3)
			Rutting
		5	Ride Quality (LV3)
			Texture
		6	Cracking Whole Carriageway
			Ride Quality (LV3)
Local Patching	£80	1	Cracking Whole Carriageway
			Texture
		2	Ride Quality (LV3)
			Rutting
		11	Texture

*2017/18 Base Rates

Table 6. Unclassified Roads Treatments, Costs and Triggers

Treatment – Description of works
Treatment Cost – typical rate per square metre to undertake works.
Condition Trigger – condition threshold used to trigger remedial works (see Treatment Triggers Table)

Treatment	Treatment Cost (m^2)*	Rule		Condition Trigger
Renewal	£83	1		Structural
Structural surfacing	£40	2		Structural
Thin Surfacing	£15	3		Surface Properties
		4		Wearing Course
Local Patching	£56	5		Wearing Course

*2017/18 Base Rates

Table 7. Footway Banding and Treatments

Treatment – Description of works
Treatment Cost – typical rate per square metre to undertake works.
Condition Trigger – condition threshold used to trigger remedial works (see Treatment Triggers Table)

Remedial Treatment	Treatment Cost (£m^2)*		Treatment/Condition Band
Reconstruct bituminous surface. / Renew flags/blocks	£81		Sections of the network which require structural maintenance.
Resurface bituminous surface. Relay flags/blocks	£34		Sections of the network which have reached the threshold at which surface treatment is required.
Consider for patching/localised repair.	£47		Sections of the network which have reached the threshold at which localised treatment or patching is required.

*2017/18 Base Rates

Table 8. Local Priorities

Layer – Graphical Interface System (GIS) Layer
Item Style Rule – Display rule for GIS
Weighting – weighting applied to local priority, higher the number the greater the weighting

Layer	Item Style Rule	Weighting
Bus Route Bands	Heavy (20+ Routes)	0.80
Bus Route Bands	Medium (10-19 Routes)	0.60
Bus Route Bands	Light (<10 Routes)	0.40
Cycle Route	Overlay	0.30
Cat1 Defects (1 hour)		0.80
Cat2 Defects (24 hour)		0.60

Table 9. Treatment Triggers

This is the rationale for aggregating the condition of the assets into a defined number of Condition Bands when using Horizons.

			High	Priority		Low
Defect		**Measurement**	**Red**	**Amber / Red**	**Amber**	**Green**
A B and C Roads						
Cracking Whole Carriageway	A	Percentage Area	2	1.1	0.15	-
	B		2	1.1	0.15	-
	C		2	1.1	0.15	-
Ride Quality (LV10)	A	mm^2	75	56	38.5	21
	B		80	71	49	27
	C		100	93	64	35
Ride Quality (LV3)	A	mm^2	20	10	7	4
	B		25	13	9	4
	C		25	13	9	7
Rutting	A	mm	30	20	15	10
	B		30	20	15	10
	C		30	20	15	10
Texture	A	mm	0.3	0.45	0.6	-
	B		0.3	0.45	0.6	-
	C		0.3	0.45	0.6	-
Unclassified Roads						
Structural			95	85	-	0
Wearing Course			95	60	25	0
Surface Properties			95	-	40	0

The outcome works programme from this asset management model is reproduced in the HIAMP Addendum each year.