

**UK** ROADS LIAISON GROUP

# **LIFECYCLE PLANNING TOOLKIT INCORPORATING DEFAULT CARRIAGEWAY DETERIORATION MODELS**

**QUICK START GUIDANCE**



**OCTOBER 2019**

### SCOPE

This document has been commissioned by the UK Roads Liaison Group Asset Management Board, with support from Transport for London and the Department for Transport and supports the use of the HMEP Lifecycle Planning Toolkits.

The Guidance has been developed by Atkins with feedback incorporated from the UKRLG AM Board.

This document is a summary version of the User Guidance of the HMEP Lifecycle Planning Toolkits. Its purpose is to provide the user with in hand guidance on the input tabs of the Toolkits and increase awareness of the use of each tab.

This document does not supersede the detailed user guidance.

### ATKINS PROJECT TEAM

John Paterson

Elena Martinez

Iosif Filosof

Rogelio Jante

### COMMENTS & FEEDBACK

The UK Roads Liaison Group would welcome any comments and feedback on this User Guidance for the Lifecycle Planning Toolkits, so that it may be reviewed, improved and refined to give the sector the best support possible. To do so, please email [ukrlg@ciht.org.uk](mailto:ukrlg@ciht.org.uk) with the header, "Feedback on the User Guidance for the Lifecycle Planning Toolkits".

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# 1. INTRODUCTION

## 1.1 ABOUT THE TOOLKITS

The Toolkits (Carriageways, Footways and Other Assets) are intended for use by local highway asset management engineers to support strategic level planning decisions including the following:

- Assessing impact of different levels of funding on asset performance and asset maintenance needs;
- Investigating current and future levels of funding required to achieve a given condition or performance target for the asset;
- Identifying the levels of funding required to minimise whole life costs; and
- Allocating resources to assets and Treatment Types to manage whole life costs.

The Toolkit produces long-term estimates of expenditure and associated asset performance. These estimates can be used to determine the likely performance of the asset under budget constraints or, alternatively, to determine the budget required to support a target asset performance.

# 2. POPULATING THE TOOLKIT

The following worksheets should be populated prior to running the Toolkit:

- 0 - Input sheet:
  - Used for setting up the Toolkit.
- 1 - Homogeneous Asset Groups:
  - Inventory data and condition distribution for each asset group at the start of the year of analysis need to be loaded into this worksheet.
- 2 - Transition Matrices:
  - This worksheet is used to define, edit and view Transition Probability Matrices (TPMs), which are used in the Toolkit to model the deterioration of assets.
- 3 - Treatment Effects & Costs:
  - Treatment Effects and Treatment Unit Costs are specified in this worksheet.
- 4 - Treatment Strategies:
  - The proportion of assets to be treated in each year by a particular Treatment is specified in this worksheet.
- 5 - Budget:
  - Budget options can be defined for each Treatment in this worksheet.
- 6 - Performance Targets:
  - Performance Targets can be defined for each Treatment in this worksheet.
- 7 - Scenario
  - Brings together inputs of all previous sheets and sets up the analysis.

## 2.1 INPUT SHEET

The user should enter the following information and populate the coloured boxes as illustrated in Figure 1:

- Start Year;
- Analysis Period (minimum 10 years);
- Output Graph Type;
- Number of Condition Bands and their description;
- Number of Homogeneous Asset Groups and their name; and
- Number of Treatment Types and their description.

For more detailed guidance please refer to chapter 4.2 to 4.7 of the detailed user guidance document.

**INPUT SHEET**

Analysis period	Condition Bands	Homogeneous asset groups	Treatment Types																																																	
Start Year: 2012	Number of condition bands: 5	Number of homogeneous asset groups: 4	Number of treatment types: 6																																																	
Analysis Period: 20 yrs	<table border="1"> <thead> <tr> <th>Rank</th> <th>Description</th> <th>Short Code</th> </tr> </thead> <tbody> <tr><td>1</td><td>Very Good</td><td>VG</td></tr> <tr><td>2</td><td>Good</td><td>G</td></tr> <tr><td>3</td><td>Fair</td><td>F</td></tr> <tr><td>4</td><td>Poor</td><td>P</td></tr> <tr><td>5</td><td>Very Poor</td><td>VP</td></tr> </tbody> </table>	Rank	Description	Short Code	1	Very Good	VG	2	Good	G	3	Fair	F	4	Poor	P	5	Very Poor	VP	<table border="1"> <thead> <tr> <th>No.</th> <th>Name</th> </tr> </thead> <tbody> <tr><td>1</td><td>Strategic &amp; Main</td></tr> <tr><td>2</td><td>Secondary</td></tr> <tr><td>3</td><td>Link</td></tr> <tr><td>4</td><td>Local</td></tr> </tbody> </table>	No.	Name	1	Strategic & Main	2	Secondary	3	Link	4	Local	<table border="1"> <thead> <tr> <th>No.</th> <th>Description</th> <th>Name</th> </tr> </thead> <tbody> <tr><td>1</td><td>SD</td><td>Surface Dressing</td></tr> <tr><td>2</td><td>MA</td><td>Micro Asphalt</td></tr> <tr><td>3</td><td>MO</td><td>Moderate Overlay</td></tr> <tr><td>4</td><td>MI</td><td>Moderate Inlay</td></tr> <tr><td>5</td><td>DI</td><td>Deep Inlay</td></tr> <tr><td>6</td><td>REC</td><td>Reconstruction</td></tr> </tbody> </table>	No.	Description	Name	1	SD	Surface Dressing	2	MA	Micro Asphalt	3	MO	Moderate Overlay	4	MI	Moderate Inlay	5	DI	Deep Inlay	6	REC	Reconstruction
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5	DI	Deep Inlay																																																		
6	REC	Reconstruction																																																		
End Year: 2031																																																				
Output Graphs																																																				
Graph Type: Bar																																																				

Figure 1: Input Sheet

## 2.2 HOMOGENEOUS ASSET GROUPS

The user should enter the following information and populate the pink boxes as illustrated in Figure 2:

- Length and width of each Asset Group; and
- Initial Condition data for the base year for each asset group; as a percentage in each of the condition bands defined in the “Input Sheet”.

**HOMOGENEOUS ASSET GROUPS**

Show / Hide CAT1 and CAT2 Treatments

Asset Group	Description	Length (m)	Width (m)	Area	Units	Initial Condition					
						% of Asset Group in condition band in base year					
						1	2	3	4	5	
		VG	G	F	P	VP					
1	Strategic & Main	2,926,500	3.50	10,242,750	m <sup>2</sup>	20%	20%	20%	20%	20%	
2	Secondary	2,926,500	3.50	10,242,750	m <sup>2</sup>	20%	20%	20%	20%	20%	
3	Link	2,926,500	3.50	10,242,750	m <sup>2</sup>	20%	20%	20%	20%	20%	
4	Local	2,926,500	3.00	8,779,500	m <sup>2</sup>	20%	20%	20%	20%	20%	

Figure 2: Homogeneous Asset Groups and Initial Condition

For the Other Asset Toolkit, instead of lengths and widths, the user should enter the quantity and the units for each asset group, as illustrated in Figure 3.

Asset Group	Description	Quantity	Units	Initial Condition				
				% of Asset Group in condition band in base year				
				1	2	3	4	5
				VG	G	F	P	VP
1	Lighting Column	2,000	no.	40%	30%	15%	10%	5%
2	Road Studs	85,000	m	50%	30%	15%	5%	0%
3	Safety Fences	4,000	m	80%	15%	5%	0%	0%

Figure 3: Asset Inventory and Initial Condition for Other Assets Toolkit

The user should note that homogeneous asset groups should be inserted in the same order as they appear in their Authority’s network hierarchy (i.e. based on the importance of the asset). This ensures that when the “overall” budget option is used (see section 2.6 of this guide), the treatments are applied following this hierarchy.

For more detailed guidance please refer to chapter 4.8 to 4.10 of the detailed user guidance document.

### 2.3 TRANSITION MATRICES

The user can either apply the default transition matrices or create their own, as illustrated in Figure 5. The “View/Edit Matrix” button can be used to display and edit the existing deterioration profiles. If the user intends to apply the default transition matrices, they are encouraged to use 5 condition bands, as they are created using this assumption. If they intend to apply a bespoke deterioration profile (as is recommended), they may use as many condition bands as the Tool allows. However, please note that the greater the number of bands, the more complex the analysis, and the longer it will take to run the toolkit. If the user has condition data in 3 condition bands (RCI for example), they can refer to the detailed guidance (chapter 4.19), for a suggested process on how they can “translate” this into 5 bands.

To enter a bespoke transition matrix, users can click on the “Add New” button. They can then name and create a deterioration profile which suits their needs.

It should be noted that the default transition matrices are based on network hierarchy and not asset classification and may need to be adjusted to suit local observations. Users of the HMEP Lifecycle Planning Toolkit are encouraged to use models that better reflect local deterioration trends, if such models are available.

Transition matrices are used to determine how much of the asset degrades to a worse condition (due to traffic, weather etc.) in a typical year. This is expressed in terms of starting conditions and destination conditions. In the example below 91% of assets which start in VG condition in Year 0 remain in VG condition in Year 1; whilst 9% will degrade to G condition.

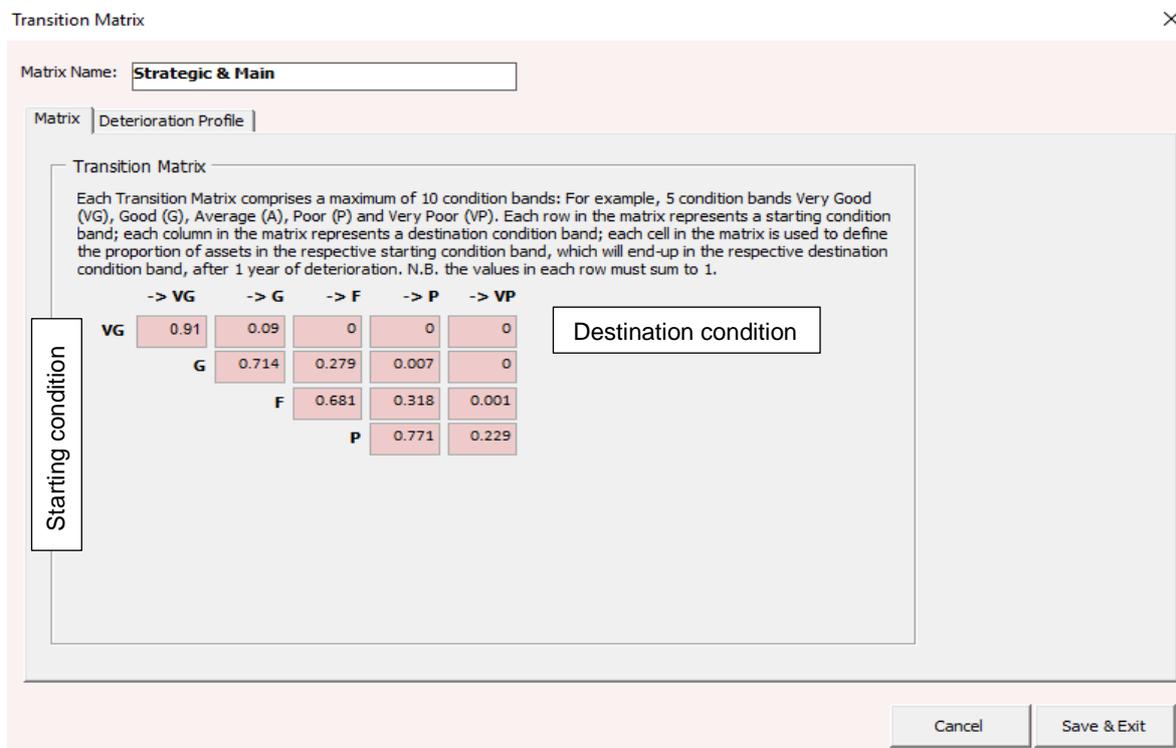


Figure 4: Bespoke Deterioration Profile

## Quick Start Guidance for Lifecycle Planning Toolkit

An automatic validity check is conducted by the Toolkit so that the sum of all condition bands for each matrix equals to 1.

Further guidance is provided in the detailed user guidance document in chapter 4.11 to 4.19.

TRANSITION MATRICES																			
Add New		Copy		Delete		Remove All		View/Edit Matrix											
Matrix Name	YG					Valid ity Chk	G					Valid ity Chk	F			Validity Check	P		Validity Check
	-> YG	-> G	-> F	-> P	-> VP		-> G	-> F	-> P	-> VP	-> F		-> P	-> VP	-> P		-> VP		
Scanner:Strat&Main:Urb	0.32	0.08	0	0	0	OK	0.83	0.17	0	0	OK	0.8	0.2	0	OK	0.87	0.13	OK	
Scanner:Strat&Main:Rur	0.31	0.09	0	0	0	OK	0.71	0.28	0.01	0	OK	0.68	0.32	0	OK	0.77	0.23	OK	
Scanner:Secondary:Urb	0.33	0.07	0	0	0	OK	0.81	0.19	0	0	OK	0.78	0.23	0	OK	0.85	0.15	OK	
Scanner:Secondary:Rur	0.33	0.07	0	0	0	OK	0.81	0.19	0	0	OK	0.78	0.22	0	OK	0.84	0.16	OK	
Scanner:Link:Urb	0.34	0.06	0	0	0	OK	0.8	0.2	0	0	OK	0.76	0.24	0	OK	0.88	0.12	OK	
Scanner:Link:Rur	0.33	0.07	0	0	0	OK	0.77	0.23	0	0	OK	0.72	0.28	0	OK	0.84	0.16	OK	
Scanner:Local:Urb&Rur	0.36	0.04	0	0	0	OK	0.9	0.1	0	0	OK	0.9	0.1	0	OK	0.93	0.07	OK	
CVI:Strategic:Urban	0.31	0.09	0	0	0	OK	0.73	0.27	0.01	0	OK	0.69	0.31	0	OK	0.78	0.23	OK	
CVI:Strategic:Rural	0.31	0.09	0	0	0	OK	0.74	0.25	0.01	0	OK	0.71	0.29	0	OK	0.79	0.21	OK	
CVI:Main:Urban	0.88	0.12	0	0	0	OK	0.74	0.25	0.01	0	OK	0.71	0.29	0	OK	0.78	0.22	OK	
CVI:Main:Rural	0.31	0.09	0	0	0	OK	0.75	0.24	0.01	0	OK	0.71	0.29	0	OK	0.8	0.2	OK	
CVI:Secondary:Urban	0.33	0.07	0	0	0	OK	0.83	0.17	0	0	OK	0.8	0.2	0	OK	0.85	0.15	OK	
CVI:Secondary:Rural	0.33	0.07	0	0	0	OK	0.83	0.17	0	0	OK	0.8	0.2	0	OK	0.86	0.14	OK	
CVI:Link:Urban	0.34	0.06	0	0	0	OK	0.82	0.18	0	0	OK	0.78	0.22	0	OK	0.86	0.14	OK	
CVI:Link:Rural	0.34	0.06	0	0	0	OK	0.82	0.18	0	0	OK	0.79	0.21	0	OK	0.86	0.14	OK	
CVI:Local:Urban	0.34	0.06	0	0	0	OK	0.83	0.17	0	0	OK	0.8	0.21	0	OK	0.87	0.13	OK	
CVI:Local:Rural	0.34	0.06	0	0	0	OK	0.83	0.17	0	0	OK	0.8	0.21	0	OK	0.87	0.13	OK	
Strategic & Main	0.9	0.1	0	0	0	OK	0.9	0.1	0	0	OK	0.9	0.1	0	OK	0.9	0.1	OK	
Secondary	0.9	0.1	0	0	0	OK	0.9	0.1	0	0	OK	0.9	0.1	0	OK	0.9	0.1	OK	
Local	0.9	0.1	0	0	0	OK	0.9	0.1	0	0	OK	0.9	0.1	0	OK	0.9	0.1	OK	
Link	0.9	0.1	0	0	0	OK	0.9	0.1	0	0	OK	0.9	0.1	0	OK	0.9	0.1	OK	

Figure 5: Transition Matrices Sheet

## 2.4 TREATMENT EFFECTS & COSTS

To input the effects of treatments, the user should enter two items of information as illustrated in Figure 6:

- The change in condition as a result of the treatment; and
- The change in asset group as a result of the treatment, if any. This is called the “after-treatment Asset Group” and will be relevant only when a treatment alters the asset (for example when a ‘bituminous replacement’ treatment means flagged footways are replaced by bituminous ones).

Users should also use this sheet to input treatment costs. Different costs can be specified for each asset group (for example, treatments on strategic roads may be more expensive than those on unclassified roads) and for each condition band (for example a pavement in VP condition may require deeper and therefore more costly treatment than one in P condition).

TREATMENTS EFFECTS & COSTS											Treatment Cost (£)					Units (£ per)
No	Asset Group	Treatment	Treatment Details	After-treatment Asset Group	Effect of treatment					Validity Check	1	2	3	4	5	
					1	2	3	4	5							
1	Strategic & Main	1	Surface Dressing	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	m³
		2	Micro Asphalt	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		3	Moderate Overlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		4	Moderate Inlay	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		5	Deep Inlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		6	Reconstruction	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
2	Secondary	1	Surface Dressing	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	m³
		2	Micro Asphalt	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		3	Moderate Overlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		4	Moderate Inlay	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		5	Deep Inlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		6	Reconstruction	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
3	Link	1	Surface Dressing	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	m³
		2	Micro Asphalt	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		3	Moderate Overlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		4	Moderate Inlay	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		5	Deep Inlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		6	Reconstruction	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
4	Local	1	Surface Dressing	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	m³
		2	Micro Asphalt	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		3	Moderate Overlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		4	Moderate Inlay	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	
		5	Deep Inlay	No Change	VG	VG	VG	None	VG	OK	5	5	5	5	5	
		6	Reconstruction	No Change	None	None	None	VG	VG	OK	2	2	2	2	2	

Figure 6: Treatment Effects & Costs Sheet

For further guidance please refer to chapter 4.20 to 4.26 of the detailed user guidance document.

## 2.5 TREATMENT STRATEGIES

Treatment strategies define the treatments that are applied to the network, and in which priority order. If the assets are defined hierarchy wise, both the assets and their treatment strategy should be inserted in priority order as treatments are prioritised based on the order inserted. The toolkit will work its way down the list of steps in each strategy until either a performance target is reached (see Section 2.7) or the budget is exhausted (see Section 2.6).

The user should enter the following information as illustrated in Figure 7:

- The name of the treatment strategy;
- The steps of each treatment strategy and the condition band that particular step is targeting (each treatment strategy may have different number of steps); and
- The % treated (**maximum** percentage of the assets in the condition band).

In the example below, up to 40% of the assets in G condition will be treated (20% by surfacing dressing and 20% by micro-asphalt). The exact % treated will depend on any performance targets or budget constraints specified in the scenario tab.

For example, for scenarios with a performance target, if treating only 30% of the assets in G condition achieves the performance targets specified, 20% of G assets will be treated by surface dressing and 10% by micro-asphalt, and no other assets will be treated.

Alternatively, for scenarios with a budget constraint, if no budget is left after treating 20% of G assets with surface dressing, no other treatments would be performed that year.

For further guidance please refer to chapter 4.27 to 4.31 of the detailed user guidance document.

Add Strategy		Delete Strategy		Add Step		Delete Step						
Serial	Name	Step	Treatment	Condition Band	% Treated	VG	G	F	P	VP		
1	Strat. #1	1	Surface Dressing	G	20%		20%					
		2	Micro Asphalt	G	20%		20%					
		3	Moderate Inlay	F	20%			20%				
		4	Moderate Overlay	F	20%			20%				
		5	Deep Inlay	P	20%				20%			
		6	Reconstruction	VP	20%					20%		
2	Strat. #2	1	Surface Dressing	G	50%		50%					
		2	Micro Asphalt	G	50%		50%					
		3	Moderate Inlay	F	30%			30%				
		4	Moderate Overlay	F	30%			30%				
		5	Deep Inlay	P	40%				40%			
		6	None									

Figure 7: Treatment Strategies Sheet

## 2.6 BUDGET

In all situations the user will run the toolkit with either a budget constraint, or a performance target. If the user does not want to introduce a budget constraint, the budget tab can remain blank.

If a budget constraint is in place, the user should decide whether the constraint can be broken down by specific treatment types and homogeneous asset groups (for example, if a contract or current working practices dictate that £100k/yr is spent on surface dressing on B-roads) or if the budget constraint should apply to all treatments (for example, £5m/yr spent on the network).

Where the budget is broken down by treatment type and homogeneous asset group, the user should enter the following information as illustrated in Figure 8

- The budget constraint for each treatment type (if known) for each budget; and
- Select “Y” or “N” whether or not they want to Roll Over the remaining budget, if any, only to the same homogeneous asset group.

Where the budget is independent of treatment type, the user should add a single line to the budget (selecting any treatment – this will not affect results), ensuring the totals column contains the overall budget (see Figure 9). The user indicates that this is an Overall budget constraint using the drop-down menus in the Scenario tab (this is further explained in section 2.8).

It should be noted that choosing the Overall budget constraint will cause the overall budget to be applied amongst all homogeneous groups (i.e. if the overall budget is £405k and there are 3 homogenous groups, the overall spend will be £405k, not £3\*405k). This budget will prioritise the asset groups based on the order in which they are inserted, so this should be done according to hierarchy, as mentioned in chapter 2.2. If the user intends to allocate the available budget differently, they can do so by creating different % of treated assets in the treatment strategies tab.

For further guidance please refer to chapter 4.32 to 4.37 of the detailed user guidance document.

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Add Budget		Delete Budget				
Serial	Name	Treatment	Budget constraints (£ 000s)	Roll Over	Total (£ 000s)	
1	£405k/year	Surface Dressing	35	N	405	
		Micro Asphalt	54	Y		
		Moderate Overlay	43	Y		
		Moderate Inlay	133	Y		
		Deep Inlay	129	Y		
		Reconstruction	11	Y		
2	£74k/year	Surface Dressing	11	N	74	
		Micro Asphalt	18	N		
		Moderate Overlay	9	N		
		Moderate Inlay	10	N		
		Deep Inlay	18	N		
		Reconstruction	8	N		
3	£45k/year	Surface Dressing	2	N	45	
		Micro Asphalt	4	N		
		Moderate Overlay	2	N		
		Moderate Inlay	16	N		
		Deep Inlay	10	N		
		Reconstruction	11	N		
4	£62k/year	Surface Dressing	5	Y	62	
		Micro Asphalt	8	Y		
		Moderate Overlay	6	N		
		Moderate Inlay	8	N		
		Deep Inlay	26	N		
		Reconstruction	9	N		

Figure 8: Budget Sheet

### BUDGETS

Add Budget		Delete Budget				
Serial	Name	Treatment	Budget constraints (£ 000s)	Roll Over	Total (£ 000s)	
1	£405k/year	Surface Dressing	405	N	405	
		Micro Asphalt		N		
		Moderate Overlay		Y		
		Moderate Inlay		N		
		Deep Inlay		N		
		Reconstruction		N		

Figure 9: Budget Sheet for Overall Budget Constraint

## 2.7 PERFORMANCE TARGETS

In all situations the user will run the toolkit with either a budget constraint, or a performance target. If the user does not want to introduce a performance target, this tab can remain blank.

If a performance target is in place, the user should enter the following information as illustrated in Figure 10:

- The name of each performance target;

## Quick Start Guidance for Lifecycle Planning Toolkit

- The performance indicator and its expression (selected from the drop-down list); and
- The performance target (%).

As shown in Figure 10, the user can either add or delete a performance target by clicking on the relevant button.

PERFORMANCE TARGETS				
Add Performance Target		Delete Performance Target		
No.	Name	Performance Indicator	Expression	Performance Target (%)
1	VP&P<=5.7%	VP & P	<=	6%
2	VP&P<=9.3%	VP & P	<=	9%
3	VP&P<=6.8%	VP & P	<=	7%
4	VP&P<=27%	VP & P	<=	27%

Figure 10: Performance Target Sheet

For further guidance please refer to chapter 4.38 to 4.44 of the detailed user guidance document.

## 2.8 SCENARIO

The user should enter the following information by selecting from the drop-down lists, as illustrated in Figure 11:

- The name of each scenario;
- The transition matrix (from the drop-down list);
- The treatment strategy (from the drop-down list); and
- The budget constraint or the performance target (from the relevant drop-down list).

SCENARIOS												
Run Analysis ...		Clear selected row(s)	Copy selected cell(s)	Paste copied cell(s)								
No.	Homogeneous Group	Scenario Name	Criteria	1	2	3	4	5	6	7	8	
				2012	2013	2014	2015	2016	2017	2018	2019	
1	Strategic & Main	Scenario 4 (Budget Constraint and Performance Target)	Transition matrix	Strategic & Main	Strategic & Main	Strategic & Main	Strategic & Main	Strategic & Main	Strategic & Main	Strategic & Main	Strategic & Main	Strategic & Main
			Treatment strategy	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Do Nothing	Do Nothing	Do Nothing	
			Budget constraint	£405k/year	£405k/year				£405k/year	£405k/year	£405k/year	
			Performance target			VP&P<=5.7%	VP&P<=5.7%	VP&P<=5.7%				
2	Secondary	Scenario 4 (Budget Constraint and Performance Target)	Transition matrix	Secondary	Secondary	Secondary	Secondary	Secondary	Secondary	Secondary	Secondary	Secondary
			Treatment strategy	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Do Nothing	Do Nothing	Do Nothing	
			Budget constraint	£405k/year	£405k/year				£405k/year	£405k/year	£405k/year	
			Performance target			VP&P<=9.3%	VP&P<=9.3%	VP&P<=9.3%				
3	Link	Scenario 4 (Budget Constraint and Performance Target)	Transition matrix	Link	Link	Link	Link	Link	Link	Link	Link	Link
			Treatment strategy	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	
			Budget constraint	£405k/year	£405k/year							
			Performance target			VP&P<=6.8%	VP&P<=6.8%	VP&P<=6.8%	VP&P<=6.8%	VP&P<=6.8%	VP&P<=6.8%	
4	Local	Scenario 4 (Budget Constraint and Performance Target)	Transition matrix	Local	Local	Local	Local	Local	Local	Local	Local	Local
			Treatment strategy	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Strat & Main	Do Nothing	Do Nothing	Do Nothing	
			Budget constraint	£405k/year	£405k/year							
			Performance target			VP&P<=27%	VP&P<=27%	VP&P<=27%	VP&P<=27%	VP&P<=27%	VP&P<=27%	

Figure 11: Scenario Sheet

The user should note that one of the budget constraints from the drop-down list is “Overall”, which is the sum of all the budget constraints. Also, the scenario sheet can be completed with the help of the relevant buttons for copy, clear and paste functions

When all the sheets are completed, the user should press the “Run Analysis” button. If the toolkit cannot run with the information provided, an error message will appear stating where the error is, so the user can address it. The user should note that the only input cells that may be left blank prior to running the analysis should either be the budget constraint or the performance target tab, depending on the analysis the user wants to conduct.

If the user does not have all the data required to run the analysis, reasonable assumptions should be made; please refer to the relevant case studies.

When the analysis is complete the output tabs will display the results of the analysis.

For more detailed guidance please refer to chapter 5 of the detailed user guidance document.

### 3. ANALYSIS OUTPUTS

The following outputs are produced by the Toolkit:

- Condition by Year.
- Condition Graph.
- Work Quantity.
- Work Quantity Graph.
- Expenditure by Condition Band.
- Expenditure by Condition Graph.
- Expenditure by Treatment
- Expenditure by Treatment Graph
- Areas or Asset Quantities by Year.

The detailed list of the outputs of the Toolkit is contained in the full guidance document.

In all the tabs with graphs the user can make use of the drop-down lists to select which asset group to display, as illustrated in Figure 12. In Sheet 13- Expenditure by Condition Graph, the user can “Select/View Asset Group” by clicking the relevant button as depicted in Figure 13.

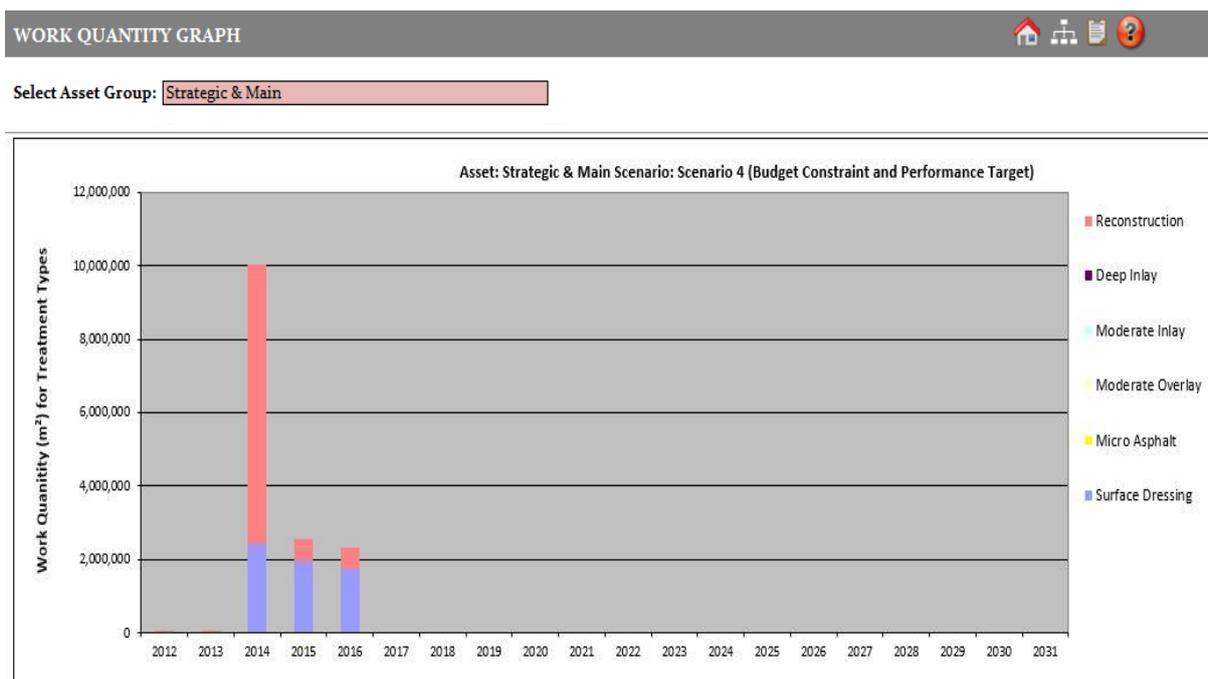


Figure 12: Work Quantity Graph

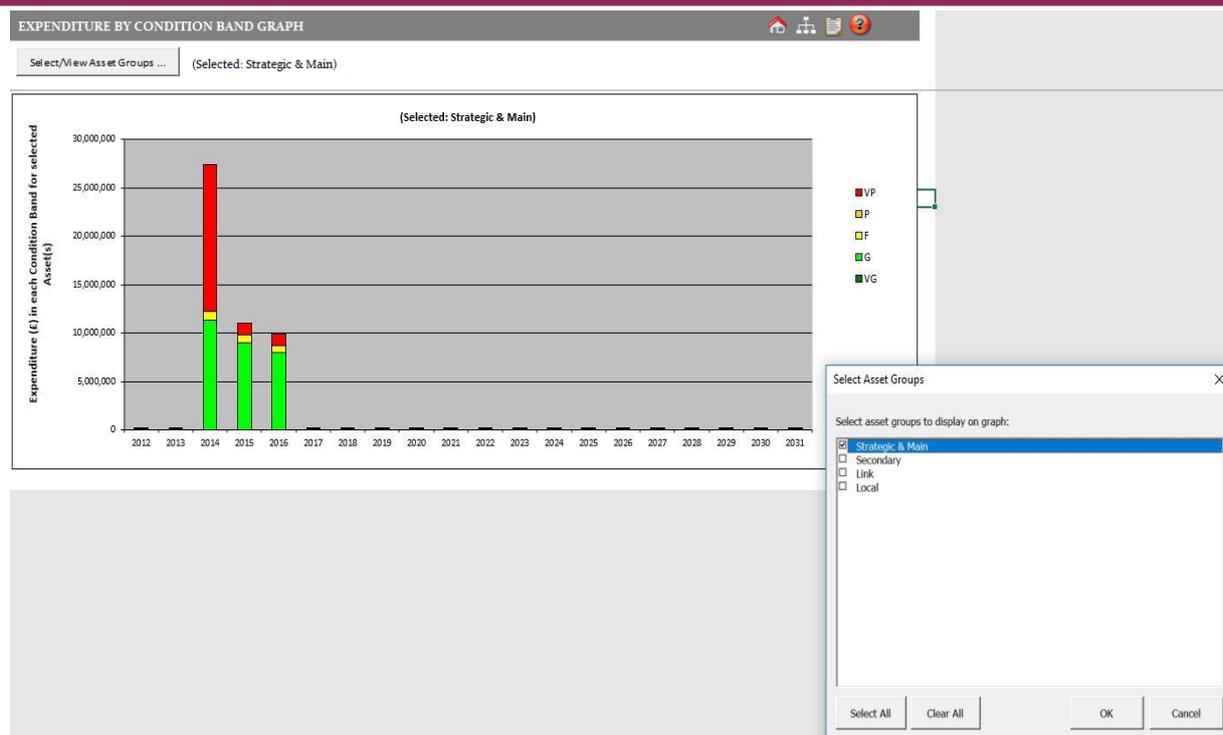


Figure 13: Expenditure by Quantity Graph

For further guidance please refer to chapter 6 of the detailed user guidance document.

## 3.1 EXPORTING THE OUTPUTS

All tabulated outputs can be exported to Excel and Word for further analysis or to create bespoke reports. Graphs are exported as images. Outputs can be exported by selecting the desired output worksheet and  click the button  located on the top right of the worksheet to copy the contents of the worksheet to the Windows Clipboard.

