6. Examining the Financial and Non-Financial Case for Maintenance

6.1 Introduction

This part of the report explains the evolution of a survey pro-forma which could be used to assess the costs of maintenance over time and the potential repairs should maintenance not be pursued. The section considers a number of issues regarding the assessment of future repair and maintenance costs including:

- the accuracy of maintenance costs and life span predictions;
- the feasibility of assessing the costs of ignoring regular inspections and preventative maintenance;
- sensitivity analysis to cater for differing views regarding future costs and life spans;
- a simple method for calculating inflation and the implications of borrowing or saving for future maintenance work;
- a discussion regarding the evaluation of cultural heritage.

This remainder of this part of the report is divided into four sections.

Section 6.2 explains the evolution of the property survey pro forma and our assessment of predicting the financial costs caused by ignoring regular inspections and preventative maintenance.

Section 6.3 discusses some general issues relating to costs and life cycles, and briefly examines how sensitivity analysis can be applied to the spreadsheet projections. It also shows how inflation, investment and borrowing calculations can be added to the spreadsheet.

Section 6.4 is a more discursive examination of how we can place a value on cultural heritage.

Section 6.5 draws overarching conclusions about the financial and non-financial case for maintenance.

6.2 Evolution of the survey pro-forma

6.2.1 Introduction to the design of the survey pro forma

The Faculty of the Built Environment has extensive experience in stock condition surveys, mostly carried out for housing associations. Our work in this area has partly been funded by Housing Corporation Innovation and Good Practice Grants and partly through consultancy work.

Housing Associations have, in the past, been eligible for Major Repairs funding from the Housing Corporation. In recent years, however, they have increasingly had to rely on their own financial reserves, and their ability to borrow. At the same time the Housing Corporation has applied more stringent standards regarding property management. Most housing

associations have responded to these challenges by developing long-term strategic business plans which acknowledge the need for extensive elemental renewals and maintenance over a 30 year period. The business plans are informed by regular stock condition surveys which generally include assessments of:

- catch-up repairs;
- elemental renewals;
- potential improvements.

The condition surveys vary from association to association but, in the main, address three basic questions:

- which elements require expenditure?;
- when is the expenditure required?;
- how much expenditure is required?.

We have adapted this approach for the maintenance management of historic buildings Recognising the need to adopt generally accepted conservation principles, we have tried to include in the survey pro forma a means of:

- emphasising the importance of regular building inspections;
- assessing the costs of ignoring regular inspections and preventative maintenance.

Six historic buildings were inspected (Figure 6.1). These were selected to represent a fairly wide spectrum of the UK's historic buildings.

Figure 6.1: The six historic buildings used in this research

To help and advise us with regard to a number of issues relating to historic buildings we drew on the knowledge and expertise of two specialists, one a Chartered Surveyor formerly responsible for Royal Historic Palaces, and the other an expert in the construction, repair and conservation of traditional timber buildings.

6.2.2 Survey 1: 1 Royal Crescent, Bath.

The first survey was based on the practice adopted by many Registered Social Landlords and includes:

- a 30 year cost projection;
- the cost of repairing or renewing all elements which will need attention within the 30 year profile;
- the cost, highlighted in gold, of inspecting elements where we felt that work was not required but where there was a degree of uncertainty, and therefore a degree of risk;
- confirmation where no work is envisaged to assist third party validation of the surveys;
- general comments to 'jog' the memory or to aid other surveyors on subsequent visits. Further comments were included with the linked photographs (see Appendix 5);
- provision for painting and other cyclical work which would be carried out as a matter of routine, not as a result of a building inspection;
- 'catch-up repairs' or 'backlog maintenance' in Year 0.

The first pro-forma used in survey 1 is shown in Table 6.1

Table 6.1: 1 Royal Crescent, Bath

Address	1 Royal Crescent
Date	October 17th 2002

Element	**0**	**1**	**2**	**3**	**4**	**5**	**6 to 10**	**11 to 15**	**16 to 20**	**21 to 25**	**26 to 30**	**No work Required**	**Comments**
Roof structure						60						Y	
Coverings rear										5000			Artificial slate
Coverings front												Y	Natural slate
Slate hanging						20						Y	
Parapets		200				20							Minor patching to balusters
Dentil cornice/string course		100										Y	Some signs of decay and blistering curre
Chimney	700												Repair flaunching, part re-render
Skylight						25		1200					Rust to glazing supports
Flashings												Y	
Wall structure												Y	
Windows												Y	
Doors												Y	
Railings	500												Decayed string course over corbel.
Courtyard		30				200							Water damage (minor) to courtyard retai
Painting					10000		10000	10000	10000	10000	10000		
Totals	£1,200	£330	£0	£0	£10,000	£325	£10,000	£11,200	£10,000	£15,000	£10,000		
										Overall	**£68,055**		

Observations from the first survey

- The first model was the simplest looking only at current and likely maintenance requirements over the period.

- We had some discussion whether the costs of recommended future inspections should include the potential repair costs. The £100 in Year 1 (shaded in gold) is an assessment of inspection cost only. We did not foresee any work but felt an inspection would minimise any risk of premature failure. An inspection will allow a further assessment to be made of the cornice and will enable a comparison of condition based on our photographic archive. In addition, we were keen not to specify work, where possible, because of concern with the conservation principle of minimal intervention. It also recognises the inevitable budgetary constraints. On the other hand we did feel that work was needed to the parapets in year 1, hence the inclusion of £200.

- Where costs are included they represent the earliest point at which an element may need maintenance. It is envisaged that at this point the element at risk would be re-inspected. In many cases routine inspection, i.e. every 3, 4 or 5 years, will monitor elements with a long life span. For example, we felt that the rear roof will cost £5,000 at present value and will not need any attention until year 21. However, we would assume that routine inspections would monitor its condition and, if necessary, reschedule it.

- In this particular example the elements were in good condition and we felt there was no requirement for a general inspection other than as indicated in year 1.

- Observations about the accuracy of costs, life spans and issues of consistency are discussed in Section 6.3.

- No attempt was made to assess the financial costs of premature failure or the financial consequences of ignoring the suggested maintenance intervention.

6.2.3 Survey 2: St James Church, Southstoke.

The second survey developed the basic pro-forma used in the first survey as follows.

- We included a separate column showing where individual elements require inspections. We also added one at every 5 years, where, for churches at least, they are required by legislation.

- A separate section was added to include cyclical and minor routine maintenance.

- An attempt was made to categorise but not quantify or price the consequences of ignoring the maintenance intervention suggested. These reflect the relative cultural value of the fabric/artefacts the element was protecting.

The second pro-forma used in survey 2 is shown in Table 6.2.

Table 6.2: St James Church, Southstoke

Address	**St James Church Southstoke**
Date	**Thursday 13th March 2003**

Element	**Backlog**	**Year 1**		**Year 2**		**Year 3**		**Year 4**		**Year 5**		**Risk/Consequences**
		view	**work**	**view**	**work**	**view**	**work**	**view**	**work**	**view**	**work**	
Walls												
South aisle - east gable				50			300					
Porch render - internal					75							
Windows												
Tower bird and bat screens												
Roof coverings												
Chancel roof - south	100	30	2000									Potential serious injury from loose slate
Chancel roof - north		30	2000									Roof felted lessens impact of roof covering failure
Porch roof						50					2000	
Vestry roof - south		50										
Roof sundries												
Hips to tower roof		25	300									
Access door to tower roof			75									
Chancel verges		50	200									
Cyclical Work												
Minor maintenance			50		50		50		50		250	
Painting			300									
Reinspect										250		
Totals	£100	£185	£4,925	£50	£125	£50	£350	£0	£50	£250	£2,250	

minor consequences

modrate consequences

major consequences

Observations from the second survey

- Separating the required pre-inspections made on-site completion of the form easier.
- The separation of inspection and intervention provides clearer information for planning and decision making.
- Assessing the consequences of element failure proved to be confusing. Were we primarily concerned with the cultural heritage of the element itself or the areas/artefacts it was protecting? It did, however, raise a number of issues regarding the evaluation of cultural significance. These are discussed in Section 6.4.

6.2.4 Surveys 3, 4 & 5: Selworthy Barn, Pile's Mill and Culver Cottage

The subsequent surveys concentrated on methods for evaluating the financial consequences of ignoring projected maintenance work. How cultural significance might be valued, and how such evaluations might inform decisions regarding maintenance is discussed in Section 6.4.

Revisions made to the pro forma developed in the second survey

The third pro forma draft:

- no longer includes an attempt to include a 'heritage factor' in the assessment of consequences;

- provides an element by element assessment of the risk of ignoring the projected maintenance interventions. This first attempt included a three year assessment of costs on an 'optimistic' and a 'pessimistic' basis. The example shown below illustrates the assessment of the risk of ignoring the maintenance of the south elevation chestnut vertical boarding. Surveys of the other two buildings are included in Appendix 5;

- includes an inspection column from year 2 onwards on the assumption that the projection for year one is accurate.

The third pro-forma used in survey 3 is shown in Table 6.3

Table 6.3: Selworthy Barn, Devon

Address	**Selworthy Barn**
Date	**Friday 6th June 2003**

Element	**Backlog**	**Risks backlog**		**Year 1**	**Risks Year 1**		**Inspect**	**Year 2**	**Risks Year 2**		**Year 3**
Roofs		**Optimistic**	**Pessimistic**		**Optimistic**	**Pessimistic**			**Optimistic**	**Pessimistic**	
Main roof slopes thatch											
Main roof ridge thatch											
S.elevation corrugated tin lean-to roof											
Junction W/S elevation roof's flashing	100	0	0								
N.elevation corrugated tin lean-to roof											
Elevations											
South elevation random rubble	250	0-100	100-250								
South elevation cob wall											
South elevation chestnut vertical boarding				750	100-500	200-1000					
North elevation lower section random rubble				300	0-100	50-300					
North elevation higher sections cob wall											
North elevation Brickwork lean-to	150	0-75	100-200								
East elevation random rubble											
External joinery											
South elevation Barn door											
North elevation Barn door											
North elevation lean-to door and window											
Miscellaneous											
Wall plate N/E elevation											
Cyclical Work											
Shelter coat to cob											
Painting, external joinery & chestnut vertical boarding											300
Painting corrugated tin roofs											350
Totals	£500			£1,050			£25	£100			£650

0-12 months Advancing decay in cladding
£100 (optimistic) - £200 (pessimistic)

13-24 months Decay of boarding and framing and corrosion of fixings; increased vermin access and water ingress into building
£250 (optimistic) - £400 (pessimistic)

25-36 months Exacerbation of foregoing; possible partial disintegration of cladding and localised damage to framed structure
£500 (optimistic) - £1000 (pessimistic)

Observations from surveys 3, 4 & 5

At a theoretical level assessing the consequences is relatively straightforward, but the range of costs is so wide that there are significant questions regarding their practical application. It does however illustrate the potential consequences of ignoring the projected intervention. This informs decision-making and helps in determining priorities.

6.2.5 Survey 6: Hill Gate Cottage

Note: A complete spreadsheet from this survey including all the photographic links and images is contained in Appendix 5. Some examples of the photos are included after the over leaf (Figure 6.2).

The only revision in survey pro forma 6 and the relevant spreadsheet was to extend the consequential costs from a 3 stage three year evaluation into a 3 stage, ten year, optimistic and pessimistic evaluation. The example below shows the pop-up assessment of the risk of ignoring maintenance to the main thatch roof slopes at Hill Gate Cottage over 3 periods up to 10 years time.

Table 6.4: Hill Gate Cottage, Devon

Address	**Hill Gate Cottage**
Date	**Friday 6th June 2003**

Element	**Backlog**	**Consequential costs backlog**		**Year 1**	**Consequential costs Year 1**		**Pre inspect**	**Year 2**
Roofs		**Optimistic**	**Pessimistic**		**Optimistic**	**Pessimistic**		
Main roof slopes thatch	8000	1500-25000	10000-100000					
Main roof ridge thatch	1000	250-10000	1000-50000					
Main roof hip thatch								
South elevation bay pan-tiled roof	50	0-500	250-2500					
West elevation bread oven slate roof	250	0-500						
West Elevation pan tiles over front door	50	0-100						
North Elevation Roman tiles lean-to	250	0-500						
North Elevation Roman tiles lean-to								
Chimneys								
Southern chimney								
North chimney								
Elevations								
East elevation random rubble								2000
West elevation random rubble/chimney breast								
West elevation cement render								
North elevation random rubble								
External joinery								
South elevation								
Bay window	500	150-1000						
Other two softwood windows								
West elevation								
East elevation	1200	350-2500						
North elevation	150	50-500	250-2500					
Miscellaneous								
Fuel oil tank	2500	0	100000					
East elevation gulley								
Cyclical Work								
Minor maintenance				100	100-1000	1000-5000		100
Painting								
Totals	£13,950			£2,650			£25	£2,100

0-3 years Further deterioration of thatch; water ingress and initial decay of battening and main roof timbers; minor damp affecting ceiling and wall plaster and causing decay of built in timbers
£1,500 (optimistic) - £10,000 (pessimistic)

4-7 years Disintegration of thatch and exposure of structure to elements; considerable damp ingress; substantial decay of main roof timbers; loss of ceilings and some wall plaster at first floor level; decay of built in timbers and significant dry rot attack; damage from damp reaching ground floor level
£10,000 (optimistic) - £35,000 (pessimistic)

8-10 years Gradual loss of upper wall structure due to long term erosion of bedding and pointing from saturation at head; roof structure unusable; first floor ceilings lost along with substantial part of wall plaster; ground floor ceilings largely lost; timber lintels decayed and walls weakened; wet and dry rot in first floors; electrical installation, sanitary fittings etc beyond salvage and reuse
£25,000 (optimistic) - £100,000 (pessimistic)

Observations from survey 6

The reservations we felt applied to the previous version are reinforced with the range of potential costs becoming even more extreme.

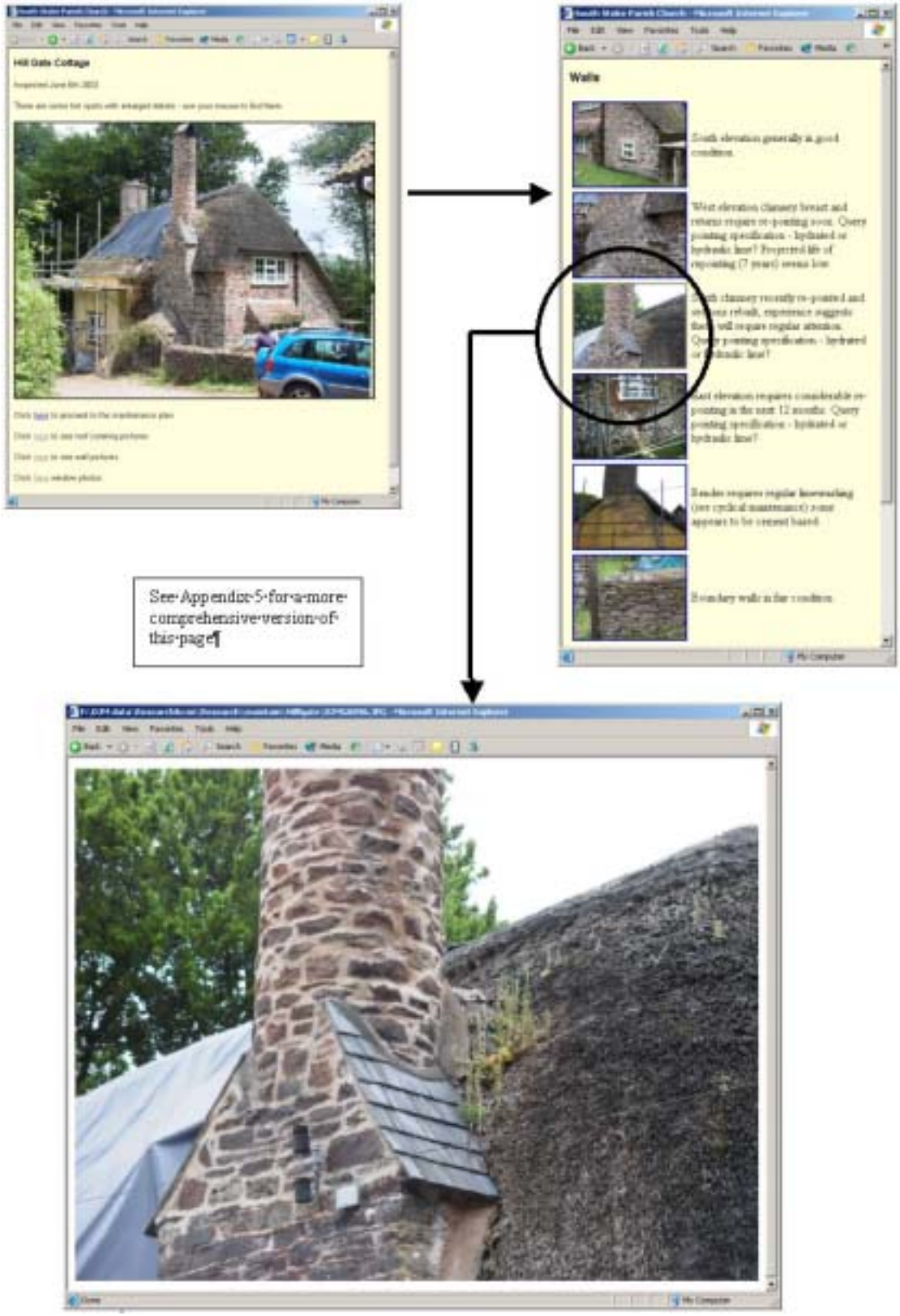


Figure 6.2: Digital images of Hill Gate Cottage from the web enabled condition survey.

6.2.6 Conclusions: the design and use of a survey proforma for maintenance management

Property profiles collected through spreadsheet pro-formas do not in themselves provide effective maintenance management. They can, however be used as a tool to:

- provide long and short term cost projections;
- provide information for sinking fund/borrowing calculations;
- provide a database photographs to help monitor deterioration and capture original construction;
- highlight the need and frequency for specific maintenance inspections;
- assess the consequences of ignoring maintenance is open to very different interpretation but it does encourage thought about risks and priorities;
- encourage debate and thought about repairs needs.
- assessing intangible 'heritage factors' as part of the cultural heritage evaluation, although this is probably not applicable to the vast majority of historic buildings;

A CD is included with the hard copy of the report illustrating how the profile and digital images can be linked to produce a simple and effective management tool. Instructions for the use of the CD are:

1. install CD;
2. open folder called 'CD';
3. double click on file called 'index-double click.htm'.

If you are viewing this in pdf-format,
and have access to the Internet,
click the link below to view the CD's contents:

http://www.maintainourheritage.co.uk/model.htm

6.3 General observations on property profiles

6.3.1 Introduction

This section considers a number of issues related to the accuracy and consistency of property profiles. It has been informed partly by our inspection of the 6 historic buildings featured in this report and partly from several years' experience in dealing with condition surveys for social housing.

6.3.2 Cost profiles

An accurate cost profile or projection is a pre-requisite for a comprehensive and effective property strategy. For owners of non-historic buildings a cost profile must be based on two key factors:

- accurate costings;
- a realistic assessment of component life.

Owners of historic buildings will also have to take into account the cultural significance of the building itself, the unique nature of the individual elements and the need for minimum intervention.

Element and component costs are relatively easy to assess. They can be based on the experience of the surveyor, local knowledge, specialist advice, price books or building records. Assessing component life is more complex because there is very little data on proven life cycles of building components and, in practice, surveyors have very different views. There are several factors which affect component life, including, for example:

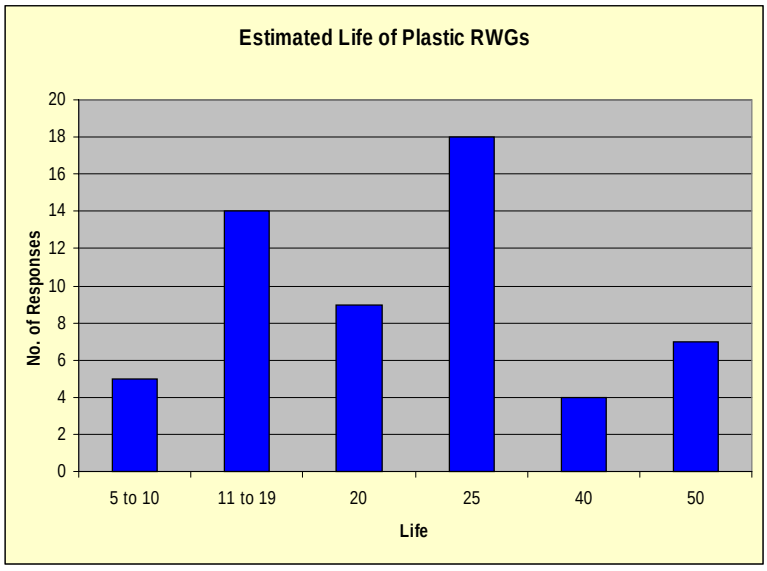
- exposure;
- quality of original components and workmanship;
- appropriateness of original specification;
- juxtaposition with other elements (e.g. some plasters affect cable sheathing);
- the effects of periodic maintenance;
- protection by other elements (e.g. an overhanging roof protects a wall);
- unknown risks (e.g. rusting of wall ties);
- chemical attack (from acid rain or from chemicals in the ground);
- biological attack;
- varying acceptable levels of fair wear and tear depending on client group;
- sacrificial coatings.

Our experience of undertaking and validating condition surveys for social housing organisations indicates that it is component life cycles, not component costs, which account for the major differences in property profiles.

Even with relatively simple components there are very different opinions regarding life cycles. This is confirmed by a survey carried out by the Royal Institution of Chartered Surveyors some years ago (RICS/BRE, 1992). In this survey a number of practices were asked to provide life cycles for a number of common building components.

Figure 6.3 below shows a typical example - the expected life of plastic rainwater goods. The estimated life of new components ranges from 5 years to 50 years although the majority of responses indicated a life span of between 10 and 25 years.

Figure 6.3: Differing estimates of life expectancy for rainwater goods



The possible variations in costs and life spans, caused in the main by subjective assessments from surveyors, can have a dramatic impact on a property profile. Where a client owns or manages a number of buildings it can result in a meaningless mass of inconsistent data. This data will be of little short term or long term use unless a measure of consistency can be introduced.

The photograph on the left shows a Victorian terraced house recently converted into four dwellings by a west London Housing Association. In June 2003 a new member of staff was asked to prepare a propety profile, partly to aid long term strategic planning, and partly to identifiy a short term programme of repair and improvement works.

The total cost of the profile (at 2003 prices) was £166,500. Details of this can be seen in the spreadsheet below (Table 6.5).

Table 6.5: Maintenance profile

Element	Code	: 0 :	: 1 :	: 2 :	: 3 :	: 4 :	: 5 :	: 6-10 :	: 11-15 :	: 16-20 :	: 21-25 :	: 26-30 :
Coverings	**102**	0	0	0	0	0	0	0	0	7000	0	0
Fascias, bargeboards	**106**	0	0	0	0	0	0	650	0	0	0	0
Gutters/RW pipes	**107**	0	0	0	0	0	0	450	0	0	0	0
Walls pointing	**109**	0	0	0	0	0	0	0	0	0	4000	0
Windows	**111**	0	0	0	0	5000	0	0	0	0	0	0
Patio doors	**112**	0	0	0	0	0	0	1350	0	0	0	0
Entrance doors	**113**	0	0	0	0	0	0	1250	0	0	0	0
Soil vent pipes	**117**	0	0	0	0	0	0	300	0	0	0	0
Door entry	**151**	0	0	1000	0	0	0	0	0	0	0	0
Floor finish	**156**	0	0	0	0	0	0	3000	300	0	3000	300
Ceilings	**157**	0	0	0	0	0	0	0	0	0	2000	0
Lighting	**158**	500	0	0	0	0	3000	0	0	0	0	0
Cupboard doors	**160**	0	0	0	0	0	0	0	500	0	500	0
Flat doors	**162**	0	0	0	0	0	0	0	0	0	1500	0
Stairs/rails	**163**	0	0	0	0	0	2000	0	500	0	500	0
Stair finishes	**164**	200	0	0	0	0	0	0	500	0	500	0
Wiring	**174**	0	0	0	4000	0	0	0	0	0	0	0
Boundary walls	**184**	0	0	0	0	0	0	0	900	0	0	0
Fencing/gates	**186**	500	0	0	0	0	0	0	1500	0	1500	0
Trees/shrubs	**193**	0	0	0	0	0	0	200	200	0	200	200
Floor finish	**202**	0	5000	0	0	0	0	0	5000	0	0	5000
Internal walls/finish	**203**	7500	0	0	0	0	0	0	0	0	0	0
Kitchen units	**206**	0	0	25000	0	0	0	0	0	0	0	25000
Bathroom fittings	**208**	0	15000	0	0	0	0	0	0	0	0	0
Heating	**211**	0	0	0	0	0	0	0	0	5000	0	0
Wiring	**212**	7500	0	0	0	0	0	0	0	0	7500	0
Extractor fans	**215**	3000	0	0	0	0	0	500	500	0	3000	3000
		£19,200	**£20,000**	**£26,000**	**£4,000**	**£5,000**	**£5,000**	**£7,700**	**£9,900**	**£12,000**	**£24,200**	**£33,500**
											Total	**£166,500**

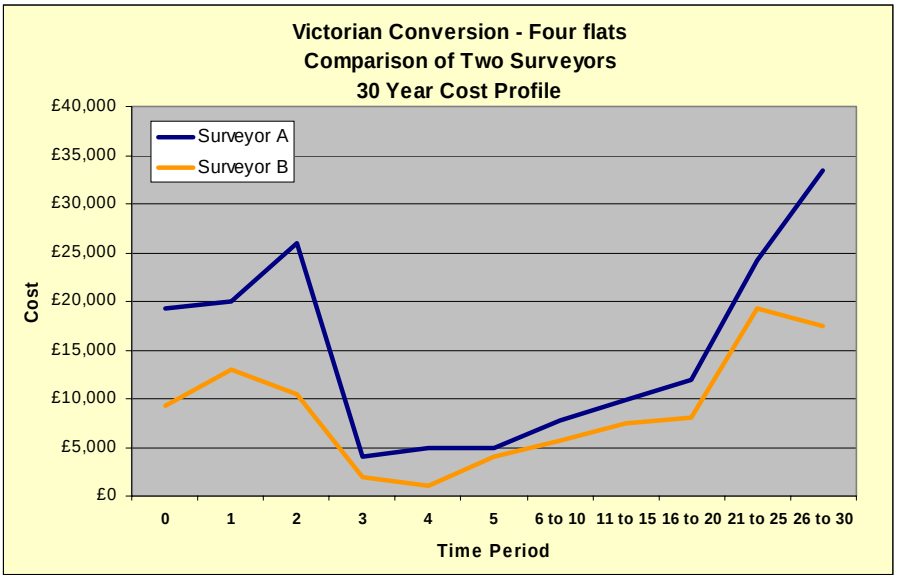
The total cost of the immediate repairs and long term renewals was £166,500. This is the equivalent of £1,387 per dwelling per year - almost three times the available budget.

A second surveyor, with extensive experience in managing repairs and improvement programmes, and with knowledge of local contractors, produced a second profile (see Table 6.6 below). The annual amount per dwelling of £812 was still higher then the budget (£750) but of much more use to the organisation. A property profile which does not take into account the available resources may be of use for long term strategic planning, lobbying or grant applications, but it is of limited use for operational management.

Table 6.6 : Comparative maintenance profiles

Year	0	1	2	3	4	5	6 to 10	11 to 15	16 to 20	21 to 25	26 to 30
A	**£19,200**	**£20,000**	**£26,000**	**£4,000**	**£5,000**	**£5,000**	**£7,700**	**£9,900**	**£12,000**	**£24,200**	**£33,500**
B	**£9,200**	**£13,000**	**£10,500**	**£2,000**	**£1,000**	**£4,000**	**£5,700**	**£7,400**	**£8,000**	**£19,200**	**£17,500**

Figure 6.4: Comparative 30 year maintenance profiles



6.3.3 Achieving consistency

Where an organisation owns a number of properties it is imperative that there is consistency in the property profiles. To provide a measure of consistency some form of schedule of lives and costs can be a helpful benchmark. These will not necessarily help determine the time scale of initial elemental failures but will provide an objective assessment of future renewals. Time scales and lives can be regularly reviewed and the profiles adjusted as appropriate. A typical example is shown below (Table 6.7).

Table 6.7: Achieving consistency

Element	Life	Cost
Welsh Blue slate, uniform size 75mm lap, on 25 x 50 battens including underfelt	150+	£150m2
Plain clay tiles 265 x 165, smooth red, 25 x 38 battens, on reinforced underlay	100+	£120/m2
Re-point rubble walling, coarse stuff or putty lime and sand	10	£40/m2
Re-point rubble walling, hydraulic lime and sand	25	£50/m2

From our experience with housing association condition surveys we know that the use of schedules, together with clear guidance to surveyors regarding subjective judgements, should help to provide consistency between surveyors, and from building to building. Guidance might be something along the following lines:

- where possible, i.e. where the element age is known, use the schedule to apply costs and lifespan;
- where the age is unknown use judgement, but the projected life cannot exceed that in the schedule;
- if the element appears to be in sound condition but has exceeded its agreed life the life can be extended by up to, say, 10 years. It may also be worth allowing for additional inspections to ensure maximum life and minimising the risks of premature failure;

- if an element is similar to one in the schedule but perhaps particularly complex, for example a slated roof with complex hip details, provide some form of commentary explaining why the costs differ from the schedule;

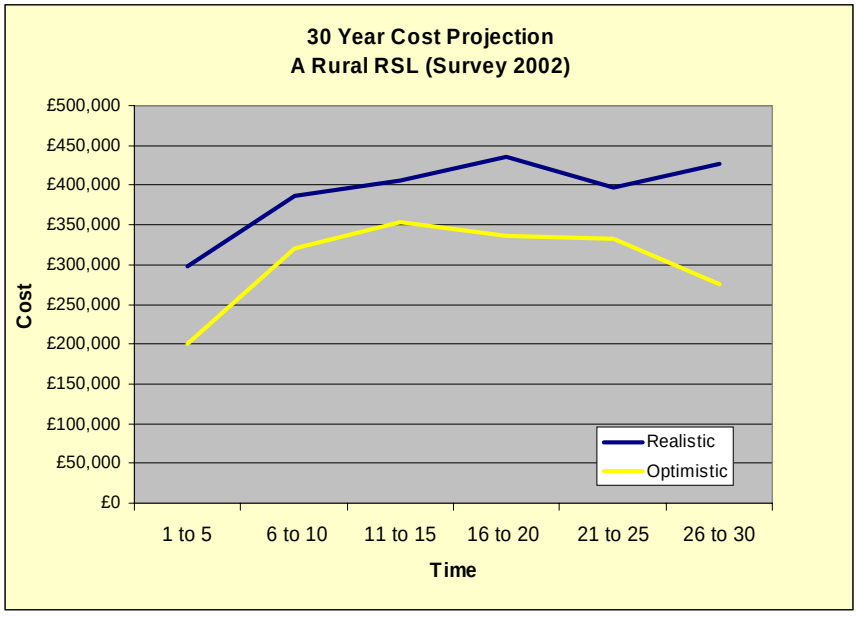
- if none of the above apply use judgement – but recognise the need for local knowledge and, where in doubt, allow for periodic re-inspection.

6.3.4 Sensitivity analysis

To provide a realistic range of likely costs, sensitivity analyses can be run to illustrate the impact of risk factors and show optimistic and pessimistic levels of expenditure

The chart below (Figure 6.5) shows the projected elemental renewal costs of a rural housing association with approximately 150 dwellings. The blue line shows the results of the original survey. So, for example, the table shows that the anticipated expenditure in years 16 to 20 is £430,000, or £86,00 per annum. However, a detailed desk top analysis of the building inspection forms, together with a number of random survey checks, suggested that the surveyors had been over cautious in predicting disrepair. The analysis also suggested that in a number of properties' elements would last longer than their scheduled life span. To reflect these adjustments a more optimistic cost forecast has been added to the graph. Thus, the anticipated expenditure of £430,00 mentioned above can now be regarded as a pessimistic outcome, a more optimistic view is that the expenditure will be £330,000, or £56,000 per annum. The reality will probably be some where between the two.

Figure 6.5: Pessimistic and optimistic maintenance profiles compared



The research team carried out a similar sensitivity exercise to our Selworthy Barn pro forma The original property profile showed a total cost of £77,050 (Table 6.8)

Table 6.8 : Original property profile for Selworthy Barn

Address	**Selworthy Barn**
Date	**Friday 6th June 2003**

Element	Backlog	Year 1	Year 2	Year 3	Year 5	Year 7	Year 8	Year 10	11 to 15	16 to 20	21 to 25	26 to 30
Roofs												
Main roof slopes thatch									20000			20000
Main roof ridge thatch						4400			4400		4400	4400
S.elevation corrugated tin lean-to roof					300			300	300	300	300	300
Junction W/S elevation roof's flashing	100											
N.elevation corrugated tin lean-to roof					150			150	150	150	150	150
Elevations												
South elevation random rubble	250									1500		500
South elevation cob wall												
South elevation chestnut vertical boarding		750								300		300
North elevation lower section random rubble		300										
North elevation higher sections cob wall										4500		
North elevation Brickwork lean-to	150											
East elevation random rubble					350							
External joinery												
South elevation Barn door					200				200			200
North elevation Barn door					200				200			200
North elevation lean-to door and window			100						200			200
Miscellaneous												
Wall plate N/E elevation						300						300
Cyclical Work												
Shelter coat to cob					150			150	150	150	150	150
Painting, external joinery & chesnut vertical boarding				300			300	300	300	300	300	300
Painting corrugated tin roofs				350			350	350	350	350	350	350
Totals	£500	£1,050	£100	£650	£1,350	£4,700	£650	£1,250	£26,250	£7,550	£5,650	£27,350
											TOTAL	**£77,050**

A slightly more optimistic profile has reduced the cost to £55,000 (Table 6.9)

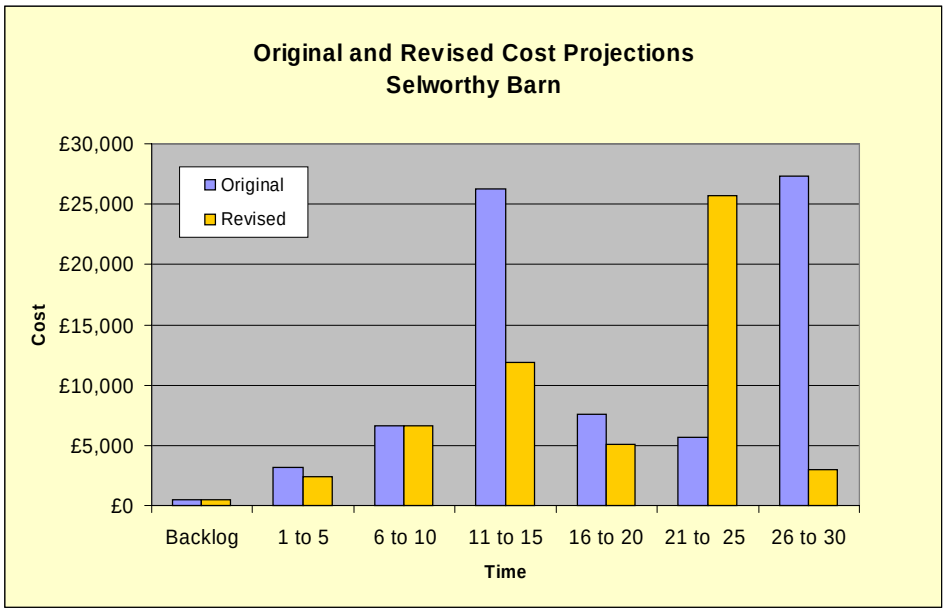
Table 6.9: More optimistic profile for Selworthy Barn

Address	**Selworthy Barn**
Date	**Friday 6th June 2003**

Element	Backlog	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	11 to 15	16 to 20	21 to 25	26 to 30
Roofs															
Main roof slopes thatch												10000		20000	
Main roof ridge thatch											4400			4400	
S.elevation corrugated tin lean-to roof						300					300	300	300	300	300
Junction W/S elevation roof's flashing	100														
N.elevation corrugated tin lean-to roof						150					150	150	150	150	150
Elevations															
South elevation random rubble	250												1500		500
South elevation cob wall															
South elevation chestnut vertical boarding		750											300		300
North elevation lower section random rubble		300													
North elevation higher sections cob wall													2000		
North elevation Brickwork lean-to	150														
East elevation random rubble															
External joinery															
South elevation Barn door												200			200
North elevation Barn door												200			200
North elevation lean-to door and window			100									200			200
Miscellaneous															
Wall plate N/E elevation								300							300
Cyclical Work															
Shelter coat to cob						150					150	150	150	150	150
Painting, external joinery & chesnut vertical boarding				300					300		300	300	300	300	300
Painting corrugated tin roofs				350					350		350	350	350	350	350
Totals	£500	£1,050	£100	£650	£0	£600	£0	£300	£650	£0	£5,650	£11,850	£5,050	£25,650	£2,950
														TOTAL	**£55,000**

A comparison of the two profiles (in blocks of 5 years) can be seen in Figure 6.6 (overleaf). The effect of the revised projection has been to reduce the cost, and to delay it. In this instance additional inspections may be necessary to minimise the risk of premature failure.

Figure 6.6: A comparison of the original and optimistic Selworthy Barn property profiles



We considered applying a similar technique to the optimistic and pessimistic consequences of ignoring maintenance but felt that the huge variation in costs would make it worthless.

6.3.5 Cost planning

The property profiles can be extended to include financial planning functions. These can be simple average year-by-year cost projections or more sophisticated financial models showing sinking fund provision and the costs of borrowing. Table 6.10 shows the cost projection for Hill Cottage. It is based on prices and costs at the time of survey, i.e June 2003.

Table 6.10: Cost projection for Hill Cottage

Address	**Hill Gate Cottage**
Date	**Friday 6th June 2003**

Element	Backlog	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	11 to 15	16 to 20	21 to 25	26 to 30
Roofs															
Main roof slopes thatch	8000												10000		
Main roof ridge thatch	1000										1000		1000		1000
Main roof hip thatch				2000											
South elevation bay pan-tiled roof	50					100									
West elevation bread oven slate roof	250														
West Elevation pan tiles over front door	50	50									50	50	50	50	50
North Elevation Roman tiles lean-to	250														
North Elevation Roman tiles lean-to											250				
Chimneys															
Southern chimney											1000		4000		1000
North chimney		2000										300		300	
Elevations															
East elevation random rubble			2000												
West elevation random rubble/chimney breast											600				
West elevation cement render						1000									
North elevation random rubble		150													
External joinery															
South elevation															
Bay window	500											500			500
Other two softwood windows		150										200			200
West elevation		200									500				
East elevation	1200														
North elevation	150										500				
Miscellaneous															
Fuel oil tank	2500														
East elevation gulley										150					
Total	**£13,950**	**£2,550**	**£2,000**	**£2,000**	**£0**	**£1,100**	**£0**	**£0**	**£0**	**£150**	**£3,900**	**£1,050**	**£15,050**	**£350**	**£2,750**

Total	**£44,850**

The anticipated total cost for years 16 to 20 is £15,050. If, for the sake of this illustration, we assume that the work will all be carried out in a single contract, a simple spreadsheet can be

created to show a range of 'what if?' scenarios, for example, the present value of £15,050 will grow to £27,182 if inflation is 3% (Table 6.11).

Table 6.11: Sinking fund and borrowing calculator

Sinking Fund and Borrowing Calculator					
Element Cost at Current Rates	£	15,050			
Predicted inflation rate	%	3			
Number of Years	Yrs	20			
Future cost	£	**£27,182**			
Investment Option			**Borrowing Option**		
Number of Years	Yrs	20	Number of years	Yrs	20
Investment rate	%	4.5	Borrowing rate	%	7
Annual sinking fund	**£**	**£866.46**	**Annual Payments**	**£**	**£2,565.79**
Total Payments		**£17,329.13**			**£51,315.72**

This can be funded by a sinking fund of £866 assuming a growth rate of 4.5%, or by borrowing in 20 years' time, but with much higher payments of £2,565. The present value of these payments is £1,420, so the cost of borrowing is almost twice that of investing.

An increase ininflation or increases in investment and borrowing rates can be fed into the model to provide alternative scenarios, in thiscase higher inflation, investment and borrowing rates (Table 6.12).

Table 6.12: Sinking fund and borrowing calculator with changed inflation rates and interest rates

Sinking Fund and Borrowing Calculator					
Element Cost at Current Rates	£	15,050			
Predicted inflation rate	%	5			
Number of Years	Yrs	20			
Future cost	£	**£39,932**			
Investment Option			**Borrowing Option**		
Number of Years	Yrs	20	Number of years	Yrs	20
Investment rate	%	6	Borrowing rate	%	9
Annual sinking fund	**£**	**£1,085.54**	**Annual Payments**	**£**	**£4,374.42**
Total Payments		**£21,710.75**			**£87,488.48**
Present value of 1st payment		**£1,085.54**			**£1,648.67**

6.3.6 Conclusions

Property profiles can help inform maintenance management. To be of real use they must be:

- carried out by skilled surveyors with an understanding of conservation principles and local knowledge;
- if the inspections are carried out for an organisation who manage listed buildings, the surveor will need to establish a thorough undersatnding of the organisation's aims and objectives;
- based on, as far as possible, historical data and agreed costs and life spans. These provide a measure of consistency and also help in the validation process;
- relatively realistic in terms of available financial resources;
- reviewed and revised regularly.

6.4 Dealing with the 'cultural increment'

6.4.1 Questions arising from the incremental nature of heritage value

An important feature of heritage value is that part of it is manifested in cultural terms that may be difficult to identify and quantify. This might be thought of as a 'cultural increment'. Although somewhat intangible, this cultural increment has a real value to future generations as well as contemporary society. Two questions arise. Firstly, 'Is the cultural increment recognized by those making maintenance decisions?' Some heritage assets have a value to society over and above that placed on them by their owners. Secondly, 'If it is recognized, how should this affect the approach to the management of maintenance?' The answer to these questions involves a great deal of discussion and is beyond the scope of this report. The following observations and comments are, however, put forward as a stimulus to this discussion.

6.4.2 The issue of ownership and interest

Attitudes to the maintenance of historic buildings are likely to be affected by the nature of ownership. Some properties are owned and managed by private individuals or organisations that are unlikely to have a primary concern to protect their cultural value. Other properties will be owned and managed by organisations that are specifically charged with a responsibility to maintain cultural value. Two issues arise.

1. Some assets may be 'under-maintained' because the private owner ignores or under values the cultural significance embedded in the property.

2. Where the cultural significance is recognized and valued, there may be a lack of agreement about how the management of maintenance should respond to this recognition. This may also result in the asset being 'under-maintained'.

6.4.3 Proprietary and non-proprietary interests

(Refer to issue 1 in 6.4.2)
The potential of a property to generate some form of 'return' clearly affects a proprietor's attitudes towards spending money on its maintenance and renewal. What people or organisations choose to do with or to built assets depends partly on their financial resources and partly on the nature of their proprietary interests. Proprietary interests typically fall into two general categories, 'consumption' and 'investment'. In devising a maintenance strategy for heritage buildings, we need to recognize that the cultural returns on such works can extend beyond the specific consumption and investment concerns of the owners or tenants. People and organisations that have no direct legal stake in the property may still have an interest in its use or condition. These other-party concerns are usually termed 'non-proprietary interests' or 'externalities'.

Where the cultural increment exists as an externality, proprietors may be reluctant to take it into account when devising their programmes of maintenance and renewal. We are not aware of any research that has investigated the extent of this 'problem'. If this is a significant issue, it points to the need to find ways of internalizing the externality. Practice in other fields (e.g. where significant social externalities exist) tends to utilise three broad approaches to upgrading quality: moral persuasion, regulation, or fiscal incentives.

6.4.4 The 'time-cost dilemma' and heritage value

(Refer to issue 2 in 6.4.2)
Building economists, architects and consultant surveyors have long sought to establish a methodology for devising appropriate quality criteria when commissioning maintenance and renewal works. At the heart of this issue is what can be though of as a 'time-cost dilemma'. This points to the opportunity cost problem of determining whether or not to spend on higher standards now and thereby save on maintenance later.

A real difficulty with this type of life-cycle costing is that value-for-money calculations are hypothetical except for certain standard components that have been tried and tested. Experience in the general field of built asset management points to a basic principle that we will seldom save enough money to justify increasing the cost of components or carrying out maintenance to a higher than current standard (on the assumption that the existing standards are in line with accepted good practice). Building economics consultant, Bernard Williams, argues

> The true value of increased quality usually lies in the functional benefits rather than the life cycle cost savings. Unfortunately many people simply ignore the value of such benefits if they are unable to quantify them. (Bazlinton 1996 p.49).

Williams's point is that savings may well accrue to the proprietor[1] but they seldom match the additional costs unless we place a value on function and treat functional obsolescence as a cost. Recent findings in the area of housing asset management, for example, indicate that higher specifications will, to some extent, save on future maintenance and running costs, but, over the planning cycle, the discounted financial returns resulting from raising the quality of maintenance interventions are unlikely to cover the additional costs of such interventions.[2]

In applying the above argument to the management of historic buildings involves us recognizing that the full value of any maintenance activity should incorporate an intangible cultural element that is valued by society and which is over and above any resultant life cycle cost savings to the organisation. Indeed, if the proprietary maintenance decision ignores or under values this element, we might argue that the asset is being 'under maintained'.

6.4.5 Towards a practice model: identifying and quantifying the incremental value

Consideration needs to be given to how best to avoid the 'under-maintenance' of cultural assets[3]. The following discussion is both generalized and provisional and should be treated as a possible approach to the problem (requiring further thought and investigation). It is offered as a starting point for discussion rather than as a definitive solution.

Because the 'cultural increment' cannot usually be measured in money terms, it has to be treated as an intangible cultural value (ICV). The ICV is the addition to total value resulting from the building's historic significance. Although the ICV cannot be quantified in money

[1] The proprietary calculations will be particular to each project and will also depend on a complex of specific management priorities. They may include, for example, such factors as convenience (reduced hassle factor of doing maintenance at leisure rather than responding to a crisis); reassurance (peace of mind that a major repair or some other risk factor will be avoided); public relations (the value of being seen as tidy site manager or a responsible management company), health and safety value; cash flow control (e.g. funds available now that may not be in the future).
[2] This observation is based on consultancy work carried out in association with the Faculty's HCond project. It is reinforced by the work of others such as the building economics consultant Bernard Williams, the Architects DEGW and the Building Research Establishment.
[3] Where 'under-maintenance' is defined as a level or quality of maintenance that is insufficient to maintain the cultural increment.

terms, it needs to be identified and recorded in some other appropriate fashion. Current policy debates point to the desirability of producing a statement of significance that describes, classifies and, where appropriate measures, the cultural value of heritage assets (DCMS, 2003). Maintenance policies should make specific reference to statements of significance and articulate how proposed programmes of work flow from the value analysis that is integral to such statements.

Precisely how the link between maintenance policies and statements of significance should be put into operation requires investigation and research. We can say, however, that it should produce an approach we might term “informed maintenance” (analogous to the established notion of “informed conservation")[4].

We can also say that there can be no formulaic way of ensuring that the proposed programme of works is informed by the statement of significance. This is because every building or space (old or new) possesses unique functional characteristics (what Stephen Bond (2003) refers to analogously as “a unique fingerprint or DNA profile”). To underline this point, Bond invites us to consider the self-evidently different forms of cultural value associated with a large war memorial, the Eiffel Tower, Kew Gardens and Brunel’s railway station at Bristol Temple Meads. The key point here is that the maintenance strategy has to consciously seek to protect the total value of the historic place or space and this means that some form of particularised analysis of each asset’s cultural element should be incorporated into the survey and its subsequent programme of works.

6.4.6 Towards a practice model: surveying the elements

The cultural increment will typically be composed of a number of different elements. However, the ICV cannot be calculated simply by aggregating the intrinsic cultural values of all the elements. In many historic buildings (probably most) the total ICV will greater than the sum of its parts. Because of this, in addition to valuing the self-contained (disaggregated) value of a component, we need to assess the total contribution that it makes to the ICV. For example, whilst the gutters on a house may not have a high ICV in themselves, the contribution they make to the existence of the building (in situ with the other elements) might be high and therefore needs to be recognized in the maintenance strategy.

This points to the need to develop a survey method that identifies two discretely different things:

1. the cultural significance/value of the element *per se* (as an historical artifact in its own right and;

2. any addition significance/value it might have to the overall ICV.

6.4.7 Towards a practice model: using functional analysis as a measure of significance

As with any rational maintenance strategy, managers should focus attention on the building’s functionality. Decisions about how to maintain a building (any building) should consider how the programmed works can best enhance its total function and thereby its value. A practical way forward would be to interpret the cultural significance in functional terms and then seek to ensure that maintenance and renewal activities appropriately enhanced function. The reason for advocating functional analysis is to bring a degree of tangibility to the notion of cultural value so that it becomes easier to use it to inform a maintenance strategy. We need to be clear that we are here using the notion of 'function' in a broad and inclusive way. This means that a building's functional significance would be assessed, not simply in terms of its economic, recreational and resource contributions to present society, but also in terms of its

[4] This analogy was given to us by Stephen Bond in his response to an early draft of this report.

cultural, educational and aesthetic contributions to present and future generations (see Appendix 4). This all-embracing functional analysis might stem from the work that is done to produce the statement of significance. From the analysis it might be possible to produce a register of weighted ‘risks’ that would in some way express what would be lost or diminished in functional terms as a result of 'inappropriate' maintenance. This is a provisional suggestion and the operational efficacy of this approach would need testing in the field in a variety of situations.

6.4.8 Financial Planning

The maintenance activity should seek to preserve the asset’s value (in contrast to ‘improvement’ that should result in enhancing its value). The value of any asset is composed of three interrelated factors:

- its potential selling price (its exchange value);
- its potential usefulness (its ‘utility’ or use value);
- its potential to yield a return on money capital committed (its investment value).

It is usually argued that in historic buildings there exists an additional value factor, namely the 'heritage' value, which might be conceived as an intangible cultural increment accruing to society at large (over and above the proprietary use value to the owner or tenant). We are suggesting that, for practical reasons, this might be treated as a separate category of use ('functional') value that accrues to those who have a non-proprietary interest in the building or estate.

At any time, a building's exchange and investment values will be determined by the perceptions about its current and future use. This means that *the real, underlying, fundamental value of a building is determined by what it does - its usefulness*. In the end, all social and economic value is grounded in current or potential use-value. This means that maintenance works must protect the building’s use value – including that part of use value that stems from its historic significance to society.

Conceived of in this way, the existence of a cultural increment has four interrelated financial effects.

1. It increases use value.
2. It imposes additional risks (associated with the possible loss of this additional use value).
3. It imposes additional costs associated with inspection and maintenance activities (designed to maintain this aspect of use value).
4. It enhances investment value (because investment value is tied to use value).

Prudent financial planning needs to utilise the principles of resources accounting to ensure that (a) there are sufficient funds to carry out the requisite maintenance activities over the span of the maintenance planning cycle, and (b) the financing costs of the maintenance programme are minimised.

We therefore suggest that an appropriate resource accounting system should facilitate coherent financial planning of the maintenance programme. This means that the accounts should accommodate both the matching principle and the accruals concept. The matching

principle states that, as far as possible, costs should be set against the returns that they generate at the point in time when this arises. The accruals concept requires the financial planners to recognise revenues and costs as they are earned or incurred rather than as they are received or paid out (as occurs in the cash-flow approach). In accruals calculations, expenses are recognised in the period in which they are incurred rather than in that in which money happens to be paid for them.

This approach to financial planning points to the efficacy of making a capital charge to the revenue account which not only helps to cover normal depreciation, but also allows for funds to set aside regularly to pay for the additional maintenance costs of protecting the 'cultural element' that is embedded in the building's use value.

Again, this needs fuller consideration and testing in a variety of contrasting live situations.

6.4.9 Summary of Section 6.4

Assumptions:

1. The building/asset is historically significant.

2. Its historical significance has a value that is real but intangible (cannot necessarily be measured in money terms). We are terming this element of value the 'intangible cultural value' (ICV).

3. Poor or inappropriate maintenance will carry the risk of damaging the ICV.

4. Poor or inappropriate maintenance sometimes occurs because maintenance decisions fail to take proper account of the need to maintain the incremental value.

Operational principles:

1. The primary issue is to determine the extent to which current maintenance practices take proper account of the cultural increment.

2. Where the increment is both significant and undervalued, determine a methodology of internalizing it into the proprietary maintenance plans.

3. Risk management principles should be used to inform the maintenance strategy so that it consciously seeks to protect the cultural value that is embedded in the structure (the 'cultural increment').

4. Resource accounting principles should be used to ensure that adequate long-term funds are available to pay for an appropriate inspection cycle and programme of works.

5. The overall system should be cost effective and simple to operate.

6.4.10 Concluding comment on the impact of maintenance management on cultural significance

It might be argued that we are reducing heritage characteristics to a 'cultural increment' and in so doing, treating this element of value as a modifier of 'commercial value' rather than as a key element of value in its own right. For this reason it is important to appreciate that the so-called 'cultural increment' is not so much a modifier or multiplier as a discrete (and possibly significant) element of use value. There is no one, simple, definitive, formulaic way of

measuring the value of the cultural increment. Historic and cultural significance varies considerably in nature and scope from place to place. However, if we wish to develop an 'informed maintenance strategy' for our heritage assets, it must incorporate an intelligent assessment of how our management of maintenance affects the long-run value of these important places and spaces. Without doubt, more work needs to be done in this field.

6.5 Conclusions

This part of the report has examined the financial and non-financial case for maintenance. It has raised a number of issues a number of issues related to the accuracy of cost forecasts. It has also considered the feasibility of assessing the financial and cultural implications of not undertaking regular inspections and preventative maintenance. In conclusion we would like to make the following points.

- There is some evidence to show that regular inspections and preventative maintenance will help to extend the life of many building components but the need for these depends on the nature of individual building elements and there may be dangers of conflict with a policy of minimum intervention.

- There is little evidence to suggest that regular inspections and preventative maintenance will **always** be a cost effective use of resources.

- Attempting to assess the financial implications of not undertaking regular inspections and preventative maintenance is fraught with difficulty. There is very little reliable data on element life and, for the reasons outlined in Section 6.2, there are several factors which influence the life spans of building materials.

- Assessing the cultural value of buildings and building components is not a science. There are a number of factors to consider and there is no single methodology or philosophy which can produce a value acceptable to all.

- Nevertheless, it is clear from our property surveys and associated research that regular (and possibly targeted) inspections and preventative maintenance will probably be:

    - cost effective for those elements near the end of their lives;

    - cost effective for those elements whose premature failure or inadequate functional performance might affect other building components;

    - cost effective for those elements of cultural value;

    - effective to the organisation in terms of minimising risk and uncertainty.