Western Cape Government
Provincial Treasury

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TREASURY CIRCULAR NO. 4 /2013

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THE MINISTER OF AGRICULTURE AND RURAL DEVELOPMENT
THE MINISTER OF COMMUNITY SAFETY
THE MINISTER OF CULTURAL AFFAIRS AND SPORT
THE MINISTER OF EDUCATION
THE MINISTER OF FINANCE, ECONOMIC DEVELOPMENT AND TOURISM
THE MINISTER OF HEALTH
THE MINISTER OF HUMAN SETTLEMENTS
THE MINISTER OF LOCAL GOVERNMENT, ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING
THE MINISTER OF SOCIAL DEVELOPMENT
THE MINISTER OF TRANSPORT AND PUBLIC WORKS
THE SPEAKER: PROVINCIAL PARLIAMENT
THE DEPUTY SPEAKER: PROVINCIAL PARLIAMENT

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GUIDELINE FOR IMPLEMENTATION OF LIFE CYCLE COSTING: DRAFT FOR COMMENT

1. PURPOSE

To inform provincial departments of the draft Guideline document for the implementation of life cycle costing and to invite comments, prior to implementation, thereof.

2. BACKGROUND

The Framework for the Western Cape Infrastructure Delivery Management System (WCIDMS), as approved by Cabinet on 13 April 2011, requires departments to carry out life cycle costing in the planning of, and budgeting for immovable assets (infrastructure). To assist provincial departments in this regard, Provincial Treasury drafted a Guideline for implementation of life cycle costing. The intention is to issue the document for application effective 1 April 2013.

3. DISCUSSION

As the next step, Provincial Treasury, in consultation with yourselves, need to finalise the document before the end of March 2013. The consultation process to be followed is outlined in paragraph 4.

The first step will entail a 3-hour information/briefing session to be held on 4 March 2013, and attended by appropriate representatives from each Department – where the background, context, rationale and content of the documents will be broadly explained and discussed.

4. CONSULTATION PROCESS

The consultation process is depicted in the table below and it is important that departments note the content thereof. Treasury, in consultation with yourselves, need to finalise the document before the end of March 2013.

No.	Activity	Date	Time*
1.	PT distributes the draft document to provincial departments for comments.	11 February 2013	
2.	PT receives comments from provincial departments, consolidate and forward to service provider (Turner and Townsend).	22 February 2013	
3.	Hold a 3-hour information/briefing session – where the background, context, rationale and content of the document will be broadly explained and discussed – and where the compiler of the document (i.e. Ms Wanda Chunnett of Turner & Townsend) will be available to respond to and clarify any concerns and issues of Departments. The session is to be attended by appropriate representatives from each Department as follows: - WCGE (max. 4 people) - WCGH (max. 4 people) - WCGTPW (max. 8 people) - WCG Human Settlements (max. 4 people) - Roads and Transport (max.3 people) - All other departments (max. 2 people per department)	4 March 2013	08:30 – 12:30
4.	Departments formally submit their comments on the document by no later than 15 March 2013. *Note:* *Only one consolidated set of comments for the document per department.*	15 March 2013	Latest 16:00
5.	PT compiles final document, taking cognisance of the comments received from the departments, and issues the document for application effective 1 April 2013.	29 March 2013	Latest 16:00

** Details of venue to follow.*

5. ACTIONS REQUIRED

Provincial departments are hereby requested to submit their first set of comments (template provided) on the Guideline document for the implementation of Life Cycle Costing on **22 February 2013** to Mr Reggie Daniels at Reggie.Daniels@westerncape.gov.za.

Your valued input is of critical importance, and your active participation in the process would therefore be appreciated.

Trusting that you find the above in order.

MS JD GANTANA
HEAD: PROVINCIAL GOVERNMENT PUBLIC FINANCE
DATE: 08/02/2013

Guideline document for the implementation of Life Cycle Costing

Western Cape Provincial Treasury

January 13

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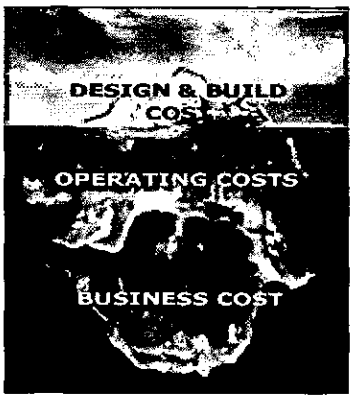
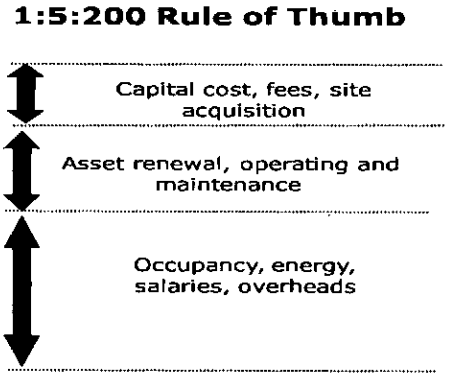
Preface

In the assessment of long-term costs of design, construction methods and materials specification, it is already widely accepted that Whole Life Costing and Life Cycle Costing can demonstrate very clearly that cost and value are not the same. Investment decisions, in both the public and private sectors, contemplate higher initial capital commitment today if an accurate Whole Life Appraisal can show that this will create advantages/benefits over a longer time horizon.

Empirical results have shown that operating costs for an asset over a 30 year cycle are estimated at five times the capital cost, and the cost of occupation could be 200 times greater.





Whole Life Cost/Costing	Life Cycle Cost/Costing
Whole Life Cost: All significant and relevant initial and future costs and benefits of an asset, throughout its life cycle, while fulfilling the performance requirements.	Life cycle cost: cost of an asset or its parts throughout its life cycle, while fulfilling the performance requirements
Whole Life Costing: methodology for systematic economic consideration of all whole life costs and benefits over a period of analysis, as defined in the agreed scope.	Life cycle costing: methodology for systematic economic evaluation of life cycle costs over a period of analysis, as defined in the agreed scope

While life cycle costs include cost associated directly with constructing and operating the asset, whole life costs include other costs such as land, income from the building and support costs associated with the activity of the asset.

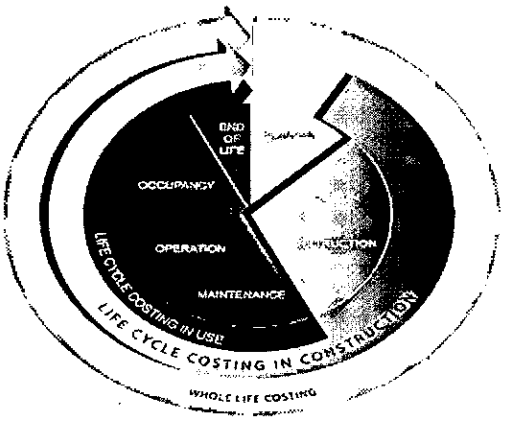
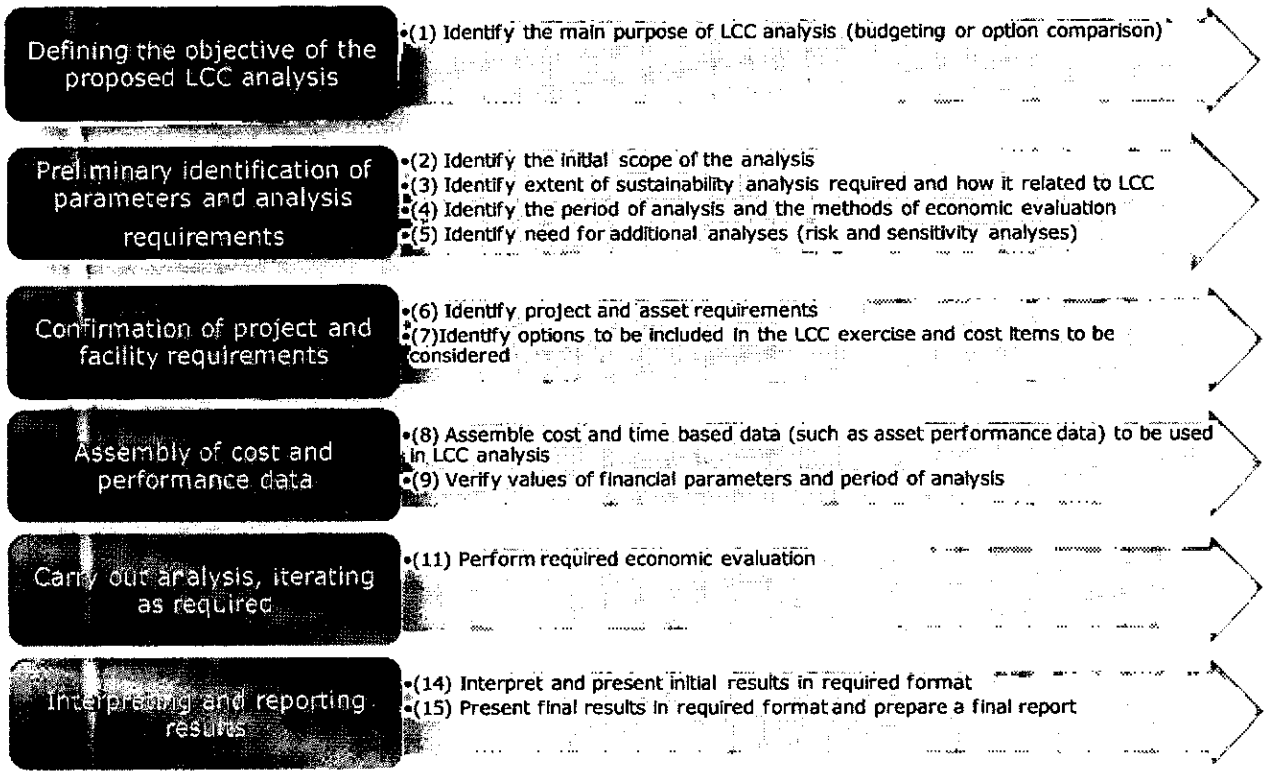


Figure 1: Whole life costing and Life cycle costing

In undertaking strategic options analysis, from an infrastructure planning perspective, either Whole Life Costing or Life Cycle Costing can be used. In terms of understanding and assessing the cost from design and construction, occupation and disposal, Life Cycle Costing can be applied.

This document provides a guideline for Life Cycle Costing.



The major benefits of LCC are:

- evaluation of competing options in purchasing;
- improved awareness of total costs;
- more accurate forecasting of cost profiles; and
- performance trade-off against cost.

The level of sophistication of LCC will vary according to the value and complexity of the asset, the stage of life of the asset and the intended use of the cost information.

1 Scope

This document provides a generic description of Life Cycle Costing and can be adopted as a framework within which different Departments can define their specific procedures.

2 Terms, definitions and abbreviations

2.1 Glossary of Terms

Infrastructure

Fixed assets that are constructed or result from construction operations including:

a) buildings, structures and facilities;

b) water supply, sanitation, electricity supply, transportation and storm water drainage systems; and

c) the related permanent fixtures that cannot be readily or economically removed or reused

Maintenance

Combination of all technical and associated administrative actions during an item's service life with the aim of retaining it in a state in which it can perform its required functions.

Residual Value

Value assigned to an asset at the end of the period of analysis.

Life Cycle Cost

Assessment expressed in monetary value taking into account all significant and relevant costs over the life cycle, as defined in the agreed scope. The projected costs are those needed to achieve defined levels of performance, including reliability, safety and availability over the period of analysis.

Life Cycle

Consecutive and interlinked periods of time between a selected date and the disposal of the asset, over which the criteria (e.g. costs) are assessed. This period may be determined for the analysis (e.g. to match the period of tenancy or ownership) or cover the entire life cycle. The

life cycle period shall be governed by defining the scope and the specific performance requirements for the particular asset.

Nominal Cost

Expected price which will be paid when a cost is due to be paid, including estimate changes in price due to, for example, forecast change in efficiency, inflation or deflation and technology.

Real Cost

Cost expressed as a value as at the base date, including estimated changes in price due to forecast changes in efficiency and technology, but excluding general price inflation or deflation.

Discounted Cost

Resulting cost when the real cost is discounted by the real discount rate or when the nominal cost is discounted by the nominal discount rate.

Discount Rate

Factor reflecting the time value of money that is used to convert cash flows occurring at different times to a common time.

Note: This may be used to convert future values to Present Day Values and vice versa.

Nominal Discount Rate

Rate used to relate present and future money values in comparable terms taking into account the general inflation/deflation rate.

Real Discount Rate

Rate used to relate present and future money values in comparable terms, not taking into account the general or specific inflation in the cost of a particular asset under consideration.

Net Present Value

Net Present Value is the sum of the discounted future cash flows. Where only costs are included this may be termed Net Present Cost (NPC).

Present Day Value

Monies accruing in the future that have been discounted to account for the fact that they are worth less at the time of calculation.

Sensitivity Analysis

Test of the outcome of an analysis by altering one or more parameters from initial value(s).

2.2 Abbreviations

For the purposes of this standard, the following abbreviations apply:

B-BBEE	Broad-based black economic empowerment
CIDB	Construction Industry Development Board
CPS	Construction Procurement System
IDMS	Infrastructure Delivery Management System
LCA	Life Cycle Assessment
LCC	Life Cycle Cost
NPC	Net Present Cost
NPV	Net Present Value
SCM	Supply Chain Management
WLC	Whole Life Cost

3 Normative references

ISO 15686 – service life planning of buildings and constructed assets.

Office of Government Commerce (OGC) (2003) Achieving Excellence Guide 7: Whole-life costing

Final Methodology, Life Cycle Costing as a contribution to sustainable construction: a common methodology Davis Langdon Management Consulting

Society of Chartered Surveyors SCS Guide to Life Cycle Costing

4 Key Principles

LCC analysis is often used for option evaluation when procuring new assets and for decision-making to minimise whole-life costs throughout the life of an asset. It is also applied to comparisons of actual costs for similar asset types and as feedback into future design and acquisition decisions. One of the primary benefits is that costs which occur after an asset has been constructed or acquired, such as maintenance, operation, disposal, become an important consideration in decision-making. Another benefit from doing proper life cycle costing is that low [initial] development costs that may lead to high maintenance or customer service costs in the future, can be identified in the early stages of project creation or acquisition.

LCC is a key component in the economic appraisal associated with evaluating project proposals. In the past the focus has been on the up-front capital costs of [asset] creation or acquisition, and institutions may have failed to take account of the longer-term costs of the asset. An economic appraisal is generally a broader based assessment, considering benefits and indirect or intangible costs as well as direct costs.

In this way the life cycle costs and benefits of each option are considered and usually converted using discount rates into net present value costs and benefits. This results in a benefit cost ratio for each option.

Historically, asset investments have been based on expedient design and lowest cost construction. If such investment has been made without proper analysis of the standard of service required and the maintenance and intervention options available, the initial saving may result in increased expenditure throughout the asset's life.

By using a life cycle costing methodology as an input to your options analysis it avoids issues with decisions being made based on the short-term costs of design and construction versus the longer-term maintenance and operation costs that can be a significant proportion of the whole-life cost.

Other issues which influence the lifecycle costs of an asset include:

- site conditions
- historic performance of assets or materials
- effective monitoring techniques
- intervention strategies.

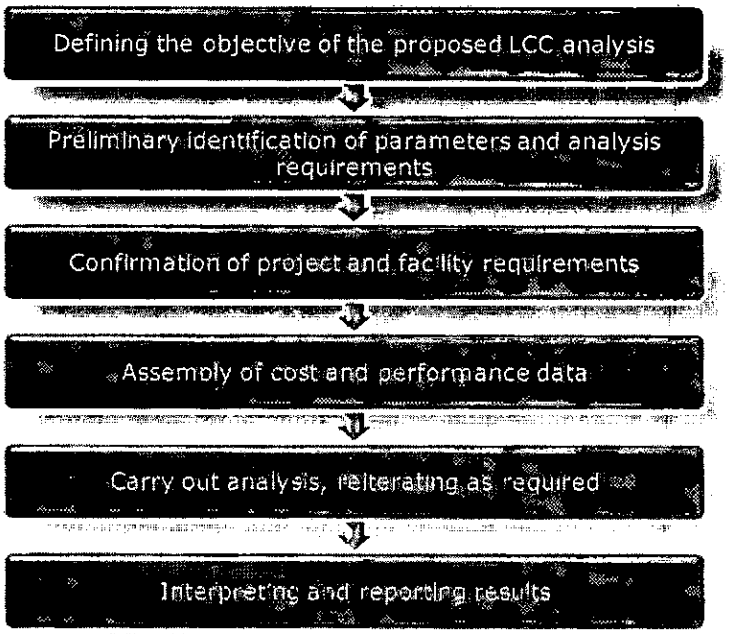
Although the general approach to determining life cycle costs is common to most types of asset, each asset will have specific issues to be considered and the detail of the assessment needs to be tailored to the

importance and value of the asset. High cost assets (and asset systems) will likely have more detail, as will critical assets and asset systems.

5 Life Cycle Costing - Methodology

This document provides a methodological framework for the common and consistent application of LCC.

LCC may be applied in a wide range of circumstances in construction such as capital spend on new or existing assets, assessing future operational budgets or for evaluating refurbishment and renewal options. The period of analysis for an LCC may also vary. LCC may be employed to inform decisions throughout the complete life cycle of a constructed asset or for a selected limited period within it. Notwithstanding the period of analysis, the core evaluation process can be summarised as follows:



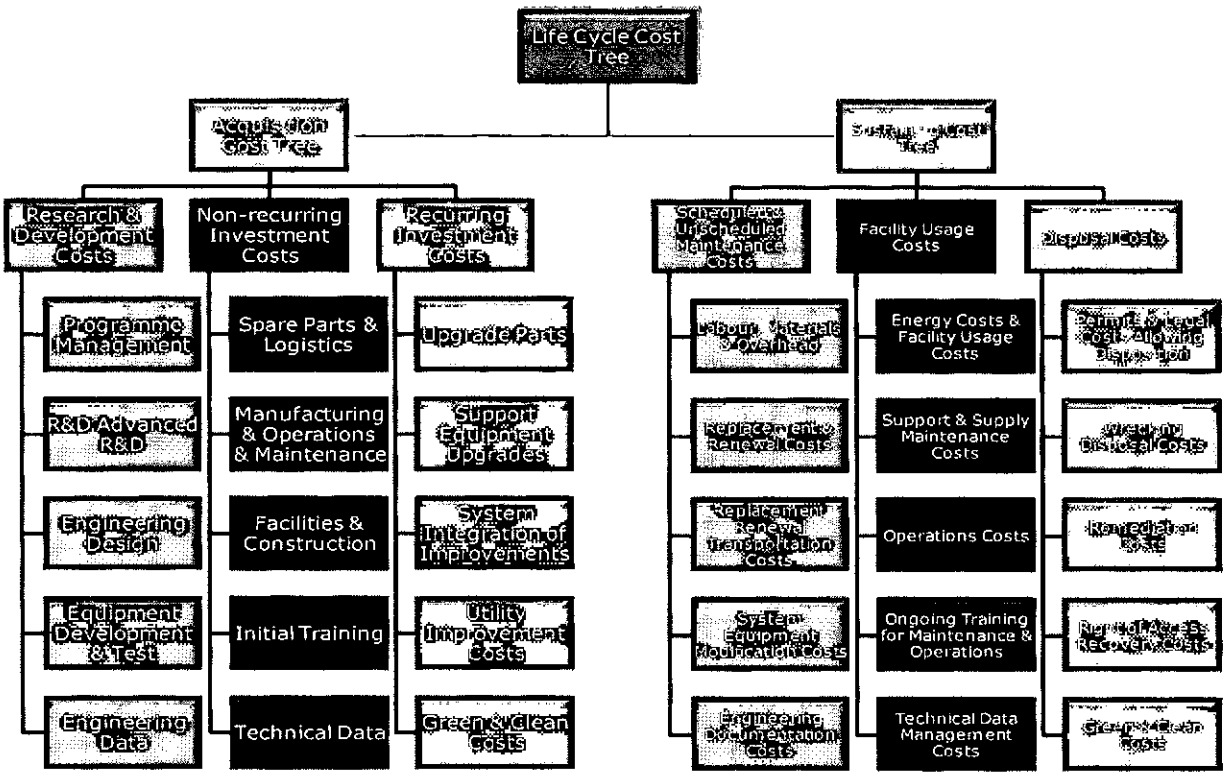
For the LCC process to be effective it should be undertaken collaboratively between all key stakeholders in the project. The LCC process is essentially iterative; both in the context of assessing the options for a decision at a specific point and of repeating the analysis at a future point in time in the life cycle of a project in the light of increasingly detailed information or changing user requirements

A basic tree for LCC also combines the dimensions of acquisition costs and sustaining costs. These costs are not mutually exclusive but are interrelated.

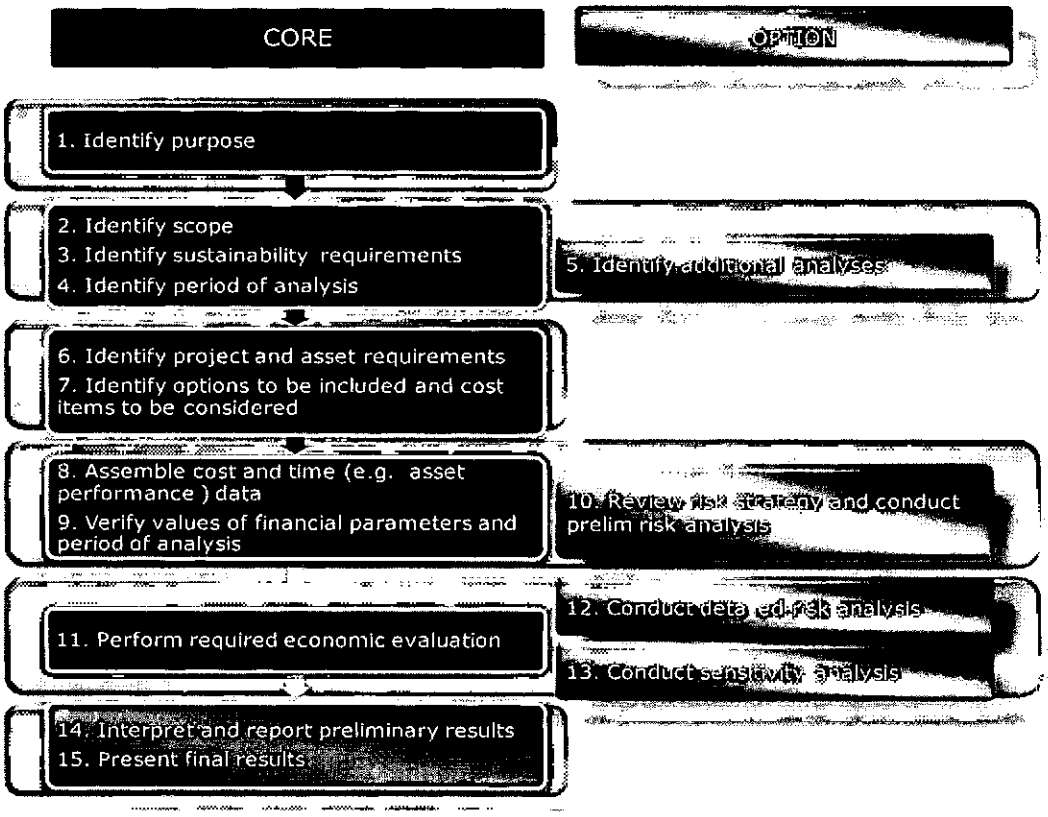
The Acquisition and Sustaining costs have branches that make up the cost elements that feed into each of these headline items. What goes into these branches depends on the specific [project/business] case and is generally driven by common sense. The objective is to include

appropriate cost elements and discard trivial elements which do not substantially influence LCC.

Examples of the Acquisition- and Sustainability Cost tree branches are illustrated below:



Based on the LCC discussion thus far the core process steps of LCC



have been expanded on:

5.1 STEP 1: Main purpose of the LCC analysis

Generally LCC analysis is applied in either of the following forms::

a. An absolute analysis used to support the processes of planning, budgeting of constructed assets; or

b. A relative analysis to undertake robust financial option appraisals.

Table 1: Typical applications of LCC

Stage in Life Cycle	Typical application of LCC
During planning, to understand the full cost implications of operating as well as building assets in order to establish its essential viability.	The analysis will be based on approximate data, typically historical information from similar projects, but sufficient for budgeting and option ranking to allow a decision on whether to go ahead, to reduce the project or stop.
During the early stages of design, decisions will be required on the fundamental elements – structure, envelope, services, finishes	The analysis can draw on feasibility studies and pre-project professional advice, as well historical information, to support decisions on the key features of the project – its size, scope, method of construction and operation.
By detail design stage, the essential cost parameters of the project will be determined but decisions will still be required on details and whether, finally, to commit to construction.	Information can now be fed into the analysis based on a clear view of all primary elements and access to related cost, service life and maintenance data from manufacturers' specifications, as well as similar projects and national price books. This allows a detailed LCC breakdown confirming the viability of the scheme and appraisal of detailed design options. Sensitivity and risk analyses may also be carried out
Detailed design also requires final selection of materials, components and systems. Potentially, similar decisions will subsequently be required in the event of their replacement during	LCC analysis can be focused on the specific component or system with the benefit of related cost, service life and maintenance data from manufacturers' specifications, as well as from similar projects and national price books. The main focus will be on option evaluation,

Stage in Life Cycle	Typical application of LCC
operation and maintenance	ranking and selection.
During the operation of the completed asset refurbishment and renewal of some elements might be required, driven by (for example): High operational costs, High energy consumption, Obsolescence (for example: physical, technical, economic, social) Change in use of the asset Components or systems reaching the end of their service life	LCC can be applied in supporting selection of the most appropriate refurbishment or renewal option, at either an asset or component level. The analysis can be based on historic or benchmark data, or on detailed data derived from manufacturers' specifications and comparable cost-in-use data. It is essential that the analysis takes into account the impact on interdependent systems and the overall asset.

5.2 STEP 2: Identify the initial scope of the LCC analysis

Identification of the scope of the exercise, including the stage(s) in the asset life cycle at which it is undertaken, the boundaries of the analysis and whether there are any specific inclusions or exclusions.

LCC analysis may be undertaken to support a project to invest in:

a. A single complete constructed asset that comprises a usable facility such as a building

b. An individual component , material or system within such an asset

c. A portfolio comprising a number of assets

The principle of lifecycle cost planning is the same for immovable and moveable assets. However, the scale of the asset under consideration will determine the detail to which an asset is componentised. Lifecycle planning for a simple building such as a small rural clinic or rural primary school is different to the lifecycle planning for a central academic hospital.

A small "simple" facility could be treated as a single asset broken down to immovable and movable asset components. A large and more complex facility would need to be broken down into more detailed components.

The determining factor as to the level of detail in breaking down an asset into components is determined to a large extent as to use of the information. If the information is to be used for budgeting and especially long term budgeting and planning, then the level of detail will not be granular and more aggregated. Where the planning is for detailed budget planning at a facility level then it is likely that the facility is made up of a number of assets and the facility will be broken down into more detailed components.

For the purposes of this methodology the life-cycle of an asset is divided into the following stages:

- Investment planning, pre-construction
- Design, construction
- Operation, maintenance
- End of life / disposal

Activities in the **investment planning / pre-construction phase** might typically include:

- Business case preparation
- Acquisition of site(s) or of existing asset(s)
- Professional consultancy
- Inspections and surveys
- Arranging finance
- Assembling the project team / consortium
- Procurement planning

Activities in the **design and construction phase** might include:

- Concept design
- Detailed design
- Site clearance
- Placing contracts for construction
- Construction of the fabric

- Fitting out
- Commissioning and handover
- Landscaping

Activities in the **operation and maintenance** phase might include:

- Life Cycle Costing (LCC) as a contribution to sustainable construction: a common methodology
- Employing an FM team or placing an appropriate contract
- Placing contracts for energy supply and other utilities
- Arranging insurances and compliance with regulatory requirements, e.g. inspections
- Planning and carrying out pre-planned (cyclical) maintenance and replacements
- Carrying out unplanned (responsive) maintenance and replacements
- Planning and carrying out pre-planned refurbishment and/or adaptation (such works may be better considered as separate projects subject to their own LCC considerations)
- Cleaning
- Redecoration
- Grounds maintenance.

Activities in the **end of life/disposal phase** might include:

- Sale of asset
- Change of use of asset
- Demolition
- Site and land clearance and clean up
- Recycling of materials

5.2.1 Identification of analysis boundaries

During the early scoping exercise identify the broad boundaries of the LCC analysis, including:

- Whether the analysis period is to include the entire asset life cycle or a defined part thereof

- What costs (and revenues) are to be included or excluded from the analysis

- Whether there are any particular project- contractual, regulatory or economic issues that will influence key criteria (such as analysis period, method of economic evaluation) that are to be defined in future steps.

Life Cycle Costing should exclude any **backlog maintenance**. It is assumed in lifecycle planning that the asset is in a maintained condition. The rehabilitation of an asset to a fully functional condition is a cost that has to be incurred prior to lifecycle maintenance taking place. Rehabilitation work is work required due to a lack of previous maintenance – commonly called backlog maintenance.

5.3 STEP 3: Identify the extent to which sustainability – and specifically environmental – analysis relates to LCC

A key part of any whole-life cost assessment is to address the sustainability aspects of the asset. An integrated approach to design, construction, operation and maintenance - that takes into account environmental factors - can improve health and safety, design quality; drive out waste; reduce maintenance requirements and subsequently reduce whole-life costs. Design decisions related to the building's energy efficiency such as orientation, thermal efficiency and "air-tightness" can influence the buildings costs in use and LCC can be used to evaluate whether additional sustainable attributes and energy efficiency measures are cost effective over a given study period.

5.4 STEP 4: Identify the period of analysis and methods of economic evaluation.

The decision on the appropriate analysis period for a LCC exercise may be driven by a number of factors

- Design life of the asset
- Project duration
- Period of economic interest in the asset
- Financial drivers
- Projected refurbishment/remodelling periods

- Regulatory requirements
- Business planning cycle
- Client requirement to adopt the ISO 14040 environmental definition of 'life cycle'

5.4.1 Discounting

The discount rate is the investment premium over and above inflation and as such is a separate concept and distinct from it. There are two possible approaches to dealing with inflation:

- Using a 'nominal' discount rate, that is a rate that is not adjusted to remove the effects of actual or expected inflation. This means that inflation predictions are built into forecast costs and prices
- Using a 'real' discount rate, that is a rate that has been adjusted to remove the effect of actual or expected inflation. This means that future costs and prices are estimated at present day ('real') prices and inflation can be dealt with separately.

As constructed assets typically have long service lives and it is difficult to predict inflation in the long term, it is generally recommended to carry out LCC analyses on using real costs and discount rates.

5.4.2 Economic evaluation

Various financial analysis techniques are available for the assessment of alternative options.

Technique	Description
Net Present Value (NPV)	NPV is the sum of the discounted future cash flows, both costs and benefits/revenues
Net Present Cost (NPC)	NPC is the sum of the discounted future cash flows (costs only)
Payback (PB)	The PB period is the measure of how long it takes to recover initial investment costs.
Net Savings (NS), Net Benefit (NB)	NS/NB is the present value of savings/benefits in the operation phase less the present value of the additional investment costs to achieve them.

Technique	Description
Savings to Investment Ratio (SIR)	The SIR is a measure of the cost-effectiveness of a proposed investment (an SIR greater than 1 is positive)
Adjusted Internal Rate of Return (AIRR)	The AIRR is a measure of the annual yield from a project over the period of analysis taking into account reinvestments of interim receipts, indicating projects with greater net savings. An AIRR greater than the minimum acceptable rate of return (i.e. the discount rate) is positive.
Annual Cost and Annual Equivalent Value (AC or AEV)	The AC or AEV is a uniform annual amount that, when totalled over the period of analysis, equals the total net cost of the project taking into account the time value of money over the period.

5.5 STEP 5: Identify the need for additional analyses (risk/uncertainty and sensitivity analyses)

Risk and uncertainty analysis can be applied in conjunction with LCC. Certain risks are inherent in the LCC assessment process, namely:

- That the total life cycle costs in a given period exceed those calculated, and;
- That the life cycle cost profile over a given period differs from that predicted (e.g. the total costs may be the same, but the distribution of those costs over time differs from that predicted).

These key risks can arise as a result of variability in one or more of the predicted values or assumptions in the LCC.

The impact of identified risks on LCC assessment can be determined by qualitative (subjective scoring techniques) or quantitative techniques (statistical or deterministic techniques).

5.5.1 Sensitivity analysis

Sensitivity analysis measures the impact on project outcomes of changing key input values

about which there is uncertainty, typically:

- discount rate
- future inflation assumptions
- period of analysis
- service life or maintenance, repair or replacement cycles
- operational cost data.

Sensitivity analysis can be carried out for different combinations of input values and several parameters can be altered at the same time.

Sensitivity analysis identifies how significant specific input parameters or combinations of parameters are in determining the LCC outcomes and indicates the range of variability in the output

5.6 STEP 6: Identify project and/or asset requirements – confirm key parameters

- Functionality of the asset: defined under the headings of use, space and access.
- Physical characteristics: including physical performance of the asset itself, its environmental engineering and the process of its construction.
- Intangibles: These might include: high quality of design internally and externally, generous working spaces, well-fitted and enjoyable circulation spaces and common areas, good acoustics, high quality of natural and artificial light
- Scope of the project: scale, context, logistics and relationship to other projects
- Quality requirements
- Project constraints
- Project budget
- Project timescale and programme

5.7 STEP 7: Identify options to be included in the LCC exercise

The purpose of this step is to ensure the appropriate options for analysis have been identified and defined in sufficient detail to enable the cost and time based data to be identified

5.8 STEP 8: Assemble cost and time data to be used in LCC analysis

For each asset or collection of similar assets or components a profile of timings when lifecycle costs will be incurred and the percentage of the capital cost that will be incurred at a particular time.is required for carrying out the LCC.

Typical cost classification and indicative check-list of cost items include:

Acquisition – non-construction costs

- Site – lease/purchase of land and/or existing building(s)/asset(s), including related fees and local taxes
- Finance – interest or cost of money; wider economic impacts
- Client's in-house resources – property/project management, administration/overheads
- Professional advice – planning, legal, preparing brief, sustainability

Acquisition – design and construction

- Professional services – project management, architecture, structural/civil/environmental engineering, cost and value management
- Site clearance, temporary works
- Construction – infrastructure, structure, envelope, services, fitting out, commissioning, handover
- Fixtures, fittings, furnishings
- Landscaping, external works

Operation

- Rent
- Rates / local taxes, land charges
- Insurances
- Energy – heating, cooling, small power, lighting, internal transport (lifts)

- Utilities – water, sewerage, telephone
- Facilities management – cleaning, security, waste management
- Regulatory costs – fire, access inspections

Maintenance

- Maintenance management – inspections, contracts management
- Minor repairs/replacements/renewals
- Cleaning
- Grounds maintenance
- Redecoration
- Loss of facility / business opportunity costs during downtime

Typically for a facility it is expected that the maintenance cost of a facility is between 3% to 4% of the replacement cost or for new facilities and ongoing budgeting the 3%to 4% of the capital cost escalated into the future.

If the facility has a high level of specialist equipment ... then the percentage figures provided above would be adjusted, usually upwards. For example a central academic hospital with a significant percentage of the capital cost invested in medical and ICT equipment would be expected to have a higher percentage of the replacement cost as the annual lifecycle cost as compared to a simple rural clinic.

Planned re-work

- Adaptation – evacuation, works, re-commissioning, fit-out
- Major replacement/renewal/refurbishment – evacuation, works, re-commissioning, fit-out
- Loss of facility / business opportunity costs during downtime

End of life/disposal/hand-back

- Final condition inspection including fees
- Restoration/reinstatement – as required by lease/contract

- De-commissioning
- Demolition, disposal, site clean-up

Income

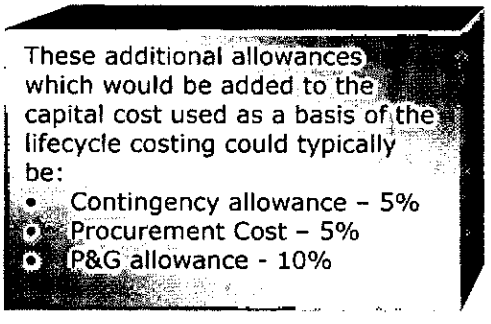
- Sales of land, interests in assets, salvaged materials
- Grants, tax allowances
- Third party income – rents, service charges

5.8.1 On-costs

It is common practice for certain additional costs to be applied to the above cost categories as 'on-costs', i.e. costs over and above the main cost rates.

Typical examples include:

- Preliminaries (e.g. set-up costs, site overheads, management costs)
- Access costs (e.g. scaffolding, access equipment)
- Design costs (e.g. architects, engineers)
- Strip-out costs (i.e. costs of removal/disposal of components to be replaced)
- Management costs (e.g. cost of planning & supervising works)
- Out-of-hours premium (i.e. additional costs for accessing a facility outside of normal working hours)
- Commissioning costs (i.e. costs of testing and adjusting plant prior to use)
- Contingency allowance to cover the unexpected and unforeseen



5.8.2 Time profiles

In addition to costs, the other key input to the LCC analysis process is time based information. Life cycle costs can fundamentally be grouped into three categories, namely:

- Those occurring at the start of the LCC analysis, e.g. acquisition and construction costs

- Those occurring at regular, predictable periods throughout the life cycle, e.g. utility costs, cleaning, cyclical maintenance/servicing of plant

- Those occurring at less frequent, less predictable periods in the future, e.g. component replacements, refurbishment, disposal costs.

5.8.3 Component service lives

This refers to data on the longevity of materials and components.

The actual life of any given component in any situation will be the result of a complex set of factors including its specification, its location, the way in which it is incorporated into the building, its level of maintenance and its intensity of use.

5.8.4 Data from sustainability assessments

This could include:

- Effects of long term cost savings

- 'Sustainability premium' calculated on options selected on environmental criteria rather than only on technical and cost grounds

5.9 STEP 9: Verify values of financial parameters and period of analysis

Confirm the values of the financial parameters and the analysis period identified in Step 3, in light of the more detailed project, asset and options information obtained in Steps 4 to 8.

- Period of analysis

- Key financial parameters (Method of economic analysis, Discount rate, Treatment of inflation)

Escalation used for planning could be CPI or the BER forecast for buildings. The BER forecast of building cost escalation is usually but not always higher than CPI. For government budget planning CPI would be used with the budget being adjusted annually going forward based on the replacement cost of the facility.

- Taxation issues

5.10 STEP 10 (Optional): Review risk strategy and carry out preliminary uncertainty/risk assessment

5.11 STEP 11: Perform required economic evaluation.

Calculating and using the NPV and other measures (Net Present Value (NPV), Net Present Cost (NPC), Payback (PB), Net Savings (NS), Net Benefit (NB), Savings to Investment Ratio (SIR), Adjusted Internal Rate of Return (AIRR), Annual Cost and Annual Equivalent Value (AC or AEV))

Examples of the application of LCC analysis

Decision required	Economic evaluation
To proceed or not	NS SIR
Evaluation of alternatives / options	LCC – NPV PB NB/NS from all options SIR
Budgeting of future costs for new facility	LCC – NPV
To lease or buy facility	LCC – NPV Annual cash flow PB

5.12 STEP 12 (Optional): Carry out detailed risk/uncertainty analysis (if required)

5.13 STEP 13 (Optional): Carry out sensitivity analysis (if required)

5.14 STEP 14: Interpret and present initial results in required format

5.14.1 Analysis and interpretation of results

The results of the LCC exercise will often require further analysis and interpretation prior to presentation to the client. This might include:

- Representation of the results as a percentage of capital or acquisition costs
- Representing the results in relation to other measures, e.g.:
  - *Cost per m^2 gross floor area of the facility*
  - *Cost per functional unit such as classroom, hospital ward, hotel room*
  - *Cost per user, e.g. patient, student, vehicle, passenger*
  - *Cost per year (or cost per m2 per year)*
- Analysis of costs per life cycle cost category, e.g. acquisition, operation, maintenance etc.
- Analysis of costs per building element, component or system
- Analysis of costs divided into distinct parts of the facility, e.g. hospital wards, operating theatres, plant areas, circulation space etc.
- Identification of regular sinking fund contributions required in order to provide funding for future life cycle works.

5.15 STEP 15: Present final results in required format and prepare a final report.

Preparation and submission of a final report:

- A narrative section describing the asset, the project to invest in it and the LCC process carried out in support of this investment
- Tabulated information, typically in spreadsheet format, covering:

o Project Summary including tables with summary of costs, project data and annual expenditure.

o Key parameters (appraisal period, start year, original base date, model base date, location factor, inflation rate, nominal discount rate, adjust cycle length, etc.)

o Total cost profiles (at today's price level and as discounted cost)

o Annual cash flows (cost in a year, cumulative costs, nominal (inflated) costs in a year, NPV of cost in a year, NPV of cumulative cost)

o Detailed LCC model with detailed costs profiles for each year for every item/category of cost, including the timings and extent of all future cost items.

6 Factors for successful application of LCC

The successful application of decision making tools and methodologies depend not only on the accuracy and quality of the input information, but also on the people using and interpreting the outputs. In essence it is a team approach. The following ingredients need to be present to for a meaningful LCC deployment.

- A team approach incorporating all key players in a project.
- Integration of the LCC exercise into the whole investment decision making process, through the concept, design, construction and operation of a facility. It is NOT a once off event.
- Recognition that the robustness of the LCC exercise is highly dependent on the level of detail and certainty in the cost and time inputs used.
- There must be a clear definition of the scope and consideration of all relevant [cost/time] parameters.
- Recognition of the limitations of the technique employed and being cognisant of the need to apply and exercise sound professional judgement.

7 Conclusions

This document serves as a high level framework for applying LCC as a tool to facilitate and guide the process of project options analysis. It is by

no means a definitive guideline and should not be used in this format to perform detailed LCC analysis.

In general the methodology assumes that the user comes with a project(s) for which the purpose, scale and initial capital cost have been broadly defined. This implies that some level of filtering has already been applied to the [initial] project wish list.

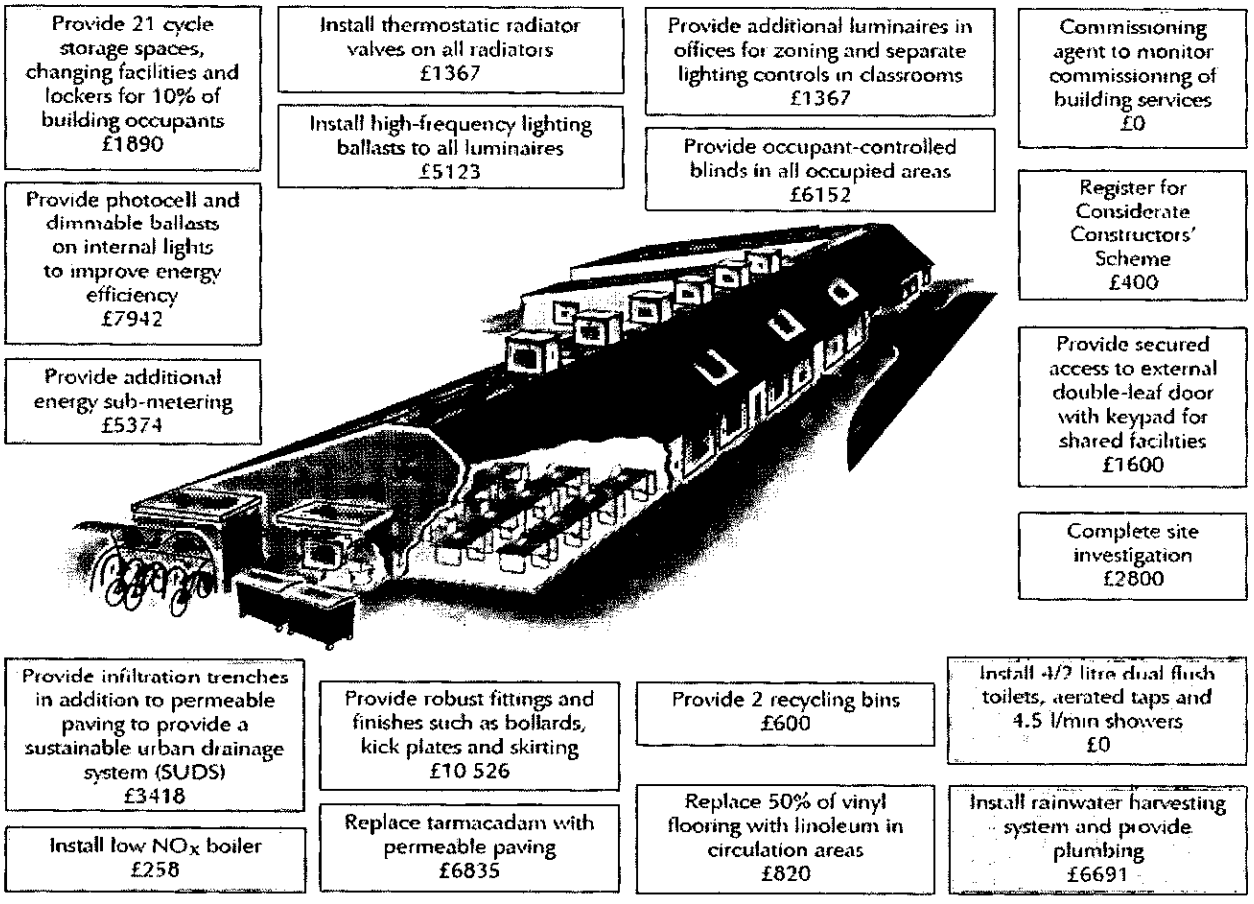
Life cycle costs include cradle to grave costs converted to net present value (NPV) economic models, and is a method to correctly consider long term business decisions which have advantages for investment optimisation. LCC is not easy, but is effective for building a sound business case for action. LCC techniques provide methods for considering trade off ideas, establishing a common ground amongst key stakeholders to facilitate communication that will support sound infrastructure investment decisions and actions.

This document gives the reader a good basis from which to launch an LCC analysis that will support the infrastructure planning and decision making processes aimed at achieving an optimal infrastructure project portfolio for inclusion in the U-AMP programme.

> Most in the public sector recognise lowest capital cost does not give best value for a construction project. The Treasury defines value for money as: "the optimum combination of whole-life cost and quality to meet the user's requirements". In practice, once the procurement process is in progress, whole life costing slips down the list of priorities. Calculations need to be incorporated at the start of the process, and not be seen as a bolt –on. Lowest life cycle cost does not always mean an initial higher capital expenditure, if the right questions are asked early in the process. Agreement on the definitions of the terms and a consistent approach should enable life cycle costing and whole life costing to become more widespread and produce significant benefits for clients.
>
> *George Martin, Willmott Dixon*

Appendix A

Case Study 1 - Price of Sustainability (Sustainable Schools)



Source: Faithful Gould Construction Expertise

Appendix B

Evaluating options to reaplce a boiler (System A is an oil boiler system whereas System B is a gas boiler system)

Recurring Costs	System A	System B
Acquisition cost	4450	5000
Annual Maintenance Costs at present (today's) costs	100	75
Component Replacement every 10 years at present (today's) costs	4450	5000
Annual Energy Cost at (today's) present costs	500	460
Study Period – Years	20	20
Residual Value at end of study period at present (today's) costs	500	1000
Discount Rate	5%	5%
Escalation Rate	3%	3%

	A Cost Items	B Cost Base Yr (B) Future (F)	C Occurrence - Initial - annual - future - year	D PV Factor And Value	E PV (BxD)
1.	**Investment Costs**				7781
	1.1 Acquisition cost	4,450 (B)	INITIAL (0)	1.0	4,450
	1.2 Capital Replacement	4450	Year 10	SPV*0.825	3671
	1.3 Residual Value (+ or -)	500 (B)	Year 20	SPV* 0.681	(340)
	1.4 Other				
2.	**Operational Costs**				9864
	2.1 Energy Costs	500 (B)	ANNUAL	UPV*16.44	8220
	2.2 Maintenance Costs	100 (B)	ANNUAL	UPV*16.44	1644
	2.3 Other				
3.	**Total LCC(1+2)**				17645

	A Cost Items	B Cost Base Yr (B) Future (F)	C Occurrence - Initial - annual - future - year	D PV Factor And Value	E PV (BxD)
1.	**Investment Costs**				8444
	1.1 Acquisition cost	5000 (B)	INITIAL	1.0	5000
	1.2 Capital Replacement	5000	Year 10	SPV*0.825	4125
	1.3 Residual Value (+ or -)	1000 (B)	Year 20	SPV* 0.681	(681)
	1.4 Other				
2.	**Operational Costs**				8796
	2.1 Energy Costs	460 (B)	ANNUAL	UPV*16.44	7563
	2.2 Maintenance Costs	75 (B)	ANNUAL	UPV*16.44	1233
	2.4 Other				
3.	**Total LCC(1+2)**				17240

Source: SCS Guide to Life Cycle Costing

Western Cape Government
Provincial Treasury

COMMENTS ON THE DRAFT GUIDELINES FOR THE IMPLEMENTATION OF LIFE CYCLE COSTING

1ST DUE DATE FOR COMMENTS: FRIDAY, 22 FEBRUARY 2013

1. COMMENTATOR DETAILS

Organisation Name				
Organisation Type (Please indicate with a X)	Department		Private Individual	
	Constitutional Institution		Private Organisation/Company	
	Public Entity		Other	
Telephone Number				
E-mail Address				

2. COMMENTS

Paragraph	Comments on the draft Guidelines	Proposed amendment to draft Guidelines	Notes to the drafter

3. SIGN OFF PAGE

Date of submission of comments: _____

Signature of organisation representative responsible for comments:

_____

Name:

Designation:

Date: