

# Life-Cycle Planning

Best practice asset management is achieved by adopting a life-cycle approach which uses transparent, informed decision-making processes. Life-cycle planning is a key asset management concept that takes into account the whole-of-life implications of acquiring, operating, maintaining and disposing of a building asset. It should be used when making decisions at both strategic and operational levels of capital works investment and building management.

In this guideline the term 'agencies' is equivalent to 'departments' (as defined in s8 of the [Financial Accountability Act 2009](#)).

The concepts contained in this guideline are consistent with the requirements in the:

*Australian Standard AS/NZS 4536:1999: Life-cycle costing - An application guide*

[Building Asset Performance Framework](#) (Department of Housing and Public Works)

[Capital Works Management Framework](#) (Department of Housing and Public Works)

[Maintenance Management Framework](#) (Department of Housing and Public Works)

[Non-Current Asset Policies for the Queensland Public Sector](#) (Queensland Treasury)

[Project Assessment Framework](#) (Queensland Treasury)

The objectives of life-cycle planning are to:

- determine the total cost of ownership and operation of an asset to ensure service continuity
- establish a sound basis on which decisions are made by evaluating the total cost of any investment decision, rather than just looking at the short-term impact or the initial capital costs
- identify the impact of refurbishment and maintenance decisions on asset disposal plans.

## Benefits

Undertaking life-cycle planning for building assets will ensure that:

- the building portfolio effectively supports whole-of-Government requirements and departmental priorities
- there is a sound basis for making investment, maintenance and disposal decisions (for example, the estimated economic life of the building asset should be considered when determining if refurbishment or disposal is the most appropriate course of action).

## Risks

Possible consequences of not undertaking life-cycle planning include:

- failure to make explicit and give consideration to the optimal balance of operating and maintenance costs that are attributable to the use of the building relative to capital works investment/procurement costs
- capital costs are minimised without the knowledge of the consequential impact on life-cycle costs
- deficiencies in the asset planning and management processes which may result in assets that are inefficient to operate and maintain
- difficulty in determining whether refurbishment/renovation or an addition to a building will deliver better value for money than continuing to maintain a building which is no longer suited to its function or purpose
- inappropriate strategies for asset utilisation over the expected remaining life of the building.

### 1.0 Life-cycle planning

The use of life-cycle planning provides confidence to asset management decisions, particularly those related to the optimum timing for replacements and upgrades. When making submissions to Government, agencies are required to demonstrate sound analysis of project proposals. This information is generally presented in a business case. Guidance on assessments related to the priority and affordability of the project options and whether to develop a business case is available in the *Project Assessment Framework* guideline:

[Preliminary Evaluation](#).

Effectively applying life-cycle planning requires knowledge and understanding of the:

- asset life-cycle concept and the related impacts which affect building performance
- analysis techniques used in life-cycle planning
- formulation of life-cycle plans.

The asset life-cycle covers the planning, investment/procurement, management-in-use and disposal of assets such that their service delivery potential is maximised and that risks and costs are managed over their entire life.

## Life-Cycle Planning

Formulation of replacement, upgrade and maintenance works programs requires access to appropriate financial information such as the value of the building asset (determined using valuation techniques) and depreciation rates. Agencies should refer to the [Non-Current Asset Policies for the Queensland Public Sector](#) for guidance on how to determine this financial information and techniques for periodically reviewing it.

### 2.0 Analysis techniques used in life-cycle planning

Analysis techniques range from preliminary evaluation of the costs, risks and benefits associated with the identified project options to the detailed financial and economic analysis required for undertaking feasibility studies and developing a business case.

Life-cycle costing is a technique used to analyse options identified as part of life-cycle planning and evaluates all costs incurred by an asset over its entire life to enable decisions on acquisition, maintenance, refurbishment or disposal to be made. The costs incurred should include the capital investment cost and the building's estimated operating, maintenance and disposal costs. The *Australian Standard AS/NZS 4536:1999: Life-cycle costing - An application guide* provides details on the application of life-cycle costing.

The project options should aim to achieve the optimum balance between the life-cycle costs before seeking approval for the allocation and expenditure of funds for the project.

The *Project Assessment Framework* guideline: [Cost-Benefit Analysis](#) provides agencies with practical advice regarding the:

- issues to consider when conducting a financial and economic analysis of project options at either the [Preliminary Evaluation](#) or [Business Case Development](#) stages identified in the Project Assessment Framework
- total life-cycle cost of the building asset (or 'net present value') which is the sum of all annual expenditure for the expected life of the asset with the expenditure for each year discounted by the appropriate discount rate

Guidance on the initial stage in the project development process is also available in the *Capital Works Management Framework* guideline: [Business Case Development](#).

### 3.0 The life-cycle plan

Agencies should have an adequate life-cycle plan for each building that supports departmental objectives. As a minimum, the following information should be included in a life-cycle plan:

- the initial capital cost (including directly associated costs, such as fees and installation) and the asset replacement value
- the expected total life (in years) before full replacement will become necessary. If this figure cannot be confidently assessed, the design life of the facility as a whole can be used
- the estimated annual maintenance and operating cost of the building using the maintenance strategy consistent with the [Maintenance Management Framework](#) and based on the best estimate of the operating pattern
- expected timing and costs of major repairs, overhauls or refurbishments, scheduled on an annual basis

- the key assumptions used to identify the preferred option for timing and costs of repairs, overhauls or refurbishments.

## 4.0 Life-cycle planning decisions

Decisions made during each phase of the asset life-cycle are briefly outlined below.

### 4.1 Planning

Management strategies are identified which may include the need for the asset. The Project Assessment Framework and the [Capital Works Management Framework](#) are the key policy documents which address strategic planning assessments applicable to government building projects.

### 4.2 Investment/procurement

During this phase the:

- need for the asset is further defined
- full costs and benefits associated with the project are evaluated. Viable alternatives need to be tested, including the option of 'doing nothing'. The preferred option should only proceed where it can be shown that the benefits exceed the costs
- feasibility of proposed projects is tested including an assessment of future uncertainties. Sensitivity analysis<sup>1</sup> should be used to identify the variables which can have a significant impact on the outcomes of the project and evaluate the range of possible scenarios, for example cost movements, demand and demographic changes (for detailed information refer to the *Project Assessment Framework* guideline: [Cost-Benefit Analysis](#))
- detailed risk analysis is undertaken of the financial, economic, budget, social and environmental impact of each of the options to identify whether a new building, building refurbishment and/or alterations is the most appropriate. This analysis is reflected in a business case which informs a decision on whether the government building project should be undertaken and, if so, which option represents best value for money
- following approval and funding of the project the procurement method is determined when all relevant factors are known.

---

<sup>1</sup> Sensitivity analysis will identify the variables that have the greatest impact on financial viability and the areas which may require additional investigative work to ensure the validity and robustness of assumptions and of the outcomes of the financial analysis. It may also assist in identifying key areas of project risk which may require proactive risk management. It is therefore a key element in the financial evaluation of a project.

### 4.3 Management-in-use

Maintenance planning and expenditure should be guided by value-for-money principles. Departments should ascertain whether it is more economical to upgrade, replace or refurbish buildings rather than continuing to make ongoing repairs. Life-cycle costing should be used to assess the merits of these proposals and to test alternatives in terms of scope and timing. The timing and extent of the required refurbishments or enhancements should be assessed through life-cycle planning. This is best done using building asset performance information in accordance with the [Building Asset Performance Framework \(BAPF\)](#) which establishes the broad scope and application of building asset performance management and the key principles and elements necessary for achieving effective management of buildings.

The BAPF identifies the following costs which will be incurred during this phase:

- **annual operating cost:**
  - ICT services
  - utilities including electricity supply, water supply, waste management services, gas and fuel supplies
  - miscellaneous services including cleaning and hygiene services, security, health and safety, landscaping and gardening services, rates and statutory charges, building management services
- **annual maintenance cost:**
  - agency management/administration (including computerised maintenance management systems)
  - condition assessment
  - planned maintenance (preventative, statutory and condition-based)
  - unplanned maintenance
- **deferred maintenance cost** - the estimated cost of all maintenance work that has not been carried out within a financial year and which is deemed necessary to bring the condition of the building asset to a required standard or acceptable level of risk.

These costs should be considered in the context of operational and other aspects that influence the performance of an asset (i.e. capacity, functionality, location, condition, remaining life, statutory compliance risk, utilisation rate, and any agency specific service-related performance indicator).

Periodic review of current and projected building asset performance is desirable to detect changes early enough for plans to be made for refurbishment, replacement or disposal.

### 4.4 Disposal

Disposal needs to be considered in the context of the effects of the decision on service delivery and any departmental obligations in terms of cultural heritage significance, community attachment or other priorities of government. There are specific requirements that agencies should take into account when considering disposing of an asset with cultural heritage significance (refer to the *Strategic Asset Management Framework* guideline: [Heritage Asset Management](#)).

## Life-Cycle Planning

Where an asset is to be disposed of in the near future, the maintenance strategy should be appropriately adjusted so that only statutory maintenance is undertaken.

Life-cycle costing is the appropriate technique to assess the optimal timing for the disposal of an asset and to assess alternative methods for the disposal because some of these methods may incur capital expenditure to prepare the asset for sale.

The suite of guidelines which comprise the *Strategic Asset Management Framework* (available online at [www.hpw.qld.gov.au](http://www.hpw.qld.gov.au)) is organised under the following categories:

1. **Overview** - explains the principles and concepts of strategic asset management as they apply to buildings.
2. **Guidelines** - expand on key aspects of strategic asset management to inform decisions over the entire life-cycle of the asset.
3. **Decision-making methodologies and guidelines** - support agencies to implement best practice strategic management of buildings.

## Life-Cycle Planning

Second Edition

First Edition published as Life Cycle Planning (ISBN 0 7242 6960 6) in the Strategic Asset Management - Best Practice Guidelines

Queensland Department of Housing and Public Works  
December 2017

(includes minor updates)

© The State of Queensland  
(Department of Housing and Public Works)

## Enquiries should be directed to:

The Manager  
Building Policy and Practice  
Building Industry and Policy  
Department of Housing and Public Works

GPO Box 2457  
Brisbane Qld 4001

[bip@hpw.qld.gov.au](mailto:bip@hpw.qld.gov.au)