Asset Management Framework for National and Provincial Departments

2021

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The National Treasury published its first Asset Management Framework in 2004. This Framework introduced the concept of asset management, described key principles of asset management and provided broad guidelines thereon. Since then, Government significantly increased its investment in infrastructure development to bolster inclusive economic growth, accelerate social development and inclusion, and to address poverty. Multiple large-scale economic and social infrastructure projects were launched to expand, modernize, integrate and upgrade infrastructure capacities. As a result, national and provincial government (and local government) substantially expanded their asset portfolios. At the same time, much of the public sector assets developed over many decades inevitably aged and now require significant renewal. Furthermore, there is a need to adapt existing infrastructure and facilities in line with the green agenda, and to climate-proof such assets.

Globally as well as in South Africa, there is growing recognition of the need for robust, holistic, and integrated asset management practices to deal with ever expanding and more complex asset portfolios, the multiple stakeholder demands placed on these assets, the risks and opportunities inherent in the ownership and operation of these assets, and the scale of lifecycle costs associated with assets.

In response to the growing recognition of the need for improved asset management practices, new legislation, standards and best practice were developed following the publication of the Asset Management Framework in 2004. Notable developments included the introduction of the Government Immovable Asset Management Act in 2007, publication of international standards on asset management in 2014 followed by local adoption of these international standards in 2015 in the form of SANS 55000 standards, and the National Immovable Asset Maintenance Standard of the Department of Public Works and Infrastructure and the cidb in 2015. The National Treasury further updated the Infrastructure Delivery Management System to incorporate an asset management system aligned to the requirements of SANS 55000.

These developments aim to ensure that assets deliver value and support organisational strategic objectives, that asset management practices follow a risk-based and opportunity-driven approach, that assets are managed over the entirety of their lifecycles, that asset management decisions are informed, asset management practices are predictable, and that asset management practices demonstrate good stewardship, governance and transparency.

Accounting practices also continually evolve in response to increasing complexity in legislation and practices, to address shortcomings in public sector financial reporting practices, to improve government's insight into its financial position and prospects, to provide stakeholders including citizens, parliament and markets with relevant information, and to hold government accountable. Within national and provincial government, this led to the publication of the Modified Cash Standard (MCS).

This 2021 Asset Management Framework builds upon the 2004 edition. It frames non-financial asset management practices within the context of the above developments. Additionally, the 2021 Edition of the Asset Management Framework focusses on asset componentisation, valuation principles and techniques, and asset risk and performance management.

1. Introduction

1.1 Purpose of the Asset Management Framework

1.1.1 The importance of public sector assets

The public sector holds vast portfolios of assets such as roads, transportation facilities such as harbors, energy, water and telecommunications infrastructure, hospitals, schools, prisons, cultural facilities, nature reserves and military assets, and movable assets.

Public sector assets underpin all economic activity in the country and enables social activity and security.

They are essential for economic growth, poverty alleviation, country economic competitiveness, social upliftment and inclusion and, overall, our collective quality of life. The availability and quality of infrastructure is considered so important that it forms one of the twelve pillars of competitiveness according to which the World Economic Forum ranks country-level global competitiveness.

Therefore, like other countries around the globe, South Africa has and continue to invest in infrastructure. South Africa has invested in public sector infrastructure since the 1900s, and Government spent R3.2 trillion on infrastructure between 1998/99 and 2018/191. South Africa is a developing country with positive population growth and will need to continue to grow the economy to provide employment and economic opportunities for all. As a result, Government will continue to invest in asset creation.

Furthermore, many public sector assets display the characteristic of longevity. Construction of the Hartbeespoort Dam in the North West Province, for example, was completed in 1923. This dam remains fully functional. Construction of the Union Buildings was completed in 1913. The Union Buildings still house the offices of the President of South Africa and form the official seat of the South African Government. Construction on the Caste of Good Hope was completed in 1679, and this facility today functions as a museum. This longevity characteristic of many public sector assets means that public sector asset portfolios expand over time, and that asset wealth accrues.

1.1.2 Challenges, risks and requirements

Public sector assets confer many benefits on society. But they also pose many and complex challenges and risks, some of which include:

Value comprising multiple and often competing requirements for assets

Managed correctly, assets provide value beyond the services or economic benefits beyond the primary purpose. Asset needs are articulated, and assets are acquired to serve a primary objective, for example an irrigation dam is designed to unlock the agricultural potential of the area to be served by the dam. Very often, the primary objective is more nuanced, and will require that the asset is designed, constructed, or manufactured, and delivered in such a way that it is environmentally responsible, adhere

to high standards of occupational health and safety, and with minimum specified performance requirements. In procurement terms, these specifications are referred to as the primary purpose.

Government wishes to leverage its spending in support of its social, economic, and other objectives. Therefore, the design of the construction project or asset acquisition as well as the way in which it is procured may be done in such a manner that secondary procurement objectives are achieved. These may include black economic empowerment, job creation, upliftment of small and emerging enterprises and community involvement.

Leveraging government investments in assets is both desirable and necessary for government to achieve its objectives. It however adds a layer of complexity in terms of how assets are managed across their lifecycles. It often also requires trade-offs: Designing and acquiring assets that serve multiple objectives adds to the cost of assets, which is where value-for-money considerations come into play.

Risk

Immovable assets especially are exposed to multiple risks that may results in asset failure, and these risks are constantly evolving. Consequences of public sector asset failure, depending on the type, nature and scale of failure may range from insignificant to catastrophic. In more extreme cases, public sector asset failure may result in loss of life, large-scale environmental damage, property damage, economic disruption and active distrust in Government's ability to manage.

Potential fiscal shocks and service delivery interruptions

No matter how well immovable assets are designed, constructed and maintained, they will inevitably deteriorate as a result of wear and tear. Immovable assets generally display the characteristic of longevity, with lives often measured in decades, in some instances, in centuries. Wear and tear from year to year is therefore often not evident. It may therefore be tempting to forego maintenance in the short term.

Furthermore, historic public sector accounting systems and financial reporting practices generally do not adequately track the deterioration of long-life immovable assets. This is a major blind spot, especially because governments generally embark on cyclical infrastructure investment, with the result that a whole generation of infrastructure may become due for major refurbishment or replacement at around the same time. This may be problematic for several reasons. The first is the scale of funding required to undertake such large infrastructure investment that have not been anticipated, and therefore not planned in advance. When the problem and scale of funding becomes known, it inevitably competes with other pre-determined policy objectives and budget commitments. And funding a major infrastructure overhaul programme may require extensive capital funding, impacting on the government debt to GDP ratio. Finally, once the funding is secured, service delivery disruptions may already occur, and it may still take several years to construct and commission appropriate asset responses.

The challenges are therefore to project and anticipate asset lifecycle needs over the short, medium and long term, and to proactively plan and implement appropriate responses. This requires sound information on asset useful lives, failure patterns, asset failure mode status, and lifecycle costs.

Changing demand

Much of government's high value assets are immovable in nature. As noted, they generally have long lives. Over time demand may change, rendering the asset functionally unfit for purpose, even though it may still be in reasonable condition. This may happen because of changes in customer preferences, as a result of technological advances, new legislation and other factors. It may also happen because of spatial shifts in demands. As a result, over time immovable assets may need to be repurposed, reconfigured or upgraded.

Sheer extent and scalability

As a general trend, government continues to expand its asset portfolios. Assets increasingly are also being linked into larger configurations. Buildings are incorporated into facilities, and facilities into precincts. Infrastructure assets are linked into infrastructure systems that may span the country, and even linked to the infrastructure of neighbouring countries. Furthermore, there are often connectedness and interdependence between different types of infrastructure systems, such as between energy and water infrastructure systems.

The sheer extent of assets threatens to overwhelm many countries, who do not have an adequate grip of the extent, type, location and distribution, failure mode status, risk exposure and lifecycle needs of their assets. Furthermore, there is often not sufficient funding to attend to all asset needs. This is not a problem limited to developing nations – first world countries such as the United States of America and Canada also face these challenges.

Prioritisation

The public sector must prioritize multiple competing asset requirement amongst other government priorities within budget constraints. This requires informed decision-making, and sound intelligence on assets, their risks and opportunities.

Governance, accountability and transparency

The Constitution of the Republic of South Africa demands good governance, accountability and transparency of the public sector. This applies especially to asset management, given its impacts on the country's fiscal position, economic competitiveness, quality of life and environment impacts. As a result there are multiple stakeholders that require financial and non-financial information about public sector assets (see **Table 1** below).

Table 1 : Stakeholders requiring asset management information

Regulatory community	Investment community	Supplier community
Parliament / provincial legislatures	National government/fiscus	General goods
Elected officials	Donor agencies	Specialised goods
Auditor General	Development banks	Capital equipment importers
Sector regulatory bodies	Commercial banks	General services
Standards setting bodies	Investors	Specialist services
	Developers	
	Fund managers	
	Credit rating agencies	
Professional community	**Broader community**	**Customers**
Professional associations	Media	Residential customers
Academic institutions	Special interest groups	Business customers
Research institutions	Taxpayers	Institutional customers
Statisticians	General public	
Economists	Other governments	

All of these, and other, risks, challenges and requirements call for robust management of assets.

1.2 Asset management defined

1.2.1 Definition of an asset

In accounting, an asset is defined as:

> A resource controlled by the department as a result of past events from which future economic benefits or service potential is expected to flow to the department[1].

ISO/SANS 55000 defines an asset as:

> An item, thing or entity that has potential or actual value to an organisation[2].

In both cases, assets can be tangible, intangible, financial or non-financial in nature.

[1] MCS Chapter 2 on Concepts and Principles, paragraph .31(a)
[2] ISO/SANS 55000 2014, page 13

Within the public sector accounting environment, an item will only be recorded/recognized as an asset if the following two conditions are met:

1	it is probable that future economic benefits or service potential will flow to the entity as a result of past events; and
2	the cost or fair value of the item can be measured reliably.

The definitions above are consistent in that assets provide the means for departments to achieve their objectives, but the accounting definition is more specific.

The "value" referred to in the ISO/SANS definition are the "economic benefits or service potential" referred to in the accounting definition. Assets that are used to deliver goods and services in furtherance of a department's objectives, but which do not directly generate net cash inflows are those typically embodying service potential. Assets that are used to generate net cash inflows are typically described as those embodying future economic potential.

The accounting definition moreover requires that this "value" is measured in financial terms.

Also note that neither definition refers to ownership. Whilst ownership is certainly a strong indicator, an entity must be able to control the use of the item and be entitled to its future economic benefits or service potential, for it to be recorded/recognized as an asset.

1.2.2 Asset focus

This 2021 Asset Management Framework is primarily focused on tangible non-current assets with special emphasis on immovable assets.

1.2.3 Definition of asset management

Asset management is the process of decision making, planning and control over the acquisition, use, safeguarding and disposal of assets to maximise their service delivery potential and benefits, and to minimise their risks and costs over their entire life.

This definition requires the following:

1	The adoption of a whole-of-life approach, from the point of needs identification through to post-disposal liabilities.
2	Planning, control and monitoring processes must be implemented to reduce risks and capitalise on opportunities across the asset lifecycle.
3	The balancing of risks, costs and opportunities in relation to the desired performance of assets. This involves trade-offs through informed decision-making over multiple timeframes and at various levels (assets and asset portfolios).

1.2.4 Fundamentals of asset management

ISO 55000 identifies the following fundamentals of asset management[3]:

a. **Value.** Assets exist to deliver value to the organisation and its stakeholders. Value can be tangible or intangible, financial and non-financial, as determined by the organisation and its stakeholders, and as expressed in organisational objectives. Therefore the focus in asset management is not primarily on assets, but rather on how they can provide value to the organisation. This includes:

- A clear statement on how asset management objectives align with and support organisational objectives;
- The establishment of decision-making systems and processes that reflect stakeholder needs and define value; and
- The adoption of a lifecycle approach to realise value from assets.

b. **Alignment.** Asset management translates organisational objectives into technical, financial and operational decisions, plans and activities to enable the achievement of organisational objectives. This includes:

- Implementing risk-based, information-driven (evidence-driven) planning and decision-making processes and activities that transform organisational objectives into asset management plans.
- The alignment and integration of asset management processes with other functional management processes of the organisation, such as finance, supply chain management, and human resource management.
- The specification, design and implementation of an asset management system.

c. **Leadership**. Leadership, organisational design and workplace culture are key determinants of the realisation of value. In particular, the workplace culture should ideally be value-centric and the organisation should be a learning organisation committed to continual improvement. Leadership and commitment is required at all levels to establish, operate and improve asset management in the organisation. This includes:

- Clearly defined roles, responsibilities and delegations;
- Ensuring that employees are aware, competent, and empowered; and
- Consultation with employees and stakeholders on asset management.

d. **Assurance.** Asset management provides assurance that assets will fulfil their purpose and that the asset management function and asset management system will perform as required.

[3] ISO 55000 2014, page 3-4

1.2.5 Scope of asset management

Asset management is a fast-evolving set of inter-disciplinary practices, drawing on the management, accounting, built environment and social sciences to holistically deal with asset requirements, risks, challenges and opportunities. The Global Forum for Maintenance and Asset Management[4] identified 39 subjects grouped into six categories that collectively constitute the Asset Management Landscape, as presented in **Figure 1** below:

Figure 1: GFMAM Asset Management Landscape

STRATEGY AND PLANNING	ASSET MANAGEMENT DECISION-MAKING
Asset management policy	Capital investment decision-making
Asset management strategy & objectives	Operations and maintenance decision-making
Demand analysis	Lifecycle value realisation
Strategic planning	Resourcing strategy
Asset management planning	Shutdown & outage strategy

ORGANISATION AND PEOPLE	ASSET INFORMATION
Procurement and supply chain management	Asset information strategy
Asset management leadership	Asset information standards
Organisation structure	Asset information systems
Organisation culture	Data & information management
Competence management	

LIFECYCLE DELIVERY	RISK & REVIEW
Technical standards and legislation	Risk assessment and management
Asset creation & acquisition	Contingency planning & resilience analysis
Systems engineering	Sustainable development
Configuration management	Management of change
Maintenance delivery	Asset performance & health monitoring
Reliability engineering	Asset management system monitoring
Asset operations	Management review, audit & assurance
Resource management	Asset costing & valuation
Shutdown & outage management	Stakeholder engagement
Fault & incident response	
Asset decommissioning & disposal	

[4] GFMAM, 2014

1.2.6 Benefits of asset management

SANS 55000[5] identifies the following benefits from applying asset management:

a. **Achievement of organisational objectives:** asset management ensures that organisational objectives are translated into asset management objectives, and decisions, plans, actions and resources are then focussed on meeting those objectives. Achievement of these objectives are monitored as appropriate, deviations are corrected and actions taken to avoid recurrence of deviations.

b. **Improved service delivery**: assuring the performance of assets can lead to improved service delivery that consistently meet customer and stakeholder expectations.

c. **Improved financial performance**: improving the return on investments, value creation and reducing costs can be achieved, while preserving asset value and without sacrificing the short or long-term realisation of organizational objectives.

d. **Informed asset investment decisions**: enabling the organization to improve its decision making across the asset lifecycle and effectively balancing costs, risks, opportunities and performance – moreover, asset investment decisions are optimised across the asset portfolio and between asset portfolios.

e. **Managed risk**: reducing financial losses, improving health and safety, goodwill and reputation, minimising environmental and social impacts, can result in reduced liabilities such as insurance premiums, fines and penalties.

f. **Enhanced reputation**: through improved customer satisfaction, stakeholder awareness and confidence.

g. **Demonstrated social responsibility**: improving the organization's ability to, for example, contribute to employment creation and reduced poverty, reduce emissions, conserve resources and adapt to climate change, enables it to demonstrate socially responsible and ethical business practices and stewardship.

h. **Demonstrated compliance**: transparently conforming with legal, statutory, regulatory and government policy requirements, as well as adhering to asset management standards, policies and processes, can enable demonstration of compliance.

i. **Improved organisational sustainability**: effectively managing effects, expenditures and performance, risks and opportunities over the short, medium and long term can improve the sustainability of operations and the organisation.

j. **Improved efficiency and effectiveness**: reviewing and continually improving processes, procedures and asset performance in response to the operating environment and stakeholder

[5] SANS 55000 (2015)

requirements can improve efficiency and effectiveness, and the achievement of organisational objectives.

1.3 Legislative and best practice framework

1.3.1 The Public Finance Management Act (PFMA)

Proper management of and accounting for assets have been set as an important responsibility of the accounting officer

Section 38 of the PFMA places the responsibility on the accounting officer for financial and risk management of the department as well as the effective and efficient use of the resources thereof. The section further specifically tasks the accounting officer with the management, including the safeguarding and maintenance, of assets, and the management of liabilities.

Section 40 requires that the accounting officer keep full and proper records of the financial affairs of the department and places the responsibility for producing annual financial statements, that will fairly reflect the financial position of the department as well as its financial performance, on the accounting officer.

Section 27 requires further that the annual budget must reflect the estimates of current and capital expenditure per vote and per main division, and in relation to capital expenditure reflect the impact thereof on future financial years.

Treasury Regulation 10.1 (issued in terms of Section 76) requires of the accounting officer to ensure that processes, manual or electronic, and procedures are in place for the effective, efficient, economical and transparent use of the entity's assets. It further places the full responsibility on the accounting officer for ensuring that control systems are in place to ensure the prevention of theft, losses, wastage and misuse of assets and the keeping of stock levels at an optimum and economical level.

To give effect to the above it is necessary to firstly identify all assets under the control of a department through reference to original documentation and physical counts and secondly to create a system that will ensure continued monitoring of these assets as well as accounting for additional assets procured on an ongoing basis.

Section 38 of the PFMA is all embracing in its reference to "assets" and so is Treasury Regulation 10.

1.3.2 Government Immovable Asset Management Act (GIAMA)

1.3.2.1 Objectives of GIAMA

The objectives of the Government Immovable Asset Management Act (GIAMA), Act 19 of 2007 are to:

- provide a uniform immovable asset management framework to promote accountability and transparency within government;
- ensure effective immovable asset management within government;
- ensure coordination of the use of immovable assets with service delivery objects of a national or provincial department and the efficient utilisation of immovable assets;
- optimise the cost of service delivery by ensuring accountability for capital and recurrent works;
- the acquisition, reuse and disposal of an immovable asset;
- the maintenance of existing immovable assets;
- protecting the environment and the cultural and historic heritage; and
- improving health and safety in the working environment.

GIAMA recognizes that assets can deliver value beyond their primarily purpose, and demands that assets are managed efficiently, including ensuring that assets remain fit for service delivery purposes.

GIAMA applies to all immovable assets acquired or owned by government, excluding any right contemplated in the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

1.3.2.2 Principles of asset management in the GIAMA

GIAMA establishes the following principles for the management of immovable assets:

- an immovable asset must be used efficiently and becomes surplus to a user if it does not support its service delivery objectives at an efficient level and if it cannot be upgraded to that level;
- to minimise the demand for immovable assets, alternative service delivery methods that do not require immovable assets must be identified and considered;
- in relation to an acquisition, it must be considered whether—
  - a non-immovable asset solution is viable;
  - an immovable asset currently used by the state is adequate to meet a change in its service delivery objectives; and
  - the cost of the immovable asset as well as operational and maintenance cost throughout its life cycle justifies its acquisition in relation to the cost of the service;

GIAMA requires the adoption of a lifecycle approach to the management of immovable assets that includes full consideration of and optimisation of lifecycle costs.

- immovable assets that are currently used must be kept operational to function in a manner that supports efficient service delivery;
- when an immovable asset is acquired or disposed of best value for money must be realised;
- in relation to a disposal, the custodian must consider whether the immovable asset concerned can be used—
    - by another user or jointly by different users;
    - in relation to social development initiatives of government; and
    - in relation to government's socio-economic objectives such as land reform, black economic empowerment, alleviation of poverty, job creation and wealth redistribution.

GIAMA therefore requires careful consideration of the need for immovable assets. Prior to acquiring a new asset, all available service delivery options must be considered in relation to demand and service delivery needs, including asset options (e.g. new asset acquisition, repurposing, refurbishment or upgrading of existing assets) and non-asset options such as demand management or the shifting of demand. Ultimately, GIAMA requires streamlined asset portfolios sufficient to meet service delivery needs without excess assets and unnecessary costs being incurred.

1.3.2.3 Custodian – user relationship

GIAMA establishes a custodian-user relationship with regards to the management of immovable assets.

A "**custodian**" acts as the caretaker in relation to an immovable asset of which it is the custodian. This includes acquiring, managing and disposing of immovable assets in accordance with the provisions of GIAMA and also the State Land Disposal Act, or any other Act regulating the disposal of state land. Within the national sphere of government, the Department of Public Works and Infrastructure is generally the custodian, and its provincial counterparts within the Public Works family are custodians in the provincial sphere of government.

A "**user**" means a national or provincial department that uses or intends to use an immovable asset in support of its service delivery objectives and includes a custodian in relation to an immovable asset that it occupies or intends to occupy.

There are some instances where GIAMA does not apply. Where custodial functions were assigned to other Ministers by virtue of legislation before the commencement of GIAMA, then those departments continue to function as custodians with respect to the asset portfolios contemplated in such legislation. One such an example where another department functions as custodian of immovable assets is the Department of Water and Sanitation. The National Water Act, Act No. 36 of 1998, appoints the Minister of this portfolio as the custodian of government Water Works.

1.3.2.4 Asset management plans

Clause 6 of GIAMA requires the accounting officers of both custodian and user departments to prepare asset management plans as part of their strategic planning processes.

Custodian asset management plans (C-AMPs) - The accounting officer of a custodian department must prepare a C-AMP for (1) all the immovable assets that are in its custody and (2) all the immovable assets which the custodian uses or intends to use in support of its own service delivery objectives.

The C-AMP must comprise of at least:

- a portfolio strategy and management plan;
- a management plan for each immovable asset throughout its life cycle;
- a performance assessment of the immovable asset;
- report on the condition of the immovable asset and the effect of the asset's condition on its ability to deliver services;
- the maintenance activities required, and the total and true cost of the maintenance activities identified; and
- a disposal strategy and management plan.

User asset management plans (U-AMPs) - The accounting officer of a user department must prepare a U-AMP for the immovable assets which that user uses or intends to use. When preparing the U-AMP, the accounting officer must meet the objectives and principles of GIAMA, adhere to any regulations published in terms of section 20; and adhere to standards issued in terms of section 19.

The U-AMP must consist of at least:

- a strategic needs assessment;
- an acquisition plan;
- an operations plan; and
- an immovable asset surrender plan.

A U-AMP is the principal immovable asset strategic planning instrument guiding and informing all immovable asset management decisions by the user. It binds the user in the exercise of its executive authority, except to the extent of any inconsistency between a U-AMP and GIAMA or the immovable asset management guidelines published by the Minister under section 19, in which case GIAMA or those guidelines prevail.

1.3.3 Accounting framework and financial reporting

1.3.3.1 Objectives of financial statements

The purpose of financial statements is to provide information that is useful to a wide range of users in support of decision-making.

Financial statements reflect the results of the stewardship of management and the accountability of management for the resources entrusted to it and are therefore an important means of demonstrating how the public sector meets its financial management responsibilities. Financial statements prepared for this purpose meet the common needs of most users. However, financial statements do not provide all the information that users may need to make decisions since they largely portray the financial effects of past events and do not necessarily provide prospective information or non-financial information. With respect to assets, financial statements provide historic information and asset management plans provide prospective information.

1.3.3.2 Qualitative characteristics of financial reporting

To achieve the objective of financial reporting, information in the financial statements must have certain qualitative characteristics as shown in **Figure 2** and are descried in **Table 2** below.

Figure 2: Qualitative characteristics

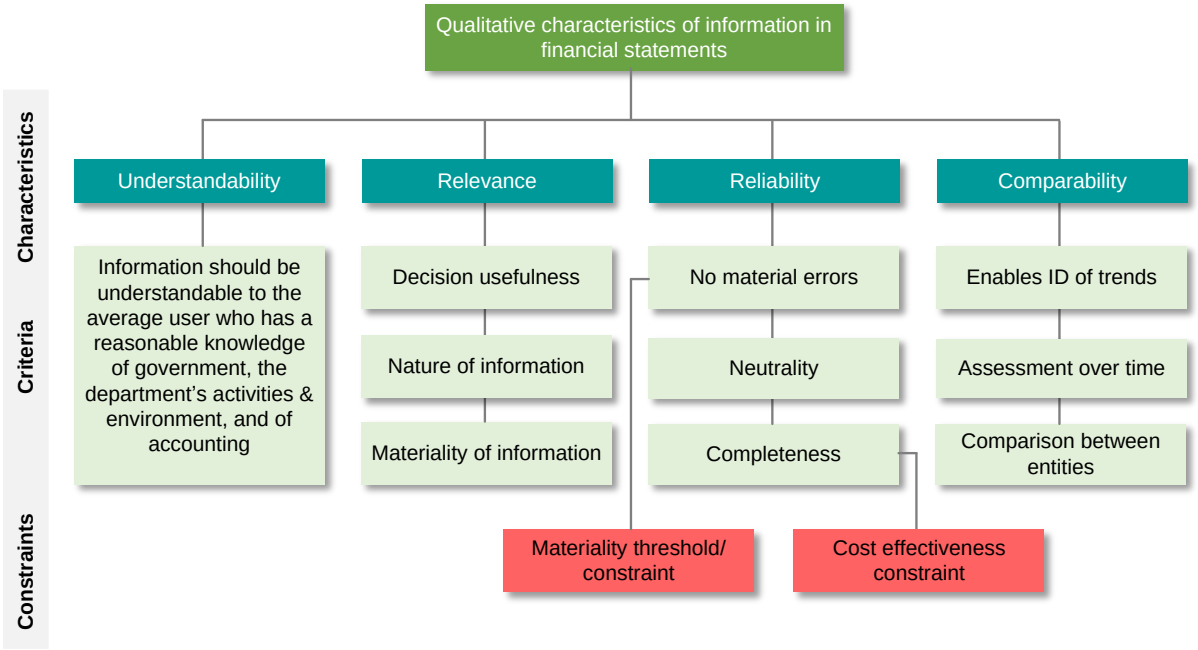


Table 2: Qualitative characteristics of information in financial statements

	UNDERSTANDABILITY

- The information contained in the financial statements must be understandable to the average user who has a reasonable knowledge of government, the department's activities and environment, accounting and a willingness to study the information with reasonable diligence.
- This does not imply that information should be excluded from the financial statements simply because it may be too complex for certain readers to understand.

	RELEVANCE

- Relevant information is information that is decision useful and can therefore influence stewardship by helping users to evaluate past, present or future events, or confirming or correcting their past evaluations.
- The relevance of information is established by reference to the nature and the materiality of the information concerned.
- Information is material if its omission, misstatement, or non-disclosure could influence the decisions of users made based on the financial statements. Materiality depends on the nature or size of the item or error judged in the particular circumstances of its omission, misstatement, or non-disclosure in the financial statements. Thus, materiality provides a threshold or cut-off point rather than being a primary qualitative characteristic which information must have to be useful.
- Material omissions or misstatements of items are material if they could, individually or collectively, influence the decisions or assessments of users made based on the financial statements. The size or nature of the information item, or a combination of both, could be factors in determining materiality of the omission or misstatement.
- Misstatement is the difference between the amount, classification, presentation or disclosure of a reported financial statement item and the amount, classification, presentation or disclosure that is required for the item to be in accordance with the relevant accounting standard. Misstatements can arise from fraud or error. Misstatements can be factual, in the case of a clear breach of a requirement of a financial reporting standard, or could be judgmental, arising from unsuitable estimation techniques or the selection of inappropriate accounting policies.

	RELIABILITY

- Information is reliable when it does not contain material errors and is free from bias. Users of the financial statements should be able to rely on the information as a faithful representation of the transactions, balances and events that it purports to represent. Reliability does not mean "absolute accuracy" but rather refers to information that the users can trust.
- Reliable information will:
  - reflect the substance rather than the legal form of the transactions or events;
  - be neutral in that it should not present information in a manner to achieve a predetermined result; and
  - be complete, within the bounds of materiality and cost.

	COMPARABILITY

- Information should be comparable to enable users to identify trends and to assess performance over time and between similar entities.
- One of the main reasons for the disclosure of accounting policies in the financial statements is to assist users in comparing the financial statements of different entities.

1.3.3.3 Basis of accounting

Financial statements can be prepared on the cash basis, on the accrual basis or some hybrid of these, with the difference being the timing of recognition of the effects of transactions and other events, as follows:

- **Cash basis**. Under the pure cash basis, the effects of transactions and other events are recognised in the financial statements when the resulting cash or its equivalent are received or paid.
- **Accrual basis**. Under the accrual basis, revenue and expenses are recognised and recorded when they occur.
- **Hybrid basis**. Under the hybrid basis, recognition practices of both the cash and accrual basis are employed.

The most appropriate basis of accounting depends on the qualitative characteristics described above in relation to users' needs.

Needs and operating condition differ across the public sector, and as a result the basis of accounting differs between different types of entities. To date, the financial statements of departments are prepared on the modified cash basis of accounting. This is a form of hybrid basis where the "pure" cash basis is modified by providing additional information to users of financial statements.

Historically, the users of departmental financial statements were primarily concerned with the utilisation of allocated resources. The need for additional information on assets held and liabilities owed by departments has caused a shift in the provision of information in the financial statements and will ultimately result in the adoption of accrual accounting by departments.

Until then, the preparation of financial statements is done in accordance with the prescripts of the MCS. The application of the MCS to asset management in national and provincial departments is a key focus of this Asset Management Framework.

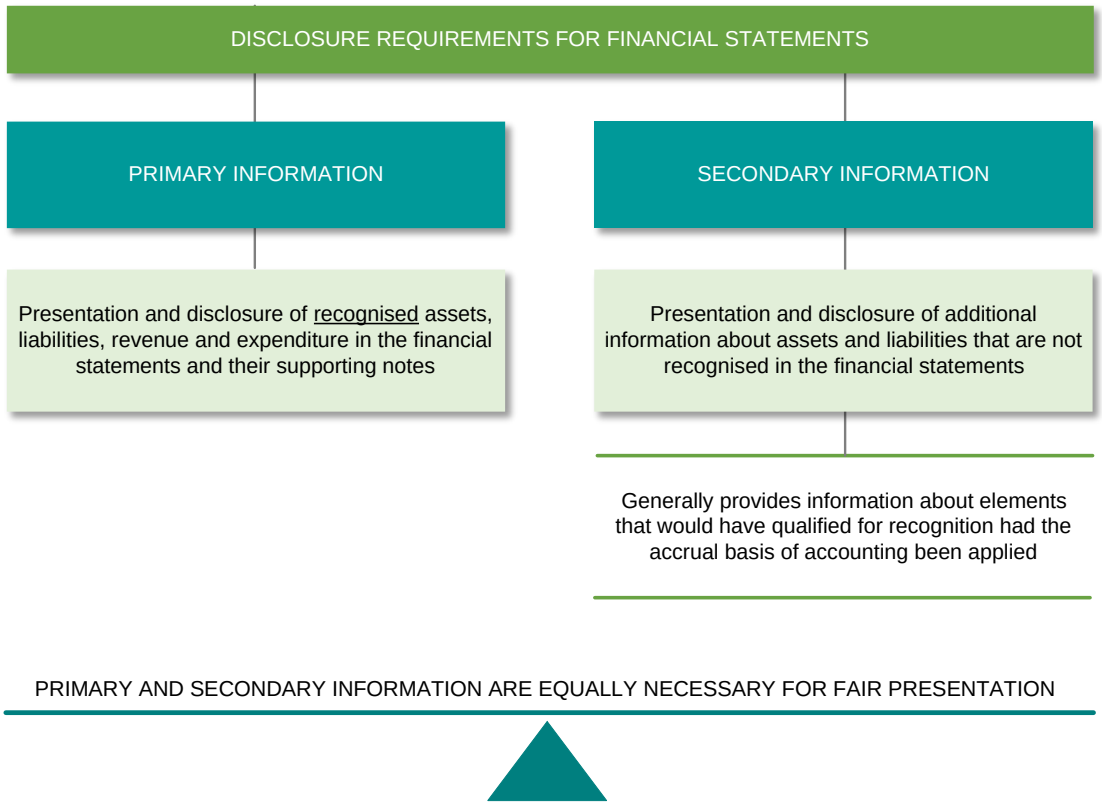
1.3.3.4 Structure of the MCS

Under the modified cash basis of accounting, only certain elements are recognised in the Statement of Financial Position and Statement of Financial Performance, while others are recorded for presentation as notes. Elements are primarily recognised when they arise from cash inflows or outflows.

To ensure a complete view of the financial position and performance of a department for the purposes of fair presentation, and without changing the basis of accounting, the MCS prescribes disclosure requirements for additional information relating to elements that do not qualify for recognition. To aid preparers in understanding this requirement, the MCS distinguishes between primary (recognised and disclosed) and secondary (recorded and disclosed) financial information but does not place a greater degree of importance on either type of information.

Primary and secondary information are equally important and necessary for fair presentation. As such, secondary information is considered an integral part of the financial statements.

Figure 3: Structure of the Modified Cash Standard



Primary financial information relates to the presentation and disclosure of recognised assets, liabilities, revenue and expenditure in the financial statements and their supporting notes. Secondary financial information relates to the presentation and disclosure of additional information about assets and liabilities that are also required to be recorded but are at present not recognised in the financial statements due to the application of the modified cash basis of accounting. Secondary information therefore generally provides information about elements that would have qualified for recognition had an accrual basis of accounting been applied.

1.3.4 SANS 55000 series of asset management standards

The South African National Standard (SANS) series of asset management standards were introduced in 2015 and comprise the following:

The SANS 55000 series of asset management standards apply to all types of assets, tangible and intangible, and across sectors and industries

- SANS 55000: 2015. Asset management - Overview, principles and terminology. This standard provides an overview of asset management, its principles and terminology, and the expected benefits from adopting asset management.
- SANS 55001: 2015. Asset management – Management systems – Requirements. This standard specifies the requirements for the establishment, implementation, maintenance and improvement of a management system for asset management.

- SANS 55001: 2015. Asset management - Management systems - Guidelines for the application of ISO 55001. This standard provides guidance for the application of an asset management system, in accordance with the requirements of ISO 55001.

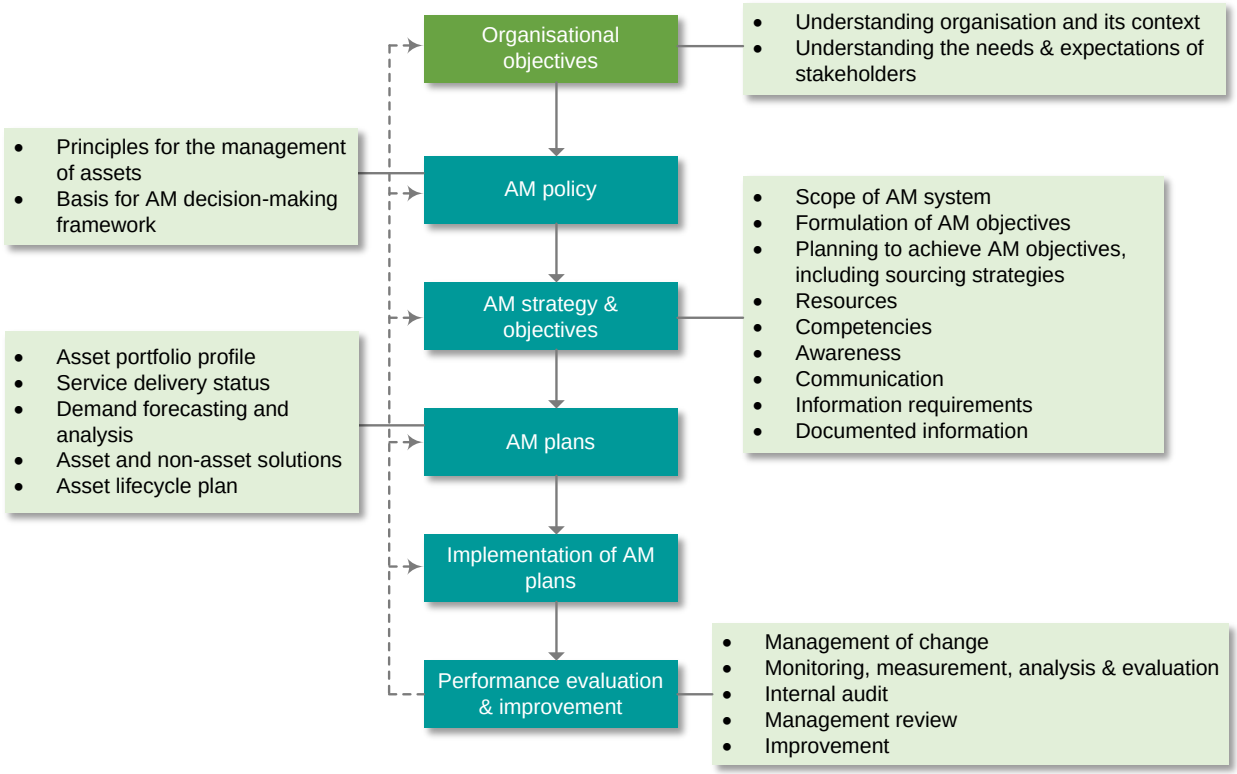
Whereas accounting standards regulate matters relating to the recognition, measurement, lifecycle accounting treatment and reporting of assets, SANS 55000 provides the principles and structure of the management system to ensure that value is derived from assets, and that assets, the asset management function and the asset management system is focused on the achievement of organisational objectives and can demonstrate this.

1.3.4.1 Requirements for a SANS 55000 compliant asset management system

The elements of a SANS 55000 compliant asset management system (AMS) is presented in **Figure 4** below.

A department will establish organisational objectives through its strategic level planning activities and will specify the programmes to achieve the organisational objectives. The asset management function then undertakes an external and internal scan to identify stakeholders relevant to asset management, their requirements and expectations inclusive of recording and reporting on financial and non-financial information, and risks and opportunities. All these are interpreted together with organisational objectives, and the organisation then determines the scope of its Asset Management Systems (AMS) and establishes its Asset Management (AM) policy.

Figure 4: Elements of a SANS 5500 compliant AMS



Strategic asset management policy

All departments are required to establish and implement accounting policies containing the principles, bases, conventions, rules and practices applied by the department in preparing, presenting and disclosing information in the financial statements. One of these accounting policies will focus on assets inclusive of recognition, measurement, lifecycle accounting treatment, disclosures as well as safeguarding and maintenance of those assets.

In addition to the accounting policy for assets, SANS 55000 requires an organisation-level asset management policy that articulates the intentions and direction of the organisation and that provides a framework for establishing asset management objectives. Accordingly, the strategic asset management policy will typically formulate asset management policy principles as outcomes aligned with organisational strategic objectives, such as the following:

- sustainable service delivery
- supporting economic development
- financial health and sustainability
- contributing to social upliftment
- enhancing organisational effectiveness and efficiency
- facilitating a safe workplace environment

Each AM policy principle will in turn specify criteria or actions to ensure that the principle is implemented and that organisational objectives are actively pursued.

A good asset management policy will:

- be consistent with the purpose of the organisation;
- identify the legal/statutory requirements for the organisation and include a commitment to satisfy all applicable requirements;
- determine the principles according to which assets will be managed in furtherance of organisational objectives;
- identify and establish linkages with other organisational policies, e.g. accounting policy for assets;
- include a commitment to continual improvement of asset management and the asset management system; and
- include a requirement for the periodic review of the AM policy, or as legislation or organisational strategic objectives change or evolve.

The following is an example of one AM policy principle:

Box 1: Example of an AM policy principle

Asset management policy principle: Financial health and sustainability

Policy statement

The department shall strive to design and manage its asset portfolios and financial arrangements in such a manner that the department protects and expands the productive capacity and economic potential vested in assets as appropriate. Asset portfolio investment decisions shall be made with due consideration to legal requirements, service delivery needs, lifecycle costs and risk, affordability, and aimed at long term financial resilience.

Financial health and sustainability asset management objectives

To this end, the department shall:

- regularly review the actual extent, nature, utilisation, criticality, performance and condition of infrastructure assets to optimise planning and implementation works;
- assess life-cycle options for proposed new infrastructure;
- assess and implement the most appropriate maintenance of infrastructure assets to achieve the required performance standards and to achieve the expected useful life of infrastructure assets;
- ensure the proper utilisation and maintenance of existing assets subject to availability of resources;
- determine the extent of asset consumption as well as a long-term programme of asset renewal;
- timeously dispose of infrastructure assets that are no longer in use;
- timeously renew infrastructure assets based on capacity, performance, risk exposure, and cost;
- maintain a positive asset sustainability ratio by aiming to fund and implement all required renewals in successive 10-year implementation periods;
- adequately fund maintenance to ensure that assets attain their full intended lifespans, and can provide services and economic returns;
- maintain the productive capacity vested in assets by ensuring that asset consumption does not exceed 50% at portfolio level; and
- maintain asset sustainability by ensuring that renewal expenditure equals depreciation.

AM strategic objectives

AM strategic objectives are established in accordance with the AM policy and must be consistent with and aligned with organisational strategic objectives. AM objectives should be specific, measurable, achievable, realistic and time-bound. Following through on the financial health and sustainability AM policy principle provided in Box 1, examples of specific and measurable AM objectives are provided in **Box 2** below:

Box 2: Examples of AM objectives

Some examples of AM objectives related to financial health and sustainability include:

AM objectives	Performance targets
Maintain the productive capacity vested in assets by ensuring that asset consumption does not exceed 50% at portfolio level	Asset consumption ratio 50% >
Maintain asset sustainability by ensuring that renewal expenditure equals depreciation	Asset sustainability ratio of at least 95% for each period

The asset consumption ratio and asset sustainability ratio are explained in Section 4: Asset performance reporting.

Strategic asset management plan (SAMP)

The SAMP defines the organisation's AM objectives and the scope of the organisation's AM system. It specifies the organisation's AM practices and approaches to AM and determines organisational roles, responsibilities and authorities with regards to asset management. It also provides overarching strategies for various aspects of AM, including approaches to service delivery, and to infrastructure procurement and delivery.

Asset management plan (AMP)

An AMP is prepared for each asset portfolio (where a department has more than one asset portfolio). The AMP considers organisational and AM objectives, assesses demand and current asset capabilities, risks, opportunities and limitations, and develops an optimum mix of asset and non-asset solutions through an asset lifecycle plan. The AMP:

- presents an overall view on the asset portfolio, inclusive of asset extent, asset value, asset consumption, failure mode status and risk exposure;
- describes service delivery commitments, the extent to which services are offered, and gaps in service delivery;
- demand for infrastructure and other services, now and in the future;

- lifecycle plan for asset creation, operation and maintenance, refurbishment, repurposing, upgrading and eventual decommissioning and/or replacement; and
- programmes, projects and activities to implement the lifecycle plan.

Where an organisation manages only one major asset portfolio, the SAMP and AMP may be combined into one plan.

Performance evaluation

To comply with the requirements of SANS 55001, an organisation shall determine what needs to be monitored and measured, the methods to be used in monitoring, measurement and evaluation, as well as the frequency of monitoring and measurement.

The organisation shall evaluate and report on asset performance, asset management performance including financial and non-financial performance, and the effectiveness of the asset management system. Additionally, the organisation shall evaluate and report on the effectiveness of processes to manage risks and opportunities.

The results of performance evaluation shall be retained as documented evidence.

Governance and assurance

SANS 55001 requires internal audits and management reviews to provide assurance that the asset management system conforms to the organisation's own requirements for its AMS as well as SANS 55001, and that the AMS remains fit-for-purpose.

Improvement

Whenever non-conformance or an incident occurs in its assets, asset management or the AMS, the organisation shall react to the non-conformity or incident by taking action to control and correct it, deal with the consequences, evaluate the need to eliminate causes of the non-conformity or incident, and implement and review corrective action as appropriate.

Additionally, the organisation shall establish processes to identify potential failures in asset performance and evaluate the need for preventative action.

Finally, the organisation shall continually improve the suitability, adequacy and effectiveness of its asset management practices and system.

1.3.5 Maintenance management standard

The Maintenance Management Standard, jointly published by the Department of Public Works and the cidb, applies to immovable public sector assets. This Standard establishes a set of principles and practice specifications for the management and care of immovable assets following initial construction or acquisition:

For the purposes of this Asset Management Framework, the Maintenance Management Standard specifies asset data and information requirements necessary for ongoing asset care

- to derive maximum value from immovable assets;
- to protect the investment made into immovable assets and ensure business continuity through the ongoing availability of such assets at reasonable cost and within acceptable risk parameters;
- in support of economic development, social upliftment and environmental sustainability for the benefit of all people in South Africa;
- by specifying robust practice requirements implemented by competent asset management practitioners.

1.3.6 U-AMP guidelines

The Department of Public Works published the Guideline for Users: User Asset Management Plans in June 2017. This guideline presents the framework for the minimum content of a U-AMP, describes the process of preparing a U-AMP, offers recommended templates for the preparation of the U-AMP, explains how the functional performance of assets is determined, and articulates norms and standards for the purposes of space planning and the assessment of utilisation for office accommodation.

The contents of a U-AMP comprise (DPW, 2008: 9):

- Section 1: An introduction that summarises the overall strategic intent of the User regarding its existing and long-term immovable asset requirements. The User must set objectives to improve the efficient and effective utilisation of the existing immovable assets and how it is going to measure itself to achieve such objectives.
- Section 2: Service delivery objectives and immovable asset requirements as expressed in the User's annual strategic plan and must be underpinned by budget programme objectives.
- Section 3: Acquisition plan must contain a summary of current and proposed acquisitions, as informed by the impact of service delivery objectives.
- Section 4: Refurbishment plan must contain a summary of current and proposed refurbishments and reconfiguration of existing immovable assets, as informed by the impact of service delivery objectives.
- Section 5: Repairs required to reinstate immovable assets to their original state.
- Section 6: Surplus immovable assets that no longer support the service delivery objectives of the User and must be surrendered to the Custodian.
- Section 7: Budget requirements to fund immovable asset needs of the User.

These guidelines will be extensively referred to in the following sections as the asset lifecycle and associated actions are described. Additionally, the U-AMPs generate structured secondary information of value for the purposes of the financial statements and informs the section on performance reporting.

1.3.7 C-AMP guidelines

The Department of Public Works published the Guideline for Custodians: User Asset Management Plans in June 2017. This guideline presents the framework for the content of a C-AMP that includes:

- Section 1: Introduction
- Section 2: Portfolio strategy and management plan
- Section 3: Asset performance summary
- Section 4: Asset lifecycle management plans
- Section 5 Acquisition plan
- Section 6: Maintenance plan
- Section 7: Disposal plan
- Section 8: Funding plan and budget requirements
- Section 9: Plan improvement and monitoring

The Guidelines also describes the process of preparing the C-AMP and presents templates for the preparation of the C-AMP. Additionally, the Guidelines describes types and categories of assets that are discussed further in **Section 2: Asset data and information** of this Asset Management Framework.

1.3.8 Framework for Infrastructure Delivery and Procurement Management

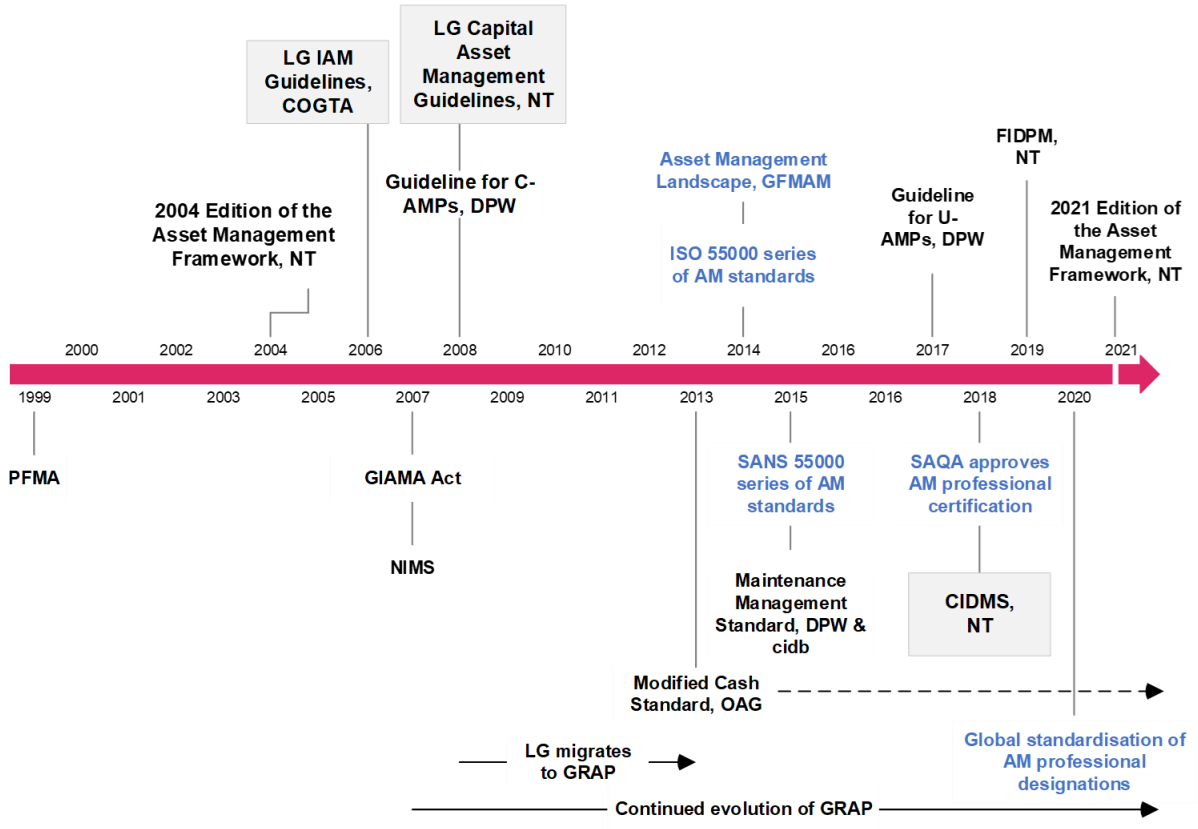
The Framework for Infrastructure Delivery and Procurement Management (FIDPM), published by the National Treasury in 2019, prescribes minimum requirements for effective governance of infrastructure delivery and procurement management through the implementation of Government's Infrastructure Delivery Management System (IDMS). The IDMS is an integrated system encompassing asset management, supply chain management and planning and budgeting systems arranged in portfolio, programme, operations, maintenance and project management processes. The IDMS also incorporates performance and risk management, and an institutional system.

The FIDPM specifies responsibilities for activities and making decisions at control points, stages and procurement gates across the portfolio, programme and operations, maintenance and project levels. Relevant requirements of the FIDPM as they apply to different stages of the asset lifecycle are explained in **Section 3: Asset lifecycle accounting and management**.

1.4 Conclusion

The availability of public sector assets, particularly infrastructure assets, is a key enabler of economic growth, social upliftment, and cohesion. Asset management is a fast-evolving multi-disciplinary set of practices that aims to deliver value from assets, as defined by stakeholders. Stakeholder requirements for assets and asset management are multi-faceted and ever more demanding.

In addition to expecting value from assets, the public sector is required to demonstrate good stewardship of the management of assets, to apply sound risk-based management techniques, to consistently perform to expectations, to continually improve, and to adhere to principles of good governance and transparency. Globally as well as locally, there is increasing convergence between asset financial management practices and asset strategic, lifecycle management practices. The following timeline demonstrates some of the major developments in the asset management environment since the publication of the 2004 Asset Management Framework, as it applies to national and provincial government departments:



In addition to the above, the National Treasury is updating the IDMS Toolkit that will be aligned with SANS 55001 Asset Management. This 2021 Edition of the Asset Management Framework for National and Provincial Departments incorporates many of the above developments, is aligned to legislative developments, features strong elements of best practice, and is future-focussed to enable national and provincial government to adapt to stakeholder expectations.

2. Asset data and information

2.1 Establishing the need for asset data

Asset data needs to be prepared in a structured manner that is rational, consistent, applicable to all types of assets and that allows comparability, both between assets and over time.

A department and its stakeholders require asset data and information for a multitude of reasons. This includes financial and non-financial information, as well as historic data and prospective outlooks on the asset portfolio of the data.

Asset data is primarily stored in a department's asset register that is also the formal source of data informing the financial statements. A good asset register:

- satisfies the need for financial reporting, good governance and transparency whilst also enabling good stewardship by providing the information necessary for asset lifecycle planning and management.
- provides a comprehensive view of the assets under the control of the department. This includes knowledge on the type, extent and location of assets, as well as the identifying characteristics of assets and details of who has responsibility for the asset.
- measures the economic value or service delivery potential vested in assets, and the remaining useful life of assets over which economic value or service delivery potential is expected.
- provides information on the performance, utilisation and condition of assets, and asset risk exposure, to predict future asset performance and failure patterns, and to plan accordingly.

This section provides the principles and methods for the collation, preparation, preparation, analysis and presentation of asset data.

2.2 Asset classification and componentisation

2.2.1 Asset classification

The public sector has many types of assets with different characteristics as well as accounting and reporting requirements. To make sense of different types of assets they are classified or categorized. This classification practice enables appropriate planning, accounting and asset management practices to be applied to different types of assets and supports reporting by type of asset.

There are different systems of asset classification in use in the public sector. The first of these systems are asset accounting classification practices.

2.2.1.1 Accounting classification of assets

Class of assets is the highest level of asset classification. A class of asset is a grouping of assets of a similar nature or function in a department's operations. A class of asset is shown as a single line item for the purpose of disclosure within the financial statements – details of assets within that class are contained in the asset register.

The table below, illustrates the tangible asset classes for the purposes of accounting treatment and financial disclosure:

Table 3: Tangible Asset classes

Asset class	Description	Examples
Machinery and equipment	Include assets used for transportation of people and objects, machinery used for information, as well as computer and telecommunications equipment	• Transportation includes motor vehicles, aircrafts, ships, railway locomotives and rolling stock • Machinery and equipment includes computers, television and radio transmitters, video and digital cameras, medical appliances, furniture, kitchen appliances
Buildings and other fixed structures	Include all buildings and structures (including infrastructure assets.	Office buildings, hospitals, prisons, schools, hostels, roads, dams, tunnels, railways, runways, sewers, harbours, communication lines, pipelines
Biological assets	Living plants and animals.	• Animals: dairy cattle, police dogs and horses, game • Plants: trees, shrubs and vines cultivated for agricultural produce such as fruit, nuts, vegetables and leaf products
Specialised military assets	Capital assets purpose-designed for military application	Submarines, frigates, tanks, military aircraft, guided missile systems etc.
Heritage assets	Heritage assets are capital assets with cultural, environmental or historic, natural, scientific, technological or artistic significance	Historic buildings, monuments, archaeological sites, conservation areas, nature reserves and works of art
Land and subsoil assets	Land consists of the ground, including soil covering and any associated surface waters	Lakes and rivers, parks

Note that there are instances where an asset could potentially meet the requirements of more than one asset class described above, requiring judgement to make an assessment as to which class of assets the capital asset should be allocated to.

For example, a heritage asset with significant historic and cultural value may also function as infrastructure, or as a fully operational building such as the Union Buildings. In such a case judgement is required by considering whether the asset meets the definition of a heritage asset, and to what extent the asset is used in the production of goods and services or for administrative purposes. If the definition of a heritage asset is not met, or if a significant portion of the asset is held for the production of goods and services or for administrative purposes, then the asset is not accounted for as a heritage asset.

2.2.1.2 Department of Public Works and Infrastructure classification of custodial assets

The Department of Public Works and Infrastructure classifies assets in instances where it functions as custodian. Accordingly, assets are classified by type or function, as follows:

- Court Buildings
- Halls & Lecture Facilities
- Medical Facilities & Mortuaries
- Mess Facilities & Restaurants
- Museums & Libraries
- Offices
- Prisons
- Residential Accommodation
- Shops
- Under Cover Parking
- Warehouses & Hangers

Additionally, the Department of Public Works and Infrastructure also categorised assets as follows:

Table 4: DPWI asset categorization system at asset portfolio level

Category	Description
Category 1: Prestige assets	Assets that are generally used by national and provincial political office-bearers (e.g. ministers, premiers, parliamentarians, etc.) either as offices, meeting places or residential accommodation. Typical prestige assets are the Parliament Buildings, Union Buildings and ministerial offices and are generally of strategic significance to the country.
Category 2: Heritage assets	Assets that are classified as such due to their age or cultural, scientific or historical value.
Category 3: Security related assets	Assets that are classified by the role that they play in relation to ensuring the security of the country or residents and may include sensitive military installations, prisons, etc. These assets are normally characterized by the high technology security installations.
Category 4: Function-specific assets	These are assets which are purpose designed for a specific function (such as hospitals, mortuaries, archives, etc) and may not be easily replaceable.
Category 5: Infrastructure assets	Assets that support or play a significant role in the economy of the country. This may include roads, harbours, airports and ports of entry.
Category 6: General assets	Assets that do not meet any of the criteria above, are easily tradable for another asset of similar nature or function and include offices, warehouses, residential accommodation and hangers.
Category 7: Vacant land	Land held by government for future use.

2.2.1.3 Other asset classification systems

Various departments employ classification systems to the assets under their control and/or where they function as the regulator for those assets and services. Below are some examples of classification systems in use:

a) **Roads**: The Department of Transport classifies roads in accordance with the Roads Infrastructure Strategic Framework for South Africa, 2006. Roads are classified as follows, ranging from primary distributors (national roads) through to non-motorised access ways (footpaths, cycling lanes etc.):

Primary distributor

Regional distributor

District distributor

District collector

Access road

Non-motorised access ways

b) **Schools:** Schools are classified in accordance with the South African Schools Act (84/1996): Regulations relating to minimum uniform norms and standards for public schools (RSA, 2013: 9-10), as follows, where the main differentiating factor is learner capacity:

Primary schools	**Secondary schools**
Micro primary schools	Small secondary schools
Small primary schools	Medium secondary schools
Medium primary schools	Large secondary schools
Large primary schools	Mega secondary schools
Mega primary schools	

c) **Hospitals:** The Minister of Health published regulations on the categories of hospitals as follows (2012) (for public hospitals), differentiating on the basis of the package of services provided, bed capacity as well as catchment sizes:

District hospitals

Regional hospitals

Tertiary hospitals

Central hospitals

Specialised hospitals

d) **Government water works:** The Department of Water Affairs published regulations relating to compulsory national standards for water services works. Accordingly, both potable water treatment works and wastewater treatment works are rated, separately, into classes of works on

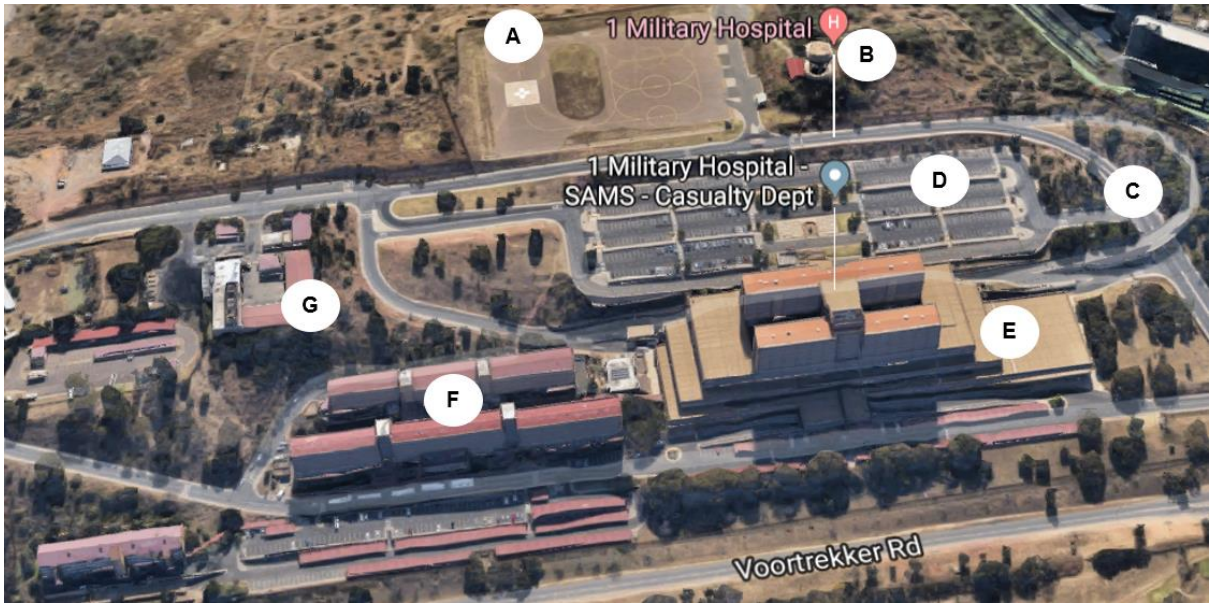
a scale ranging from E to A considering factors such as population served, capacity, infrastructure, operating procedures and control processes.

2.2.2 Asset componentisation

2.2.2.1 The problem of immovable assets in facilities or precincts

Many immovable "assets" are actually not assets, but rather a system, network or configuration of multiple assets. It is, for example, easy to think of a hospital, school or prison as an asset. This is actually not the case, these types of assets in turn comprises multiple assets. Consider for example the 1 Military Hospital in Tswhane:

Figure 5: 1 Military Hospital



Source: Google Earth

A	Helicopter airfield with control room
B	Reservoir and pump station
C	Internal roads system including fly-over bridge
D	Parking area
E	Multi-story main hospital building
F	Multi-story residential units
G	Boiler house

A quick glance at 1 Military Hospital shows that it is not an asset or even a facility. It is, in fact, a whole multi-purpose precinct combining buildings with multiple applications together with a range of infrastructure assets providing heating, road and air mobility, and water. This type of situation creates

challenges in terms of accounting and financial reporting, as well as asset lifecycle management, including:

a) **Asset categorisation**. How should the hospital facility be classified in terms of the MCS and per the classification system of DPWI? Consider the following:

- The accounting class is relatively easy. The facility can be categorised as "Buildings and other fixed structures (Infrastructure)" as it displays the characteristics of being immovable, with multiple elements being specialized in nature, all designed to function together in a larger system that is the hospital facility.
- Problems arise with the DPWI classifications. The hospital clearly belongs to the portfolio Category 4: Function-specific assets. However, there are also significant infrastructure assets within the precinct, including roads, bridges, the boiler room, the reservoir and pump station, and the airfield. Infrastructure assets, according to the DPWI system belongs to the portfolio Category 5: Infrastructure assets. There is also a Category 6: General assets for assets such as residential units. Accordingly, immovable assets within the hospital precinct belongs to three categories. DPWI further classifies assets by type (see **Section 2.3.3**). Several assets within the precinct can be classified within the precinct including medical facilities and mortuaries, mess facilities and restaurants, offices and residential accommodation. This asset type list however does not cover all types of buildings, structures and infrastructure on site.

b) **Valuation/measurement**. The many immovable assets within the hospital precinct have vastly different features including use of construction materials and other fittings, construction methods, physical dimensions and measurements of capacity. How then would fair value, and more specifically replacement cost be calculated as required in the GIAMA asset management guidelines?

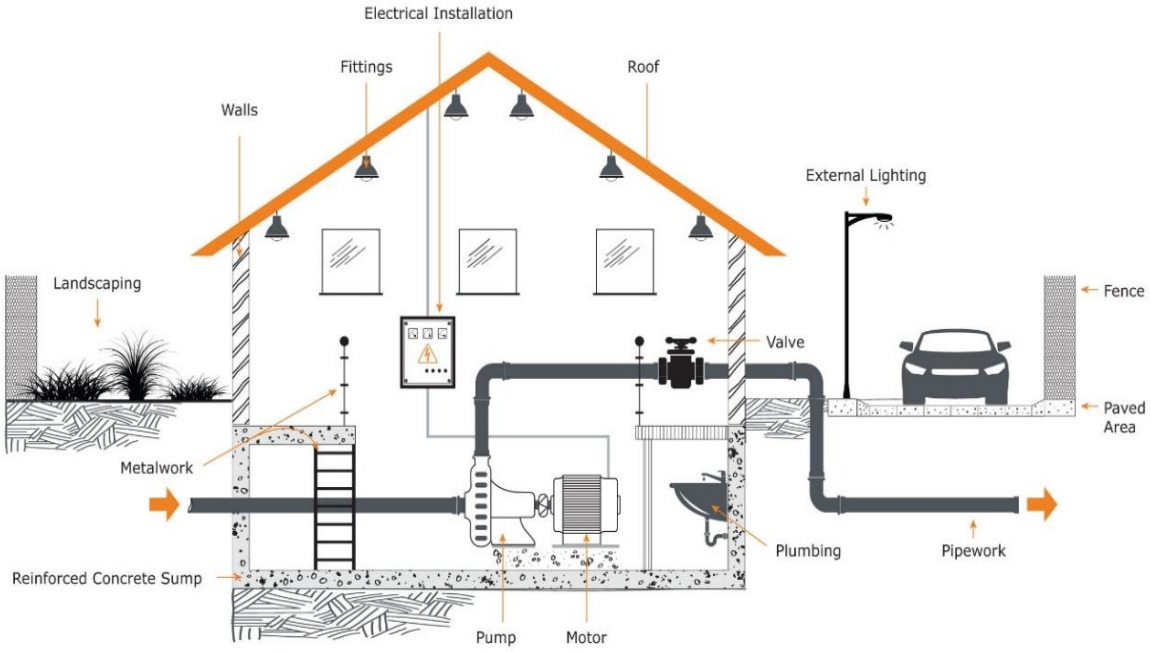
c) **Asset lifecycle planning**. The many and diverse buildings, infrastructure and other immovable assets all have different design lives, failure curves and lifecycle care needs. It is impossible therefore to undertake lifecycle planning, inclusive of maintenance planning, and budgeting at the level of the precinct as a whole.

1 Military hospital is a reasonably sized hospital but is not particularly big compared to central hospitals. By way of comparison, 1 Military Hospital has a bed capacity of 556 and the precinct covers 40 ha. The Chris Hani Baragwanath Hospital in Johannesburg has 3 400 beds and occupies 70 ha. Naturally the challenges outlined above become compounded the larger the precinct or facility becomes.

2.2.2.2 Further challenges: establishing useful lives and lifecycle requirements

Assume that 1 Military Hospital is not considered a singular asset, but rather a collection of immovable assets such as those identified in **Figure 5** (from the helicopter airfield to the boiler house). These "individual" immovable assets are also comprised of multiple assets, each with differing useful lives and failure patterns. Consider a typical water pump station as shown in **Figure 6** below, which is also one of the types of assets in 1 Military Hospital.

Figure 6: Components of a water pump station



The pump station comprises multiple civil, electrical and mechanical components. Assets are acquired to provide economic benefit or service delivery potential. To qualify as a capital asset, the economic benefit or service delivery potential must be for more than one reporting period.

Table 5 indicates the components of the pump station with illustrative replacement values, age, remaining useful life (RUL) and annualized depreciation. Each of the components listed exceeds the capitalization threshold, and each has an useful life expectation of more than one reporting period.

The expected useful lives of the components range from 15 to 80 years. The weighted average expected useful life (EUL) is 32 years and based on this and an age of the whole facility from new of 18 years, the remaining useful life of the overall facility would be 14 years.

Table 5: Example of components in a pump station

Component	Replacement value	Expected useful life	Age (yrs)	RUL (yrs)	Depreciation pa	Portion of facility depreciation
Roof	450 000	40	18	22	11 250	15%
Walls	900 000	60	18	42	15 000	20%
Electrical installation	270 000	30	18	12	9 000	12%
Fittings	67 500	15	18	-3	4 500	6%
External lighting	9 000	45	18	27	200	0%
Landscaping	27 000	30	18	12	900	1%
Fence	110 400	30	18	12	3 680	5%
Paved area	9 000	20	18	2	450	1%

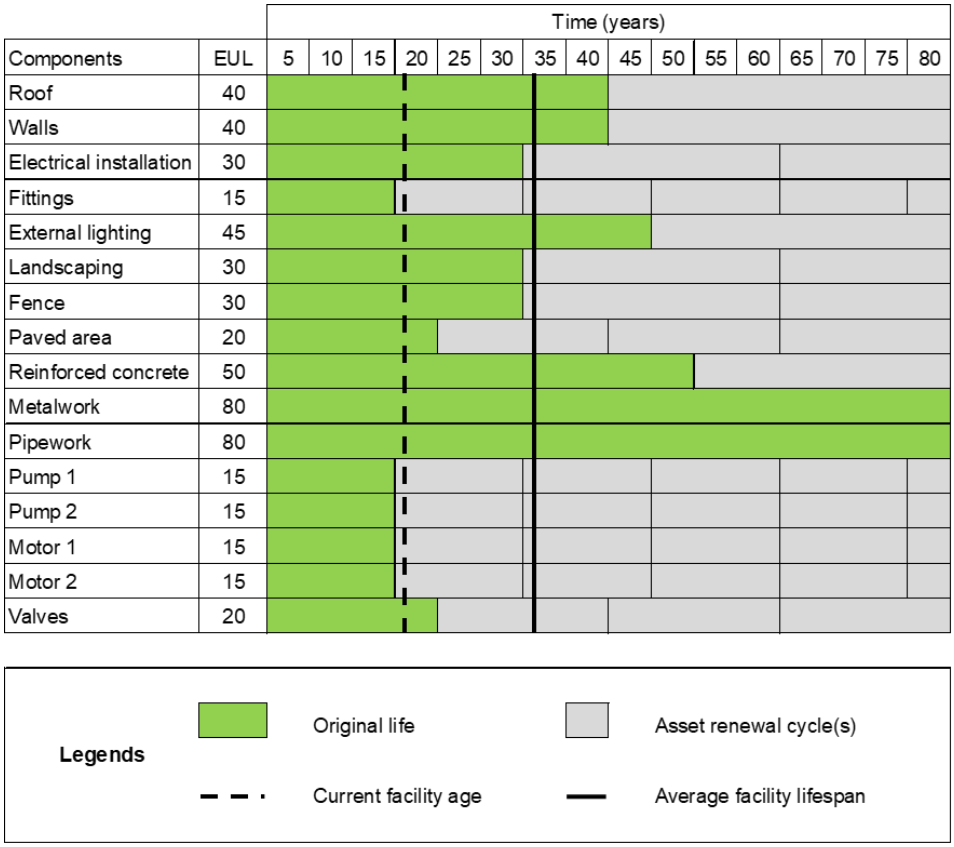
Component	Replacement value	Expected useful life	Age (yrs)	RUL (yrs)	Depreciation pa	Portion of facility depreciation
Reinforced concrete	162 000	50	18	32	3 240	4%
Metal work	27 000	80	18	62	338	0%
Pipe work	22 500	80	18	62	281	0%
Pump 1	60 000	15	18	-3	4 000	5%
Pump 2	60 000	15	18	-3	4 000	5%
Motor 1	140 000	15	18	-3	9 333	12%
Motor 2	140 000	15	18	-3	9 333	12%
Valves	17 000	20	18	2	850	1%
Total	**2 471 400**	**32**	**18**	**14**	**76 355**	

Note 1: This example is not intended to condone the practice of carrying negative RULs, but rather to illustrate relative life status and replacement needs of the facility at year 18. In practice it will be necessary to adjust either the EUL or RUL in such instances, or indeed to have appropriate control systems to identify and recognize where items have been replaced.

Note 2: The items with low portions of depreciation (say less than 10%) do not need to be separately identified if considering this specific facility in isolation (they could be lumped with the respective parent assets), though the items are considered significant in other aspects of the network, or collectively across the entire network, and are therefore included in the hierarchy, and applied here for consistency.

Figure 7 illustrates when each of the significant items need to be replaced. After 18 years, several items should already have been replaced. Were these capital replacements that extended the life of the pump station, or not? If the pump station had not been broken down into components, the replacement items may or may not have been capitalised, and the life may or may not have been extended. If the life was extended, by how long? In this example, it is evident how asset registers rapidly lose touch with reality if they are not effectively componentised.

Figure 7: Timing of the replacement of the components of the pump station



From this example it is clear that:

- Significant components of complex immovable assets have different useful lives.
- After 15-20 years, the pump station will likely fail functionally, as the pump and motor sets have reached end-of-life, and either cannot perform anymore, or cannot perform to required standards.
- The pump and motor sets represent the core of the pump station, without which the pump station cannot function as intended. However, it would be uneconomical to dispose of the pump station when the pump and motor sets fail, as they only comprise 16% of the value of the pump station.
- It therefore makes sense to renew those components that have reached end-of-life, to ensure that the facility as a whole continue to provide services. Renewal is a capital activity on existing assets that returns the service potential of the asset or expected useful or expected useful life of the asset to that which it had originally.

Therefore, following a componentised approach to complex immovable assets leads to more optimized asset lifecycle costs, maintenance of the productive capacity of assets and service delivery continuity, and improves budgeting and financial reporting. Additionally, once assets have been componentised, it becomes possible to develop maintenance plans for assets.

Now that components have been defined for the pump station, detailed activity-based maintenance plans can be developed at the component level, for example:

Table 6: Component-level maintenance plan for pump station: motors:

Component type	Rolled up activity description	Actions	Frequency
Motor	Service	Clean interior of motor ventilation	Monthly
	Service	In addition to monthly service: • Check and service brushes and commutators • Clean exterior of motor • Check flexible coupling between pump and motor and replace flexible elements, oil, grease if required. • Check motor windings	Every 3 months
	Service	• In addition to 3 monthly service: • Check alignment between pump and motor • Blow out the stator, rotor, terminal box and fan cowl with an air jet to remove any internal dust. If contaminated with oil or grease, wash with a recommended detergent. • Lubricate motor • Service motor windings • Check and oil sleeve bearings • Check flexible coupling between pump and motor and replace flexible elements, oil, grease if required.	6 Monthly Service

2.2.2.3 Linear assets

Many infrastructure assets are linear in nature, installed over long distances that may span kilometers to over a thousand kilometers. These include pipes, cables, lines, roads and canals. The costs per kilometer can be very significant and well above the capitalization threshold for assets for every single kilometer. Heavy freeway structures routinely cost tens of millions of Rand to construct.

Moreover, sections of these assets may be upgraded over time. For example, national or provincial roads may be widened to include additional lanes. Upgrading extends service delivery potential and must therefore be capitalised. Due to fluctuating demand over the length of the asset, the costs involved and local factors it seldom happens that long linear assets are upgraded as a whole at one time.

Similarly, complete sections of linear assets may be replaced from time to time and for various reasons, such as replacing ageing sections of pipe with modern equivalents. When these sections are replaced rather than repaired, the requirements for capitalisation are met.

These situations point to the need to geographically segment long linear assets into predefined, manageable sections for separate recognition as assets in the asset register. This enables assets to be replaced to be derecognised, and for upgrading and renewal projects to be properly identified, recognised and measured.

2.2.3 Identifying asset components

The preceding sub-sections demonstrate both the need and value of disaggregating or componentizing complex assets such as infrastructure and buildings into components to enable improved asset lifecycle planning, budgeting, safeguarding and financial reporting.

The following are key principles for the identification and recognition of a component in an asset register:

1	When the component has independent physical or functional identity;
2	When the component has a definable estimated useful life, and the estimated useful life measures more than one reporting period;
3	The value of the component can be measured;
4	The value of the component is material in relation to its parent asset or in itself exceeds the capitalisation threshold;
5	It is a maintenance significant item; and
6	For which there may be specific requirements for significant statutory tests or licensing.

A component that meets the above requirements is considered a component for separate recognition and measurement in the asset register as a unique asset record.

2.2.4 Creating an asset hierarchy

Assets should be componentised in a structured manner in accordance with the principles defined in the preceding sub-section and in a structured asset hierarchy. An asset hierarchy is a framework for segmenting an asset base or asset portfolio into appropriate classifications. The asset hierarchy can be based on asset function, asset type or a combination of both, but once decided, should be consistently applied across the asset base or asset portfolio.

Figure 8 below presents a 6-level asset hierarchy that demonstrates how the **pump station** referred to in the previous sub-sections can be componentised using the asset hierarchy presented in **Table 7** that:

- ✓ satisfies the principles for componentisation;
- ✓ recognizes major asset classes identified in the MCS;
- ✓ recognizes the asset categories and asset types defined by DPW; and that
- ✓ provides for asset types not defined by DPWI.

Figure 8: Pump station at 1 Military Hospital

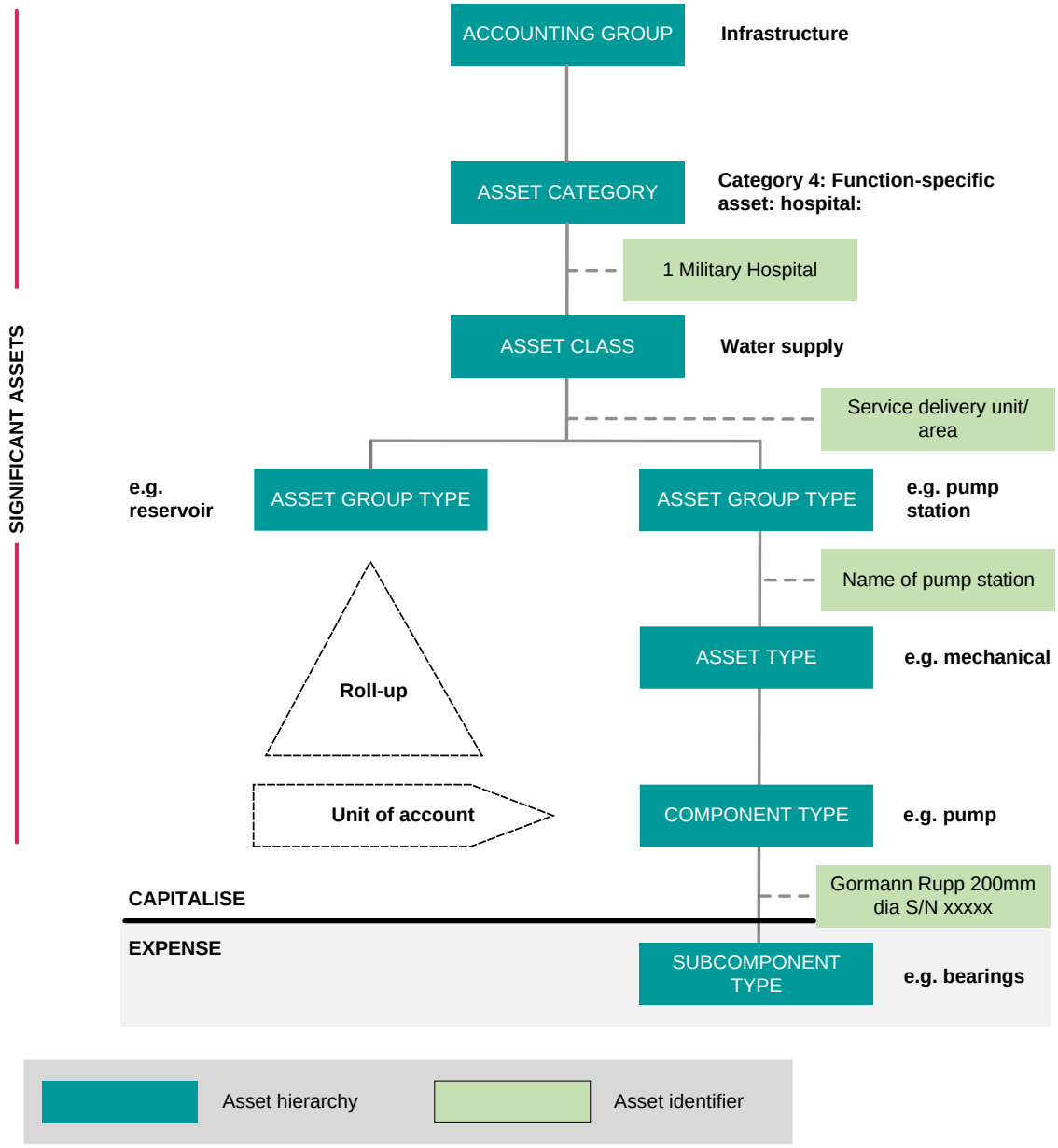


Table 7: Illustrating the pump component in an asset hierarchy

Level descriptor		Options	Reference
1	Accounting group	Buildings and other fixed structures	MCS
2	Asset category	Category 4: Function-specific assets	DPWI
3	Asset class	Water supply infrastructure	DPWI
4	Asset group type	Pump station	CIDMS
5	Asset type	Mechanical	CIDMS
6	Component type	Pump – Gormann Rupp 200mm	CIDMS

2.2.5 Segmentation and grouping of assets and components

The level of detail adopted in defining the scale (or "grain size") of the components is guided by their value and importance, and the scope/extent of a typical renewal project when the components reach end of life.

The approach to segmentation and grouping becomes an essential part of the definition of the scope of the component when considering its life-cycle treatment (and by implication when applying the definition of capital renewal and maintenance). For example, the resurfacing of a portion of a road surface within a street block would not be considered capital in nature as the whole component (defined as the whole block-to-block length) could not reasonably be considered to have new life. Similarly, the replacement of a single damaged road sign, single toilet in an ablution block, or single street light pole would not be considered capital and would therefore be expensed.

Large facilities such as the 1 Military Hospital or linear assets are split into segments, and smaller items in operational use are grouped. Only components that are reflected per item when operational are considered as capital spares (when taken out of service but retained for future use), other items (that are grouped when in service) are considered consumable inventory if taken out of service and not disposed.

Segmentation and grouping rules should be developed with consideration to the criteria for components, the scope and extent of components and existing conventions, software and data structures, and then applied consistently. Following are examples of segmentation and grouping rules:

Table 8: Example segmentation and grouping rules

Rule type	Asset group type	Convention
Segmentation rules	Facilities (such as treatment works)	per process element as applicable
	Urban roads, storm-water and water pipes	per street block
	Sewers	Manhole to manhole
	Bulk storm water	Node to node
	Roads between settlements, bulk water pipes, and rail lines	between intersections or changes in attributes
	Buildings	Per floor and functional area
Grouping rules	Road/rail furniture	Per segment (as defined above)
	Road lighting	per road element (as defined above)
	Equipment in buildings	per segment (as defined above)

2.3 Asset attribute data

Asset attribute data refers to the specific properties of assets inclusive of:

- ✓ Location data
- ✓ Identification referencing
- ✓ Nature and physical description
- ✓ Asset value
- ✓ Asset performance and failure nodes
- ✓ Criticality grading

2.3.1 Location data

Depending on the nature of the asset, location data can include the address (site-based assets), GPS coordinates where applicable, map feature ID, or stand number or Surveyor General code where applicable. It must be possible to locate components within facilities (see **Section 2.3.2**).

2.3.2 Identification and referencing

It is a good idea to physically label the component location and also the component (where relevant) for ready identification. The facility and component location reference codes should reflect the functional location hierarchy. The components should reflect the asset hierarchy and, where applicable, a serial number. Asset referencing codes will be system specific.

Table 9: Immovable asset identification referencing guidelines

Type of assets	Guidance
Above-ground facilities	Roads generally already have names and sign boards, or, alternatively, distance markers (and will not therefore need additional referencing)
	Facilities and buildings – it is common practice at facilities with public access to provide signage on building names and numbers, and this should also be applied at all facilities and buildings – this will generally be enough, i.e. it will not be necessary to label components such as the roof, floors etc.);
	Process units and elements/equipment positions (for example at treatment works, substations etc.) should have clearly displayed names and/or block numbers, and the equipment plinths marked with the functional location (unless under water, when an alternative location can be used for the label).
Below-ground infrastructure	Pipes, cables – ideally location points should be marked during construction (e.g. marked on kerbs), and large infrastructure with marker posts.

Robust labels (for example with serial numbers) should also be attached to equipment that is sometimes moved, possibly to another location, or for repairs.

2.3.3 Nature and physical description

The nature of an asset is characterized as (1) type, (2) size and (3) general descriptor, as shown in **Table 10** for building components.

Table 10: Example of the approach to asset attribute data for building-type facilities

Component type	Component Descriptors				Extent measure
	Type	Size	Class	Description	
Land			zoning	function	m^2
Air conditioning	installation type			make	m^2 aircon floor area
Earthworks	terrain	width	class		linear m
Electrical installation	installation type				m^2 electrified floor area
Finishes, fixtures & fittings	building type				m^2 floor area
Fire protection	installation type				m^2 floor area
Gas installation	installation type				no
Lifts	type	No of floors		make	no lifts
Plumbing	installation type				m^2 wet floor area
Floor	type				m^2 floor area
Security system	installation type				m^2 secured floor area
Walls	type			building type	m^2 floor area
Roof	type				m^2 covered floor area
External furniture	type				no
External lighting	type			lux	no
Paving				material	m2 paved area
Irrigation	type				m2 irrigated area
Landscaping	type				m2 landscaped area
Perimeter protection	type				linear m
Sign - general		size		function	no
Small building / enclosure	type				m2 floor area
Road surface	type	width (m)	class		linear m
Road structural layer		width (m)	class		linear m

Component type	Component Descriptors				Extent measure
	Type	Size	Class	Description	
Earthworks	terrain	width (m)	class		linear m
Carports	type	bays			no
Earth structure		m3 of earth		function	no
Masonry structure		m3 of masonry		function	no
RC structure	type	m3 of concrete		function	no
Tank	material				kℓ of storage capacity
Fabricated steel	steel type		exposure level	material	kg
Compressor	Type			make / serial no.	no
Generator		kVA		make / serial no.	no
Control panel	type			make	no (piece of equipment)
Isolator		current (A)		make	no
Power factor equipment	phase	kW		cosΦ	no
Transformer	type	kVA		make / serial no.	no
LV overhead line	type		single / three phase		linear m
LV underground cable	type		single / three phase		linear m
Pipe - sewer	material	diameter (mm)	class		linear m
Pipe - water	material	diameter (mm)	class		linear m
Tennis court	type				no
Bowling green					no
Sports field	type				no
Swimming pool	type				no

2.3.4 Asset values

Data is required on the value of the asset for accounting and financial reporting purposes, as well as its current replacement cost and depreciated replacement cost for lifecycle planning and other purposes. Asset valuation is discussed in **Section 3: Asset lifecycle accounting and management**.

2.3.5 Asset performance and failure nodes

Assets generally are required to be fit for purpose and in a condition that enables it to perform as expected. Additionally, assets need to be of sufficient capacity to meet needs and must be utilized at levels that are efficient.

Assets and components fail in a variety ways. In the context of this model, "failure" is considered anything that may cause the replacement/renewal, repurposing, upgrading or decommissioning of an asset. To ensure consistent, structured rule-based decision-making, asset performance and failure modes are structured into grading scales that are consistently applied across assets, with data assembled accordingly.

2.3.5.1 Condition grading

General built environment convention

Condition refers to the physical state of an asset and is a measure of the asset's "health" status. Within the built environment at large, especially in the context of infrastructure, the general convention is to rate the condition of assets in accordance with a five-point rating system, where 1 is considered "very good" condition and 5 "very poor" condition, as follows:

Table 11: Generic condition grading system

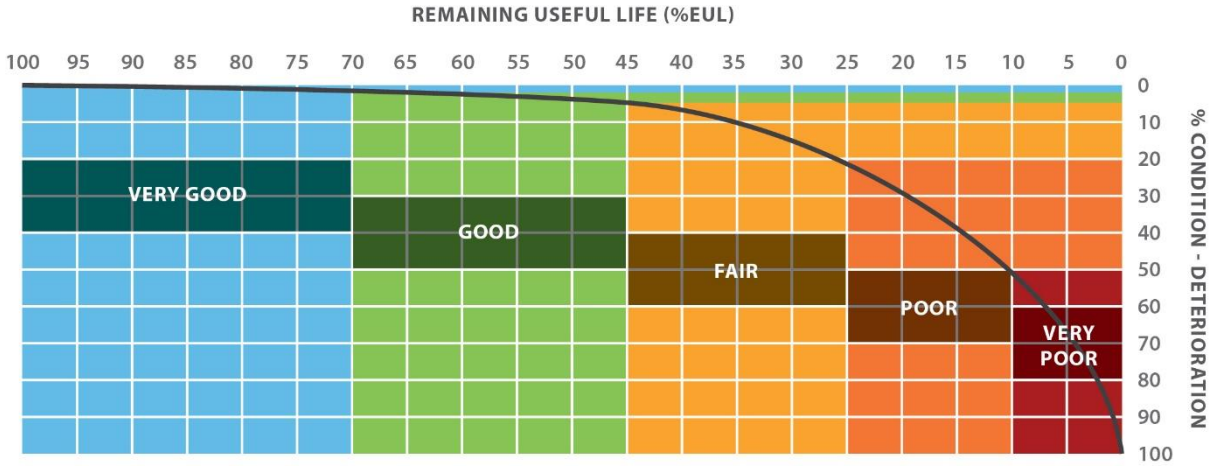
Grade	Description	Detailed description	Indicative RUL
1	**Very good**	Sound structure, well maintained. Only normal maintenance required.	71 – 100% EUL
2	Good	Serves needs but minor deterioration (< 5%). Minor maintenance required.	46 – 70% EUL
3	Fair	Marginal, clearly evident deterioration (10–20%). Significant maintenance required.	26 – 45 % EUL
4	Poor	Significant deterioration of structure and/or appearance. Significant impairment of functionality (20–40%). Significant renewal/upgrade required.	11 – 25% EUL
5	**Very poor**	Unsound, failed needs reconstruction/replacement (> 50% needs replacement).	0 – 10% EUL

Note the following:

1	Each condition grade is associated with typical lifecycle interventions. As the condition of the asset deteriorates, the more serious the lifecycle intervention.
2	Each condition grade is further associated with a typical remaining useful life (RUL) band. The worse the condition of the asset, the less the remaining useful life.
3	The indicative RUL curve across the condition grades assume a normal parabolic deterioration curve as expected for most assets, particularly civil structures.

The relationship between the condition grade and remaining useful life is demonstrated in **Figure 9** below:

Figure 9: Relationship between condition and remaining useful life



Of course, the generic condition grading scale should be interpreted to different components and how they can fail, as shown in the following example:

Of course, the generic condition grading scale should be interpreted to different components and how they can fail, as shown in the following example:

Table 12: Car port condition grading scale

Grade	Description	Detailed description of car ports condition
1	**Very good**	Excellent physical condition; very good strength and stability. No corrosion or damage evident. Paint not chipped, faded or cracking. Nets / roof with no visible holes or fading.
2	**Good**	Minor deterioration (< 5%); some surface damage to the structure but no excessive corrosion, staining or loss of stability. Paint only slightly faded. Nets / roof with no visible holes or fading.
3	**Fair**	Sound structure but showing signs of wear and tear (10-20%); visible corrosion and staining, weakness at joints and connections. Paint starting to look faded or crack/chip. Some small areas of damage to roof element.
4	**Poor**	Significant deterioration of steel structure and/or appearance (20-40%); significant loss of stability or deformation to structure, significant corrosion or staining. Paint chipped/ cracked and notably faded appearance. Nets / roof with notable holes or corrosion.
5	**Very poor**	Serious structural problems from corrosion or physical damage. Unsound (>50% needs replacement) no longer reliable as structure, about to collapse or majority of structure has collapsed. Potentially causing safety risk. Nets / roof at point of collapse or with expansive holes and corrosion.

GIAMA environment

Condition grading is also applied within the GIAMA environment, and condition is also presented on a five-point rating system. However, the condition grading scale is inverted where C1 means "very poor" condition and C5 means "very good" condition.

Table 13: GIAMA condition rating scale

Rating	Condition status	General description
C5	**Very good**	The asset has no apparent defects. Appearance as new. Risk index: No effect on service capability. No risk
C4	**Good**	The asset exhibits superficial wear and tear, with minor defects and minor signs of deterioration to surface finishes. Risk index: Intermittent, minor inconvenience to operations. Probability of risk to health & safety or property is slight. Low-cost implications.
C3	**Fair**	The asset is in average condition, deteriorated surfaces require attention; services are functional, but require attention, backlog maintenance work exists. Risk index: Frequent inconvenience to operations. Some risk to health and safety or property. Medium cost implications.
C2	**Poor**	The asset has deteriorated badly, with some structural problems. General appearance is poor with eroded protective coatings, elements are broken, services are interrupted; significant number of major defects exists. Risk index: Many disruptions to service capability, some risk to health and safety or property. High-cost implication.
C1	**Very poor**	The asset has failed; it is not operational and is unfit for occupancy. Risk index: Accommodation is unusable, immediate high risk to security, health and safety or property. Significant cost implication.

Source: DPW: Guideline for U-AMP, 29 – 30 June 2017: p. 23.

2.3.5.2 Performance grading

General performance grading

Performance refers to a qualitative or quantitative measure used to assess performance against a standard or other target. For the sake of consistency and sufficient range to assess performance, the performance grading scale is also presented on a five-point grading scale, as follows:

Table 14: Generic performance grading scale

Performance grade	Description
1	**Substantially exceeds requirements**
2	**Exceeds requirements moderately**
3	Meets requirements
4	**Moderate non-compliance**
5	**Substantial non-compliance**

"Requirements" are naturally specific to the asset component type being assessed and must be interpreted accordingly. Some typical performance measures include:

Table 15: Examples of asset component type performance metrics

Component type	Performance metrics
Air conditioning	functional performance
Anchored wall	movement
Baler	repair events pa
Ballast	repairs events pa
Batteries	charge retention
Carports	screening from weather
Channel	leakage/flooding
Chemical Toilet	leakage
Communal standpipe : Pedestal	flow
Communal standpipe : Tap	leakage
Commuter shelter	integrity of weather protection
Control panel	operational functionality
Culvert	blockages/repairs pa
Current Transformer	breakdowns pa
Doser	operational functionality
Earth Structure	leakage
Earthworks and formation	erosion/slippage/settlement
Electrical installation	building outages pa
Electrical service connection	repairs pa
Electricity Meter	operational functionality

Once the performance metric for an asset component type has been selected, the generic performance grading scale can be interpreted for that component type, as shown in the following example:

Table 16: Performance grading scale applied to water reticulation

Performance grade	Description	No. of bursts over last 3 years (weighted 50/30/20)
1	**Substantially exceeds requirements**	<3
2	Exceeds requirements moderately	>3 ≤ 5
3	Meets requirements	>5 ≤ 7
4	**Moderate non-compliance**	>7 ≤ 10
5	**Substantial non-compliance**	>10

Performance grading in the GIAMA environment

Performance rating

The performance grading scale in the GIAMA environment also adopts a five-point grading scale. It differs from the generic performance grading scale in the following three respects:

1	In the generic performance grading scale performance is assessed assuming that performance can exceed standards. This assumption is not made in the GIAMA performance grading scale; instead, the highest performance grade is assumed necessary for high profile public buildings.
2	As was the case with the condition grading scale, the performance grading scale is inverted when P5 is the highest performance standard and P1 is the lowest performance standard.
3	The required condition is specified for each performance level.

Table 17: GIAMA performance rating scale

Performance Standard	Condition Standard	Index
Highly sensitive functions with critical results or high-profile public building	Assets to be in best possible condition, Only minimal deterioration will be tolerated	**P5**
Business operations requiring good public presentation and high-quality working environments	Assets to be in good condition operationally and aesthetically, benchmarked against industry standards for that particular class of asset	**P4**
Functionally-focussed assets at utility level	Assets to be in reasonable condition, fully meeting operational requirements	**P3**
Functions are providing essential support only, with no critical operational role (e.g., storage) or asset has limited life	Condition needs to meet minimum operational requirements only	**P2**
Functions have ceased and the asset is dormant; pending relinquishment, etc	Condition can be allowed to deteriorate or marginally maintained at minimal cost	**P1**

Source: DPW: Guideline for U-AMP, 29 – 30 June 2017: p. 33.

Accessibility rating

Additionally, many public buildings and facilities must be accessible to the general public. To this end the DPW developed the accessibility rating scale that is presented in **Table 18**.

The accessibility rating assesses the asset's physical location in relation to the service delivery objectives. This includes the accessibility of the accommodation for the general public, or members that have to conduct their business at the asset. The allocation of the accessibility rating naturally has to consider what is expected of the asset. A facility that does not require public access, should not be marked down on accessibility should it not provide for public access.

Table 18: GIAMA accessibility rating scale

General Description	Rating
The asset fully supports service delivery objectives; is fully accessible to the general public with well-designed public areas and parking; is accessible for the physically challenged; and has all the services required by the functions performed in the accommodation.	**A5**
The asset mostly supports service delivery objectives; is fairly accessible to the general public with moderately designed public areas and parking; is accessible for the physically challenged to the main areas; and have the majority of services required by the functions performed in the accommodation.	**A4**
The asset partially supports service delivery objectives; is accessible to the general public with limited public areas and parking; has limited accessibility for the physically challenged; and has the minimum services required by the functions performed in the accommodation.	**A3**
The asset limits achievement of service delivery objectives; is not generally accessible to the general public with limited public areas and parking; is not accessible for the physically challenged; and does not have the services required by the functions performed in the asset.	**A2**
The asset does not support service delivery objectives at all; is not at all accessible to the general public and should not be used for the current service delivery objectives	**A1**

Source: DPW: Guideline for U-AMP, 29 – 30 June 2017: p. 34.

Suitability index

The suitability index assesses whether an asset is suitable for its required function, having considered both the required performance standard and the accessibility rating, as follows:

Figure 10: Suitability index

	Accessibility Rating				
Required Performance Standard	**A1 (Very Poor)**	**A2 (Poor)**	**A3 (Fair)**	**A4 (Good)**	**A5 (Excellent)**
P5	**C**	**C**	**B**	**A**	**A**
P4	**C**	**C**	**B**	**A**	**A**
P3	**C**	**B**	**B**	**A**	**A**
P2	**C**	**B**	**A**	**A**	**A**
P1	**C**	**C**	**C**	**C**	**C**

A	The asset is fully suitable for its required function
B	The asset meets the minimum suitability criteria for its function
C	The asset does not meet the required suitability criteria

Source: DPW: Guideline for U-AMP, 29 – 30 June 2017: p. 22.

Operating performance index

Operating performance refers to whether an asset meets the standards expected for functional and operational requirements, considering both the required performance standard and the asset's condition rating, as follows:

Figure 11: Operating performance index

	Condition rating				
Required Performance Standard	**C1 (Very Poor)**	**C2 (Poor)**	**C3 (Fair)**	**C4 (Good)**	**C5 (Excellent)**
P5	**3**	**3**	**3**	**2**	**1**
P4	**3**	**3**	**2**	**1**	**1**
P3	**3**	**3**	**2**	**1**	**1**
P2	**3**	**2**	**1**	**1**	**1**
P1	**2**	**2**	**1**	**1**	**1**

1	The asset standards exceed the level expected for functional and operational requirements
2	Functional performance meets the standards expected for functional and operational requirements
3	Functional performance does not meet the standards expected for functional and operational requirements

Source: DPW: Guideline for U-AMP, 29 – 30 June 2017: p. 24.

Functional performance

The functional performance index combines the outcomes of the suitability index and the operating performance index as follows:

Table 19: GIAMA functional performance index

	Operating performance index		
Suitability index	1 – Optimal	2 – Minimum	3 – Outside
Optimal – A	A1	A2	A3
Minimum – B	B1	B2	B3
Outside – C	C1	C2	C3

Results are interpreted as follows:

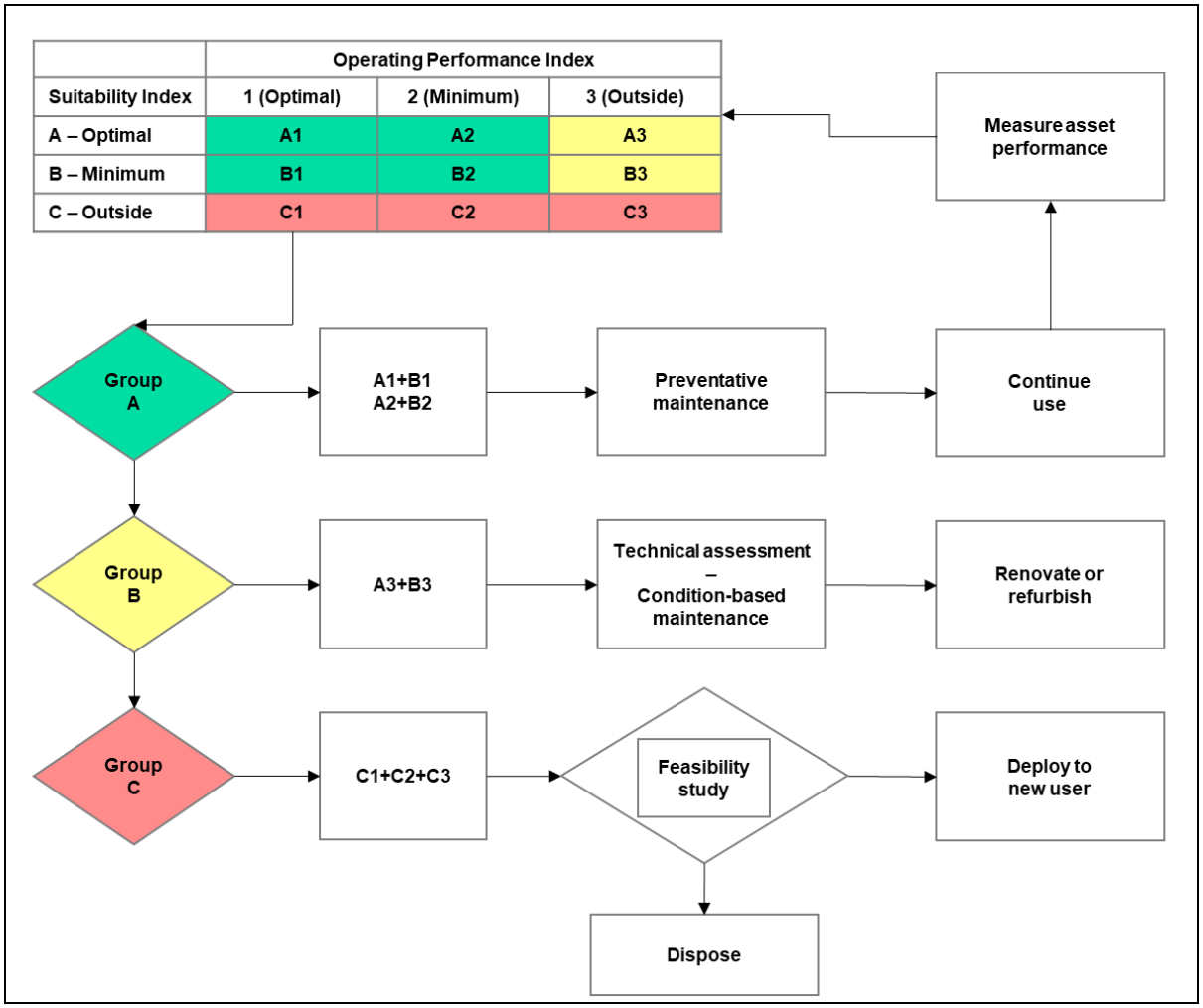
A1	The asset is operating optimally and is fully suitable for its required function
A2	The asset meets the minimum operating criteria and is fully suitable for its required function
A3	The asset does not meet the minimum operating requirements but is fully suitable for its required function
B1	The asset meets the minimum operating requirements but only meets the minimum suitability criteria for its required function
B2	The asset meets the minimum operating requirements and suitability criteria for its required function
B3	The asset does not meet the minimum operating requirements but meets the minimum suitability criteria for its required function
C1	The asset is operating optimally but does not meet the minimum suitability criteria
C2	The asset meets the minimum operating criteria but does not meet minimum suitability criteria
C3	The asset does not meet the minimum operating criteria or the minimum suitability criteria

Source: DPW: Guideline for U-AMP, 29 – 30 June 2017: pp. 25 - 26.

GIAMA asset lifecycle decision-making framework

Appropriate asset lifecycle decisions can be made using the indices described above, as follows:

Figure 12: GIAMA asset lifecycle decision-making framework



Source: *DPW: Guideline for U-AMP, 29 – 30 June 2017: p. 27.*

2.3.5.3 Utilisation grading

The utilisation grade measures the extent to which the asset is utilized, measured against its capacity.

General application

Following is a generic utilisation grading scale applicable to assets in general:

Table 20: Generic utilisation grading scale

Performance grade	Description
1	Not used
2	Under-used
3	Normal use (including strategic redundancy)
4	At capacity
5	Overloaded

As in the case of condition and performance, the generic utilisation grading scale needs to be interpreted by asset component type. Following is an example of the application of the utilisation grading scale to water distribution pipes:

Table 21: Example of specific grading scale – utilisation of water distribution pipes

Utilisation grade	Description	Pipe velocity (m/s)
1	Not used	Nil
2	Underused	≤0.05
3	Normal use	>0.05 - ≤0.7
4	At capacity	>0.7 - ≤1.5
5	Overloaded	>1.5

Utilisation grading in the GIAMA environment

Part 6 of the DPW's U-AMP Guidelines provides space planning norms and standards. Accordingly, personnel are categorised as (1) administration, (2) technical and management, (3) senior management and (4) executive management, and workspace space norms are provided for each category, ranging from 6-8m2 for administrative personnel to 20-25m2 for executive management. Additionally, the space norms allow for support space per workspace area (e.g. meetings rooms, rest rooms and catering), core space per workspace area (e.g. circulation and facilities management) and structural areas (e.g. external walls, internal walls and structural columns). These other spaces are calculated as a percentage of workspace area. The process to determine utilisation is then as follows:

1	Categorise the organisational structure into functional areas: executive management, senior management, technical/management and administration
2	Using the space norms, calculate the amount of space required for each functional area based on the number of posts per functional area
3	Determine the amount of space occupied by the organisation
4	Divide space currently occupied (3) by the space required (2) and express the result as a percentage

Results should be interpreted as follows:

<100%	100%	>100%
There is too much space, and the accommodation is under-utilised	Fully utilised	The accommodation is over-utilised and more space is required

2.3.6 Criticality grading

SANS 55001 Cl 6.2.1.2b requires organisations to "review the importance of assets related to their intended outcomes, objectives and product or service requirements". SANS 55002 Cl 6.2.2.1 advises that a "risk ranking process can determine which assets have a significant potential to impact on the achievement of AM objectives". These are what are considered "critical assets": assets that have a high consequence of failure (e.g. are likely to result in a more significant financial, environmental and social cost in terms of their impact on organisational objectives and service delivery).

Criticality therefore relates to the impact or consequence of failure, not likelihood or probability. Consequently, the more critical an asset is rated, the greater management attention it receives, and generally, the higher priority it receives in terms of budget prioritisation.

Table 22: Asset criticality rating scale

Criticality grade	Criticality description	Consequence of failure	Qualitative description
1	Cursory	Insignificant	Is readily absorbed under normal operating conditions
2	Non-critical	Minor	Can be managed under normal operating conditions
3	Important	Moderate	Can be managed but requires additional resources and management effort
4	Critical	Major	Will have a prolonged impact and extensive consequences
5	Most critical	Catastrophic	Irreversible and extensive impacts, or significantly undermining key business objectives

The criticality rating scale presented above rank assets in terms of potential impact of failure. To determine the potential impact, two approaches can be followed. Ideally, assets would be assessed against a multi-dimensional risk impact matrix such as shown in **Table 23**. Note that the risk impact rating scale and the asset criticality rating scale are both 5-point rating systems. The risk impact rating (consequence of failure) then determines the asset criticality. For example, an asset with an impact or consequence rating of "4" (major impact or consequence) is then given an asset criticality rating of "4" (critical asset).

Table 23: Risk impact rating scale

Impact rating	Organisation's ability to cope with impact	Assumed monetary value (for purposes of prioritisation only)		Impact category					
		Risk cost range	Assumed risk cost	Service delivery performance	Health and safety	Environmental damage	Organisational image	Direct costs (repair, lost, income, third party damage)
1. Insignificant	Is readily absorbed under normal operating conditions	< R 200 000	R 100 000	Service delivery interruption of less than 2 hours; limited to one or a few non-critical customers	Health impact limited to first aid at most	Minor transient environmental damage, visual effects only	Individual interest only, no community concern	R 100 000
2. Minor	Can be managed under normal operating conditions	R 200 001 - R 1 000 000	R 500 000	Service delivery impact of between 2-6 hours, affecting one or few customers, or service delivery impact of less than 2 hours affecting several street blocks	Minor health impact of a temporary nature on small number of people	Minor damage to environment, longer effect	Minor community interest, minor local media report	R 500 000
3. Moderate	Can be managed but requires additional resources and management effort	R 1 000 001 - R 5 000 000	R 2 500 000	Service delivery interruption affecting a whole village, suburb or neighbourhood for upto 2 hours	Serious health impact on small number or minor impact on large number of people	Moderate environmental impact. Prosecution expected	Public community discussion, major local media interest	R 2 500 000
4. Major	Will have a prolonged impact and extensive consequences	R 5 000 001 - R 30 000 000	R 15 000 000	Service delivery interruption affecting a major node, or which exceeds the maximum duration allowed for one event in terms of legislation	Extensive injuries or significant health impacts, single fatality. May result in inquiry or prosecution	Major long term environmental impact. Prosecution expected	Major loss in community confidence	R 15 000 000
5. Catastrophic	Irreversible and extensive impacts, or significantly undermining key business objectives	> R 30 000 000	R 40 000 000	Non-achievement of legal mandate	Multiple fatalities. Likely to result in commission of inquiry and prosecution	Serious damage of national importance and irreversible impact. Prosecution expected	National media	R 40 000 000

The basic approach to determining asset criticality is to make general assumptions about the impacts of failure at the component type level based on defined characteristics, and then to apply asset criticality ratings to all components of that type in the asset portfolio accordingly.

As an example, the larger a water pipe, the more customers it can generally serve, and losses and service delivery impacts resulting from large pipe bursts tend to be more severe than those related to smaller pipes.

Following this logic, a rule set such as the following can be developed:

Table 24: Asset criticality rating rule set for water pipes (illustrative)

Criticality grade	Water pipe diameter size
1: Cursory	<=110 mm dia
2: Non-critical	>110 to 160 mm dia
3: Important	>160 to 300 mm dia
4: Critical	>300 to 900 mm dia
5: Most critical	>900 mm dia

The same type of logic can be applied to other asset portfolios. It generally stands to reason that higher order roads (e.g. trunk roads, primary distributors, freeways and major arterials) have a greater consequence of failure than local access (residential) roads. Therefore, one can reasonably establish a rule set for asset criticality for roads based on road class. Similarly, a HV transformer will be given a higher asset criticality rating than a MV transformer. Bridge collapse can very likely lead to multiple fatalities, and bridges should therefore be rated as "5" (most critical assets), regardless of type (e.g. vehicular, pedestrian or utility services bridge).

2.4 Asset valuation

2.4.1 General

All government departments are required to measure or value the assets under their control. The PFMA and the relevant accounting standards such as the Modified Cash Standard and GRAP require that assets are measured, and asset values are reported in Annual Financial Statements. Additionally, DPWI (2008: p. 14) requires that custodians report on the "financial indicator". The financial indicator expresses the current book value of an immovable asset as a percentage of its replacement value. Asset valuation data serve the following purposes:

- It demonstrates good stewardship, accountability and transparency by publishing information on the investments made into service delivery capacity and/or economic potential;
- It indicates whether the entity is solvent or not;
- When the depreciated replacement cost methodology is used, lifecycle planning and management is enabled.

2.4.2 Measurement models and techniques

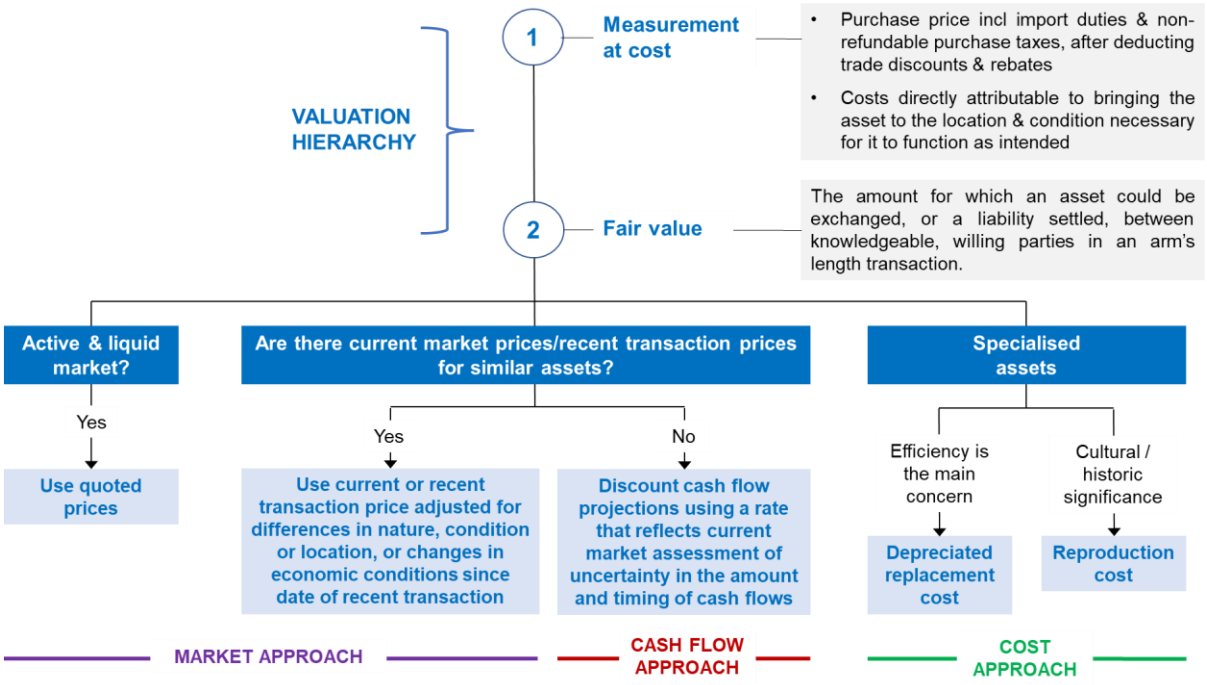
Various measurement models and techniques are available and selection of the appropriate measurement model and technique will depend on the asset class, the circumstances under which the asset is acquired, the nature of lifecycle interventions subsequent to initial measurement, and the purpose for which assets are valued. Assets may be valued for a variety of reasons, some of which include:

- for purposes of compliance and financial disclosure;
- for insurance purposes;
- to assess the reasonability of municipal property valuations that determine the property rates payable, and to contest the municipal property valuation in instances where it is considered excessive;
- for tariff setting purposes, where tariffs are based on the consumption of immovable assets;
- to aid in asset lifecycle planning and management;
- where an asset will be disposed off in the market before conclusion of its useful life; or
- Where an asset is transferred, and the capital asset was recorded at R1. The exception is movable assets procured prior to 1 April 2002 (or another date as approved by the OAG), which may be transferred at R1 where these assets were so recorded.

2.4.3 Valuation hierarchy

The default approach in the public sector is to measure assets purchased or constructed at **cost** (see Section 2.4.3.1). Where actual cost is not known, assets are **fair valued** using the methods indicated in **Figure 13**.

Figure 13: Valuation hierarchy and valuation methods



2.4.3.1 Cost of an asset

Assets purchased or constructed are initially measured at actual cost. It is important that supporting documentation such as contract documentation, invoices and bills of quantities are kept, and that the costs capitalised can be verified with reference to the supporting documentation, having made adjustments as appropriate for the allowable elements of cost as described.

Using actual costs for initial measurement offers the advantage that the costs incurred are indisputable, provided of course that measurement value recorded in the asset register reconciles with the supporting documentation and has been determined in accordance with the provisions of the MCS.

This method is also particularly useful for short life assets where the impacts of price increases or fluctuations do not materially affect fair presentation.

Of course, there are instances where actual cost information is not available. This is the case with many legacy capital assets in the public sector.

Elements of cost

The Modified Cash Standard (2021: 90-91) articulates the following principles regarding the allowable elements of cost of capital assets:

The cost of a capital asset comprises the following:

- Its purchase price inclusive of import duties and non-refundable purchase taxes, after deducting trade discounts and rebates; and
- Any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating as intended by management.

The following are examples of directly attributable costs:

- compensation of employees directly involved in the construction or acquisition asset to the extent that the department can reliably estimate the amounts to be capitalised;
- costs of site preparation;
- initial delivery and handling costs;
- installation and assembly costs;
- costs of testing whether the asset is functioning properly, after deducting the net proceeds from selling any items produced while bringing the asset to that location and condition (such as samples produced when testing equipment); and
- professional fees.

Recording of costs as part of the cost of an asset ceases when the capital asset is in the location and condition necessary for it to be capable of operating in the manner intended by management. Therefore, costs incurred in using or redeploying an item, are not included. For example, the following costs will not be included:

- costs incurred while an item capable of operating in the manner intended by management has yet to be brought into use or is operated at less than full capacity;
- initial operating losses, such as those incurred while demand for the item's outputs build up;
- costs of relocating or re-organising part or all the entity's operations; and
- cost of training staff to operate the asset.

The revenue and related expenses of incidental operations not necessary to bring the item to the location and condition necessary for it to be capable of operating as intended by management, are recognised in the statement of financial performance in arriving at the net surplus or deficit and included in their respective classifications of revenue and expense.

Incidental operations

An example of incidental operations is where revenue is earned through using a building site as a car park until construction starts. These incidental operations may occur before or during the construction

or development activities. Because incidental operations are not necessary to bring an item to the location and condition necessary for it to be capable of operating in the manner intended by management, the revenue and related expenses of incidental operations are recognised in the statement of financial performance in arriving at the net surplus or deficit and included in their respective classifications of revenue and expenditure.

Costs of self-constructed assets

The cost of a self-constructed asset is determined using the same principles as for an acquired asset. All costs directly related to the building project will be accumulated to determine a final cost for the eventual asset.

Costs such as wasted materials and labour costs during a strike are considered as abnormal and will not form part of the cost of the asset. Certain costs such as administrative cost for a secretarial office that deals with several projects and other duties will be considered as overheads and not directly attributable to the asset as time is spent on different tasks and not measurable per project.

The key factor is that the costs must contribute directly and measurably to the creation of the asset to be taken into consideration. Assets from construction are recorded in the asset register at cost when ready for use. Subsequent costs to complete the project are added to the cost of the asset in the asset register as incurred.

Warranty costs

When a department acquires an asset, such as a motor vehicle, the invoice price sometimes includes an element relating to the manufacturer's warranty. These costs are deemed to form part of the initial cost of the asset as they are directly attributable to bringing the asset to its location and condition necessary for it to be capable of operating in the manner intended by management. The warranty enables the department to derive service potential from related assets in excess of what could be derived had the warranty not been there. The cost of the warranty is therefore accounted as part of the asset acquisition cost.

2.4.3.2 Fair value of an asset

Where actual costs are not known, an appropriate fair value method must be applied.

> Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction.

The fair value of a capital asset is usually its market value determined by appraisal. An appraisal of the value of immovable property (land and/or buildings) is normally undertaken by a member of the valuation profession when the asset, who holds a recognised and relevant professional qualification with the South African Council for the Property Valuers Profession (SACPVP). Fair value can be established by using one of the following methods as appropriate:

- **The market approach**. This approach assesses value by comparing the asset being valued with identical or similar assets for which price information is available in the market. It is for example relatively easy to benchmark the market prices for vehicles, computer equipment and furniture (see Table 27 for additional guidance on the market approach).
- **The income approach or capitalisation approach**. The income approach assesses the market value of an asset by converting future cash flows from the yield of an asset to a single current capital value. This approach is usually appropriate where investment properties are valued.
- **Reproduction cost** is the cost of replacing an asset with the same materials used in initial construction. The walls of the Union Buildings, for example, was constructed using sandstone. Today, bricks are commonly used to construct the walls of a similar sized building. However, the sandstone gives the Union Buildings its unique heritage character and if, for whatever reason, a portion of wall needs to be replaced, it will be done with sandstone again.
- **The depreciated replacement cost approach**. Under this approach, value is determined with reference to obtain an asset of equal utility.

The MCS promotes cost-effective compliance and hence encourages departments to make use of existing valuation information such as municipal property valuation rolls to determine the value of properties including vacant land. In instances where the property is located in a mostly inactive market, the market value may be estimated with reference to the market of a similar property in a similar location, for which market information exists.

Note that when existing assets are fair valued, adjustments need to be made to quoted prices obtained or market transactions referenced to account for value consumed/age/remaining service potential and other characteristics that may affect fair value.

Table 25: Guidance on fair value using the market approach:

Consideration:	Guidance:
Fair value in an active and liquid market	
Method of fair value indexing:	Quoted market prices - may include manufacturer's / supplier's published price lists and listed prices on supplier websites
Typically applies to:	Motor vehicles, machinery & equipment, furniture etc.
Note possible price volatility:	▪ The prices of some assets are highly volatile, especially when imported and there are significant exchange rate fluctuations – obtain prices as close as possible to financial year-end ▪ Finalise the fair price index per asset type by averaging the prices obtained from different suppliers, and document & save supporting evidence
Cost efficiency in valuation:	Where possible, use common industry-accepted published price lists e.g. TransUnion Dealer Guides for vehicles
Similar characteristics:	An active and liquid market involving technology is often characterised by model updates / upgrades – assess whether the same asset with the same functionality and performance is being assessed: if not, obtain estimates of assets with similar characteristics
Condition / age:	Adjustments must be made to the indexed market prices for the condition / age of the asset being fair valued
Current market/recent transaction prices for similar assets	
Method of fair value indexing:	Current market prices / recent transaction prices
Typically applies to:	▪ Assets traded in the market place but subject to changes in technology and product updates that result in current market offerings differing in specification e.g. new vehicle with same or improved performance but smaller engine capacity ▪ Assets traded are not homogenous, and price adjustments are necessary to account to differences in nature, condition/value consumed, location and other relevant factors ▪ Buildings and land typically display the characteristics of similar assets with differences to be accounted for
Note variances in price:	▪ Account for similar characteristics e.g. function or performance ▪ Can use comparable model(s), do not need to be same mode ▪ Need not be specific to a manufacturer/supplier ▪ Similar circumstances e.g. location, topography, climatic conditions etc. ▪ Establish similarity range per asset type and obtain prices per type ▪ Finalise the fair price index per asset type by averaging the prices obtained, and document & save supporting evidence

Depreciated replacement cost (DRC)

Why use the DRC method?

There are several instances where other valuation methods fail to measure infrastructure assets, buildings and other complex assets. Original cost information is often unavailable and indeed the age of many assets are also unknown. Under these conditions the cost method cannot be applied. Infrastructure assets such as bridges, reservoirs and roads are not traded in the marketplace. Hence fair value cannot be established by comparing the asset to market values, as they generally do not exist.

The reproduction cost method is generally unsuitable for the valuation of infrastructure. Stakeholders generally require that infrastructure and other complex assets held for service delivery purposes must be fit-for-purpose, efficient and cost-effective. Additionally, build environment technologies, materials and techniques are continually advancing, and new modern equivalent assets (MEAs) are constantly being introduced. The reproduction cost method does not allow for the use of MEAs.

This leaves the Depreciated Replacement Cost (DRC) method. The definition of DRC is as follows:

> The replacement cost of an asset less accumulated depreciation calculated on the basis of such cost to reflect the already consumed or expired economic benefits of the asset.

The "replacement cost" portion of DRC is based on the Current Replacement Cost (CRC) of an asset. As its name suggests, it is the value based on an assessment of how much it will cost to replace the item in current-day terms. The full definition is as follows:

> The cost the entity would incur to acquire the asset on the reporting date. The cost is measured by reference to the lowest cost at which the gross future economic benefits could be obtained in the normal course of business, or the minimum it would cost to replace the existing asset with a new modern equivalent asset with the same economic benefits allowing for any differences in the quantity and quality of output and in operating costs.

The DRC method has multiple applications including:

for accounting purposes:

- **Determination of fair value of assets transferred between departments**. Where actual costs are not known or the asset to be transferred was recorded at R1, and no active markets exists for the asset, the DRC method can be used to value the asset.
- **Cost allocation**. Where the cost of a facility is known, but the facility comprises several buildings/immovable assets and these buildings/immovable assets are to be occupied by more than one custodian department and costs need to be allocated between departments.
- **Project unbundling / componentisation**. The MCS does not require assets to be componentised. Departments operating within the GRAP Framework must however componentise assets and the DRC method is a proven, reliable and effective way to assign actual cost data to components in a scientific manner. There is no longer a need for cumbersome, and

often inconsistent and unreliable analysis of how costs are allocated to components. Note that the DRC methodology is used to componentise assets even when the cost model is applied under GRAP, and the actual costs of an immovable asset is known. This is because cost data in the built environment, as reflected in bills of quantities and invoices, are not reflected in terms of assets and asset components, but rather in items such as labour, materials and professional and general fees.

- **Fair presentation**. In some instances Departments charge tariffs based on asset consumption and in these instances asset values are based on DRC. This additionally has the benefit that the carrying value of an asset maintains the positive attribute of being a fair representation of the remaining value of the asset, regardless of the length of time that the asset has been in use or will remain in use.
- **Impairment testing**. Departments operating under the MCS are not required to conduct impairment testing and to adjust asset values accordingly. Departments operating within the GRAP Framework must however conduct impairment testing and adjust asset values accordingly. Since the DRC method employs condition assessment of assets, it also lends itself to impairment testing at the asset level for non cash-generating assets as defined in GRAP 21.

for financial purposes:

- To assess and possibly contest municipal property rates.
- To improve budgeting estimates for especially asset renewal or refurbishment.

for purposes of asset lifecycle planning, risk analysis and budgeting:

- Budget estimates and/or sufficient provision for future renewal or refurbishment of assets. The level of consumption of the asset (depreciation) is determined by the current replacement cost of the asset, the expected useful life, and remaining useful life/the current condition of the asset. As a result, it is possible to:
    - Estimate asset renewal/refurbishment costs at any time
    - Fund asset renewal/refurbishment/replacement, assuming of course that depreciation is included in cost-reflective tariffs as appropriate.
- Asset life-cycle planning. The DRC method is ideal for determining asset value, risk exposure and asset renewal needs at the asset component level, or at rolled-up levels. This means it is suitable for both asset accounting reporting and asset life-cycle planning. To appreciate this statement, have a look at the final sections on infrastructure profiling in this module: the profiles indicating the cost of rectification have been prepared using the CRC/DRC methodology.

How does it work?

The DRC approach requires information on the expected useful life (EUL), residual value (RV), current replacement cost (CRC) and remaining useful life (RUL) of each of the asset components. DRC is then calculated as follows (assuming that the straight-line method of depreciation applies):

$$DRC = \frac{RUL}{EUL} \times (CRC\text{-}RV) + RV$$

where:

CRC: Current replacement cost (as determined by the product of a unit rate and extent measure)

DRC: Depreciated replacement cost

EUL: Expected useful life

RUL: Remaining useful life

RV: Residual value

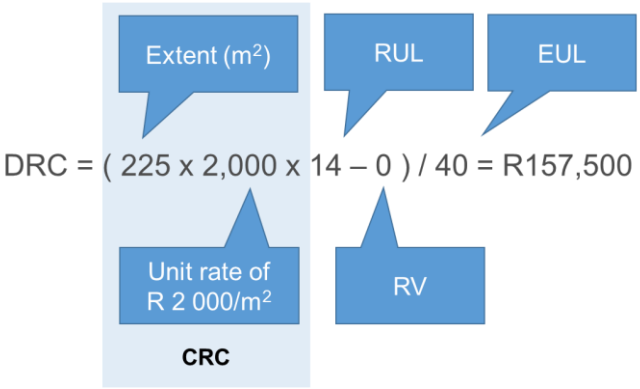
Note: An RV of zero can be used in the above formula to determine the DRC of assets that do not have an RV.

Box 3: Basic example of the application of DRC

Example:

A roof has an expected useful life from new of 40 years. It is 225 m^2 in extent, the unit rate (including all qualifying costs at the reporting date) is R2,000 per m^2, there is no residual value; and the remaining useful life (based on a condition assessment) was determined to be 14 years.

DRC is then calculated as follows:



In this example the estimated life of a roof in general was known to be 40 years, but the actual age of the roof was unknown. In instances where the actual age of the asset component is not known, a condition assessment is performed. The roof was assessed to be in "Fair" condition (condition grade 3) as per the following condition rating scale:

Table 26: Roof condition grading scale

Grade	Description	Detailed description of roof condition
1	Very good	No visible/ detectable leaks in roof. Paint / tile colour not faded and no visible damage or deterioration to gutters.
2	Good	Minor deterioration due to normal wear and tear (< 5% of component) evident. No surface structural damage evident. Minor fading of roof colour - minor wear and tear on gutters. No leaks.
3	Fair	Clearly evident deterioration to roof material and gutters (10-20%). Some loose roof screws, infrequent occurrence of leaks - or notable damage to small section of roof (cracked roof tile or corroded steel in area). Further deterioration likely. Gutters showing notable wear and tear. Isolated occurrences of corrosion.
4	Poor	Significant deterioration of roof structure and/or appearance (20-40%). Deteriorated elements or areas having impact on surrounding areas, larger leaks/ notable leaks. Corrosion occurring. Gutters are an eye sore - potentially broken and falling off roof. Inadequate water proofing (for flat roofs).
5	Very poor	Part of the roof structure collapsed/sagging to unsafe extent or collapse of portion imminent. >50% needs replacement. Roof unsound - colour faded and/or portions of roof material missing. Gutters notably corroded/ broken.

Then, the median RUL for an asset with an EUL of 40 years and in "Fair" condition is referenced from the following table:

Table 27: RUL bands for assets with an EUL of between 5 – 200 years

Condition	Remaining Useful Life (RUL) in years																				
	Very poor			Poor			Fair			Good			Very good								
EUL Expected Useful Life	Low 0% EUL	Median 5% EUL	High 10% EUL	Low 11% EUL	Median 18% EUL	High 25% EUL	Low 26% EUL	Median 35% EUL	High 45% EUL	Low 46% EUL	Median 58% EUL	High 70% EUL	Low 71% EUL	Median 85% EUL	High 100% EUL						
5	0	**0**	1	1	**1**	1	1	**2**	2	2	**3**	4	4	**4**	5						
10	0	**1**	1	1	**2**	3	3	**4**	5	5	**6**	7	7	**9**	10						
15	0	**1**	2	2	**3**	4	4	**5**	7	7	**9**	11	11	**13**	15						
20	0	**1**	2	2	**4**	5	5	**7**	9	9	**12**	14	14	**17**	20						
25	0	**1**	3	3	**5**	6	7	**9**	11	12	**15**	18	18	**21**	25						
30	0	**2**	3	3	**5**	8	8	**11**	14	14	**17**	21	21	**26**	30						
35	0	**2**	4	4	**6**	9	9	**12**	16	16	**20**	25	25	**30**	35						
40	0	**2**	4	4	**7**	10	10	**14**	18	18	**23**	28	28	**34**	40						
45	0	**2**	5	5	**8**	11	12	**16**	20	21	**26**	32	32	**38**	45						
50	0	**3**	5	6	**9**	13	13	**18**	23	23	**29**	35	36	**43**	50						
60	0	**3**	6	7	**11**	15	16	**21**	27	28	**35**	42	43	**51**	60						
70	0	**4**	7	8	**13**	18	18	**25**	32	32	**41**	49	50	**60**	70						
80	0	**4**	8	9	**14**	20	21	**28**	36	37	**46**	56	57	**68**	80						
100	0	**5**	10	11	**18**	25	26	**36**	45	46	**58**	70	71	**86**	100						
150	0	**8**	15	17	**27**	38	39	**53**	68	69	**87**	105	107	**128**	150						
200	0	**10**	20	22	**36**	50	52	**71**	90	92	**116**	140	142	**171**	200						

Some additional guidance on the components of DRC:

a) CRC. The CRC is the product of an appropriate unit rate and the extent of the component, and represents the cost of replacing the asset. The unit rate is based on the cost of replacing the asset under consideration with a modern equivalent asset, which has the same functional capacity. Unit rates are established at the asset component level. **Section 2.4.3.1** describes which costs can be included in the unit rates and which costs must be excluded from the unit rate.

b) Expected useful life (EUL). The EUL of an asset is influenced by a wide range of factors such as the operating environment and standard of manufacture or construction. It will always require judgement as EUL is a prediction of potential future service-delivery performance. The degree of confidence in EUL can, however, be increased by relevant data on influencing factors in the operating environment and/or historic performance (where statistical analyses can be carried out). Where there is little reliable historical performance data available, industry norms are used as a guide, supplemented with insight of sector experts and officials familiar with the assets. Usually, useful life depends on the types of material used, but other parameters can also be reliably modelled, such as the exposure of steel products.

   Departments will over time capture data on actual life realised. This will help establish trends as a scientific basis for estimating the expected useful lives of assets and possibly determining other key influencing factors. The EULs should be informed by documented life-cycle strategies for each component type.

   Land assets are considered to have infinite life and are not depreciated.

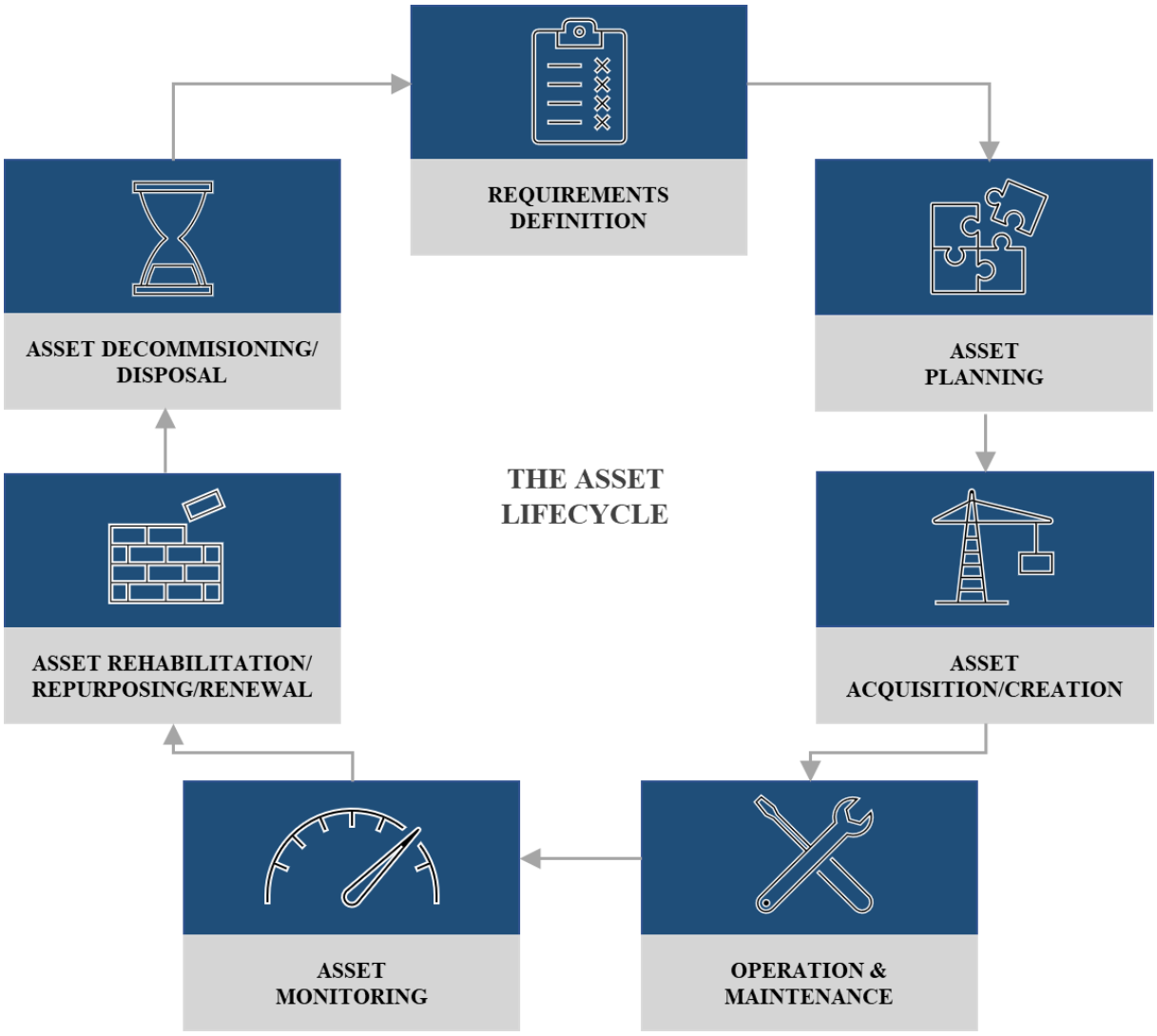
c) Remaining useful life (RUL). Assessment of the RUL of assets is a critical element of a valuation and indeed for forecasting renewal needs. It is typically influenced by the age of an asset and its condition, though it may also be influenced by commitment to replace or dispose based on capacity or performance considerations.

3. Asset lifecycle accounting and management

3.1 The asset lifecycle

Asset management follows a lifecycle management approach aimed at optimizing the benefits and costs of assets over their entire lives, whilst minimizing the risks associated at various stages of the asset lifecycle. The asset lifecycle is presented in **Figure 14** below:

Figure 14: The asset lifecycle



This section describes each of the above lifecycle activities, inclusive of accounting and physical asset management processes.

3.2 Needs identification and requirements definition

3.2.1 Needs and demand

Service delivery needs are influenced by multiple developments. These may include population growth, migration, other shifts in population dynamics such as increasing concentration in certain areas, changes in spatial development frameworks, changes in the economy and changes in customer requirements. These developments may cause increases or decreases in demand for assets or require adaptation of existing assets.

Some of the factors affecting demand include:

Table 28: Typical factors affecting the demand for public services and assets

Government	Government policy & regulation
	Spatial planning and land use management
	Level of fixed capital investment
Spatial	Density and permeability
	Land availability
	Transport infrastructure, transport linkages and modes of transport
	Land use changes
	Cost of land and properties
Environmental	Weather patterns
	Natural resource availability and quality
	Climate changes
Population and social	Population growth/decline
	Household sizes
	Education levels
	Leisure trends
	Consumer preferences
	Social consciousness
	Environmental awareness
	Population health, diseases
Economic	GDP growth
	Job creation and employment levels
	Real disposable income
Technology	More efficient appliances
	Disruptive technologies

Demand may also be more nuanced, requiring a more sophisticated approach to demand forecasting. For example: the population may increase, which in turn increases the demand for infrastructure assets. This would for example increase the overall demand for potable water. However, as consumers become more environmentally aware and water-efficient appliances become common-place, the unit demand for water (the amount of water required per household) may decrease.

In many instances in the public sector, the approach to determining the demand for service delivery and asset requirements are norms-driven, targeted specific levels of service. Some of the relevant, credible publications related to levels of service, norms and standards include:

- CSIR. Guidelines for Human Settlements Planning and Design. Volumes 1 & 2.
- Council for Scientific and Industrial Research (CSIR). August 2012. CSIR Guidelines for the Provision of Social Facilities in South African Settlements. First Edition. Pretoria: CSIR Built Environment.
- Government Gazette No. 37081. 29 November 2013. South African Schools Act (84/1996): Regulations relating to minimum uniform norms and standards for public school infrastructure.
- Government Gazette No. 27985. 2 September 2005. Department of Public Works: Space planning norms and standards for office accommodation used by organs of state.
- Relevant South African National Standards published by the SABS.

Table 29: Examples of norms for the provision of social facilities

Facilities	Ave population threshold	Median population	Site size (ha)
Health and emergency services			
Tertiary hospital L3	2 400 000	2 400 000	35.00
Regional hospital L2	1 770 000	1 770 000	7.00
District hospital L1	300 000 - 900 000	600 000	5.00
Community health centre	100 000 - 140 000	120 000	1.50
Primary health clinic	24 000 - 70 000	47 000	0.50
Fire station	60 000 - 100 000	80 000	1.20
Police station	60 000 - 100 000	80 000	1.00
Social and cultural (public service facilities)			
Performing arts centre - major	Variable	500 000	0.50
Community performing arts centre	50 000	50 000	0.25
Museum - large	500 000	500 000	0.50
Museum - medium/small	Variable	50 000	0.25
Regional library - reference	450 000	450 000	0.56
Regional library	200 000	200 000	0.56
Local library	20 000 - 70 000	45 000	0.10

Source: CSIR (stand sizes indicated in green determined outside of CSIR guidelines)

Of course, not all asset needs are driven by demand or norms. It may also be that the need identified results from an opportunity such as is presented by a new mega-project proposal such as a new airport zone development, or from the need to respond to disasters or identified risks.

3.2.2 Match immovable asset requirements with service delivery needs

However, asset needs have been identified, they need to be matched against service delivery objectives. In doing so, departments need to rationalize demand against available resources whilst maintaining required levels of service. This means that alternative service delivery methods that do not require immovable assets must be identified and considered. A department must also satisfy itself that a non-immovable asset solution proposed in viable.

3.2.3 Asset management plans

Requirements for new immovable assets are included in asset management plans. The National Treasury's Framework for Infrastructure Delivery and Procurement Management (FIDPM) separates infrastructure planning into strategic planning culminating into the Strategic Infrastructure Asset Management Plan and infrastructure planning that culminates in the infrastructure asset management plan (IAMP) (2019: p 5). The National Treasury defines the IAMP as follows:

> The long-term plan that outlines the asset activities and resources required, to provide a defined level of service, in the most cost-effective way. The plan must include a list of programmes and projects for at least five years.

The National Treasury further categorises infrastructure planning, culminating in the IAMP, as a portfolio-level process.

Within the GIAMA environment, users will prepare U-AMPs. The overall strategic intent of the User in relation to existing and long-term immovable asset requirements are expressed in Section 1 of the U-AMP. Section 2 indicates how immovable assets will support service delivery objectives, underpinned by budget programme objectives. Section 3 of the U-AMP will contain an acquisition plan of current and proposed acquisitions. Custodians in turn develop C-AMPs. Section 5 of the C-AMP focusses on the acquisition plan inclusive of new assets to be constructed or purchased and new leases.

3.3 Asset planning

The asset planning phase defines the assets to be acquired or constructed. Most movable assets planned for can be purchased off-the-shelf or ordered and manufactured according to standard specifications.

In the case of immovable assets and some non-standard movable assets that must be designed and manufactured according to unique specifications, this is often not so easy. Examples of non-standard movable assets include specialised military equipment and coach-built vehicles or vehicles that are converted following initial manufacturing for specialised application, for example ambulances.

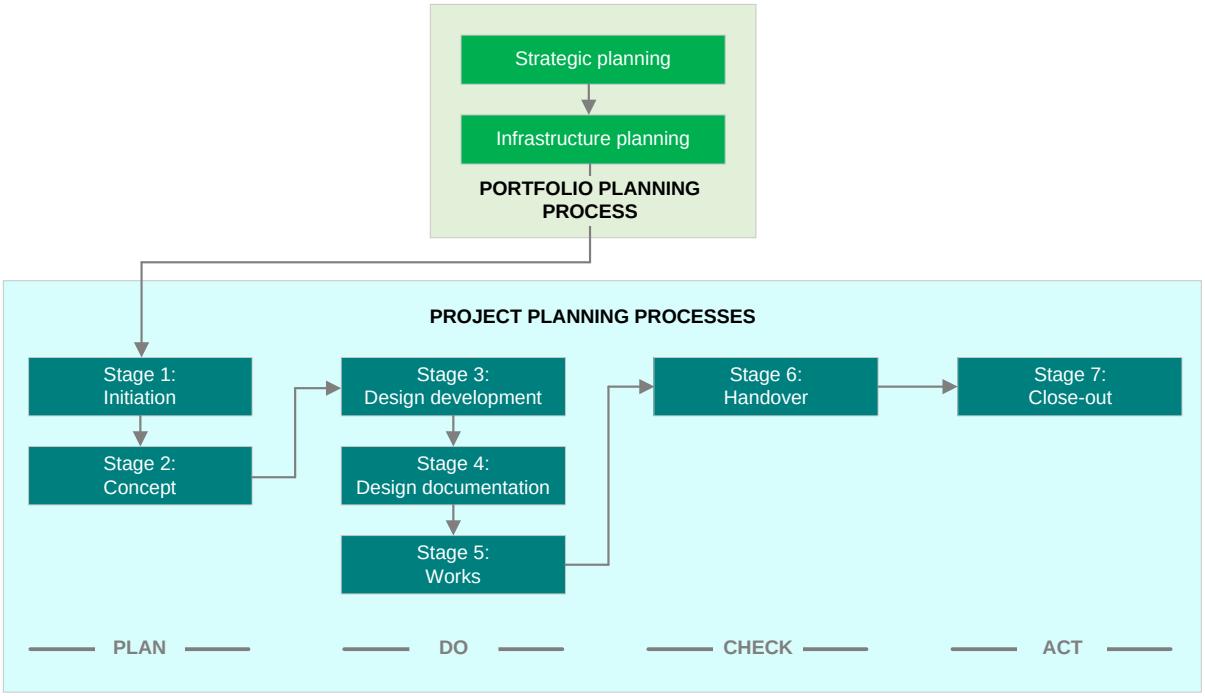
In these instances, the process involves moving from portfolio planning processes where asset management plans broadly define the needs for assets in the aggregate (for the whole portfolio of assets), to asset planning at the process processes level (planning for individual assets) involving several stages from initiation, concept, design development to design document.

Collectively, these represent the first four of seven stages within the Infrastructure Delivery Management (IDM) project processes as defined within the FIDPM. These stages are presented in **Figure 15** below and described in the following sub-sections.

It needs to be noted that:

- Procurement of professional service providers and contractors can happen at different points in the project stages
- Different forms of construction contracts forms exist. Depending on the form of contract, additional project stages may be included.

Figure 15: Project processes for infrastructure delivery



3.3.1 Initiation [Stage 1]

Stage 1 involves the preparation of an initiation report, or in the case of mega capital projects, a prefeasibility report. The initiation report defines project objectives, needs, acceptance criteria, the department's priorities and intentions and procurement strategies.

The prefeasibility report determined whether the project proposal should proceed to the feasibility stage, where sufficient information is available to enable a final decision whether to implement the project or not. Stage 1 is complete when the initiation report or prefeasibility report is approved.

3.3.2 Concept [Stage 2]

The concept stage involves the development of alternative design concepts to satisfy the project requirements, the testing of alternatives and selection of a particular conceptual approach to determine if the project is feasible in terms of available budget, technical solution, timeframe and other considerations or requirements as specified. The concept report will provide at least the following information:

- Document the project need and requirements, the initial design criteria, cost plan, design options and section of the preferred design option.
- The detailed project brief, scope, scale and form and, where necessary, site studies and specialist advice.
- Provide an indicative schedule for documentation and construction or maintenance services associated with the project.
- Provide a site development plan or other appropriate schematic layouts of the works.
- Articulate all necessary statutory permissions, funding approvals and utility approvals required to proceed with the works.
- Include a baseline risk assessment and health and safety plan as required in terms of the Construction Regulations issued in terms of the Occupational Health and Safety Plan.
- Include a risk report indicating the need for further surveys, tests, inspections, investigations, consents and approvals required, as needed, during following stages and the identified health, safety and environmental risks.

The feasibility report will address the following at a minimum:

- Description of the needs and demand analysis with output specifications, and an options analysis.
- A viability evaluation including financial analysis and, where necessary, an economic analysis.
- A risk assessment and sensitivity analysis.
- A professional analysis comprising a technology options assessment, an environmental impact assessment and regulatory due diligence.
- An implementation readiness assessment inclusive of institutional capacity and a procurement plan.

Stage 2 is complete when the concept report or feasibility report is approved.

3.3.3 Design development [Stage 3]

The design development report:

- Develops the approved concept in sufficient detail to finalise the design and definition criteria.
- Establishes the detained form, function, character and costings.
- Defines all components in terms of overall size, typical detail, performance and outline specifications.

- Describes how infrastructure or elements or components thereof are to function, how they are to be safely constructed, maintained and commissioned.
- Confirm that the project scope can be completed within the budget or propose a revision to the budget.

Stage 3 is completed when the design development report is approved.

3.3.4 Design documentation [Stage 4]

Design documentation provides the:

- Production information detailing the performance definition, specification, sizing and positioning of all systems and components that would enable construction; and
- Manufacturing, fabrication and construction information for specific components of the work informed by the production information.

Stage 4 is complete once the design documentation report is approved.

3.4 Asset acquisition or creation

It is normally in this phase of the asset lifecycle where new assets are created or acquired. Assets must be subjected to recognition criteria and if qualified to meet the definition of an asset, must be classified, measured and recorded in the asset register. This section explains the ways in which the following assets are created or acquired, and the appropriate accounting treatment for each:

- Immovable capital assets
- Movable capital assets
- Intangible assets

3.4.1 Immovable capital assets

Immovable capital assets can be created or acquired through an exchange transaction or acquired through a non-exchange transaction.

3.4.1.1 Created or acquired through an exchange transaction [Stage 5]

Immovable assets created or acquired through an exchange transaction generally follow the infrastructure delivery project process outlined in **Figure 15**. From the asset planning phase (initiation through to design documentation), the project moves into the Works phase (**Stage 5**). During this stage construction and installation takes place and once completed, the goods and services are certified as being delivered in accordance with contract specifications. Once this happens, the completed works are capable of being used or occupied and **Stage 5** is complete when the works completion report is approved.

3.4.1.2 Asset handover [Stage 6]

The following happens in **Stage 6**: Asset handover:

- All information and records regarding the infrastructure constructed is assembled and finalised;
- End user staff is trained in the operation of the works, where required;
- Works are handed over to the user; and
- The handover/record information report is approved.

It is important to ensure that the following, as appropriate, is obtained from the contractor:

- As-built schematics
- Operator manuals
- Warrantees
- Certificates of inspection and compliance
- Cost information

3.4.1.3 Asset recognition

Following asset handover, all criteria for asset recognition will have been satisfied, including:

- The asset has service delivery potential or future economic benefits arising from past events, in this case from the construction or manufacturing of the asset; and
- The contractor has done asset handover and the asset is now under the control of the department who can employ it to generate the expected benefits.

Asset recognition involves the following steps:

1	The asset is classified per accounting group, asset category and asset class (see **Table 7**)
2	The asset is componentised (see **Table 7**)
3	Components recorded as individual asset records are assigned an asset custodian
4	The asset description and attribute information is recorded for each individual asset record

The above information is recorded in the asset register of the department. The structure and contents of the asset register is discussed in **Section 3.4.4**.

3.4.1.4 Close out report [Stage 7]

Stage 7 of the project delivery process involves close-out. This stage commences when the end user accepts liability for the works and is complete when:

- Record information is archived;
- Defects certificates and certificates of final completion are issued in terms of the contract;
- The final account is received and the final amount due to the contractor is certified; and
- The close-out report is approved by the client department.

3.4.1.5 Asset measurement

Following the close-out stage, the final project cost will be known and must be capitalised. Note the following:

- **Section 2.4** provides guidance on which costs can be capitalised, and which costs cannot be capitalised.
- Also note that the recording of costs to be capitalised stop when the asset is in the location and condition necessary for it to be capable of operating in the manner intended by management. Functionally, this may often happen at completion of the asset handover stage, though the final cost reconciliation is only completed at the close-out stage. In determining the capital costs to be capitalised the final account, subject to testing of the elements of allowable costs to be capitalised, is generally the cost at which the asset is capitalised. Any operational costs subsequent to asset handover but prior to (or after) close-out are expensed.

Where assets are componentised, the projects costs are apportioned at component type level. At this point asset records related to the project are assessed and assets further categorised as major assets or minor assets in accordance with the threshold criterion established by the OAG. Asset values and further categorisation as major assets or minor assets are recorded against each asset record in the asset register.

Self-constructed assets

The process for a self-constructed asset is generally the same as for acquired assets, and the costs to be capitalised are determined using the same principles as for acquired assets. Costs to be capitalised must directly and measurably contribute to the creation of the asset. The following costs are not capitalised:

- Administrative costs such as secretarial services that offer support to this and other projects are considered overheads and are not capitalised.
- The costs of wasted materials and labour costs during a strike are abnormal expenses and will not be capitalised.

Warranty costs

In certain instances an element of the asset's acquisition costs are specified as the manufacturer's warranty. This typically applies to vehicles and many types of manufactured equipment. Such costs are deemed to form part of the initial costs of the asset as they enable the department to derive the full benefit of the asset and in the desired condition to function as expected. Accordingly, the warranty cost is accounted as part of the asset acquisition cost.

Assets transferred between departments

Immovable capital assets are transferred at cost or fair value. In the event that transferor had the asset recorded at R1, the transferor must fair value the capital asset prior to transfer.

Guidance on fair valuation is provided in **Section 2.4**. Documentation supporting the value at which the asset was transferred must accompany the asset. This documentation may include invoices or a documented valuation methodology as appropriate.

The transfer is complete when the documentation is signed by both the transferor and the recipient department.

The recipient department upon receiving the signed documentation will record the asset in its asset register and will capitalise the costs of the asset in accordance with valuation documentation provided by the transferor and signed by both parties.

Instances where nominal values are considered deemed cost

The following immovable capital assets are measured at R 1,000 for initial recording in the asset register, where R 1,000 will be considered deemed cost:

- Admiralty reserves
- Commonages
- Communal land
- Inaccessible / mountainous areas
- Islands
- Offshore rock outcrops and conservation areas
- Land parcels with graves and cemeteries
- Road reserves
- Seashores

3.4.2 Movable capital assets

3.4.2.1 Movable capital assets acquired through an exchange transaction [Stage 5]

A movable asset that meets the requirements of a capital asset is measured at its cost. This cost is the actual amount paid for the asset as substantiated by invoices. Note that payment can be made as a single payment or a series of payments made over a period.

3.4.2.2 Movable capital assets acquired through a non-exchange transaction [Stage 5]

A department may acquire a movable capital asset through one of the following types of non-exchange transactions:

- The movable asset is acquired through transfer from another department;
- The movable asset is acquired through a non-exchange transaction from non-governmental entities, such as in the case of donations or contributions; or
- The movable asset is acquired through the exercise of powers of expropriation.

Under any of the above circumstances the cost of the item is its fair value as at the date it is acquired. **Section 2.4** provides guidance on determining fair value.

3.4.2.3 Instances where movable assets are recorded at nominal cost [Stage 5]

Movable capital assets may be recorded at R1 if the asset was procured prior to 1 April 2002 (or another date as approved by the OAG) if its cost cannot be reliably measured and its fair value has not been determined prior to implementation of the MCS. In such instances the use of R1 is regarded as the asset's deemed cost.

Where the cost of fair value of the asset has been determined the asset may be recorded at the determined value instead of R1.

3.4.3 Intangible capital assets

3.4.3.1 Identifiability criterion

An intangible asset is an identifiable non-monetary asset without physical substance. An asset must meet the following identifiability criterion to meet the definition of an intangible asset:

- It must be seperable, meaning it must be capable of being separated or divided from the entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, identifiable asset or liability, whether or not the entity intends to do so; or
- When it arises from binding agreements, including rights from contracts, regardless of whether such rights are transferrable or seperable from the entity or from other rights and obligations.

In this context, a binding arrangement is any arrangement that confers enforceable rights and obligations on the parties as if it were in the form of a contract.

3.4.3.2 Internally generated intangible assets

Criteria for internally generated assets

It can be difficult to assess whether an internally generated intangible asset exists. It is not always easy to determine whether there is an identifiable asset that will generate expected future service potential or economic benefits. Furthermore, it may be difficult to distinguish the cost of generating an internal intangible asset from the costs related to a department's recurring operations.

To overcome these challenges and to qualify as an internally generated intangible asset, it must meet the identifiability criteria articulated above, and the asset must be generated through distinct phases of research followed by development.

Research phase

The research phase may include activities such as:

- Activities aimed at uncovering new knowledge;
- The search for, analysis, evaluation and selection of research findings, applications or other knowledge;
- The search for alternatives for techniques, processes, materials, products, services or systems; and
- The formulation, design, evaluation and selection of possible alternatives for new or improved techniques, processes, materials, products, services or systems.

The research phase itself does not generate an intangible asset that will generate probable service potential or economic benefits. Therefore, research expenditure is treated as current expenditure and expensed in the Statement of Financial Performance.

Development phase

Examples of development activities include:

- the design, construction and testing of pre-production or pre-use prototypes and models;
- the design of tools, jigs, moulds and dies involving new technology;
- the design, construction and operation of a pilot plant that is not of a scale economically feasible for commercial production; and
- the design, construction and testing of a chosen alternative for new or improved materials, devices, products, processes, systems or services.

An intangible asset arising from development or from the development phase of an internal project shall be accounted for as such provided that the department can demonstrate all of the following:

- the technical feasibility of completing the intangible asset so that it will be available for use or sale;
- its intention to complete the intangible asset and use or sell it;

- its ability to use or sell the intangible asset;
- how the intangible asset will generate probable future economic benefits or service potential. Among other things, the department can demonstrate the existence of a market for the output of the intangible asset or the intangible asset itself or, if it is to be used internally, the usefulness of the intangible asset;
- the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset; and
- its ability to measure reliably the expenditure attributable to the intangible asset during its development.

The availability of resources to complete, use and obtain the benefits from an intangible asset can be demonstrated by, for example:

- a strategic plan showing the technical, financial and other resources needed and the department's ability to secure those resources; or
- an agreement where the department secured donor funding to complete the intangible asset and where ownership of the intangible asset will vest with the department.

Capitalisation of costs to the carrying value of the intangible asset commences with the development phase, provided that all of the above criteria have been met.

3.4.4 Asset register

Following asset acquisition or asset creation, the asset is recorded in the asset register. The asset register is a formal record of asset information considered worthy of separate identification for both asset accounting and strategic management purposes. The asset register provides the asset-related information presented in the financial statements. A good asset register will contain the following, considering the requirements of the MCS, GIAMA and SANS 55001:

- Asset description / identity
- Acquisition data
- Control / accountability
- Accounting data
- Revaluation data
- Lifecycle management
- Decommissioning / disposal

Table 30: Data groups within the asset register

Data groups	Data description
Description/identity	Asset classification (as per asset hierarchy)
	Secondary classification (major or minor asset)
	Asset identification number
	Secondary asset identification numbers (e.g. serial numbers, vehicle registration numbers, VIN numbers etc.)
	Reference to spatial or engineering system (e.g. roads management system) where the asset is duplicated
	Asset common name or description (e.g. Union Buildings)
	Overview of the nature and extent of the asset including attribute data
	Location data including physical address and/or GPS coordinates as appropriate
Acquisition data	Acquisition date
	Form of acquisition (created/purchased, non-exchange transaction)
	Cost or deemed cost
	Measurement base (cost or fair value)
	Supplier / transferor
Control / accountability	Custodian department
	User department
	Asset custodian (person / position with assigned responsibility for the asset)
	Any applicable restrictions / conditions
	Warrantees
Accounting	Opening balance
	Capital additions / capital improvements
	Other changes
	Closing balance
	Reclassification, where applicable
Revaluation	Revaluation date
	Valuation method
	Revaluation cost adjustment
Lifecycle management	Estimated useful life
	Current age
	Remaining useful life
	Current replacement cost
	Residual value
	Depreciated replacement cost
	Condition grade
	Performance grade

Data groups	Data description
	Failure mode grade 3 (e.g. capacity)
	Failure mode grade 4 (e.g. utilisation)
	Criticality grade

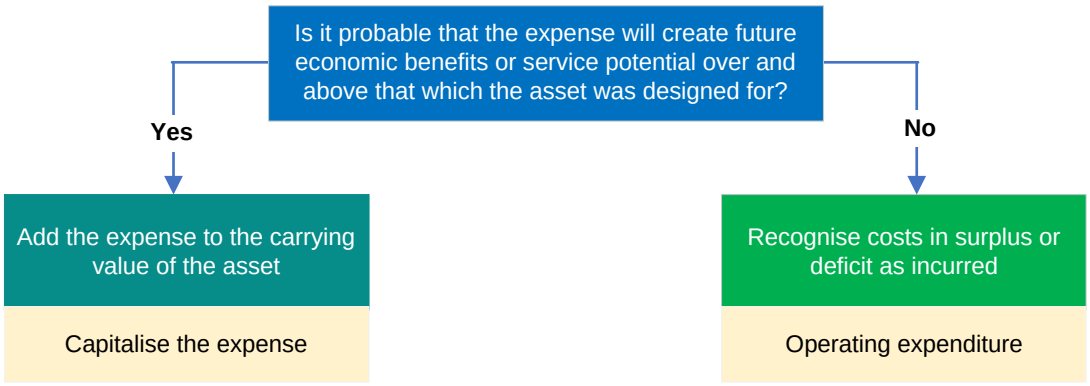
A good asset register will in addition to accuracy, completeness and currency also display the following characteristics:

- It will support accounting treatment, enable financial disclosure, underpin asset lifecycle management and promote asset accountability inclusive of safeguarding;
- It will be structured to differentiate between asset classifications;
- It should enable the preparer of the financial statements to provide the disclosures required in terms of the MCS (see Chapter 11 of the MCS – disclosure requirements are stated on Pg. 93 and additional requirements for immovable asset data in the asset register are noted in Appendix A to Chapter 11);
- The asset register will enable maintenance and updating of asset information as required; and
- Asset information will be readily available to asset managers.

3.4.5 Subsequent measurement

At this point of the asset lifecycle, assets that are in the condition and location ready for use have been recorded in the asset register, and initial costs have been capitalised as allowed, or deemed cost will have been established. More costs will be incurred over the remainder of the asset's life, and these costs will be either expensed or capitalised.

Figure 16: Treatment of subsequent expenditure



The following are considered activities and expenditure that will create future economic benefits or service potential over and above that which the asset was designed for:

- Contributes to the increase in the useful life of an asset which is beyond the original useful life expectation;
- Increase productivity of the asset;

- Expands capacity of the asset;
- Significantly reduces operating or maintenance costs whilst delivering the same or increased level and standard of output;
- Increase size; and/or
- Change its shape and use.

3.5 Operation and maintenance

3.5.1 Asset operation

3.5.1.1 Asset operation defined

Asset operation refers to the combination of all technical, administrative and managerial actions, other than maintenance actions, that results in the item being in use. Following are some examples of asset operation:

Examples of water operations:

- Scheduled water releases (at dams)
- Water abstraction and/or bulk purchases
- Purchasing of chemicals and water purification
- Managing distribution and reticulation through flow and pressure management techniques
- Water quality testing

Examples of building operations:

- Cleaning
- Security services including access control
- Landscaping operations
- Removal of bees
- Pest and rodent control
- Waste management
- Occupational health and safety assessment, planning and operational control

Examples of road and stormwater operations:

- Cutting vegetation at roadsides
- Clearing of ditches, culverts, and stormwater inlets
- Removal of debris or obstacles from natural causes

3.5.1.2 Accounting for operating costs

Asset operations are recurring expenditure that are of an operational or current nature.

3.5.1.3 Planning and execution of operating costs

The FIDPM and the IDMS view operations as part of the IDM operations and maintenance level processes. An Operations Management Plan (OMP) must be prepared that presents the operations work schedules with the organisational structure and institutional arrangements for the planning, implementation, monitoring and control of all operational activities. The plan must include (NT, 2019: pp 9 – 10):

- Operating procedures
- Scheduling activities
- Emergency procedures
- Resource requirements (e.g., personnel, equipment, materials and funding)
- Performance and quality requirements
- Risks and occupational health and safety (OHS) provisions

The DPW Guidelines for U-AMPs also require the preparation of an Operations Plan. However, the scope of this operations plan is broader than the definition of operations, and includes the following (DPW, 2017: 10):

- Capital infrastructure plan (refurbishment, additions, reconfiguration and upgrades)
- Maintenance required to reinstate immovable assets to their original state or a usable state as necessary for service delivery requirements
- Management of day-to-day services such as payment of utility bills, security services and cleaning.

Only the last component, namely the management of day-to-day services, forms part of operations.

3.5.2 Asset maintenance

3.5.2.1 Asset maintenance defined

All actions intended to ensure that an asset performs a required function to a specific performance standard(s) over its expected useful life by keeping it in as near as practicable to its original condition, including regular recurring activities to keep the asset operating, but specifically excluding renewal.

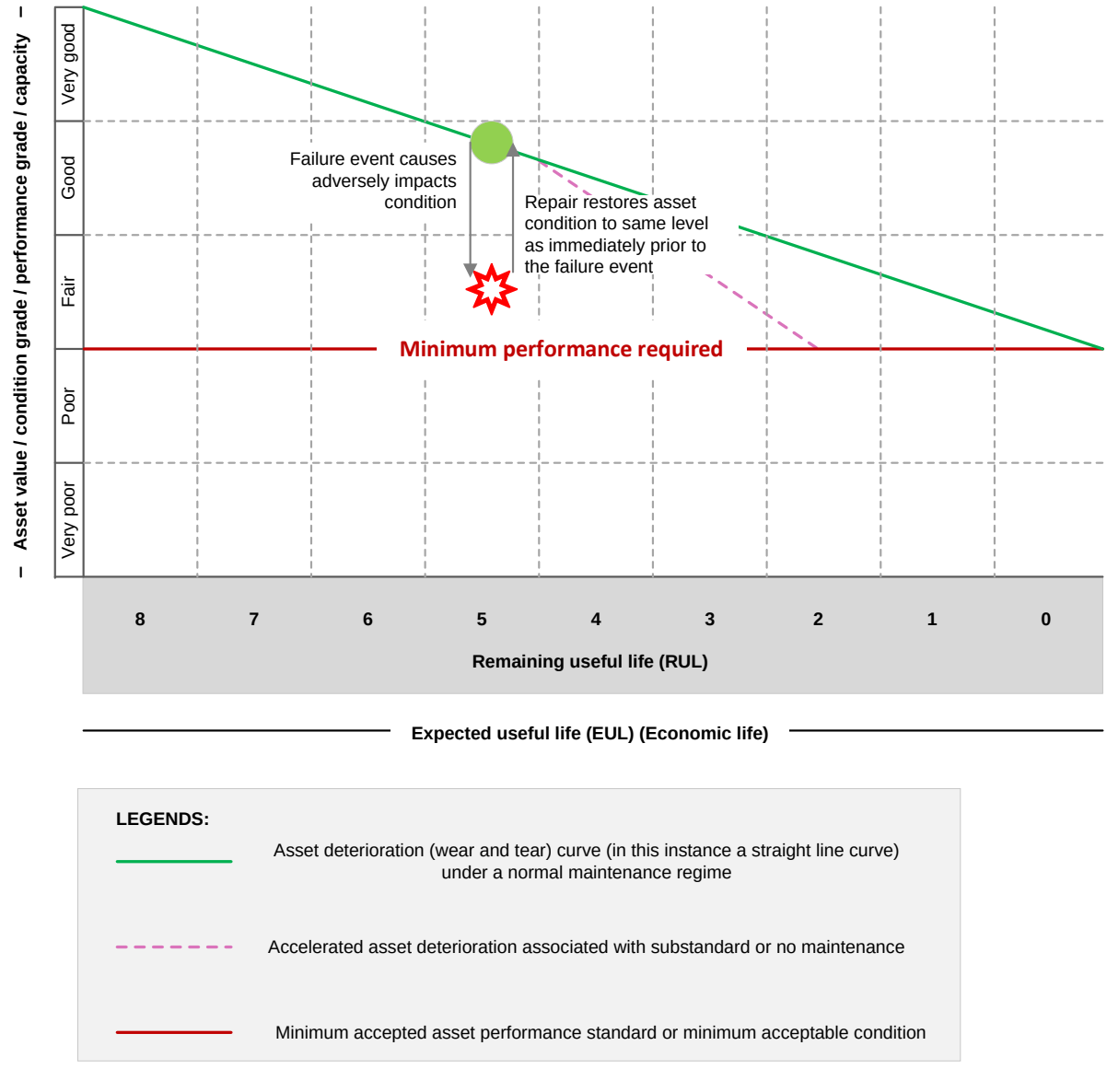
Figure 17 shows the expected useful life (EUL), in this case 8 years. After 8 years, the asset may still be functioning, but not at the expected level of performance. Hence the asset life has been estimated at 8 years, which is considered to be its economic life. During that 8 years, the asset's condition and/or performance will likely deteriorate. This is normal, all assets are subject to wear and tear. This deterioration curve is demonstrated by the green line in **Figure 17**.

When the asset is new at the beginning of the 8-year lifespan, it should be in very good condition and should further perform very well, provided of course that the asset has been well designed and constructed or manufactured, and that the EUL has been estimated to a reasonable degree of accuracy. Maintenance cannot extend the economic life of the asset – indeed, the EUL should already factor for the maintenance regime required to ensure that the EUL is realised.

As the asset ages, its condition and/or performance will deteriorate, and its remaining useful life (RUL) will reduce. Nonetheless, with proper maintenance, the asset should remain within required condition and performance parameters throughout its EUL, barring of course unexpected events such as fire, floods, serious operator errors or vandalism.

On the other hand, the asset is unlikely to reach its EUL within the required condition or performance parameters under conditions of substandard or no maintenance. This scenario is demonstrated by the broken pink line in **Figure 17**, where the EUL is reduced by 2 years.

Figure 17: Asset life and deterioration under different maintenance regimes



Maintenance can be predictive, preventative, routine or reactive in nature. These terms are described below:

Table 31: Forms of maintenance

Maintenance type	Definition	Examples
Predictive maintenance	Action to monitor the condition of an asset and predict the need for preventative or corrective action. Also referred to condition monitoring or performance monitoring.	CCTV (camera) inspections of pipe systems to determine actual condition and deterioration
Preventative maintenance	Maintenance carried out at predetermined intervals, or corresponding to prescribed criteria, and intended to reduce the probability of failure or the performance degradation of an item. Preventative maintenance is planned or carried out on opportunity.	Statutory inspections of fire safety equipment, lifts and other hydraulic equipment. Repair of sealants and expansion joints of bridges
Routine maintenance	Day-to-day operational activities to keep the asset operating and which form part of the annual operating budget, including preventative and periodic maintenance.	Replacement of light bulbs, paint crack filling, repainting of walls, cleaning of drains, oil and filter changes, etc.
Corrective maintenance	Physical action taken to restore the required function of a faulty item.	Replacement of burst pipes, pothole patching and crack sealing

Repairs is a form of corrective maintenance. It does not improve the condition of an asset to "as new" state, nor does it extend the asset's EUL or improve its design capacity or performance. This is also demonstrated in **Figure 17**. Following a failure event, repairs reinstate an asset to the condition or performance level where it was immediately prior to the failure event.

3.5.2.2 Accounting for maintenance costs

When expenditure relates to sub-components at any level below the 6-level hierarchy, such expenditure is not capitalised even if the sub-components are expected to be used for a period longer than twelve months.

Additionally, replacement of a part of a component type following a failure event is also maintenance, provided that the part in question does not constitute the largest portion of the asset. For example: a burst occurred on a pipe segment that is 200 meters long. Replacing the portion of pipe that burst only measures 1 meter. The intervention is of a maintenance nature, and the overall condition of the 200-meter-long pipe segment does not change.

Maintenance expenditure is of an operational or current nature.

3.5.2.3 Planning and execution of maintenance costs

The FIDPM and the IDMS view maintenance as part of the IDM operations and maintenance level processes. A Maintenance Management Plan (MMP) must be prepared that describes the maintenance actions necessary to keep infrastructure assets as near as practical to their original condition without resorting to renewal, to ensure their minimum availability and reliability.

The plan must include (NT, 2019: p 10):

- Maintenance procedures and activities
- Scheduling of activities
- Resource requirements (e.g., personnel, equipment, materials and funding)
- Performance and quality requirements
- Risks and OHS provisions

For departments preparing U-AMPs, maintenance requirements are included in the Operations Plan.

Also note that the FIDPM requires a Maintenance Management Review Report (MMRR) that requires management to evaluate the continued suitability, adequacy and effectiveness of assets, asset management and the asset management system. The minimum content of this report includes (NT, 2019: 10):

- Achievement of operations and maintenance (O&M) objectives
- O&M performance in relation to pre-determined performance measures
- Review of the O&M risks as documented in the risk register
- Review and signature of the Accounting Officer of the facility or network.

3.6 Asset monitoring

3.6.1 The need for asset monitoring

SANS 55001, Clause 9.1, requires an organisation to determine:

- What needs to be monitored;
- The monitoring methods to be used;
- When and how monitoring and measuring shall be performed; and
- When monitoring and measurement results shall be analysed and performed.

In addition to the requirements of SANS 55001, GIAMA, various pieces of sectoral legislation and other SANS standards also require asset monitoring.

3.6.2 Scope of asset monitoring

Asset monitoring covers the following aspects:

- Asset management and customer performance reporting;
- Technical/engineering and operational performance; and
- Asset-level condition and performance.

Therefore, asset monitoring includes monitoring, measurement and evaluation of assets and of the asset management function.

3.6.3 Asset monitoring

Section 2.3.5 provides guidance on condition assessment and asset performance monitoring, in both the GIAMA environment and generally elsewhere in the public sector.

3.6.4 Asset management performance

Asset management performance management is separately discussed in **Section 5: Asset performance management**.

3.6.5 Nature of expenditure

Due to the importance of asset monitoring and evaluation, it is often presented as a separate lifecycle activity in prominent literature. Asset monitoring is however an operational activity performed as part of operations and maintenance and such costs are recognised in surplus or deficit as incurred.

3.7 Asset rehabilitation, renewal, and repurposing

3.7.1 Asset rehabilitation or renewal

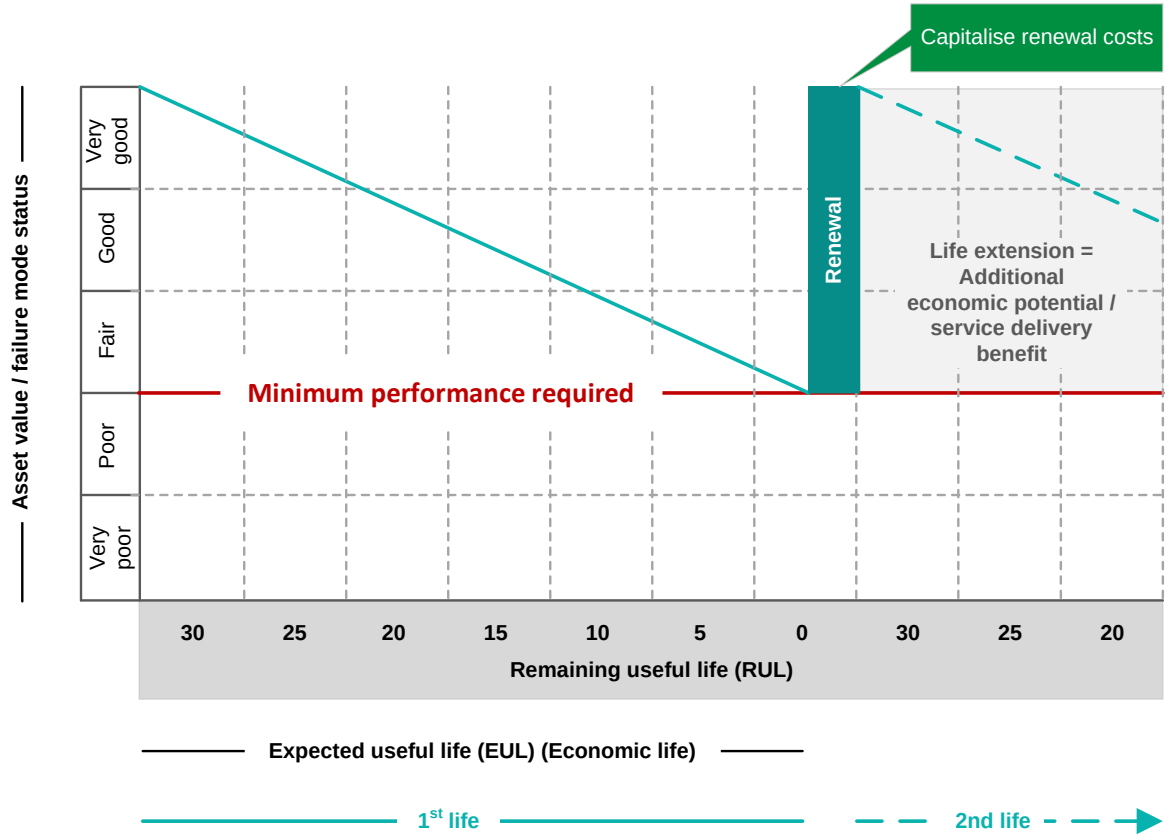
3.7.1.1 Definition of asset rehabilitation or renewals

Asset renewal or rehabilitation is expenditure on an existing asset that returns the service potential of the asset or expected useful life of the asset to that which it had originally. Renewal can include works to replace existing assets or facilities with assets or facilities of equivalent capacity or performance capability.

Test for renewal: does the expenditure result in life extension of the asset?

The concept of renewal is demonstrated in **Figure 18**. In this instance, the asset under consideration has an EUL of 30 years, meaning that it is estimated that the asset has the potential to deliver economic benefits or service for 30 years. At year 30, the asset has reached the minimum acceptable performance level and is renewed.

Figure 18: Renewal demonstrated



The result is that the asset now has a life extension of another 30 years, which is clearly an increase in economic potential or service delivery benefit. Typical examples of asset renewal include:

- Road resurfacing
- Relining of pipes, reservoirs or furnaces
- Replacement/rewiring of building electrical installation where existing installation has reached end-of-life or has become unsafe
- Re-winding and overhaul of motor after failure
- Rehabilitation of entire concrete structure based on condition and/or structural assessment
- Replacement of full manhole-to-manhole lengths of pipe including manholes based on condition and/or performance (e.g., blockages).

3.7.1.2 Accounting for asset rehabilitation or renewals

Expenditure on renewals is of a capital nature and such expenditure is recognised as expenditure for capital assets.

3.7.1.3 Planning and execution of rehabilitation or renewals

Within the GIAMA environment, refurbishment is triggered when an asset's performance index falls outside of acceptable range, as demonstrated in **Figure 12**.

Other departments who manage assets outside the GIAMA environment should establish minimum performance standards or minimum acceptable condition levels and assets should be renewed when minimum acceptable performance or condition levels are reached, provided of course that demand for the asset remains constant or is growing, at the location or in the catchment area served by the asset.

Asset renewal or refurbishment needs should be anticipated and included in asset management plans. In the GIAMA environment, renewal or refurbishment needs are included in the Operations Plan of the C-AMP.

Asset renewal or refurbishment may also be undertaken as an emergency response to asset failure caused by unplanned events such as fire, flooding and other natural and human-caused disasters.

Major renewal or refurbishment projects are executed in accordance with the six stages of infrastructure delivery defined in the FIDPM (see **Section 2.3** and **Section 2.4**).

3.7.2 Asset repurposing or reconfiguration

3.7.2.1 Definition of repurposing or reconfiguration

Asset repurposing

Asset repurposing involves changing the current purpose of the asset to another purpose but excludes retaining the current purpose and affecting changes to the asset to serve additional purposes. Applied to immovable assets, asset repurposing is often associated with a change in land use.

The following are examples of asset repurposing:

- An inner-city office block is converted to residential apartments
- A vehicle that was purchased for general use is now adapted with the necessary modifications and fittings to function as a specific-purpose vehicle, e.g., an ambulance or search and rescue vehicle
- A combat military aircraft is taken out of active combat service. Its weapon systems are dismantled and any military-sensitive technology is removed, after which the aircraft is utilised for civilian purposes
- A previously active government facility is repurposed as a museum, examples of which include military bases such as the Castle of Good Hope in Cape Town, and Fort Klapperkop in Pretoria.

Reconfiguration

Asset reconfiguration involves changing the lay-out and/or internal flow of movement within a building, facility or network to improve or optimise its performance.

The following are examples of reconfiguration:

- An administrative office building features an excess of closed offices that were larger than the generally accepted norms for space provision. The amount of floor space is such that there isn't sufficient space for communal areas. The building has now been reconfigured by changing it's

internal lay-out to decrease the number of closed offices and the sizes of closed offices, to increase open plan floor space, add two boardrooms and a staff canteen.

- An urban roads network is reconfigured to improve traffic flow in high vehicle areas surrounding the CBD by designating certain roads as one-way roads only, and to prohibit vehicular movement on certain road sections in the CBD and to designate those road sections as walking lanes instead.

3.7.2.2 Accounting for repurposing or reconfiguration

The costs associated with asset repurposing are normally of a capital nature. In the event of the office building converted to residential apartments, significant costs must be incurred to fit kitchens and bathrooms for every apartment.

Additionally, asset repurposing projects often also involve a component of asset renewal which is a capital expenditure activity.

Judgement is however required. Dismantling the weapon system from the military aircraft may, depending on the specific aircraft and its weapons platform, be possible not only for purposes of asset repurposing, but also to service and repair the weapons system. In such a case the costs of dismantling the weapons system are not capitalised.

3.7.2.3 Planning and execution of repurposing or reconfiguration

Asset repurposing and asset reconfiguration requirements should be identified within asset management plans. For asset management plans prepared within the GIAMA environment, asset repurposing and asset reconfiguration requirements are noted within the Capital Infrastructure Plan that forms a part of the Operations Plan of an U-AMP.

Asset repurposing and asset reconfiguration requirements outside the GIAMA environment are included in the asset lifecycle plan section of the iAMP.

3.8 Upgrading

3.8.1 Definition of upgrading

Upgrading involves the replacement of an asset or addition/ replacement of an asset component, which materially improves the original economic benefit or service potential of the asset.

The following are examples of asset upgrading:

- Upgrading of a road to increase its load bearing capacity (axle load)
- Widening of a road by increasing the number of lanes to improve traffic flow
- Upgrading a building from general office accommodation to prestige office accommodation
- Adding new processing units to a WWT or a WWTW to increase its processing capacity, or adding new generation units to a power plant to increase its electricity output

- Adding additional memory disks to a computer server stack to increase memory capacity, or adding processors to increase the speed of computer operations
- Mechanising the inlet works at a WWTW to improve plant operators' health and safety and to reduce smell pollution
- Any works on engineering systems or buildings that improve capacity; performance including speed, energy efficiency, output quality (e.g. quality of water); or that reduces risks.
- Works on an asset that reduces the costs of operating and maintaining the asset without reducing levels of service.

3.8.2 Accounting for upgrading

Costs incurred on asset upgrading is of a capital nature as the asset's economic potential or service delivery potential is increased through increased capacity or performance. Very often, upgrading also involves a component of renewal that, in addition to increased capacity or performance also extends the asset's life.

3.8.3 Planning and execution of upgrading

Asset upgrading requirements should be identified within asset management plans. For asset management plans prepared within the GIAMA environment, asset upgrading requirements are noted within the Capital Infrastructure Plan that forms a part of the Operations Plan of an U-AMP.

Asset upgrading requirements outside the GIAMA environment are included in the asset lifecycle plan section of the iAMP.

Asset upgrading is delivered through the six stages (initiation through to close-out) of infrastructure delivery described earlier in this section.

3.9 Decommissioning and disposal

Assets can be disposed of for several reasons, some of which include:

- The asset has reached the end of its useful life – this should generally be the main reason for asset disposal
- The asset is no longer functionally fit-for-purpose, caused, for example, by changes in customer expectations or by changes in legislation
- The demand for the asset ceased or has reduced to the point where it is no longer feasible to keep operating the asset, even if there is still life remaining in the asset
- The asset has become obsolete. An obsolete asset is one that is technologically outdated, or has become cost-prohibitive to operate, or where spare parts are simply not available anymore.
- An asset is transferred to another department or organ of state through a non-exchange transaction.

At the end of the asset's life it is either decommissioned or disposed of. Many assets can be disposed of by selling such assets at auctions. In the case of many infrastructure assets this is simply not possible as such assets may be constructed on site and cannot be cost-effectively dismantled or demolished and removed.

3.9.1 Definition of decommissioning and disposal

Asset decommissioning

Actions required to take an asset out of service. The following are examples of asset decommissioning:

- A water or sewerage pipe is decommissioned. Replaced connections are disconnected from the reticulation system and left in situ.
- A potable water reservoir is decommissioned. The civil structure is still fairly sound, but there is no longer a need for the reservoir due to water network reconfiguration. Specific measures include dismantling and removing electrical and mechanical components, and welding shut the reservoir opening hatch to prevent entry and possible health and safety risks, and other measures as necessary to ensure that site risks have been attended to.
- Decommission a dam with a safety risk means taking steps to ensure that the remaining structure will, without any further operational action, maintenance, inspection or safety evaluation, hold no danger or potential danger to human life or property, have no significant adverse impact on resource quality, or significant detrimental effect on the environment (Minister of Water Affairs, February 2021: 38 – 44). Amongst other, a license to decommission a dam must be obtained from the Director General of Water Affairs, professional studies are required to ensure no adverse impacts, a design report must be submitted specifying any engineering/construction related activities to decommission the dam, and the approved design report must be implemented.
- A boiler house is decommissioned. The boiler kettle and mechanical equipment are removed and sold for scrap metal.

Asset disposal

Actions necessary to decommission and dispose of assets that are no longer required. The following are examples of asset disposal:

- A police patrol vehicle is no longer required. The sirens and policy marking are removed, and the vehicle is sold at auction.
- A batch of computers have come to the end of their useful life. The computer disks are cleaned to ensure that no government data or information remains, and the computers are sold at auction.

3.9.2 Accounting for decommissioning and disposal

3.9.2.1 General treatment of decommissioning and disposal costs

Asset decommissioning and disposal costs are generally of an operational or current nature and such costs are recognised in surplus or deficit as incurred.

3.9.2.2 Site rehabilitation costs

There are however certain instances of infrastructure assets where there are statutory requirements for the rehabilitation of those assets or facilities to be rehabilitated at end of useful life. Moreover, in some instances are long term statutory obligations post-decommissioning to manage environmental impacts.

Examples of such include:

- When a landfill site is closed, the entity remains responsible for managing both gas emissions and leachate on site, for general site safety, and also for site rehabilitation e.g., returning the site to its natural state through planting of greenery.
- Underground storage tanks for fuel, oil, gas or other chemicals. Such tanks contain toxic material with harmful substances that can quickly move through soil and pollute groundwater, causing environmental damage and risks to human and animal health and safety. When an underground tank is removed, all remaining substance is removed from the tank, it is cleaned and removed, surrounding soils are sampled and if contaminated, is rehabilitated.
- When a dam is decommissioned, actions are taken to ensure that the structure will pose no risk to life or property. Additionally, there may be requirements to deal with built-up sediment, and to recover aquatic and riparian ecosystems.

Instances such as the above generally involve components of site rehabilitation necessitated by statutory requirements, and contained in the original regulatory approvals, unless, of course, in the case of very old infrastructure assets constructed prior to the introduction of such legislation.

Where rehabilitation requirements are stipulated in the original authorisation to proceed with asset acquisition or creation, the estimated costs of rehabilitation are capitalised at initial take-on.

3.9.2.3 Removal

When an asset is disposed of, it is derecognised in the asset register. The reason for disposal is noted and the disposal date is recorded. Where asset decommissioning requires statutory approval, evidence of the approval is retained as documentary proof.

All proceeds from disposal are recognised as revenue.

4. Asset risk management

4.1 Defining risk and risk management

4.1.1 Risks defined

Risk is the effect of uncertainty on objectives. An effect can be either positive or negative, and uncertainty relates to both potential events as well as the consequences of such events. Because risk is about uncertainty and government (as everyone else) functions in a world with imperfect knowledge, risk is ever-present. Objectives can have multiple dimensions, including service delivery, financial, economic development, social, cultural, workplace health and safety aspects. Objectives also apply at different levels, such as the strategic or organisation-wide level, asset portfolio, project, process, activity or product levels. The more objectives and levels there are, the more risks there are to be managed.

4.1.2 Risk management defined

Risk management is the application of a formal process that identifies the exposure of an entity to risk and determines appropriate responses to managing risks within acceptable levels.

4.1.2.1 Risk management principles

ISO 31000 is the international standard that establishes the principles for risk management, as follows:

- **Risk management creates and protects value.** Risk management contributes to the improvement in performance and achievement of objectives in outcome areas such as legal compliance, health and safety, environmental sustainability and public acceptance, and in processes through improved project management, operational efficiency gains and product quality.
- **Risk management is an integral part of all organisational processes.** Risk management is not a separate activity from other organisational processes. It forms part of the responsibilities of management as well as of all organisational processes, including strategic management, project management and change management processes.
- **Risk management forms part of decision-making.** Risk management assists decision-makers to make informed choices and prioritise resources and actions.
- **Risk management is systematic, structured and timely.** A systematic, structured and timely approach to risk management contributes to efficiency and to consistent, comparable and reliable results.
- **Risk management specifically and explicitly addresses uncertainty.** Risk management focusses specifically and explicitly on uncertainty, the nature of that uncertainty, and how it can be addressed.
- **Risk management is based on the best available information.** The inputs to risk management may include sources such as historical data, experience, stakeholder feedback, observation, forecasts and expert judgement. However, decision makers should inform themselves of, and

should take into account, any limitations of the data or modelling used or the possibility of divergence among experts.

- **Risk management is dynamic, iterative and responsive to change.** Risk management continually senses and responds to change. Environmental changes and events (both within the organisation and its external environment) changes the organisational context. As a result new risks emerge, others change and some disappear. The risk profile changes and risk management needs to respond to this.
- **Risk management is tailored.** Risk management is aligned with the organisation's external and internal context, and risk profile.
- **Risk management takes account of human and cultural factors.** Risk management recognises the capabilities, perceptions and intentions of external and internal people that can facilitate, promote or hinder achievement of the organisation's objectives.
- **Risk management is transparent and inclusive.** Appropriate and timely involvement of stakeholders, and specifically decision-makers at all levels in the organisation, ensures that risk management remains relevant and up-to-date. Consultation also provides the opportunity for stakeholders to be properly represented and for their preferences to be considered in establishing risk criteria.
- **Risk management facilitates continual improvement of the organisation.** Organisations should craft and implement strategies to improve their risk management maturity alongside other aspects of their organisation.

4.2 Following a risk-based approach to asset management

Assets are continually exposed to risks and asset failure itself also poses risks. These are wide-ranging, as demonstrated in **Table 32**. Risks can range in severity, with more severe risk events leading to loss of life, property damage, economic disruption and social upheaval.

Due to the interconnected nature of infrastructure systems, failure of one type of infrastructure can also lead to failure in other infrastructure. When load shedding occurs for an extended period, say at Stage 6, water supply is disrupted as pump stations are not functioning, and traffic lights are not working causing delays in travel time that may also affect emergency service response times. Following are some common risks associated with assets and asset management:

Table 32: Asset and asset management risks

Risk category	Risk source/type
External risks	Community resistance to services offered, the cost thereof, or nature or location of assets
	Developers/construction companies damaging infrastructure supply lines
	Informal settlers locating in demarcated flood lines
	Informal settlers locating in demarcated servitudes
	Legislative/regulatory requirements
	External strike action affecting supply chains

Risk category	Risk source/type
Malicious/ unlawful intent	Anti-social behaviour or criminal activity in public spaces
	Cyber attack
	End-user abuse e.g. vehicle overloading causing damage to road surfaces
	Operators resisting technology/new assets, intent on damaging/breaking it
	Protest action resulting in damage/destruction of public property
	Sabotage
	Terrorism
	Theft/burglary
	Vandalism
Management risks	Financial risks
	Information risks
	People risks
	System/control risks
Natural phenomena and disasters	Contagious diseases
	Drought
	Earthquakes/unstable soils/seismic activity
	Electrolytic activity
	Floods
	Lighting
	Rising water table
	Veld fires
Operating risks	Communication failure
	Control failure
	Procedural failure

4.3 Risk management in asset management

The generic risk management principles stated in the previous section also apply to asset management, but with some additional features, as follows:

- **AM in its totality follows a risk-based approach.** This requires that the risks related to assets, service delivery processes and asset management practices must be managed. Assets are the additional dimension when managing risk in infrastructure asset management.
- **Risk is a measure of the likelihood or probability that an event may occur *times* the impact or consequence** expected to result, should the risk materialize. This is called the risk equation (likelihood times impact). Note the use of the words "may" and "should". Risk involves uncertainty. Probability or likelihood may be expressed in one of the following ways, or in some combination of the following ways:
    - Statistical probability e.g. 80% or 0.8.

- Qualitative expression, generally in terms of (1) frequency (e.g. seldom or very often), (2) level of likelihood (e.g. very unlikely or very likely) or (3) the expected timeframe in which the event is likely to occur (e.g. almost certain to happen within the next year).

Note that the statistical probability must always be a value less than 100% or < 1, otherwise there is no uncertainty and therefore no risk involved. When assessing the probability of failure of an asset, asset managers often tend to be more specific than simply referring to "Probability"; they then talk about Probability of Failure (POF).

- **It is not possible to eliminate all risks,** because not all risks are known and it will very likely be too costly to eliminate all risks. In recognition of this, organisations establish risk tolerance levels, which is the level of risk that the organisation is willing to live with after implementation of risk measures.

SANS 55000 requires organisations to adopt a structured, consistent and documented approach to the management of risks. Specific pieces of legislation, such as the Occupational Health and Safety Act (OHSA) have similar requirements.

Departments should have corporate risk management policies, procedures and risks registers in place. As noted in **Section 2.1**, SANS 55000 requires that AM follows a risk-based approach, and:

- that organisations adopt AM policies that state the organizational outcomes to be achieved, and therefore principles according to which assets are to be managed;

- that AM strategies specify AM objectives as well as the practices necessary to deliver on AM objectives, the decision-making criteria that apply to ensure that decisions support achieve attainment of organizational outcomes and supporting AM objectives, and the performance metrics that apply in monitoring and evaluating that organizational outcomes and supporting AM objectives are achieved; and that an organization's AM system and its AM policy must be consistent with other organizational systems and other organizational policies.

This means that the AM system must adopt a framework for the management of risk, and that risk management framework must be consistent with the corporate risk management framework.

The corporate risk management framework will by its nature be fairly broad to deal with all types of risks that the organisation faces. Corporate risk management frameworks also tend to be focused on short to medium term risks, whereas the long lifespans of infrastructure assets necessitate a longer view.

This necessitates calibration between the probability rating scales used in the AM system and the corporate risk management system.

4.4 The risk management process

4.4.1 Overview of the risk management process

The risk management process is depicted in **Figure 19Figure 1**, and comprises the following steps:

Step 1: Establishing the risk context

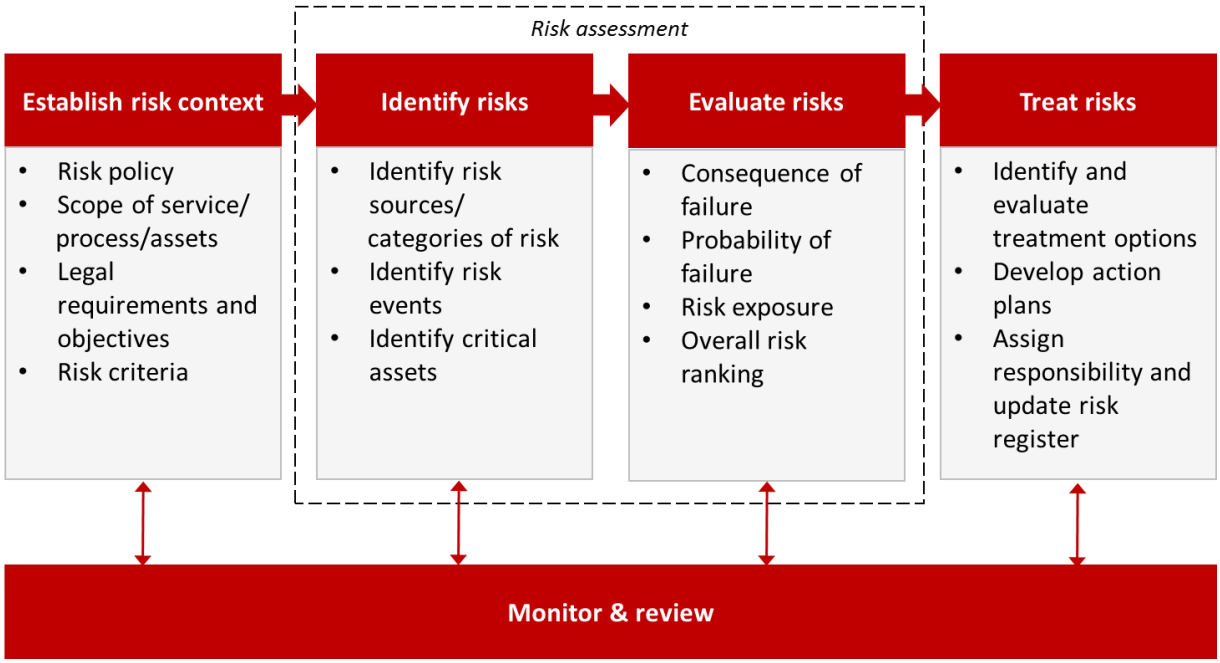
Step 2: Identifying risks

Step 3: Evaluating risks

Step 4: Treating risks

Step 5: Monitoring and review

Figure 19: Risk management process



4.4.2 Establishing the risk context [Step 1]

4.4.2.1 Nature and scope of the service(s) and asset portfolio(s)

The starting point in the risk management process is to define the service(s) and asset portfolio(s) for which the risk assessment is done, and for which risk management tactics and controls must be developed. Risks may vary across services, asset portfolio(s) and even within a given asset portfolio, and risks may also vary per geographical area. Therefore, the following should be defined:

- The service(s) offered by the Department that are dependent on the utilisation of physical assets and intangible assets.
- Profiling of the asset portfolio(s) for which the risk assessment is done, in terms of at least the following:
    - Description of the type of asset portfolio (e.g., roads)
    - Description of the extent of the asset portfolio at the level of asset group type also present results in accordance with sectoral classification systems (e.g., for roads: primary distributor, regional distributor, district collector etc.)
    - Current replacement cost value at asset group type level and for the asset portfolio as a whole
    - Portfolio-level condition or health grading (explained in **Section 5: Asset performance management**), for the asset portfolio as a whole as well as at asset group type level
- The geographical areas served where physical assets are required for service delivery or the creation of economic benefits.

4.4.2.2 Legal requirements and objectives

Having profiled the services, assets and geographical service delivery areas, determine the following:

- Legal requirements related to the delivery of the service(s), and/or the way the service or assets must be operated and managed. Where such exist, they should be considered in the risk assessment.
- Programme objectives established for the service(s) offered and the assets that enable or provide these services.
- Any other objectives or key performance indicators

4.4.2.3 Establish or calibrate risk criteria

Risk criteria comprises the following:

- an impact rating scale;
- a probability grading scale;
- an asset criticality grading scale; and
- a rule set for grading asset criticality

All of these need to be calibrated to the entity being assessed, the nature and extent of its asset portfolio(s), the entity's risk management policy, and other key operating parameters. These are described in more detail below.

Risk impact rating scale

A risk impact rating scale is an useful instrument to assess the consequence of a risk across several impact categories. An example of a risk impact rating scale is presented in **Table 23**. Note the following about the risk impact rating scale:

- There is a range of possible impact categories, such as service delivery, health and safety, and environmental protection. These impact categories should be consistent with the entity's strategic objectives/desired outcome areas and it's asset management policy, and will typically also include some additional impacts such as direct costs and organisational image.
- Note that a risk impact can be rated anywhere between 1 (insignificant) and 5 (catastrophic). For each level of risk impact, there is a qualitative description that generally describes the extent to which the entity can cope with the risk, and an assumed risk cost. The assumed risk cost is used for prioritisation purposes, and is not necessarily the actual risk cost.

Probability rating scale

The probability rating scale, shown in **Table 33** below, is used to assess the likelihood of a risk materialising. Note that probability in this instance has been calibrated to the typical average lifespan of a consolidated portfolio of immovable assets.

Table 33: Probability rating

Likelihood Grade	Likelihood	Description	Probability
5	**Almost certain**	This risk is expected to occur within 1 year	0.99
4	**Likely**	This risk is expected to occur between 1 and 5 years	0.333
3	**Moderate**	This risk is expected to occur between 6 and 20 years	0.077
2	**Unlikely**	This risk is expected to occur between 21 and 50 years	0.033
1	**Rare**	This risk is expected to occur after 51 years	0.013

Asset criticality grading scale and rule set

ISO 55001 Cl 6.2.1.2b requires organisations to "review the importance of assets related to their intended outcomes, objectives and product or service requirements". ISO 55002 Cl 6.2.2.1 advises that a "risk ranking process can determine which assets have a significant potential to impact on the achievement of AM objectives". These are what are considered "critical assets.

Critical assets are those assets that have a high consequence of failure (e.g. are likely to result in a more significant financial, environmental and social cost in terms of their impact on organisational objectives and service delivery).

Note that this definition speaks to consequence, not likelihood. Therefore, redundancy, which reduces the probability of failure, is generally not considered in assigning criticality grades. Consequently, the more critical an asset is rated, the greater management attention it receives, and generally, the higher priority it receives in terms of budget prioritisation.

A generic asset criticality grading scale and approach to determining asset criticality is presented in **Section 2.3.6** and in **Table 22**.

4.4.3 Identify risks [Step 2]

4.4.3.1 Risk types

The first step in identifying risks is to determine the types of risks that may apply. This serves as an useful tool to prod further thinking about specific risks, and to classify risk exposure by type. **Table 32** categorizes risk categories and lists sources of risk or risk types in each category as it relates to assets and asset management.

4.4.3.2 Process for identifying risks

There are various ways of identifying risks, such as conducting a desktop review of available documentation, interviews with knowledgeable staff, analysis of asset data, and applying own experience and judgement. By far the most common method is to workshop risks with knowledgeable officials, specifically those involved in the service/asset portfolio with knowledge about operating conditions, past failures and current risks.

There are two approaches to risk identification, namely (1) direct identification of risks and then backtracking to identify the source of the risk or (2) identification of risk sources.

- **Planning risk workshops.** When planning a risk workshop, consider the following:
    - What is the scope of the workshop? Will it be limited to risk identification, or will it also address risk assessment and treatment? Will it be limited to one asset portfolio, or will it involve all asset portfolios?
    - Based on the answers to the above, ensure that suitable workshop participants are invited.
    - Allow sufficient time for the workshop.

- **Preparation, orientation and structure.** When facilitating the risk workshop:
  - Orientate and empower workshop participants. They need to understand the purpose and expected outcomes of the workshop, the terminology used, the process to be followed in generating the desired outcomes, and methods applied (e.g. impact rating scales). An agenda and prepared presentations on the above matters will help.
  - Structure the workshop for best results. In the event that multiple asset portfolios are represented, deal with cross-cutting issues (e.g. management risks or external risks) in a plenary session, and create breakaway sessions to deal with asset portfolio issues specifically (e.g. physical asset risks).
  - Preparation and tooling. In addition to an agenda, presentations on the purpose, outcomes, terminology, process and methods, and an attendance register, ensure availability of the following:
    - A white board and marker pens to note participants' inputs.
    - Ideally, take flipchart paper along, with Prestic.
    - Asset condition risk profiles.
    - Basic maps (e.g. cadastral, environmental and network lay-outs)
    - Positions of key facilities and points of interests.
- **Identification of risk events.** The key purpose of a risk identification process is to identify risk events. A risk event is an occurrence with a cause and a possible impact or chain of possible impacts.
- **Questions to ask.** Using the risk source framework provided in this practice note, ask questions such as:
  - What are the risks to achieving organisational objectives and AM objectives?
  - What is the source of each risk?
  - What can happen?
  - What would the impact be?
  - Please provide details of when, where, why and how these risks may materialise?
  - Who (customers and stakeholders) and what (e.g. sensitive wetlands in a defined area, or properties in the industrial zone) might be impacted upon?
  - Are there any risk controls in place?
  - Who is responsible for the risk control(s)?
- Preparation of the risk register. Risks identified should be recorded in a risk register.

4.4.4 Evaluate and manage risks [Step 3]

4.4.4.1 Calculating risk exposure

Having identified risks, the next steps are to (1) determine both the probability of failure (PoF) and consequence of failure (CoF), and then (2) to calculate risk exposure.

Table 33 provides the means to grade PoF, and **Table 22** the grading of CoF, the product of which is risk exposure (PoF x CoF). Note that both PoF and CoF are structured in accordance with a five-point rating system (as is criticality, and failure modes), as follows:

Table 34: Rating levels for likelihood and impact

Likelihood (PoF)		Impact (CoF)	
Likelihood grade	**Likelihood**	**Impact grade**	**Impact**
5	**Almost certain**	**5**	**Catastrophic**
4	**Likely**	**4**	**Major**
3	**Moderate**	**3**	**Moderate**
2	**Unlikely**	**2**	**Minor**
1	**Rare**	**1**	**Insignificant**

So, let's say that the likelihood of a risk event occurring is 3 (moderate) and its impact is assessed to be 4 (major), on the assumption that there are no risk controls in place. The following risk matrix presents the possible mix of risk exposure scores:

Figure 20: Risk matrix indicating unmoderated risk exposure scores

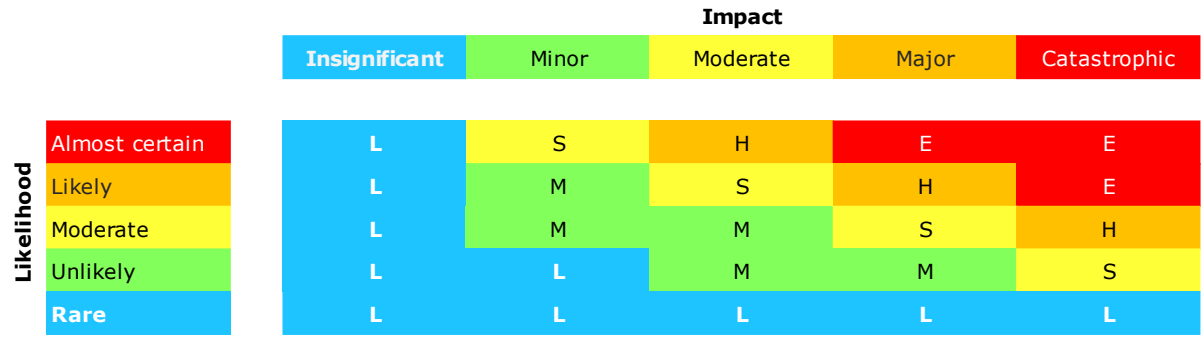
		Impact				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood	Almost certain	**5**	10	15	20	25
	Likely	**4**	8	12	16	20
	Moderate	**3**	6	9	12	15
	Unlikely	**2**	4	6	8	10
	Rare	**1**	**2**	**3**	**4**	**5**

Risk scores could then be classified as indicated in **Table 35** and presented in **Figure 21**:

Table 35: Risk exposure classification

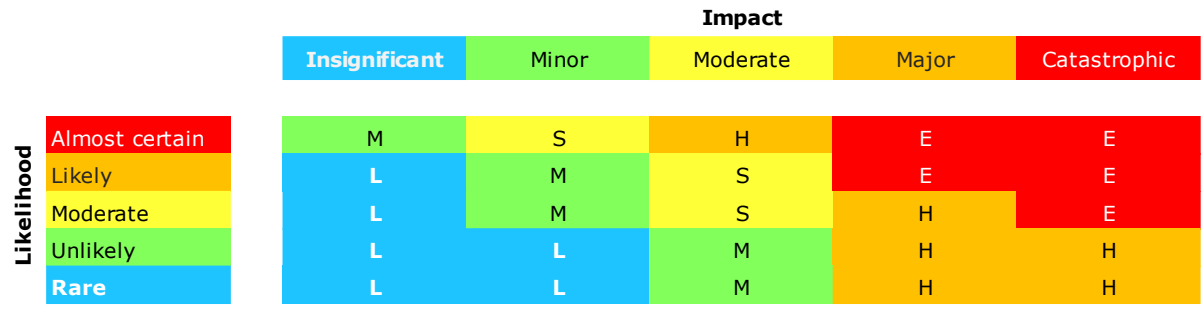
Risk exposure description	Denoted as…	Risk exposure score range
Extreme	E	20-25
High	H	15-19
Significant	S	10-14
Moderate	M	6-9
Low	**L**	1-5

Figure 21: Risk matrix indicating unmoderated risk exposure descriptions



At face value, this appears to be a perfectly rational and simple system to apply. But the system frays at its edges, particularly with regards to risk events where the impact is catastrophic but the likelihood is rare, resulting in a low risk. Management tends not to pay too much attention or allocate much resources to low risks. As a consequence, the organisation may be ill prepared to deal with such an event should it materialise.

Figure 22: Risk matrix indicating moderated risk exposure descriptions



Comparing **Figure 22** to **Figure 21**, the major difference is that risk events with impact ratings of "major" or "catastrophic" will be rated as at least "high" risks, even when the likelihood of them occurring is unlikely or rare.

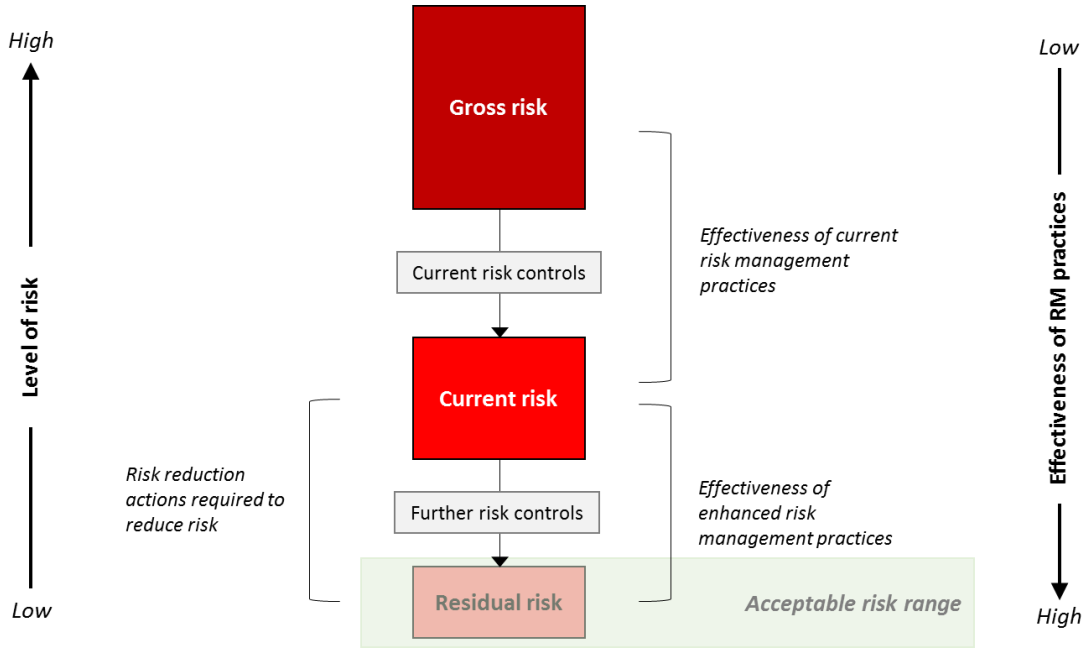
4.4.4.2 Risk ranking

Three levels of risk are evaluated, as follows:

- **"Gross" or inherent risk** is the level of risk related to an event when either (1) there are no risk control in place to manage the event (e.g. asset redundancy or processes) or (2) when all risk controls fail.
- **Current risk** is the level of risk assuming that current risk controls (e.g. systems, processes or asset redundancy) are place to manage the event.
- **Residual risk** is the level of risk assuming that additional risk controls to reduce current risk are implemented.

These are demonstrated in **Figure 23** below:

Figure 23: Gross, current and residual risk



4.4.4.3 Risk treatment

Risk treatment options need to be developed for all risks, but especially those exceeding the risk tolerance of the organisation. These typically include:

- extreme, high and significant risks;
- risks associated with regulatory requirements; as well as
- risks that could be easily reduced with little effort or cost.

Typical risk management strategies include the following:

- risk reduction through capital or maintenance expenditure (e.g. renewal to reduce risk of condition-based failure), or adding redundancy (e.g. a second pump-and-motor set in a pump station);
- risk reduction through operational and management initiatives e.g. improve health and safety practices to reduce risks of work place incidents that can harm employees;
- reduce the impact of failure through actions such as emergency response plans, evacuation plans etc., commonly used for high consequence, low likelihood events such as dam bursts;
- transfer risk e.g. through insurance arrangements, or through outsourcing of activities;
- fully accept risks within acceptable risk tolerance levels; and
- some combination of the above.

Risk treatment options should be assessed considering:

- Existing risk controls;
- The impact of the proposed risk treatment option on risk exposure, inclusive of likelihood and consequence;
- The cost of implementing the risk treatment option; and
- The appropriateness of the risk treatment option (considering factors such a organisational values and objectives, social views and practices, and legislation).

Finally, responsibility for risk treatment actions must be assigned to responsible persons, and arrangements for monitoring and review established and documented. These decisions and arrangements should be recorded in the risk register.

5. Asset performance management

5.1 The need for performance evaluation and reporting

SANS 55001 requires organisations to determine what needs to be monitored and measured, the methods to be used in monitoring, measurement and evaluation, as well as the frequency of monitoring and measurement.

The organisation shall evaluate and report on asset performance, asset management performance including financial and non-financial performance, and the effectiveness of the asset management system. Additionally, the organisation shall evaluate and report on the effectiveness of processes to manage risks and opportunities.

5.2 Key considerations

The following are key considerations in the development of asset performance management requirements for national and provincial government departments:

5.2.1 Requirements and benefits

Asset performance management, inclusive of performance evaluation and reporting offers the following benefits:

- Performance evaluation offers the opportunity to identify improvement opportunities and to communicate and celebrate good performance.
- Performance reporting fosters good governance and transparency.

5.2.2 Financial performance reporting

The MCS stipulates requirements for primary and secondary information in the financial statements, to ensure fair presentation.

At present, the MCS does not allow for depreciation or impairment testing. As such, typical asset performance measures such as Asset Impairment and the Asset Sustainability ratios cannot be calculated from the Annual Financial Statements. Additionally, most government departments generally do not generate significant revenues, and a ratio such as the Asset Management Turnover ratio would not be applicable in most instances.

5.2.3 Stakeholder requirements

With respect to public assets and asset management, stakeholders generally require retrospective, current and prospective information about information set out in **Table 36** below.

Table 36: Stakeholder asset performance information requirements

Temporal focus	Performance focus		Reason
Retrospective information requirements	1	The value of the economic potential and service delivery capability vested in public sector assets	Provides an indication of the extent to which public sector assets enable economic and social activity
	2	Trend analysis of investments made in public sector assets	Provides an indication of whether Government continues to invest sufficiently to support economic and population growth, and to meet commitments related to aspects such as poverty alleviation and climate change adaptation
Current information requirements	3	Condition of asset portfolios	Provides an indication of whether existing asset portfolios are in a state to continue to deliver the expected economic or service delivery benefits
	4	Adequacy of maintenance	Provides an indication of the quality of asset care and whether there is a reasonable expectation that assets will deliver to potential for their planned lifespans
	5	Risk exposure	Provides an indication of whether assets are exposed to significant risks that may cause disruptions to the economy or the provision of social services
Future view	6	Planned renewals/refurbishment	Provides comfort that public assets will continue to underpin economic and social activities
	7	Planned new asset creation	Provides comfort that Government will continue to invest sufficiently in new asset creation to enable economic and population growth
	8	Climate change adaptation	Demonstrates government's commitment to climate change goals by reporting on investments that enable the transition to green infrastructure

5.2.4 Information availability

Primary financial information as required by the MCS is available from departments' financial systems. Whilst accounting information does not include information on asset condition, depreciation or planned future lifecycle activities such as new asset creation or renewal, the GIAMA Guidelines require departments to record the condition of assets, to record the replacement cost of assets, and to plan for new asset creation and renewal.

With this in mind, and the asset data model presented in **Section 2: Asset data and information** the following asset performance measures are proposed for inclusion as secondary information in the Financial Statements of departments.

5.3 Asset performance measures

The following measures assess the health status of asset portfolios and the adequacy of spending on maintenance and renewal to ensure the ongoing functioning of assets within agreed performance parameters, and that public assets can continue to deliver economic and service delivery benefits as expected.

5.3.1 Asset consumption ratio and asset portfolio health grade

5.3.1.1 Purpose of this ratio

This ratio measures the extent of consumption (accumulated wear and tear) of an asset portfolio, which is indicative of the overall health and ability of the asset portfolio to continue to provide service delivery and/or economic benefits, and the extent of asset renewal required.

5.3.1.2 Formula and source data

The asset consumption ratio is calculated as follows:

$$\frac{DRC - RV}{CRC - RV} \quad \text{x} \quad 100$$

Sources of data:

- GIAMA requires departments to record replacement cost (CRC) for assets in the asset register.
- **Section 2: Asset data and information** provides guidance on how to determine depreciated replacement cost (DRC)
- In the event that no information is available on residual value (RV), then calculate RV as 0.

5.3.1.3 Norm and interpretation

There is no one single norm for all asset portfolios that indicates the point beyond which an asset portfolio requires significant investment in renewal. That "point" is dependent on the performance standards adopted in the entity's asset management strategy for each asset portfolio and, where appropriate, for asset sub-group types and critical assets. Performance standards will generally range between 60% - 40% of CRC, depending on the nature and criticality of assets. Where specific performance standards have not been established, the norm of 50% should apply. The following table provides a general indication of how to interpret the outcome of the asset consumption ratio.

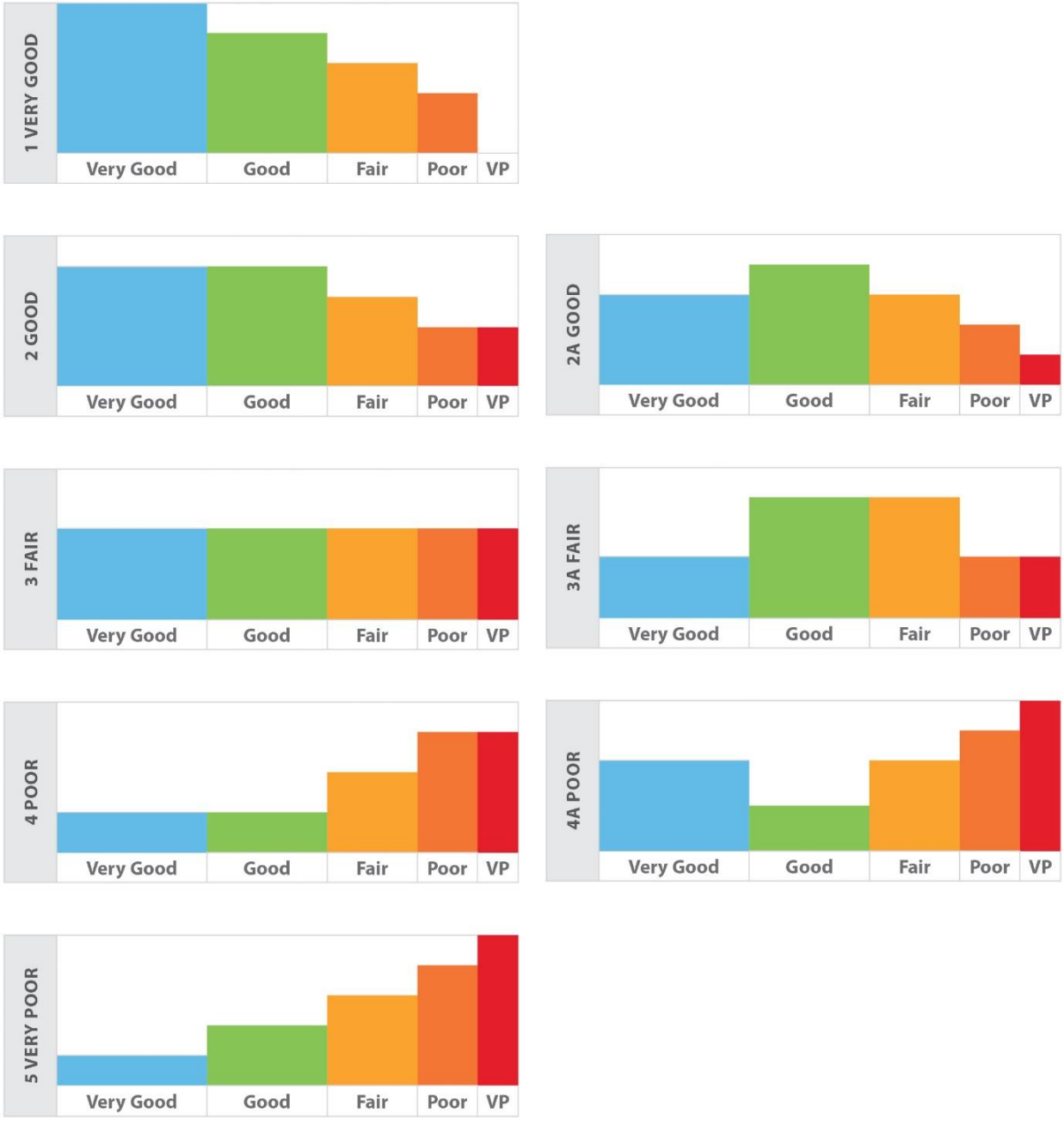
Table 37: General interpretation of asset consumption ratio

Grade	Description	(DRC-RV)/(CRC-RV)
1	**Very good**	65% or more
2	Good	52.3% to 65%
3	Fair	46.7% to 52.3%
4	Poor	40% to 46.7%
5	**Very poor**	40% or less

In some conditions the asset consumption ratio masks an emerging renewals backlog (consider scenario 2 and scenario 4a) in **Figure 24**below). This especially tends to happen during periods of high levels of

investment in new asset creation. Entities should therefore also report on the portfolio health grade as per **Table 37** above.

Figure 24: Illustrative condition distribution for various asset portfolio health grades



The above scenarios should be interpreted as follows:

- **Scenario 1 (very good):** Overall, the asset portfolio is in very good condition. This situation tends to manifest in instances where initially there was limited demand or limited investment into the asset portfolio, with major expansion in the asset portfolio in recent times, which accounts for the high percentage of assets in very good condition and good condition. This situation can also exist when the nature of assets is critical, and cared for to a high standard (e.g. for operating theatres).

- **Scenario 2 (Good):** This represents a scenario where the entity's investment programme is skewed towards the creation of new assets, with little investment in renewals. The high levels of investment in new asset creation masks an emerging renewals backlog.
- **Scenario 2a (Good):** This represents the typical condition profile of a well-managed asset portfolio with a relatively small percentage of assets rated as critical, under conditions of financial constraints. The largest share of replacement value of assets are found in the condition range "Good" to "Poor". The renewals backlog, represented by assets in "Very poor" condition, requires attention but is in proportion to the overall asset portfolio, and manageable. Investment in new asset creation does not receive priority over investment in renewals.
- **Scenario 3 (Fair):** The overall condition of the asset portfolio becomes a matter of concern. Relatively high levels of investment in new asset creation takes precedence over investment in renewals.
- **Scenario 4 (Poor):** This scenario presents the case of an aging and neglected asset portfolio. Renewals are under-funded, and there is little asset creation activity. Urgent attention is required to avoid large scale asset and service failures.
- **Scenario 4a (Poor):** This situation commonly occurs at the end of life of first generation assets constructed at scale and over a relatively short space of time, coupled with a recent and sustained programme of new asset creation. This scenario is indicative of the inability to care for large and expanding asset portfolios. Urgent, multi-year structured renewal programmes are required to avoid systemic asset and service failures. In such a situation a structured renewals programme alone is not sufficient – an optimised asset lifecycle plan is required that also considers portfolio optimisation (addressing over-design, redundancy etc.)
- **Scenario 5 (Very poor):** Asset portfolios are beyond the point where they are functionally fit for service, and service delivery collapse is imminent.

5.3.2 Asset sustainability ratio

5.3.2.1 Purpose of this ratio

The asset sustainability ratio determines the extent to which an entity replaces the asset value consumed during a period of review in order to maintain service delivery capabilities. It is a measure of the extent to which the entity maintains the value of its capital stock or productive capacity.

5.3.2.2 Formula and source data

The asset sustainability ratio is calculated as follows:

$$\frac{Capital\ renewal\ and\ replacement\ expenditure}{Depreciation\ expense} \quad \text{x} \quad 100$$

The MCS does not require financial systems to record depreciation. Given this, the depreciation expense is calculated by subtracting the residual value (if any) from the current replacement cost (CRC), and then by dividing the CRC by the estimated useful life of the asset.

5.3.2.3 Norm and interpretation

The norm is 100% under conditions where the demand for the service remains constant or is growing. The outcome of this ratio can be interpreted as follows:

< 100%:

If the investment in renewal of assets does not at least equal the consumption of those assets, the entity is likely to experience future reduced service delivery capacity, breakdown in assets and significant increase in repairs and maintenance expenditure. The following are possible reasons for a ratio of less than 100%:

- The demand for the service is decreasing, and the entity is deliberately scaling down or phasing out operations – there is limited or no need to invest in asset renewal.
- Forced asset sweating due to financial constraints.
- Detailed plans for maintenance and renewal were not in place that may include (1) insufficient budget requests, (2) lack of detailed implementation plans or (3) a combination of both.
- Insufficient implementation capacity.
- Inefficient planning or management resulting in renewals work not being implemented in full during the period in question.
- Some renewals were deliberately deferred to coincide with a larger renewal or upgrading programme.
- Other reasons e.g. a large renewals contract was awarded to contractor a, and this appointment is disputed in court by contractor.

> 100%

If more than 100% is spent it could indicate that:

- The entity is addressing a renewal backlog following a period of asset sweating.
- Actual renewals expenditure was higher than estimated expenditure as a result of (1) outdated estimates, (2) sudden and/or unexpected inflation or (3) a combination of these factors.

5.3.3 Asset renewal funding ratio

5.3.3.1 Purpose of this ratio

The asset renewal funding ratio measures the extent to which asset renewal is accommodated in the asset management plan. Whereas the asset sustainability measures past renewal activity, the asset renewal funding ratio provides management with a view on future renewal needs, and planned expenditure in relation to future needs.

5.3.3.2 Formula and source data

The asset renewal funding ratio is calculated as follows:

$$\frac{NPV\ of\ planned\ capital\ renewals\ over\ 10\ years}{NPV\ of\ required\ capital\ expenditure\ over\ 10\ years} \quad \text{x} \quad 100$$

Data on required capital renewal and planned capital expenditure is sourced from the asset management plan.

5.3.3.3 Norm and interpretation

The norm is between 90% - 100%. If the target is not materially achieved on an ongoing basis, then a mounting renewals backlog is sure to mount, and adverse impacts on service delivery are likely. Moreover, sustained performance below target over time may require future investments in renewals of a magnitude that can create national fiscal challenges.

5.3.4 The green renewals agenda ratio

5.3.4.1 Purpose of this ratio

South Africa has committed itself on the global stage towards climate change adaptation. Environmental sustainability is also required in terms of the:

- The National Environmental Management Act;
- The Energy Efficiency Strategy of the Republic of South Africa;
- The National Climate Change Response Paper; and
- The Green Building Policy (draft).

The need for asset renewal offers the opportunity for sustained, incremental greening of asset portfolios through green component and technology replacement. The green renewals agenda ratio provides information on the size of the renewals programme and the percentage of planned expenditure on this programme earmarked for green renewals.

5.3.4.2 Formula and source data

The green renewals agenda ratio is calculated as follows:

$$\frac{NPV\ of\ planned\ green\ renewal\ \text{expenditure}\ \ over\ 10\ years}{NPV\ of\ required\ renewal\ expenditure\ over\ 10\ years} \quad \text{x} \quad 100$$

5.3.4.3 Norm and interpretation

No norm exists for this ratio. In developing the asset management strategy and asset management plans, asset planners should assess the scope and feasibility of green renewals, considering policy, available green materials and technologies, lifecycle costs, implementation capacity and the outcomes of asset lifecycle plans, and establish an appropriate norm for each asset portfolio.

5.3.5 Repairs and maintenance as a percentage of CRC

5.3.5.1 Purpose of this ratio

This ratio has two applications. Applied to budgeting, it gives an indication of the adequacy of budgeted expenditure for repairs and maintenance of assets. Applied to actual expenditure, it tests whether the entity spent adequately on repairs and maintenance.

5.3.5.2 Formula and source data

The repairs and maintenance as a percentage of CRC ratio is calculated as follows:

$$\frac{Repairs\ and\ maintenance}{CRC\ of\ immovable\ assets} \quad \text{x} \quad 100$$

The current replacement cost (CRC) of immovable assets can be obtained from the asset register. When the formula is applied for planning purposes, the amount for repairs and maintenance can be sourced from the asset management plan(s) or from the operating budget. When applied to assess actual expenditure, data on repairs and maintenance can be sourced from the Statement of Financial Performance.

5.3.5.3 Norm and interpretation

Provisional norms are between 1.8% - 2.2% for civil structures, and up to 4.5% per annum for electrical infrastructure. These norms should be reviewed once the current replacement costs of all asset portfolios have been established on a consistent basis, performance standards have been developed, asset lifecycle strategies developed and costed, and asset management plans prepared. Possible reasons for specific outcomes include:

Repairs and maintenance expenditure exceeds the norm:

- An increasing expenditure trend may be indicative of high asset-usage levels.
- The entity has a deteriorating asset base requiring high levels of major reactive maintenance.
- Renewals expenditure is incorrectly classified as repairs and maintenance expenditure, thus incorrectly bloating reported repairs and maintenance expenditure.
- New assets are purchased and incorrectly classified as repairs and maintenance expenditure, also incorrectly bloating reported repairs and maintenance expenditure.
- There are high levels of inefficiency in the maintenance management function.
- Amounts calculated for either/or repairs and maintenance or CRC are incorrect.
- Norms established for this ratio requires review and possible calibration.

Repairs and maintenance expenditure below the norm:

- A ratio below the norm indicates that insufficient monies are being spent on repairs and maintenance to the extent that it could increase impairment of useful assets.
- If an increasing expenditure trend suddenly drops to lower levels without an increase in the fixed asset value, this may be indicative of challenges in spending patterns. This may be the result of lack of planning, funding constraints or delivery capacity.

5.3.6 Deferred maintenance

5.3.6.1 Purpose of this metric

This metric quantifies the portion of planned maintenance work necessary to maintain the service potential of an asset that has not been undertaken in the period in which such work was scheduled to be undertaken.

5.3.6.2 Formula and source data

Deferred maintenance is calculated as follows:

$$\frac{Value\ of\ planned\ maintenance\ for\ the\ financial\ period\ -\ Actual\ expenditure\ on\ maintenance}{Value\ of\ planned\ maintenance\ for\ the\ financial\ period}$$

Data on planned maintenance can be sourced from the asset management plan(s), and data on actual expenditure on maintenance and repairs from the Statement of Financial Performance.

5.3.6.3 Norm and interpretation

The norm is 8% or less, which equates to one (1) month of delayed expenditure on repairs and maintenance, assuming an equal spread of maintenance expenditure across the year. Spending below this level is indicative of inefficiencies in the planning regime, funding constraints or delivery capacity. Sustained levels of deferred maintenance may lead to asset impairment and service delivery disruptions.

Acronyms

AM	Asset Management
AMS	Asset Management System
AMP	Asset Management Plan
C-AMP	Custodian Asset Management Plan
CG	Conditional Grade
CoF	Consequence of Failure
CRC	Current Replacement Cost
CSIR	Council for Scientific and Industrial Research
CIDB	Construction Industry Development Board
CRC	Current Replacement Cost
DPWI	Department of Public Works and Infrastructure
DRC	Depreciated Replacement Cost
EUL	Expected Useful Life
FIDPM	Framework for Infrastructure Delivery and Procurement Management
GDP	Gross Domestic Product
GIAMA	Government Immovable Asset Management Act
GFMAM	Global Forum for Maintenance and Asset Management
GRAP	Generally Recognised Accounting Practice
IAMP	Immovable Asset Management Plan
IDMS	Infrastructure Delivery Management System
MCS	Modified Cash Standard
MEAs	Modern Equivalent Assets
MMP	Maintenance Management Plan
MMRR	Maintenance Management Review Report
OAG	Office of the Accountant-General
O&M	Operations & Management
OHS	Occupational Health and Safety
OMP	Operations Management Plan
PFMA	Public Finance Management Act
SACPVP	South African Council for the Property Valuers Profession
SAMP	Strategic Asset Management Plan
SANS	South African National Standards
RUL	Remaining Useful Life
RV	Residual Value
WTW	Water Treatment Works
WWTW	Wastewater Treatment Works

Glossary

Asset hierarchy

A framework for segmenting an asset base into appropriate classifications. The asset hierarchy can be based on asset function, asset type, or a combination of the two.

Asset management

The process of decision making, planning and control over the acquisition, use, safeguarding and disposal of assets to maximise their service-delivery potential and benefits, and to minimise their related risks and costs over their entire life.

Asset management information system

A combination of processes, data and software applied to provide outputs needed to manage assets well.

Asset management objectives

Specific outcomes required by implementing an asset management system.

Asset management plan

A documented plan developed to manage one, or a portfolio of, assets. It combines multidisciplinary management techniques (including technical and financial) over the life cycle of the asset in the most cost-effective way to provide a specified level of service. The plan specifies approaches, programmes, projects, activities, resources, responsibilities and time frames across the life cycle of the asset(s) planned for, or over a time frame appropriate for robust life-cycle planning.

Asset management practices

The asset management processes and techniques that an entity undertakes, such as demand forecasting, developing and monitoring levels of service and risk management.

Asset management strategy

The high-level, long-term approach to asset management including asset management action plans and objectives for managing the assets.

Asset management system

A management system whose function it is to establish the asset management policy and objectives, as well as processes and organisational arrangements inclusive of structure, roles and responsibilities to achieve asset management objectives.

Asset register

A record of asset information considered worthy of separate identification for both asset accounting and strategic management purposes including inventory, historical, condition and construction, technical and financial information about each.

Asset system

Set of assets that interact or are interrelated e.g. potable water supply system. Also referred to as an asset portfolio.

Asset type

Grouping of assets having common characteristics that distinguish those assets as a group or class.

Attribute data

Data in tabular format (rows and columns).

Capacity

Maximum output that can be produced or delivered using the existing network or infrastructure.

Class of assets

A grouping of assets of a similar nature or function in a department's operations that is shown as a single line item for the purpose of disclosure in the financial statements.

Competence

The ability to apply knowledge and skills to achieve intended results.

Component

A component (Note 1) is a specific part of a complex item (Note 2) that has independent physical or functional identity and specific attributes such as different life expectancy, maintenance and renewal requirements and regimes, risk or criticality.

Note 1: A component is separately recognised and measured (valued) in the organisation's asset register as a unique asset record

Note 2: A complex item is one that can be disaggregated into significant components. Infrastructure and buildings are considered complex items.

Condition

The physical state of the asset.

Condition assessment or condition monitoring

The inspection, assessment, measurement and interpretation of the resultant data, to indicate the condition of a specific component so as to determine the need for some preventive or remedial action.

Conformity

Fulfilment of a requirement.

Control budget

The amount of money which is allocated or made available to deliver or maintain infrastructure associated with a project or package, including site costs, professional fees, all service and planning charges, applicable taxes, risk allowances and provision for price adjustment for inflation.

Contract management (for the purpose of this AMF)

Applying the terms and conditions, including the agreed procedures for the administration thereof.

Contractor (for the purpose of this AMF)

Person or organisation that contracts with the employer to provide goods or services or any combination thereof covered by the contract.

Continual improvement

Recurring activity to enhance performance.

Corrective maintenance

Maintenance carried out after a failure has occurred and intended to restore an item to a state in which it can perform its required function. Corrective maintenance can be planned or unplanned.

Critical assets

Those assets that are likely to result in a more significant financial, environmental and social cost in terms of their impact on organisational objectives and service delivery.

Current replacement cost

The cost the entity would incur to acquire the asset on the reporting date. The cost is measured by reference to the lowest cost at which the gross future economic benefits could be obtained in the normal course of business, or the minimum it would cost to replace the existing asset with a new modern equivalent asset with the same economic benefits, allowing

for any differences in the quantity and quality of output and in operating costs.

Decommissioning

Actions required to take an asset out of service.

Defect

Non-conformity of a part or component of the works to a requirement specified in terms of a contract.

Deferred maintenance

The portion of planned maintenance work necessary to maintain the service potential of an asset that has not been undertaken in the period in which such work was scheduled to be undertaken.

Demand management

The active intervention in the market to influence demand for services and assets with forecast consequences, usually to avoid or defer CAPEX expenditure. Demand management is based on the notion that as needs are satisfied expectations rise automatically and almost every action taken to satisfy demand will stimulate further demand.

Depreciated replacement cost

The replacement cost of an asset less accumulated depreciation calculated on the basis of such cost to reflect the already consumed or expired economic benefits of the asset.

Discounted cash flow

A technique to convert cash flows that occur over time to equivalent amounts at a common point in time. It is the process of finding present values, which is the inverse of compounding interest.

Discount factor

A rate or factor used to relate present and future money values. Also referred to as the discount rate, hurdle rate, required return, cost of capital or opportunity cost. For the purposes of this Toolkit the discount factor in formulae is denoted with an "r".

Facility

A complex comprising many assets (e.g. a hospital, water treatment plant, recreation complex, etc.), which represents a single management unit for financial, operational, maintenance or other purposes.

Failure modes

Ways in which an asset can fail in relation to required levels and standards of service that trigger asset management planning and potentially investment decision making:

- Capacity
- Condition
- Cost of operation
- Performance.

Failure modes, effects and criticality analysis

A systematic, logical risk-based maintenance approach aimed at maximising the reliability of plant and equipment assets.

Gate

A control point at the end of a process where a decision is required before proceeding to the next process or activity.

Gateway review

An independent review of the available information at a gate upon which a decision to proceed or not to the next process is based.

Geographic information system (GIS)

Software that provides a means of spatially viewing, searching, manipulating and analysing an electronic database.

Impact

Impacts are effects that either positively contribute to an outcome or strategic objective, such as increased revenue, or that reduce risks such as environmental disasters, workplace injuries, loss of property, or damage to the reputation or image of the organisation.

Incident

Unplanned event or occurrence resulting in damage or other loss.

Infrastructure assets (for the purpose of this AMF)

Stationary systems forming a network and serving whole communities, where the system as a whole is intended to be maintained indefinitely at a particular level of service potential by the continuing replacement and refurbishment of its components.

Infrastructure delivery

The combination of all planning, technical, administrative and managerial actions associated with the construction, supply, refurbishment, rehabilitation, alteration, maintenance, operation or disposal of infrastructure.

Infrastructure procurement

The procurement of goods or services including any combination thereof associated with the acquisition, refurbishment, rehabilitation, alteration, maintenance, operation or disposal of infrastructure

Internal rate of return

IRR is the discount rate that equates the present value of net cash inflows with the initial investment in the project, resulting in a NPV = R0. The IRR is the true yield of the investment, expressed as a rate of return.

Key performance indicator

Set of quantifiable measures that an industry uses to gauge or compare performance in terms of meeting strategic and operational goals.

Land assembly

The process of packaging land to the point that it can be used for its intended function. One of the most important steps in this process is ensuring that all necessary land rights are in place before development can commence.

Level of service

Levels of service statements describe the outputs or objectives an entity intends to deliver to customers.

Life

A measure of the anticipated life of an asset or component, such as time, number of cycles, distance intervals etc. over which benefits are derived from the use or availability of an asset.

Life cycle

The time interval that commences with the identification of the need for an asset and terminates with the decommissioning of the asset or any liabilities thereafter.

Life cycle asset management

Encompasses all asset management strategies and practices associated with an asset or group of assets that result in the lowest life cycle cost necessary to achieve stated service requirements within acceptable risk parameters.

Life cycle cost

The total cost of an asset throughout its life including planning, design, construction, acquisition, operation, maintenance, renewal and disposal costs.

Maintenance plan

Describes the planned and unplanned maintenance actions for an asset, facility or portfolio of assets, with intended delivery methods and schedules, budget requirements and responsible parties.

Maintenance objectives

Objectives for what maintenance has to achieve to ensure the assets are in the right condition to meet the needs of the entity. Maintenance performance measures and targets are the means of assessing whether the maintenance objectives are being met.

Maintenance standards

The standards set for the maintenance service, usually contained in preventive maintenance schedules, operation and maintenance manuals, codes of practice, estimating criteria, statutory regulations and mandatory requirements, in accordance with maintenance quality objectives.

Maintenance strategy

Interprets higher-order documents and formulates maintenance objectives and targets, establishes maintenance tactics, and defines maintenance roles and responsibilities.

Modern equivalent asset

The most cost-efficient asset currently available, which will provide equivalent functionality to the asset that will be replaced (or is currently being valued using the DRC methodology).

Monitoring

Determining the status of a system, a process or an activity.

Net present value

The value of an asset to the entity in present money terms. It is the net amount of discounted cash inflows arising from the use and subsequent disposal of the asset, after deducting the value of the discounted total cash outflows.

Objective

Result to be achieved at strategic, tactical or operational level. Objectives can be set in a variety of domains or outcome areas (e.g. economic, social or environmental outcomes), or can relate to elements of the entity (e.g. corporate level or units in the entity), or can relate to processes, services, products, programmes and projects.

Obsolescence

The asset can no longer be maintained, or suffers a loss in value due to a decrease in the usefulness of the asset, caused by technological change, or changes in people's behavioural patterns or tastes, or environmental changes.

Operation

Combination of all technical, administrative and managerial actions, other than maintenance actions, that results in the item being in use.

Opportunity cost

The cost of cash flows that could have been earned in the best alternative investment opportunity.

Order

An instruction to provide goods, services or any combination thereof under a framework agreement

Outline specifications

Preliminary set of specifications (generated during the early phases of a design process) on which detailed specifications are based.

Package

Work which is grouped together for delivery under a single contract or an order.

Performance

Measurable result of either a quantitative or qualitative nature that can relate to the management of activities, processes, products or services, systems or entities.

Performance measure

A qualitative or quantitative measure used to measure actual performance against a standard or other target. Performance measures are used to indicate how the entity is doing in relation to delivering levels of service.

Performance monitoring

Continuous or periodic quantitative and qualitative assessments of the actual performance compared with specific objectives, targets or standards.

Policy

Intentions and direction of an entity as formally expressed in a documented statement approved by top management and communicated throughout the entity.

Portfolio

To be read in context, as follows:

(1) Asset portfolio: a grouping of assets to deliver a range of services association with a particular function. Examples of asset portfolios include water and sanitation, roads and stormwater, electricity distribution, solid waste, information and communications technology, social amenities and investment properties.

(2) In relation to infrastructure procurement and delivery management: a collection of projects or programs and other work that are grouped together to facilitate effective management of that work to meet a strategic objective.

Predictive action

Action to monitor the condition of an asset and predict the need for preventative or corrective action. Also referred to condition monitoring or performance monitoring.

Preventative action

Action to eliminate the cause of a potential nonconformity or other undesirable potential situation.

Preventative maintenance

Maintenance carried out at predetermined intervals, or corresponding to prescribed criteria, and intended to reduce the probability of failure or the performance degradation of an item. Preventative maintenance is planned or carried out on opportunity.

Process

Set of interrelated or interacting activities, which transforms inputs into outputs.

Procurement strategy

Selected packaging, contracting, pricing and targeting strategy and procurement procedure for a particular procurement.

Program (for the purpose of this AMF)

The grouping of a set of related projects in order to deliver outcomes and benefits related to strategic objectives which would not have

been achieved had the projects been managed independently.

Project

A project can be defined as:

(1) an unique set of coordinated and controlled processes and activities;

(2) undertaken to achieve a specific objective(s) according to specifications;

(3) within a defined timeframe (start and end dates);

(4) that consume resources (e.g. funds, labour, materials and equipment); and

(5) is confined by a control budget.

Quality

Totality of features and characteristics of a product or service that bears on the ability of the product or service to satisfy stated or implied needs.

Reliability-centred maintenance

A process for optimising maintenance based on the reliability characteristics of the asset.

Retention sum

Sum retained for a certain period to offset costs which may arise from the contractor's failure to comply fully with the contract.

Risk

The effect of uncertainty on objectives. Risk events are events that may compromise the delivery of the entity's strategic objectives.

Risk controls

Measures to manage or mitigate identified risks.

Risk exposure

The level of risk to which an entity is exposed. Risk exposure is a function of the probability of an occurrence, times the impact of that occurrence.

Risk management

The application of a formal process that identifies the exposure of an entity to service performance risk and determines appropriate responses.

Risk register

A record of information that stipulates risks identified, the levels of risk exposure before and after implementation of risk controls, and details of appointed risk owners as a minimum.

Routine maintenance

Day-to-day operational activities to keep the asset operating (replacement of light bulbs, cleaning of drains, repairing leaks, etc.) and which form part of the annual operating budget, including preventative and periodic maintenance.

Stage

A collection of logically related activities in the infrastructure delivery cycle that culminates in the completion of a major deliverable.

Statutory permission

Any relevant approval, consent or permission in terms of any legislation required to plan and deliver the infrastructure relevant to the current investment decision. As a result sunk costs should be excluded from a project's incremental cash flows in a replacement cash flow investment decision.

Valuation

Estimated asset value, which may depend on the purpose for which the valuation is required,

i.e. replacement value for determining maintenance levels or market value for life cycle costing.

Value for money

The optimal use of resources to achieve intended outcomes.