Infrastructure Delivery Management System (IDMS)

Pilot roll out in selected municipalities through stakeholder engagement and training

Training Module 3:
Infrastructure Delivery
Management Processes

Portfolio, Programme ,
Operating & Maintenance and
Project Management Processes

Participants Manual

September 2019

MISA
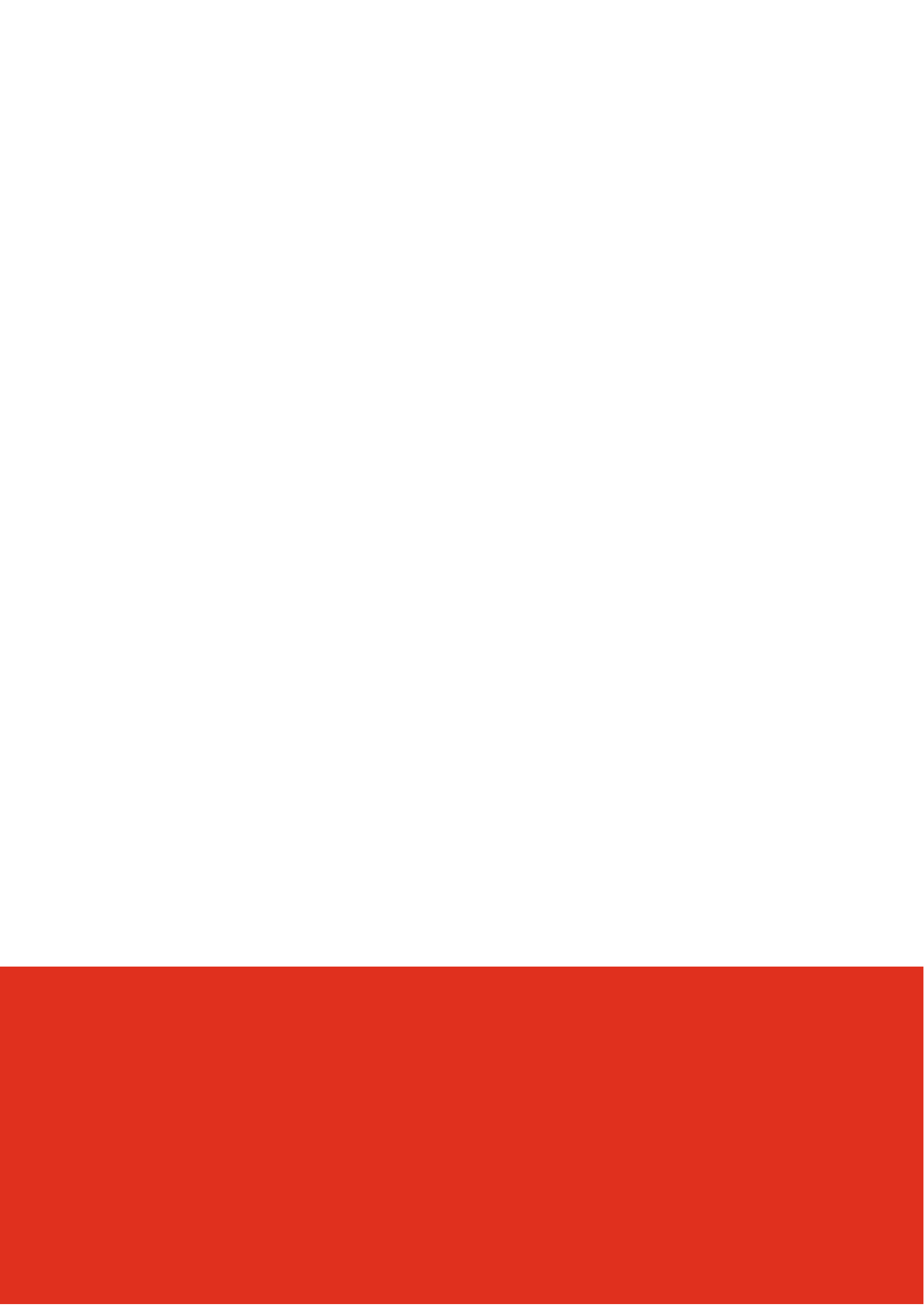Municipal Infrastructure Support Agent
REPUBLIC OF SOUTH AFRICA

Table of Contents

List of figures

List of Tables

Section 1:
About this module

Section 1: About this module

Purpose of this module

The purpose of this training module is to introduce the Infrastructure Delivery Management System (IDMS) Portfolio Management Module to the District Municipal Management. This module provides guidance on IDMS processes and deliverables that the municipality are accountable for, and provides guidelines on the roles and responsibilities of the officials responsible for implementing the IDMS.

The primary purpose of this module is to is to provide an overview of Portfolio Management in the public sector, in order to realise the following benefits for the reader:

- define and explain the **differences and interrelationship** between Infrastructure Asset (Portfolio) Management and Project (Portfolio) Management;

- explain the importance of the **alignment** of Infrastructure Asset Management (IAM) objectives with an organisation's strategic service delivery objectives;

- describe the **alignment** of the IAM Policy with the Government-wide Immovable Asset Management Policy, and other related policies and strategies;

- describe **how to align** the Strategic Infrastructure Asset Management Plan (SIAMP), the Infrastructure Asset Lifecycle Management Strategies and corresponding Delivery Management Strategy, (applied to assess and plan the in-house human resource capacity and management information systems required to support implementation of the SIAMP), with the IAM objectives;

- explain asset life cycle management;

- explain the development of Lifecycle Management Plans, being the plans that set out the asset level activities required to achieve the IAM objectives for specific infrastructure assets, such as hospitals, clinics, schools, water distribution networks, roads, administration buildings, etc.;

- provide guidance on the identification, prioritisation and authorisation of programme and project proposals;

- provide guidance on the **annual review** of the IAM Plan, such as the consolidation of the Facilities at portfolio level;

- describe portfolio management integration with the infrastructure programme management processes, during the annual budgeting processes.

Learning outcomes

By the end of the training on this module you:

- Will understand the **context** of the Portfolio Management module of the IDMS

- Will have knowledge of the **key concepts** and components of best practice Portfolio Management

- Will have knowledge on the performance management elements that relate to infrastructure Portfolio Management;

- Will understand the monitoring and controlling requirements for infrastructure Portfolio Management.
- Will know what is expected of Executives to **institutionalise** the IDMS across your Municipality

Audience for this module

The audience for this module is intended for Executives of your District Municipality:

- Political leadership oversight roles - Chairpersons of Portfolio Committees (or the equivalent) of:

  o Water services

  o Technical services

  o Human settlements planning and development

  o Budget and treasury

  o Standing committee on municipal public accounts

  o Audit Committee

Municipal Executive leadership

  o Municipal Manager

  o Director budget and treasury

  o Director Community Services

  o Director Rural and economic development

  o Director internal audit office

  o Corporate services

  o Water and sanitation services

  o Technical services

Who's responsible

Note: the participants may vary from DM to DM depending on the structure

Context of this module

National Treasury is the custodian and driver of the development and roll out of the IDMS. They have also introduced the associated Standard on Infrastructure Procurement and Delivery Management (SIPDM) (recently revised to FIPDM and effective of 1 October 2019). Training on both of these standards for government officials at National and Provincial has taken place over recent years, but with limited training at local government level.

With this in mind, the Municipal Infrastructure Support Agent (MISA) has been tasked with the roll out and implementation of the IDMS at local government level. Given the fact that MISA are already engaged in providing technical support on infrastructure delivery to municipalities, MISA has identified three District Municipalities (DM's) in the Eastern Cape, namely Alfred Nzo, Amathole and OR Tambo as initial target municipalities for the roll out of the IDMS. These DM's are pilot Municipalities for potential further rollout in due course.

Tip

Since your DM is part of the pilot you have the opportunity to be in the forefront of new developments.
Also when compliance requirements are establed, your DM will have a head start

This pilot roll out will take place via training and stakeholder engagement. MISA have appointed PwC to provide this training and stakeholder management over a period of 14 months, ending at the end of March 2020. The expectation is that Municipalities will institutionalise the IDMS as a standard set of processes and tools to plan and implement infrastructure moving forward.

The training and support to the Municipalities includes:

- Formal training - four modules, of which this module is the second.
  - Module A0 – a one day intensive Executive Overview, aimed at Municipal Executives
  - Modules 1 to 3–two day training sessions per module
  - Module 1 – covers IDMS overview, planning and budgeting, supply chain management and performance and risk management.
  - Module 2 - includes an overview on applicable MSCOA and GRAP requirements.
  - Module 3: Infrastructure Delivery Management Processes covers overview of portfolio, programme, operations and maintenance and project processes, and applicable control points and stage gates.
- Formal Skills Transfer – Skills transfer contact sessions that provide intensive focus on key plans and documents required in the IDMS.
- Ad hoc support – support to provide day-to-day assistance in the institutionalisation of the IDMS

MISA is already providing technical support in two of the three municipalities, namely Alfred Nzo and OR Tambo, through the Regional Management Support Contract programme (RMSC). Collaboration between the two initiatives will take place as appropriate to limit duplication of work.

How to use this module

This module can be used in conjunction with notes and presentation material during your classroom session.

IDMS Placemat
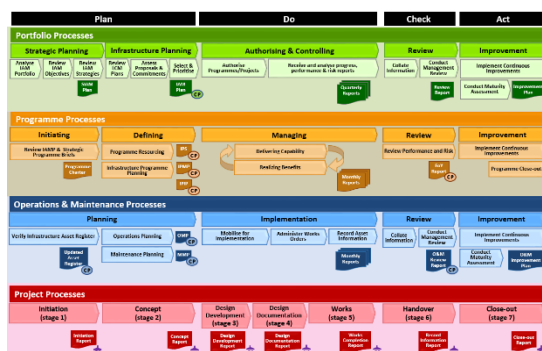
A standalone version of the IDMS Placemat is included in the **annexure** *for ease of reference*. This placemat is designed as a quick reference guide for Officials and executives.

Figure 1: IDMS Placemat (see annexure)

Icons used in this manual:

This manual will include the following icons:

These icons will highlight particular issues of interest and practical tips on how to implement IDMS processes and source materials.

👤	Who's responsible
💡	Tip
📋	Checklist
🔍	Where can I find it
❓	Question
👍	Good practice
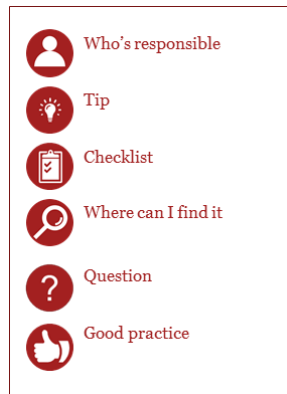
Figure 2: List of icons used in manual

Exercises:

Multiple exercises are included in this training module. The exercises allows an opportunity to practice IDMS concepts within a classroom context.

Section 2: Portfolio Management

2.1 Overview

Section 2: Portfolio Management

Subsection 2.1 Overview

Overview

The legality of the IDMS for application in all spheres of government is endorsed by:

The 9 Provincial IDMS Framework documents, which have been approved by Provincial EXCO's (thereby endorsing IDMS in each Province);

- Sections within the annual issue of the Division of Revenue Act (DoRA);
- Endorsement of the IDMS by the Presidential Infrastructure Coordination Committee (PICC);
- The Standard for Infrastructure Procurement and Delivery Management (SIPDM) issued by National Treasury in November 2015. [Note: The SIPDM is under review but remains applicable as currently published until an update is approved and released by National Treasury].

The Infrastructure Delivery Management System, or IDMS, is represented in IDMS Concept Diagram, which depicts the structure and relationships between the concepts.

The IDMS Concept Diagram inner interconnecting circles represent the Core Legislative Requirements of the IDMS, namely, asset management, planning and budgeting, and supply chain management.

Infrastructure Delivery Management comprises portfolio, programme, operations, maintenance and project management processes.

Performance and risk management are integrated in the delivery management processes, while the outer circle represents the institutional system that provides organisations with guidance on a generic approach towards building an institutional Infrastructure Delivery Management System (IDMS). Collectively, these two outer circles are referred to as the Infrastructure Delivery Enablers. The IDMS Concept diagram depicts the structure and relationships between the concepts that enable the generic application of the infrastructure delivery management principles to all of Government.

Figure 3: The IDMS concept diagram

This section deals with the Portfolio Management part of Delivery Management Processes.
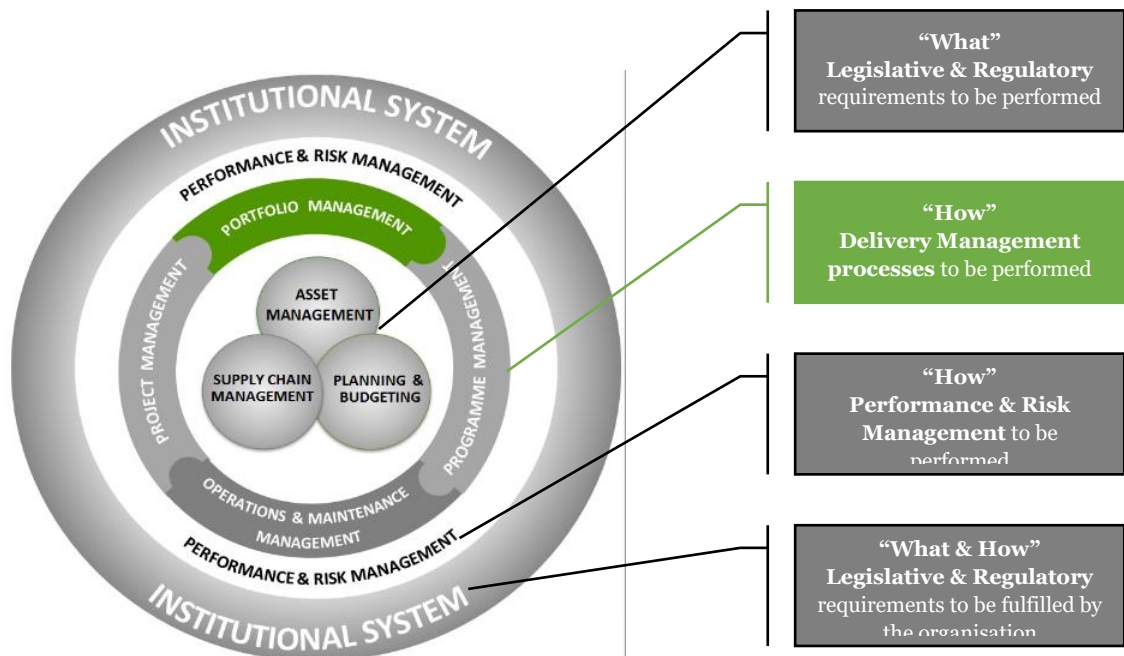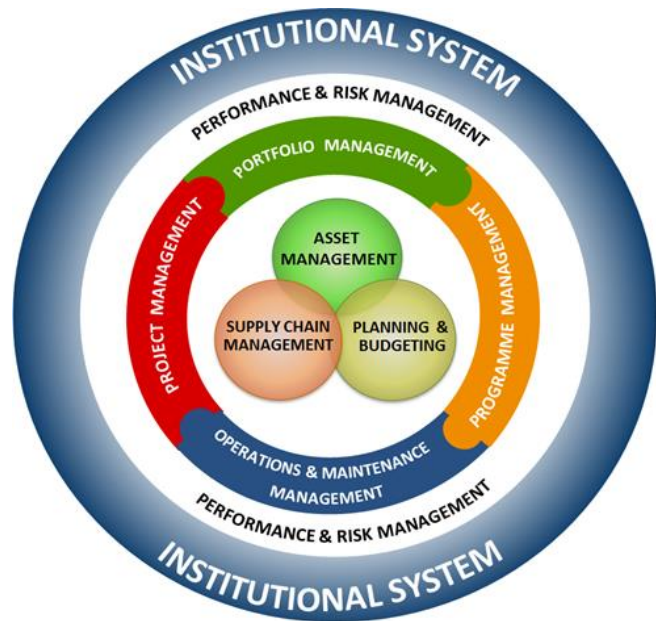
Figure 4: Portfolio Management in the IDMS Concept Diagram

The Links between Portfolio Management and Program and Project Management

Program and project management each measure actual-to-planned schedule, effort, and budget for individual components to anticipate potential problems and to ensure corrective action is occurring, and reports this analysis to portfolio management. This information is used in portfolio reviews to determine required actions. Program and project management may work together with portfolio management to determine "go/no go" criteria for proposed and current components, including "termination criteria" (phase gates). Program and project management may work together with portfolio management in capacity planning by inputting resource requirements (e.g., human resources, financial, and physical assets).

Portfolios rely on projects (either standalone or within programs) in order to achieve their strategic intent. For this reason, they are all interconnected by the sharing and allocation of goals and resources.

Regularly scheduled reviews and planned, continuous communication among project management, program management, or portfolio management ensures that the appropriate resources are allocated to their assigned, authorized portfolio components.

Table 1: Linkages between Portfolios, Programmes and Projects

PROJECT	PROGRAMS	PORTFOLIOS
Projects have a narrow scope with specific deliverables.	Programs have a wide scope that may have to change to meet the benefit expectations of the organization.	Portfolios have a business scope that changes with the strategic goals of the organization.
The pA programme is defined as a "temporary structure of interrelated programme components managed together, that provides advantages, contributes to the achievement of strategic and operational objectives, and realizes benefits". Programme Management is defined as the "coordinated activities to direct the interrelated programme components, to achieve objectives and to realize benefits". project manager tries to keep change to a minimum.	Program managers have to expect change and even embrace it.	Portfolio managers continually monitor changes in the broad environment.

Success is measured by budget, on time, and products delivered to specification.	Success is measured in terms of Return On Investment (ROI), new capabilities, and benefit delivery.	Success is measured in terms of aggregate performance of portfolio components.
Leadership style focuses on task delivery and directive In order to meet the success criteria.	Leadership style focuses on managing relationships, and conflict resolution. Program manager's need to facilitate and manage the political aspects of the stakeholder management.	Leadership style focuses on adding value to portfolio decision-making.
Project managers manage technicians, specialists, etc.	Program managers manage project managers.	Portfolio managers may manage or coordinate portfolio management staff.
Project managers are team players who motivate using their knowledge and skills.	Program managers are leaders providing vision and leadership.	Portfolio managers are Leaders providing insight and synthesis.
Project managers conduct detailed planning to manage the delivery of products of the project.	Program managers create high-level plans providing guidance to projects where detailed plans are created.	Portfolio managers create and maintain necessary process and communication relative to the aggregate portfolio.
Project managers monitor and controls tasks and the work of producing the projects products.	Program managers monitor projects and ongoing work through governance structures.	Portfolio managers monitor aggregate performance and value indicators.

IDMS Placemat

The IDM Processes Placemat - Highlighting Portfolio Management Processes in Figure 2 shows:

- the major delivery management processes and deliverables;
- the lifecycles and Control System for the delivery management processes;
- alignment of the Portfolio Management Lifecycle with the Plan-Do-Check-Act management cycle.

Figure 5: IDM Processes Placemat - Highlighting Portfolio Management Processes
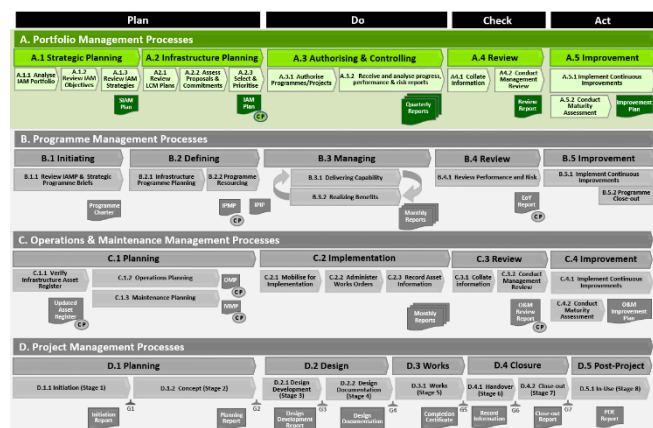
The figure below illustrates the high-level integration of delivery management process deliverables, and shows:

- how the portfolio management plans are relate to the IDM processes;
- how the IAMP incorporates the IAM Strategies contained in the SIAMP;
- the linkages between portfolio / programme / operations & management and project management processes.

Legend:

1. Strategic Infrastructure Asset Management Plan (SIAMP) informs Infrastructure Asset Management (IAM) Plan.
2. Manufacturers and suppliers' recommendations inform Facility/Network O&M Plans (Zero Based Budget).
3. Facility/Network O&M Plans feeds into Facility/Network Lifecycle Plans (Zero Based).
4. Facility/Network Lifecycle Plans feeds into infrastructure MTEF planning and budgeting process.
5. MTEF planning and budgeting priorities informs IPMPs (programme control budgets).
6. Facility/Network O&M Baseline Plans communicated to O&M Teams for implementation.
7. Capital projects communicated to project implementation teams.
8. Report project information to Programme Management.
9. Report O&M information to Programme Management.
10. Output informs Programme Management Plans.
11. Report Programme Management information to Portfolio Management.
12. Output from Programmes Management informs IAM Plan.
13. Output from Portfolio Management informs SIAMP.

Figure 6: High-level integration of Delivery Management Processes

Alignment with SANS/ISO 55000 Asset Management System

The figure below shows how the 'key elements of an asset management system' (as in SANS/ISO 55000 Standard for Asset Management) has been adapted for IDMS purposes.
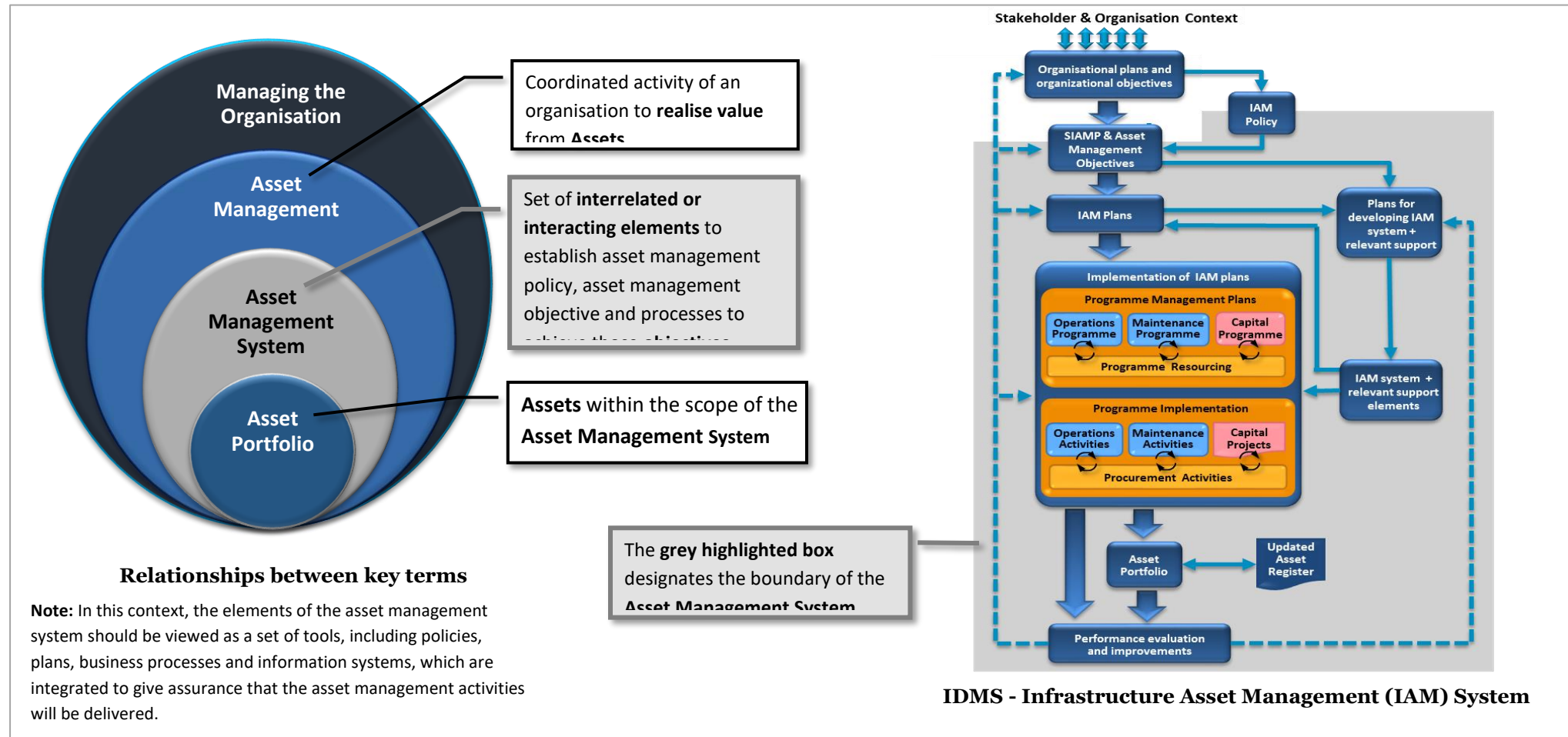
Figure 7: IDMS adaptation of SANS/ISO 55000 elements of an asset management system

The figure below shows alignment of the adapted SANS/ISO 55000 'key elements of an asset management system (shown in Figure 3) with the IDM Processes shown on the IDM Placemat, e.g.

- Portfolio Management Processes focused on strategic decision making;
- Programme Management Processes focused on tactical decision making
- Operations and Maintenance Processes and Project Management Processes aimed at operational decision making.
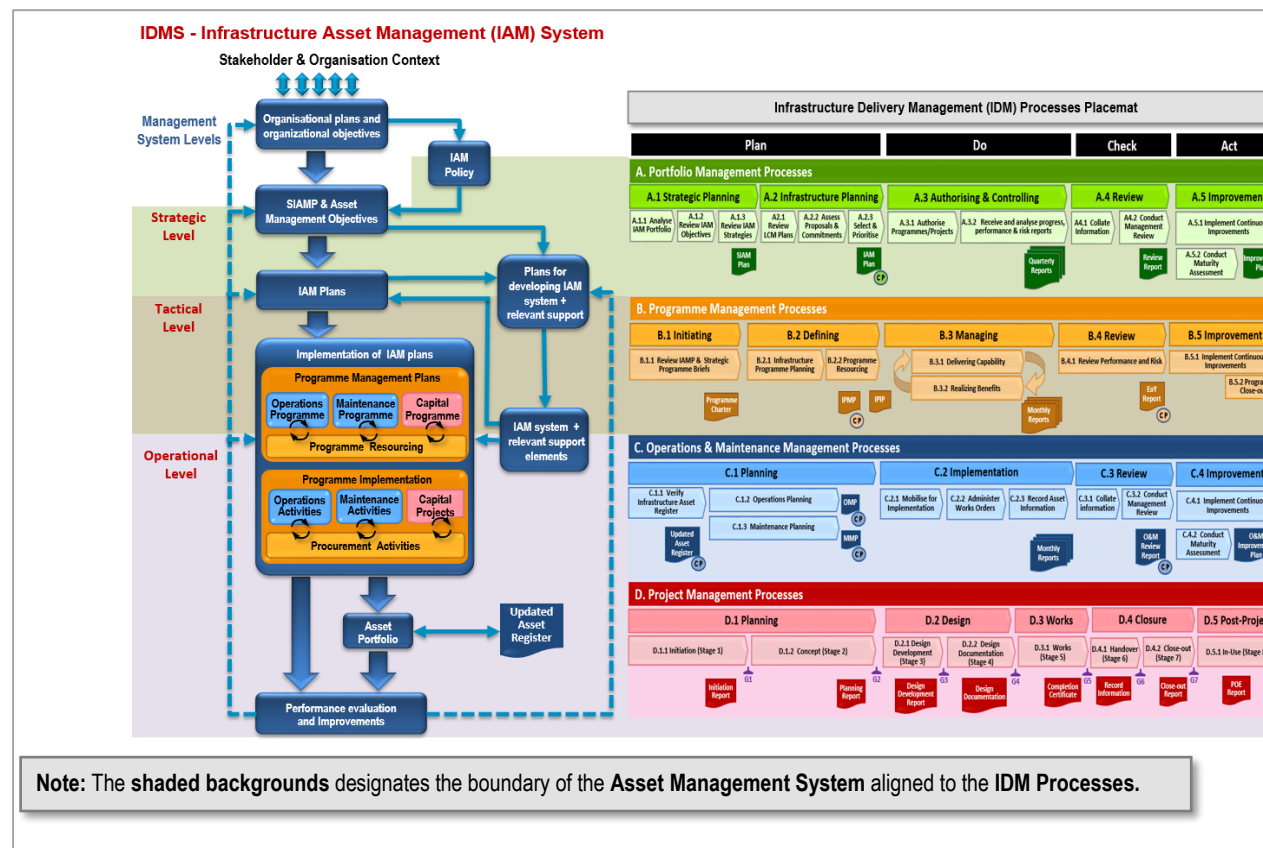
Figure 8: The Asset Management System aligned to the IDM Processes Placemat

2.2 Introduction

Subsection 2.2 Introduction

Definitions

A portfolio, in the words of SANS 21500, is a "collection of portfolio components (programmes, projects or other related work) grouped together to facilitate their management to meet, in whole or in part, an organisation's strategic objectives".

The portfolio components, i.e. the programmes, projects or other related work, are linked to a defined portfolio of infrastructure assets.

The **Portfolio Lifecycle** outlines and describes the annual, repetitive stages in the management of a portfolio of infrastructure assets:

- Strategic Planning;
- Infrastructure Planning;
- Authorising and Controlling;
- Review;
- Improvement.

Portfolio Management is defined (in PMI) as the 'centralized management of one or more portfolios that enable executive management to meet organisational goals and objectives through efficient decision making on portfolios, projects, programs and operations'.

Portfolio Management includes identifying, prioritizing, authorizing, managing, and controlling programmes projects, and other related work, to achieve specific strategic business objectives.

The definition of **Asset Management** from SANS/ISO 55000: *"coordinated activity of an organisation to realise value from assets."*

The definition of an **Asset Management System** from SANS/ISO 55000: *"set of interrelated or interacting elements to establish asset management policy, asset management objectives and processes to achieve those objectives."*

The lifecycle of an asset is defined as: ***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*** (*IIMM, 2015, section 1.3.3*).

Asset Lifecycle therefore, encompasses all practices associated with management strategies for the asset, from planning to disposal, as shown on Figure 8. The objective is to achieve the lowest long-term cost rather than short-term savings, when making decisions. The lifecycle steps are summarised as follows:

▪ **Asset Planning**

Involves confirming the service required from the customer, and ensuring that the most effective solution is found to meet that need (an asset-based solution, demand management or a combination of the two). Planning starts with the need for the service provided by the assets, and is usually defined by analysis of:

- the organisation's strategic or business goals;
- the customers' level of service requirements both now and in the future; and/or
  - legislative and regulatory requirements.

▪ **Asset Acquisition**

Is the provision of a new, or improvement (upgrade or additions) to, an asset, where the outlay can reasonably be expected to provide benefits beyond the year of outlay.

▪ **Asset Operations and Maintenance**

Functions relate to the day-to-day running and upkeep of assets. The associated costs are particularly significant for dynamic/short-lived assets.

▪ **Asset Renewal**

Is the significant replacement, rehabilitation or renovation of an asset, or asset component, to restore the asset to its required functional condition and performance.

▪ **Asset Disposal**

An option considered when the service is no longer required, or when the asset becomes less economical than other methods of delivering the service
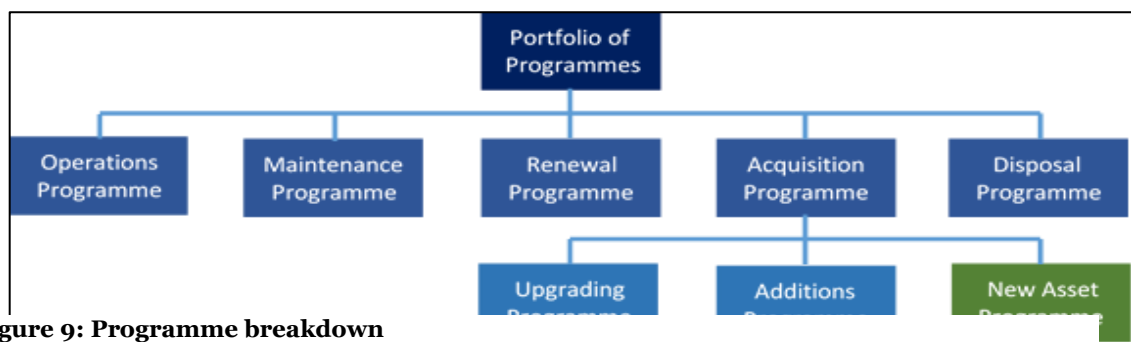
Figure 9: Programme breakdown

Expenditure classification terms contained the Portfolio of Programmes include:

▪ **Operational Expenditure (OPEX)** that include.

- The **Operations Programme** and the **Maintenance Programme** are focused on the availability and reliability of existing infrastructure assets. The Maintenance Programme is subdivided into a Preventative and Corrective Maintenance programmes (as described in Module 8).

- ■ **Capital Expenditure (CAPEX)** that includes:
  - The **Renewal Programme** is directly linked to the Maintenance Programme, and serves to improve the condition and extend the original design life of existing assets and where maintenance has become inefficient, ineffective, and costly, and therefore, value is not being derived from the Asset. Terms associated with Renewal include Renovations, Refurbishment and Rehabilitation. The focus of Renewal is on expenditure that maintains the existing value or footprint of the asset. Expenditure associated with this programme is classified as Capex, except when the value of the project is less than 15% of the replacement value of the asset.
  - The **Acquisition Programme** has three sub-programmes:
    - o The **Upgrades Programme** usually results in changed, or improved, functionality of existing assets and extend the functionality or the life of the asset;
    - o The **Additions Programme** usually increases the 'footprint' of existing assets;
    - o The **New Assets Programme** is responsible for construction of 'new' infrastructure assets; when the analysis of the existing portfolio of assets shows that the demand for infrastructure exceeds the existing supply, and non-infrastructure alternatives are not feasible.
  - The **Disposal Programme** is normally the least active, due to government's preference to retain infrastructure assets.

Each infrastructure portfolio / programme can be sub-divided into **sub-portfolios / programmes**, or even sub-sub-projects, depending on the scope of the work, to improve accountability / responsibility and management effectiveness.
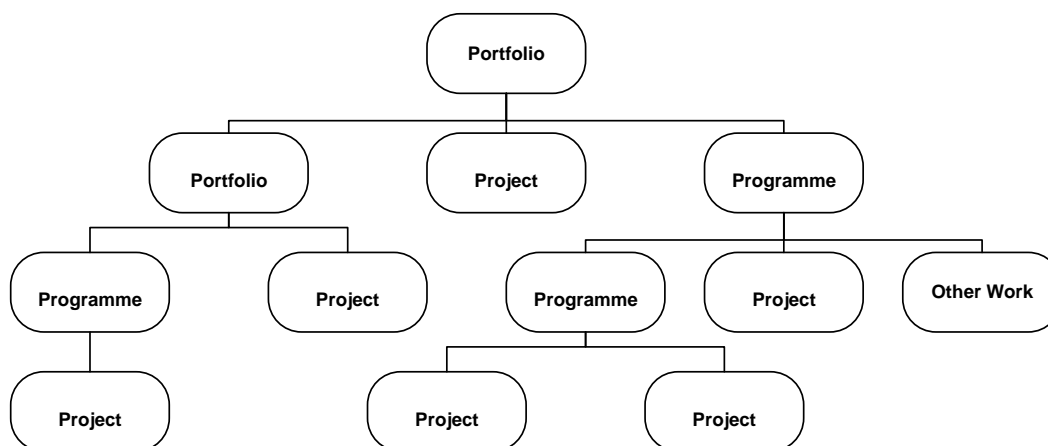
Figure 10: Cascade of Projects and programmes from Portfolio level

Benefits of Portfolio management

The benefits of Portfolio Management can be summarised as follows:

- Ensures alignment with organisational strategies and objectives;
- Ensures cost effectiveness by selecting the right programmes and projects;
- Balances competing delivery and developmental objectives;
- Provides guidance on the prioritizing of the work;

- Provides strategic consideration of the resources, skills and capabilities required for managing the infrastructure asset portfolio;

- Allocates resources, based on organisational priorities and capacity;

- Creates a portfolio-minded culture.

Benefits of IA lifecycle management (LCM)

The lifecycle management approach is central to infrastructure asset management. It forms the basis of the Infrastructure Asset Management (IAM) Plan and the Infrastructure Budget to be developed for a specific time-period.

Key concepts of infrastructure asset lifecycle management

Figure 17 illustrates the key concepts of an infrastructure asset lifecycle with the associated costs. (GIAMA Guidelines for a Custodian Asset Management Plan - see Guideline C8.G 01: Guidelines for Custodians: Custodian Asset Management Plan, National Public Works, Feb 2010).

The infrastructure asset is obtained at an initial acquisition cost. Ordinary use of the asset leads to wear and tear, requiring preventative maintenance to ensure that the asset remains above its minimum required performance level.

When preventative **maintenance is no longer able to sustain the minimum level of performance** in a cost-effective manner, the asset requires renewal (renovation/ rehabilitation). The renewal restores the assets to its original condition, and preventative maintenance then continues.

During the asset's lifecycle, it may be upgraded or extended, increasing the value of the asset.

The asset could be renewed (i.e. renovated/rehabilitated) a number of times. However, typically at the end of the asset's planned life, also known as the 'design life', systems supporting the asset can be expected to fail. The asset now requires major rehabilitation/refurbishment, which may involve a major overhaul of systems and/or replacement of these systems or components of systems. Once the refurbishment has been completed, a new economic life cycle begins and the useful life (being the period during which benefit can be derived from the use of an immovable asset), of the asset is increased accordingly, as demonstrated in the figure below.
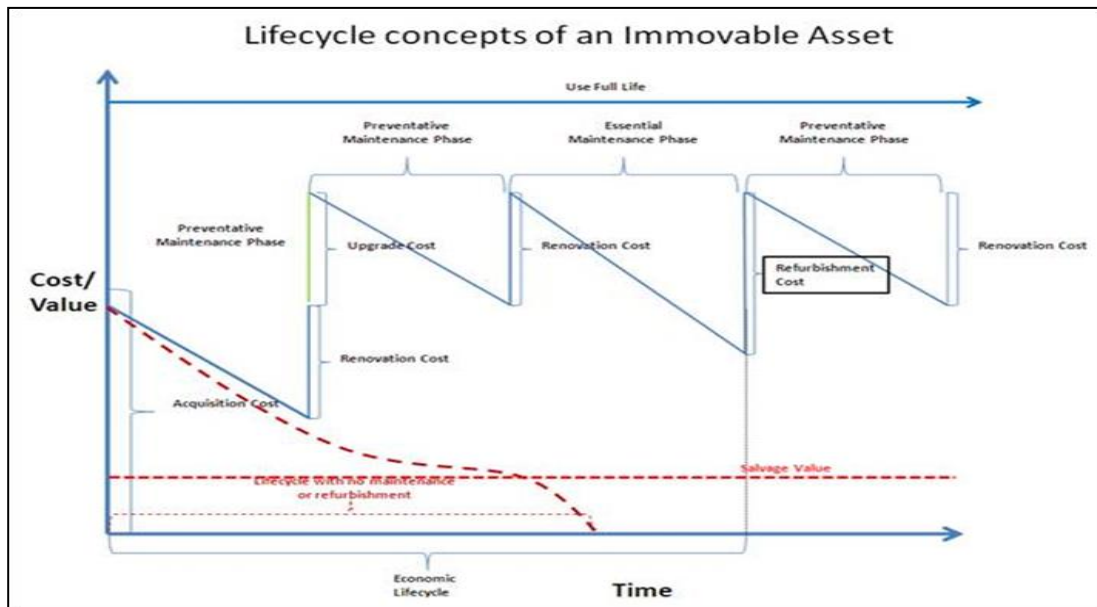
Figure 11: Asset Lifecycle (to be revised) (Source: GIAMA Guidelines for a C-AMP)

The planned renewals must be reviewed in conjunction with user requests for upgrades. Upgrades should, where possible, be scheduled in parallel with renovations, to ensure minimal disruption of user activities.

The importance of Renewals in Lifecycle Management

The importance of regular, periodic renewal of infrastructure assets is shown in the figure below. It shows that the periodic renewal of infrastructure assets is more cost effective than a 'operate to failure' approach.
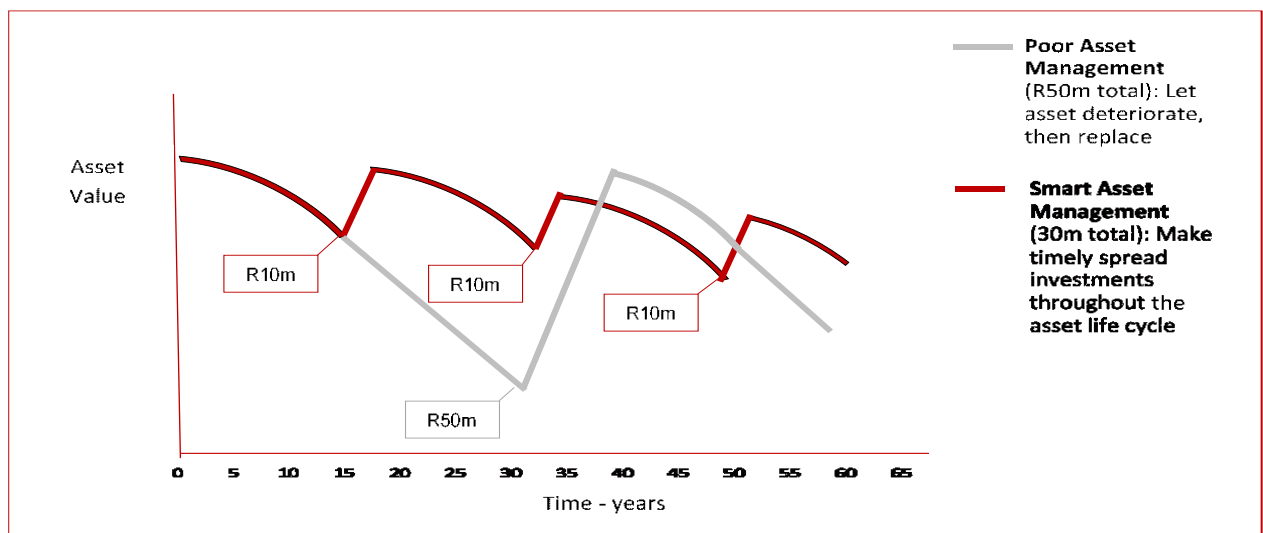
Figure 12: Impact of Renewals on Useful Life

The Asset Management Hierarchy

Planning, in the IDMS, is performed at strategic, tactical and operational levels, as shown on Figure 8.

- **Strategic planning** is aimed at aligning infrastructure asset management objectives with organisational strategy. The strategic planning horizon is long term, usually 15 to 20 years, as described in this Module.

- **Tactical Planning** is performed to secure resources to implement infrastructure programmes (funding, institutional arrangements, etc). The tactical planning horizon is medium term, usually three to five years.

- **Operational Planning** is aimed at 'doing' the planned work and entails scheduling of the work to be done and the assignment of resources for implementation of the asset management activities. The operational planning horizon is short term, usually one year.

Figure 13: Levels of Planning

Principle of Continuous Improvement

The concept of Continuous Improvement, and its relationship with performance measures and targets, is clearly explained in the Plan-Do-Check-Act Cycle, as shown in Figure 59. Performance measures and targets are established ('Plan'), the plans are executed ('Do'), the actual performance is compared to the target ('Check') and, if the objectives are not achieved/targets are reached, then action is taken ('Act') to improve performance.
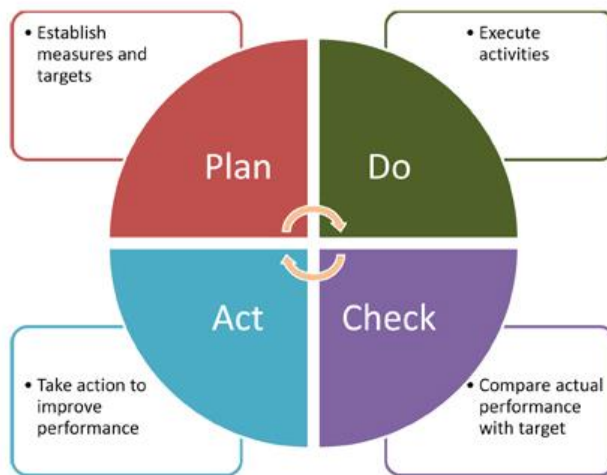
Figure 14: Improvement explained in terms of the PDCA Cycle

Measures should therefore be put in place for the continual improvement of the portfolio management f unction. This should harness all aspects of **corrective action and preventive actions,** together with **risks and opportunities,** as described in the Risk Management Strategy.

2.3 Control Cycle for Portfolio Management

Subsection 2.3: Control Cycle for Portfolio Management

The combination of the Control Cycles and Control Stages together make up the IDM Control System (see Module 2, Section 7: Infrastructure Delivery Management Control System for a more comprehensive explanation).

The table below summarises the **IDM Control Cycle for Portfolio Management**, recommended for governance of infrastructure delivery in the South African public sector.

It is important to distinguish between the IDM **Control Stages** for Project Management (as described in Module 9: Project Management) and the **Control Cycles** applicable to Portfolio Management, Programme Management and Operations & Maintenance Management processes. The Control Cycles prescribe the **Control Cycle Deliverables**, each of which must be signed off, but which are not seen as pre-requisites for moving to another process, as these processes are generally cyclical in nature and inform, or are informed by, each other. Accordingly, the Control Cycle processes are not referred to as stages, and are not numbered, to avoid creating the impression that they are sequential.

Table 2: Control Cycle for Portfolio Management

Portfolio Management Control Cycle		
Process	**Control Cycle**	
Name	**Control CP nt Deliverable**	**Description**
A.2 Infrastructure Planning	Infrastructure Asset Management Plan (IAMP) *Note: In National & Provincial Government the CP Deliverable is a UAMP & RAMP*	The IAMP is a description of the current and expected role infrastructure assets play in the organisation's service delivery offering, how risks to service delivery using infrastructure assets will be managed and an assessment of the financial implications of using and managing infrastructure assets to deliver services. *The IAMP includes a list of programmes and projects over the prescribed planning period as well as a prioritised list to be implemented against a forecasted infrastructure budget.* Minimum contents of the IAMP include: 1. Executive Summary 2. Introduction 3. Levels of Service 4. Future Demand 5. Lifecycle Management Plan 6. Management Risks 7. Financial Summary 8. Plan Improvement and Monitoring 9. Resourcing Strategy 10. Appendices

2.4 Portfolio Management Processes

Subsection 2.4: Portfolio Management Processes

Portfolio management is accomplished through processes, using relevant knowledge, skills, tools, and techniques that receive inputs and generate outputs.

In order to be successful, the portfolio management team must:

- Understand the organization's strategic plan.
- Establish determining factors for managing the portfolio based on the strategic plan. These determining factors will support the beginning of the portfolio process.
- Consider all of the organization's projects, programs, and other portfolio components.
- Follow agreed-upon processes.
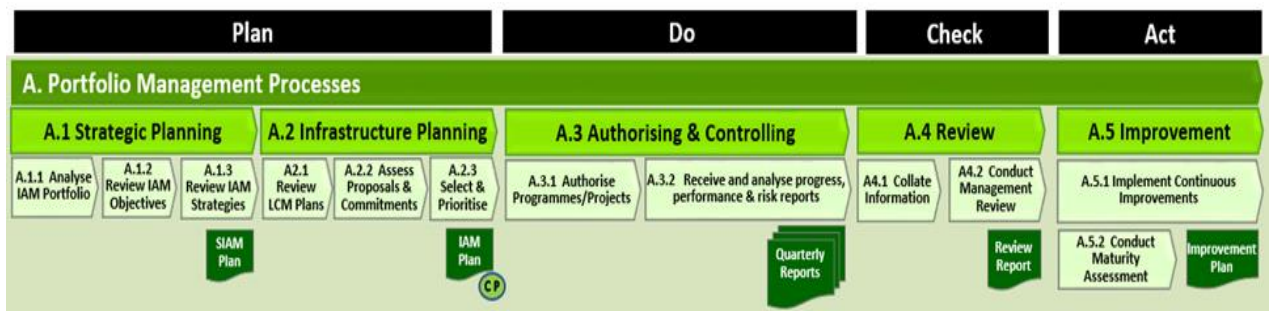
Figure 15: Portfolio Management process cycle

2.5 Plan

Subsection 2.5: Plan
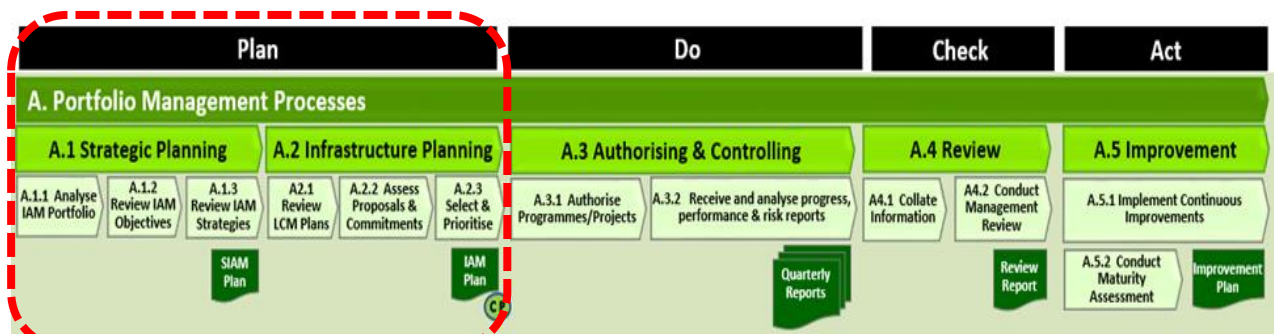
At the global level, cognisance should be taken of the United Nations Sustainable Development Goals (SDGs), which have replaced the Millennium Development Goals (MDGs). Within the African context, planning should be aligned with the 10 priority actions of the African Union Agenda 2063.

The National Development Plan (NDP) and the 14 outcomes of the Medium Term Strategic Framework (MTSF), provide a central reference point for alignment with the national programme of action. In reviewing this plan, the Nine Point Plan adopted by national government, as a measure to address challenges related to global economic downturn, has also been considered.
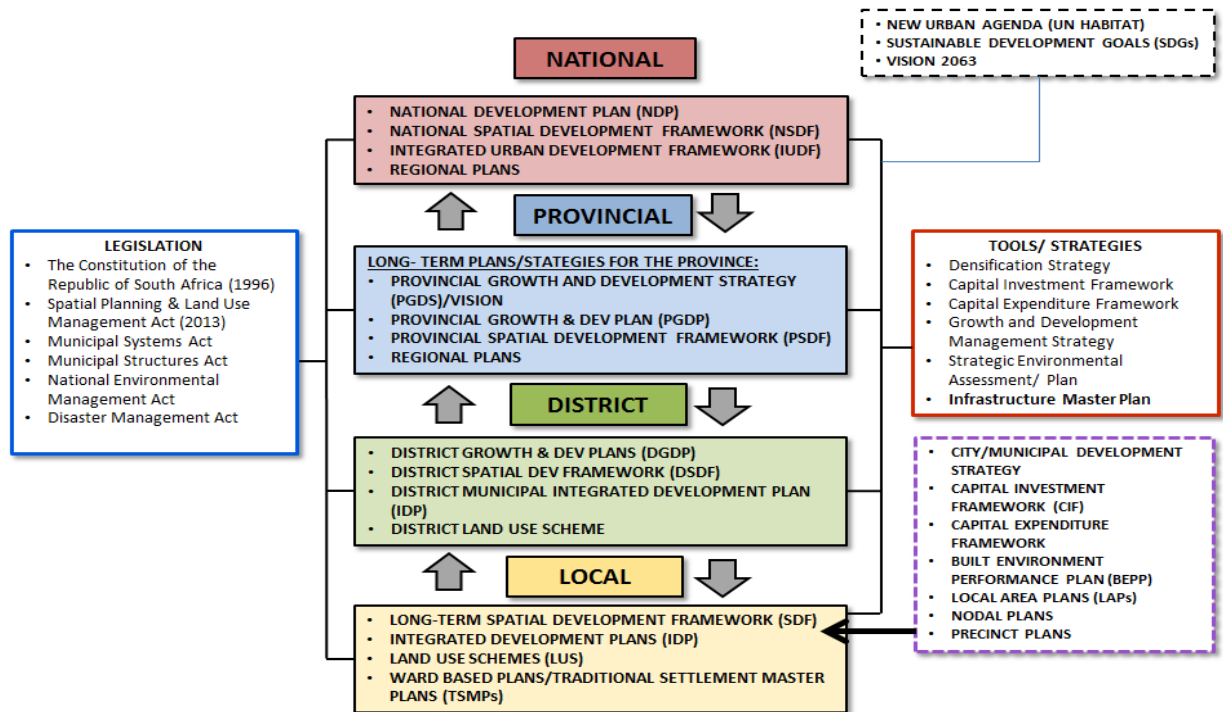
Figure 16: The Hierarchy of Planning

Strategic Planning in the Context of Government

The mandate (responsibility) and policies of government departments, describe the minimum level of service to be provided and the way a department is to conduct its business. These mandates and policies are set through political processes in the legislative environment.

A strategic plan defines how the members of the communities are to be provided with the services defined in the policies of government. It comprises of two main components, the strategic plan for service delivery; and the supporting plans for Human Resources, Asset Management, Infrastructure, Information Systems, Financial Strategies and so forth. Infrastructure planning is undertaken in parallel with the development of the strategic plan, and the plans must fully align.

In accordance with National Treasury guidelines, the Strategic and associated Performance Plans must cover the five-year period of office of the newly elected government. The Five Year Strategic and Performance Plans are prepared in the planning cycle immediately following an election and are reviewed and updated annually. The Strategic and Infrastructure Plans have a long-term outlook. The MTEF plans are revised annually and address the budget year, plus the consequential requirements of the two following years (the two outer years).

The Strategic and associated Performance Plans are developed in the context of national, provincial and local development frameworks, as represented in Figure 14, in a process of top-down and bottom-up planning. Thus, careful consideration and integration is required with the development planning processes of the other spheres of government, which is inherent in the principles of co-operative government, as set-out in Chapter 3 of the Constitution.
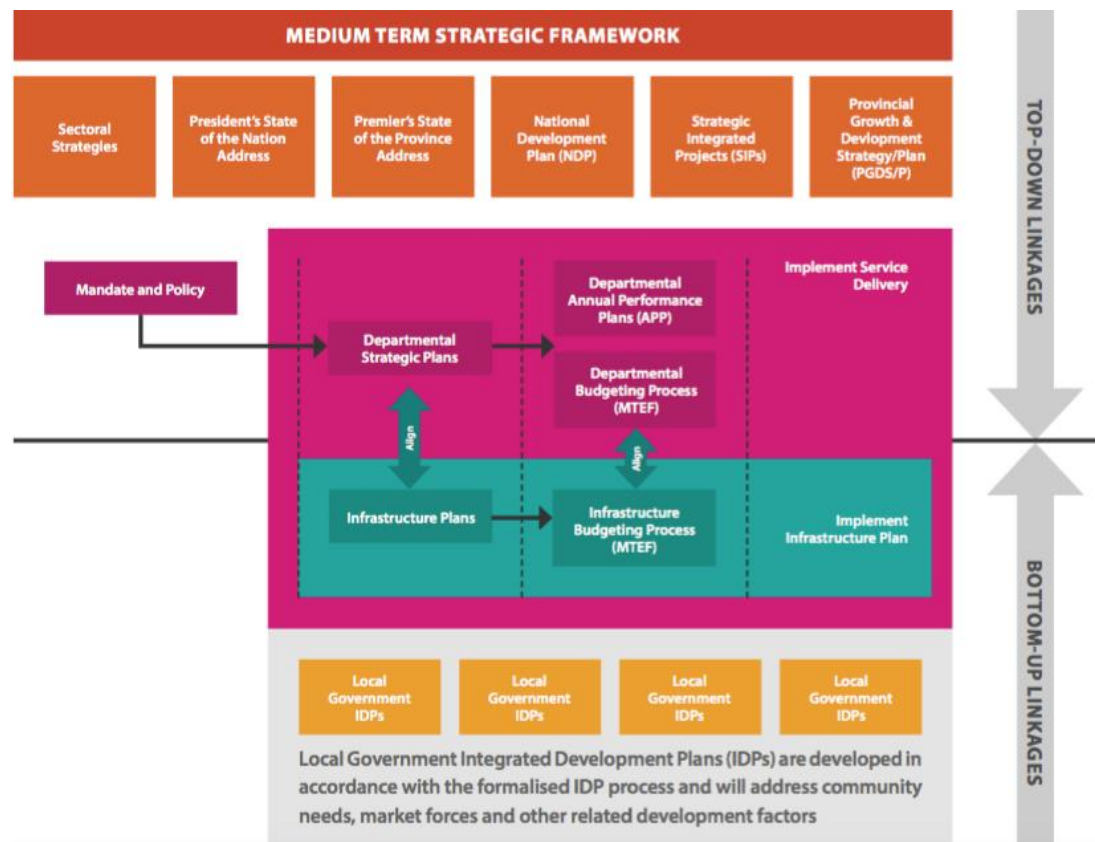
Figure 17: Top-down and bottom-up planning

Understanding IAM alignment with Organisational Strategy and Objectives

- The **Organisation Strategic Plan** contains the vision, goals and objectives of the organisation. It provides direction to all management functions in the organisation. The Infrastructure Asset Management objectives, strategy and plans must be aligned with the organisational goals and objectives.

- The **Infrastructure Asset Management Policy** (IAM Policy) is the foundation of an organisation's approach to asset management. As a key component of the 'line of sight', it provides a framework for translating the organisation's strategic objectives into infrastructure asset management objectives, and principles which guide development of the infrastructure asset management strategy.

- The **Strategic Infrastructure Asset Management Plan** (SIAMP) describes an organisation's long-term approach to managing its infrastructure assets. This plan specifies how organisational objectives and IAM Policy objectives will be converted into infrastructure asset management objectives, and the approach for developing the infrastructure asset management plan.

  The SIAMP can have a timeframe that extends beyond the organisation's own business planning timeframe, requiring the asset management system to address the whole life of the assets, and to ensure sustainable service delivery.

- The **Infrastructure Asset Management Plans** (IAM Plans) summarises the activities that an organisation intends to undertake to deliver its infrastructure asset management objectives, along with the resources required, timescales and costs.

  The IAM Plans are underpinned by Infrastructure Asset **Lifecycle Management Plans** for each facility or infrastructure asset network.
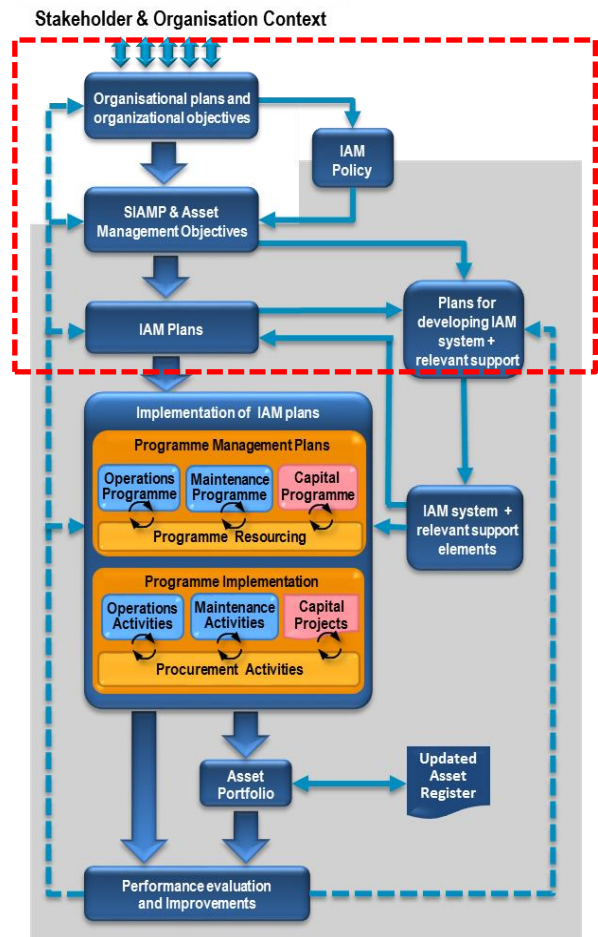
IAM Policy

A summary of the relationship between the typical portfolio management policy, strategy and plan deliverables, as adapted from IIMM 2015, is provided the table below

Table 3: Defining the relationship between IAM Policy, Strategy and Plan

	IAM Policy	Strategic IAM Plan	IAM Plan
What is it?	Broadly outlines the principles and requirements for undertaking IAM across the organisation, in a structured and coordinated way, consistent with the organisation's strategic plan.	Documents and demonstrates an integrated approach to planning and coordination of IAM outcomes across the various asset groups. Specifies the organisation's IAM objectives, assets and a high level, long-term strategy for managing the organisation's assets.	Long-term plans (usually 20 years or more for infrastructure assets), that outline the asset activities for each facility or asset network, and the resources to provide a defined level of service in the most cost- effective way.

Typical Contents		
• Organisational context and importance of IAM; • Organisation's overall vision. mission and strategic goals. Supporting IAM vision and goals; • Mandatory IAM requirements. IAM policies underpinning the strategic goals; • IAM responsibilities for implementing the policy and relationships; • Audit, review and updating procedures.	• Strategic Context - analysis of key internal and external drivers; • Strategic Issues and Options; • IAM Objectives- both in relation to the performance of the IAM System and the performance of the asset network; • IAM Approach - key lifecycle management strategies and programmes to deliver IAM objectives; • Financial Summary - high level long term expenditure and funding requirements.	• Summary of the organisation's strategic goals and key IAM policies; • Levels of service, performance standards and reporting processes; • Demand forecasts and management techniques; • Description of the asset portfolio; • Description of the Iife-cycle management activities for operating, maintaining, renewing developing and disposing of assets; • Prioritised "MTEF List of Projects" and corresponding Strategic Programme Brief for each Infrastructure Programme; • Long-term cash-flow forecast; • Resourcing strategy - recruitment, training, procurement and ICT requirements; • Key IAM improvement actions, including resources and timelines for implementation of the proposed improvements.

Organisations may package these documents as three separate documents, or combine the Policy and the SIAMP, or the SIAMP and the IAM Plan, into single documents. Regardless of how these documents are packaged, the key components should include those shown the table and the documents should be signed off by the senior management team of the organisation.

The IAM policy provides infrastructure asset managers with an understanding of top management expectations with respect to IAM outcomes and **provides direction for the development of IAM strategies**, objectives and plans.The IAM Policy is a top management responsibility. Top management is defined in the MFMA as the Accounting Officer, the Chief Financial Officer, all senior managers responsible for managing the respective votes of the municipality, and other senior officials designated by

the accounting officer. The organisation's Infrastructure Delivery Unit should contribute to the development of the IAM Policy and other infrastructure related policies, such as the Infrastructure Procurement Policy.

The organisation's Infrastructure Delivery Unit should therefore understand the basic requirements for the development of an IAM Policy.

The IAM Policy should provide guidance on:

- Organisational context and importance of IAM;
- Organisation's overall vision, mission and strategic goals;
- Supporting IAM vision and goals.

The policy principles detailed in the sections that follow, have been adopted as mandatory requirements, applicable to infrastructure asset management for the whole of Government.

IAM Strategy

Generally the Infrastructure Asset Management Strategy is commonly known as the Strategic Infrastructure Asset Management Plan (SIAMP)

Note: The SIAMP may be contained in the organisational strategic plan, and/or it may be a component of the IAM Plan (as recommended in the IDMS).

The definition of the SIAMP, as provided from ISO/SANS 55000: "*Documented information that specifies how organisational objectives are to be converted into asset management objectives, the approach for developing asset management plans, and the role of the asset management system in supporting achievement of the asset management objectives*".

This definition provides a broad understanding of the SIAMP document, clearly showing that its role is to capture asset management objectives, that link the organisational objectives (typically part of the organisational plan/corporate plan/business plan) to lower level plans.

In simple terms, Strategic Planning is the process of establishing and documenting the future direction of your organisation. The strategic plan should set a clear direction for all the organisation's activities.

> **Strategic Planning is the process of establishing and documenting the future direction of your organisation**

The SIAMP is aimed at describing the organisation's long-term approach to managing its infrastructure assets, that will enable the portfolio of assets to provide the desired levels of service in a sustainable way, while managing risk, at the lowest life cycle cost.

Strategic level planning, provides for:

- a comparison between the **assets required** and those **assets currently available,** i.e. demand vs supply;
- **the identification** of assets that must be **acquired** to meet programme delivery needs;
- an evaluation of existing assets, to determine whether their performance is adequate to support the selected service delivery strategy.

The timeframe ('planning horizon'), for the SIAMP usually extends beyond the organisation's own business planning timeframe (normally 5 years), due to the longevity of infrastructure assets and the generally accepted requirement that the infrastructure asset management system should address the whole life of the assets.

The SIAMP should:

- be a high level, long term plan to deliver the IAM policy;
- contain the asset management objectives;
- be used to develop the infrastructure asset management plan(s), aimed at achieving the infrastructure asset management objectives (ISO 55002);
- describe how the organisation will develop and improve its asset management capabilities (i.e. its processes, information, systems, skills of its people, tools, etc.).

The SIAMP is aimed at providing a coherent, but simple, strategic picture of the existing infrastructure asset portfolio, its contribution to service delivery, and the current costs of providing the infrastructure assets. The information should be presented at the aggregate level, based on the various **lifecycle management strategies**.

The SIAMP should also provide an understanding of the human resource capacity requirements and an understanding of the IAM training that is required. Details about the level of IAM training of both staff and top management, is a vital part of understanding the current situation.

In summary, the SIAMP should comprise the following:

1. Strategic Context
    o Analysis of key internal and external drivers;
    o Strategic Issues and Options;
2. IAM Objectives, in relation to
    o The performance of the AM System;
    o The performance of the asset network;
3. IAM Approach (Action Plan) - key strategies and programmes to deliver AM objectives;
4. The IA Lifecycle management strategies:
    i. An operational strategy which defines the use of existing infrastructure assets and may include matters such as access, security, accountability and monitoring performance and condition assessment;
    ii. A maintenance strategy defining which infrastructure assets are to be maintained, the level of maintenance and the delivery of maintenance services. NIAMM definition: Interprets higher-order documents and formulates maintenance objectives and targets, establishes maintenance tactics, and defines maintenance roles and responsibilities;
    iii. A renewal strategy which defines the renewal profile for infrastructure assets;
    iv. An acquisition strategy which defines the infrastructure assets to be extended, upgraded or acquired in the planning period;
    v. A disposal strategy identifying infrastructure assets to be disposed of in the planning period.
    The Lifecycle Management Strategies provide guidance for the revision of Lifecycle Management Plan(s) for individual facilities, networks of infrastructure asset or individual infrastructure assets.
5. The delivery management strategies:
    i. A demand management strategy, which guides the consideration of non-infrastructure options, to minimise the need for the creation of new infrastructure assets;

ii.   A funding strategy, which defines the options available for funding capital expenditure (capex) and operational expenditure (opex);

iii. A risk management strategy, which describes the strategic infrastructure delivery risks and the strategic mitigation actions to be implemented;

iv.   A Resourcing Strategy, to guide recruitment and training decision making, to ensure sufficient in-house capacity to manage an organisation's infrastructure delivery strategy, and to guide the procurement of service providers (PSPs and contractors), to plan and oversee the implementation of IAM Plans.

6. Financial Summary - high level long term expenditure and funding requirements.

Processes Overview

Analyse Infrastructure Asset Management (IAM) Portfolio

An overview the **Analyse IAM Portfolio** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below.
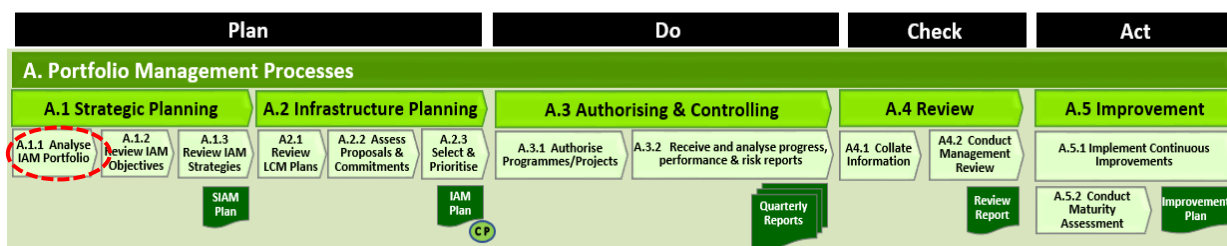
Figure 18: IDM "Placemat" showing only Portfolio Management Processes
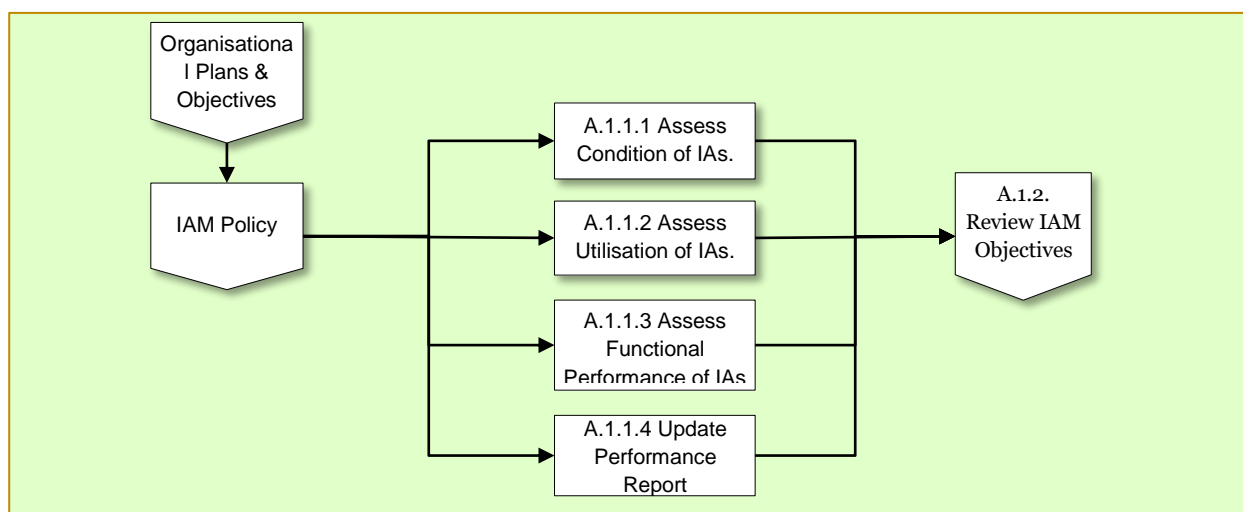
Figure 19: Process Mapping – A.1.1 Analyse IAM Portfolio

Table 4: Strategic Planning Processes - Analyse IAM Portfolio

No.	Process	Definition	Description
A.1.1	Analyse IAM Portfolio	The objective of the 'Analyse IA Portfolio' planning processes is to determine the condition, utilisation and functional performance of the portfolio of Infrastructure Assets (i.e. to find answers to the question "Where are we?").	
A.1.1.1	Assess Condition of IAs.	The 'Assess Condition' process leads to the development of a condition indicator that expresses the actual condition of the asset (determined by inspection) as a ratio of the required condition (as per the relevant design specification) of the asset.	**Step 1:** Define what outputs are required from the results of the assessment. **Step 2:** Determine what information should be collected and what level of detail are required. **Step 3:** Determine levels of skill required of the assessors and the tools and equipment needed. **Step 4:** Plan, schedule and prepare budget for implementation.

No.	Process	Definition	Description
			Step 5: Procure PSPs if required. **Step 6:** Conduct condition assessments. **Step 7:** Update existing Condition Assessment Report.
A.1.1.2	Assess Utilisation of IAs.	The '*Assess Utilisation*' process leads to the development of a utilisation indicator that measures the capacity of an asset effectively used for service delivery, as a percentage of the total capacity of the asset (as per the relevant design norm) expressed as a percentage.	**Step 1:** Determine the overall space required, in terms of the organisation's structure, aligned with the Space Planning Norms & Standards as prescribed by the Minister of Public Works. **Step 2:** Determine the amount of space currently occupied by the organisation (provided by the Custodian). **Step 3:** Divide the space currently occupied (Step 2) by the required space in terms of the Space Planning Norms & Standards (Step 1) and express it as a percentage. **Step 4:** Update the existing Utilisation Improvement Plan. (Use Template 4 shown in C6.G03 to determine the utilisation of **office accommodation**. Users must develop similar templates to indicate the utilisation of function specific assets, e.g. schools and hospitals).
A.1.1.3	**Assess Functional Performance of IAs.**	**Functional performance is the measure used to determine the extent to which an asset meets the asset requirements and thereby the service delivery objectives that such an asset supports. Detailed guidance is provided in Annexure C to the GIAMA 'Guideline for a C-AMP' (see C6.G09).**	
A.1.1.3.1	Confirm required performance rating for each IA.	The 'Confirm required performance rating' process is aimed at confirmation of the required performance standard for each IA, i.e. the standard expected of the accommodation that provides the baseline against	Use Table 1 in Annexure C to the GIAMA 'Guideline for a C-AMP' (see C6.G09) to confirm the required Performance Rating: **Step 1:** Determine performance standard. **Step 2:** Determine condition standard.

No.	Process	Definition	Description
		which its performance will be measured. The required performance standard is a strategic decision that will affect the management of immovable assets throughout their lifecycle.	**Step 3:** Update the required performance rating index.
A.1.1.3.2	Assess Accessibility of each IA.	The 'Assess Accessibility' process provides a rating of 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 has to take into consideration what is expected of the asset, e.g. a facility that does not require public access, should not be marked down on accessibility should it not provide for public access.	Use Table 2 in Annexure C to the GIAMA 'Guideline for a C-AMP' (see C6.G09) to confirm the required Accessibility Rating: **Step 1:** Update the Accessibility Rating.
A.1.1.3.3	Assess Suitability of each IA.	The 'Assess Suitability' process is aimed determining a Suitability Index for each IA based on the Performance Index and the Accessibility Rating as determined above. The Suitability Index provides an indication of the IA's suitability for providing the required support to the organisation's service delivery objectives.	**Step 1:** Confirm the required performance standard **Step 2: Confirm** the accessibility rating **Step 3:** Update the suitability index of the asset
A.1.1.3.4	Update User Condition Rating for each IA	The '*Update Condition Rating*' process is utilised to give a brief indication of the physical condition of the asset as perceived by the user. (It should be noted	Use Table 4 in Annexure C to the GIAMA 'Guideline for a C-AMP' (see C6.G09) to determine the User Condition Rating: **Step 1:** Update the User Condition Rating.

No.	Process	Definition	Description
		that this is not a full condition assessment).	
A.1.1.3.5	Update Operating Performance Index	The 'Update Operating Performance Index' process is utilised to determine - by cross reference between the required performance standard and the user condition rating – an Operating Performance Index for each IA.	Use Table 5 in Annexure C to the GIAMA 'Guideline for a C-AMP' (see C6.G09) to determine the Operating Performance Index: **Step 1:** Update the Operating Performance Index.
A.1.1.3.6	Assess Functional Performance	The '*Assess Functional Performance*' process leads to the updating of a functional performance index for an IA as a measure of its effectiveness in supporting service delivery objectives (i.e. the "fit for purpose" test).	Use Table 6 in Annexure C to the GIAMA 'Guideline for a C-AMP' (see C6.G09) to determine the Functional Performance Index: **Step 1:** Update the Functional Performance Index by cross referencing the Suitability Index and the Operating Performance Index.
A.1.1.4	Update Performance Report	The '*Update Performance Report*' process leads to the classification of the IAs into three groups: **Group A:** Immovable assets that are in an acceptable condition to the User. **Group B:** Immovable assets that are suitable to User's requirements but require technical condition assessment as the asset performance does not meet minimum functional requirements of the facility. **Group C:** Immovable assets that have been identified as unsuitable to the current User's requirements.	**Step1:** Classify immovable assets into groups based on the combined performance assessment (as described in the preceding steps).

Review Infrastructure Asset Management (IAM) Objectives

An overview the **Review IAM Objectives** are outlined in the process map shown in the figures below. These processes are further expanded in the table below.
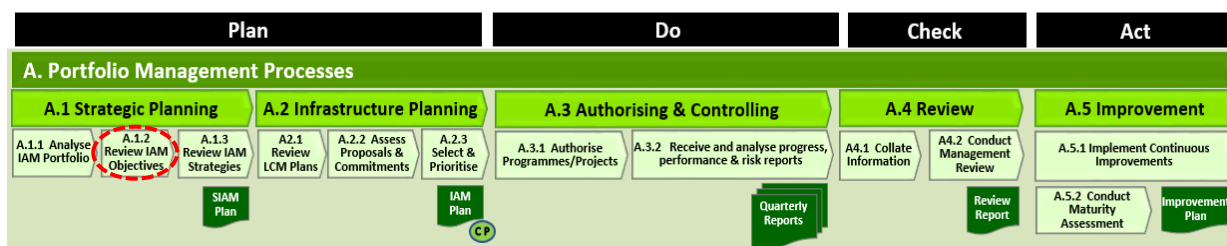
Figure 20: IDM "Placemat" showing only Portfolio Management Processes
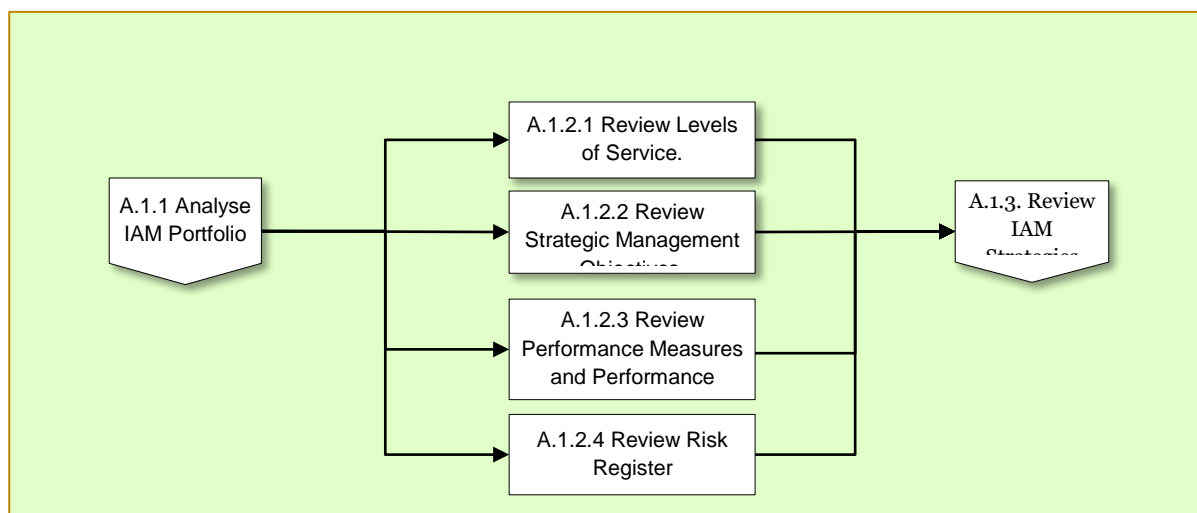
Figure 21: Process Mapping – A.1.2 Review IAM Objectives

Table 5: Strategic Planning Processes - Review IAM Objectives

No.	Process	Definition	Description
A.1.2	Review IAM Objectives.	The objective of the 'Review IAM strategic objectives, KPIs and risks' processes is to ensure that the IAM objectives are aligned with the organisational objectives, the IAM Policies and customer expectations, to establish realistic performance measures (i.e. to find answers to the question "Where do we want to be?") and to review/identify the risks associated with the achievement of the objectives.	
A.1.2.1	Review Levels of Service	The '*Review Levels of Service*' process determines the outputs an organisation intends to deliver to customers".	**Step 1:** Determine LoS through user and/or community and/or customer consultation. **Step 2:** Review OHS Act. **Step 3:** Describe LoS in terms of the following parameters: • Availability: • Quality • Reliability

No.	Process	Definition	Description
			• Cost efficiency • Comfort • Safety **Step 4:** Update Level of Service Statement.
A.1.2.2	Review Strategic Management Objectives	The '*Review Strategic Management Objectives*' process is aimed at ensuring alignment of the IAM Objectives with the Organisation's Strategic objectives.	**Step 1:** Study Management Review Report. **Step 2:** Update IAM Strategic Objectives.
A.1.2.3	Review Performance Measures and Performance Targets	The '*Review Performance Measures and Performance Targets*' process leads to the establishment of Key Performance Indicators (KPIs, for measuring actual performance against the stated objectives) and Performance Targets.	**Step 1:** Study Management Review Report. **Step 2:** Update Performance Measures (KPIs) and Performance Targets.
A.1.2.4	Review Risk Register	The 'Review Risk Register' process is to record newly identified risks and to re-assess the previously registered risks.	**Step 1:** Study Management Review Report. **Step 2:** Review Strategic Risks. **Step 3:** Update Risk Register.

Review Infrastructure Asset Management (IAM) Strategies

An overview the **Review IAM Objectives** are outlined in the process maps shown in the figures below. These processes are further expanded in the table below.
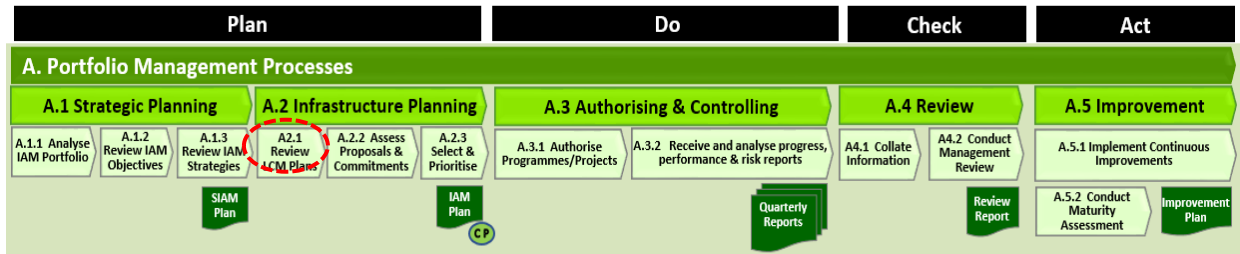
Figure 22: IDM "Placemat" showing only Portfolio Management Processes
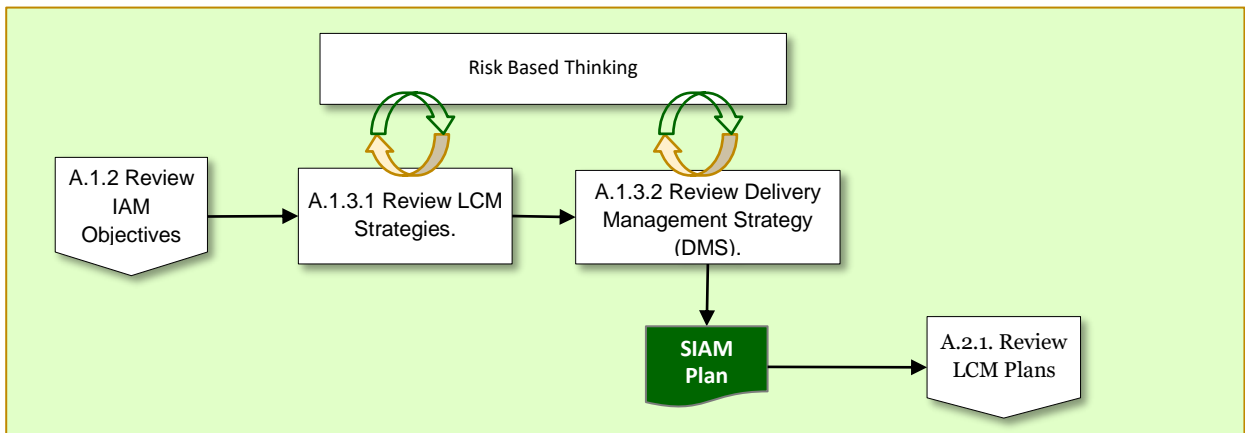
Figure 23: Process Mapping – A.1.3 Review IAM Strategies

Table 6: Strategic Planning Processes - Review IAM Strategies

No.	Process	Definition	Description
A. 1.3	Review IAM Strategies	The objectives of the Review IAM Strategies processes are to update the LCM strategies and the supporting Delivery Management Strategy (DMS) aimed at achievement of the IAM objectives (i.e. to find answers to the question "How do we get there?").	
A.1.3.1	Review LCM Strategies	The objectives of the Review LCM Strategies processes are to update the LCM strategies aimed at achievement of the IAM objectives (i.e. to find answers to the question "How do we get there?").	
A.1.3.1.1	Review Operations LCM Strategy	The '*Review Operations LCM Strategy*' process is aimed at updating the existing Operations Strategy based on legislative, policy and technical changes, lessons learnt and proposed improvements (in the Improvement Plan).	**Step 1:** Update Operational Objectives; **Step 2:** Update Operational Processes **Step 3:** Review Operational Structures and Support: **Step 4:** Review support arrangements for monitoring infrastructure asset performance **Step 5:** Review support

No.	Process	Definition	Description
			arrangements for condition assessments **Step 6:** Review plans for emergencies, crises and incidents. **Step 7:** Update Operations LCM Strategy.
A.1.3.1.2	Review Maintenance LCM Strategy	The NIAMM Standard defines maintenance LCM strategy as the document that "*interprets higher-order documents and formulates maintenance objectives and targets, establishes maintenance tactics, and defines maintenance roles and responsibilities*".	**Step 1:** Review Maintenance objectives and targets **Step 2:** Review Maintenance tactics. **Step 3: Review** Maintenance roles and responsibilities. **Step 4:** Update Maintenance LCM Strategy.
A.1.3.1.3	Review Renewal LCM Strategy	The '*Review Renewal LCM Strategy*' process is aimed at updating the existing Renewal Strategy based on legislative, policy and technical changes, lessons learnt and proposed improvements (in the Improvement Plan).	**Step 1:** Review Renewal objectives and targets **Step 2:** Review Renewal profiles and plans for the IA portfolio(s) **Step 3:** Review Renewal roles and responsibilities. **Step 4:** Update Renewal LCM Strategy
A.1.3.1.4	Review Acquisitions LCM Strategy	The '*Review Acquisitions LCM Strategy*' process is aimed at updating the existing Acquisition Strategy based on legislative, policy and technical changes, lessons learnt and proposed improvements (in the Improvement Plan). Acquisition proposals should be justified by a thorough evaluation of all service delivery options and subjected to a comprehensive Programme and Project Assessment Process that results in the development of a Project Pipeline Register (PPR)	**Step 1:** Review Acquisition objectives and targets **Step 2:** Review Proposed Acquisitions **Step 3:** Review Acquisition roles and responsibilities. **Step 4:** Update Acquisition LCM Strategy.

No.	Process	Definition	Description
		and the subsequent management of the identified projects in the Project Pipeline.	
A.1.3.1.5	Review Disposal LCM Strategy	The 'Review Disposal LCM Strategy' process is aimed at updating the existing Disposal Strategy based on legislative, policy and technical changes, lessons learnt and proposed improvements (in the Improvement Plan).	**Step 1:** Review Disposal objectives and targets **Step 2:** Review proposed disposals **Step 3:** Review Disposal roles and responsibilities. **Step 4:** Update Disposal LCM Strategy.
A.1.3.2	Review Delivery Management Strategy (DMS)	The objective of the Review Delivery Management Strategy is to review the Demand, Risk, Funding and Resourcing Strategies for implementation of the Lifecycle Management Strategies.	
A.1.3.2.1	Review Demand Management Strategy	The 'Review Demand Management Strategy' process is aimed at the updating of the existing strategic actions to influence demand for services and assets to avoid or defer required asset investment.	**Step 1:** Consider IAM Policy. **Step 2:** Consider Management Review Report. **Step 3:** Consider historic demand. **Step 4:** Consider drivers for demand. **Step 5:** Consider future demand and change in demand over time. **Step 6:** Update the Demand Management Strategy.
A.1.3.2.2	Review Risk Management Strategy	The '*Review Risk Management Strategy*' is aimed at the updating of the existing structured and coherent approach to identifying, assessing and managing risk. It incorporates a process for the regular re-assessment of existing risks based on new developments or actions taken. The IDMS risk management strategy is based on a "*Risk Based Thinking*" methodology that integrates planning and risk	**Step 1:** Consider IAM Policy. **Step 2:** Consider Management Review Report. **Step 3:** Review existing risk management strategy. **Step 4:** Update the Risk Management Strategy.

No.	Process	Definition	Description
		management. (The **purpose** of **risk management** is to identify potential problems before they occur so that **risk**-handling activities may be planned and invoked as needed across the life of the IA or project to mitigate adverse impacts on achieving IAM objectives)	
A.1.3.2.3	Review Funding Strategy	The *'Review Funding Strategy'* process is aimed at the updating of the existing funding strategy by considering alternative options for funding of the infrastructure delivery requirements.	**Step 1:** Consider IAM Policy. **Step 2:** Consider Management Review Report. **Step 3:** Consider the options available for funding capital (capex) and operational (opex) asset expenditure. **Step 4:** Analyse all available possibilities (e.g. infrastructure grants, equitable share, sponsor contributions, etc.), including the utilisation of private sector funding (e.g. borrowed funds) where appropriate. **Step 5:** Update the Funding Strategy.
A.1.3.2.4	Review Resourcing Strategy	The *'Review Resourcing Strategy'* process is aimed at updating the existing guidance on how to meet future human and ICT resourcing needs.	**Step 1:** Develop an understanding of the workload in the MTEF portion of the IAM Plan **Step 2:** Identify the work to be done by in-house resources **Step 3:** Identify work to be outsourced to Professional Service Providers (PSPs) and CIDB registered contractors. **Step 4:** Review the Recruitment and Retention Strategy and a Training and Development Strategy based on an analysis of the available human resources

MISA
Municipal Infrastructure Support Agent
REPUBLIC OF SOUTH AFRICA

No.	Process	Definition	Description
			Step 5: Develop/review a Targeting Strategy for attainment of the identified developmental goals in accordance with the organisation's Developmental Procurement Policy **Step 6:** Develop/review an Infrastructure ICT Strategy to support the delivery of the infrastructure as documented in the Infrastructure (AM) Plan **Step 7:** Update the Resourcing Strategy.

Delivery Management Strategies

The Delivery Management Strategies are aimed at:
- Providing guidance on the management of the demand for infrastructure assets;
- Providing guidance on the management of strategic infrastructure risks;
- Ensuring the availability of funds for infrastructure delivery;
- Ensuring the timeous identification of suitably capacitated human resources for the design, construction and management of the infrastructure asset related projects and operational works.

The DMS is an important input into delivery planning at programme management level.

Demand Management Strategy

Organisational objectives that drive the demand management strategy, are closely linked to one of the key principles of infrastructure asset strategic planning. i.e. that **'Public demand for Service delivery guides asset management practices and decisions'**.

The immovable asset management principles contained in the Government-wide Immovable Asset Management Policy, further dictates that:
- 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-asset solution is viable;
- an immovable asset currently used by the state is adequate to meet the change in its service delivery objectives;

The IIMM Definition of Demand Management:

Demand management:
"Actions taken to influence demand for services and assets, often undertaken as part of sustainability initiatives and/ or to avoid, or defer, required asset investment. Demand management may be 'SUPPLY-SIDE' demand Management (for example minimising wastage through pipe leak detection or customer

'DEMAND-SIDE' management, to reduce demand for over-utilised assets or vice versa (for example through pricing, regulation, education and incentives)."

The Global Forum on Maintenance and Asset Management (GFMAM) defines demand management as:

Demand management:

"The processes an organisation uses to both assess and influence the demand for, and level of service from, an organisation's assets."

The development of a Demand Management Strategy requires thorough analysis and understanding of the **demand factors**. Demand analysis typically includes the analysis of forecasted future demand for the product or services being offered, and the **requirements** that this demand will place on the infrastructure asset portfolio.

There are several elements of demand analysis that should to be considered:

• Historic demand;

• Drivers of demand;

• Future demand and change in demand over time;

• Changes in required levels of service;

• Current and future utilisation and capability of assets;

• Impact on the future performance, condition and capability.

Central to the process is **forecasting** the service delivery needs, and the capacity to meet them, on a short, medium and long-term basis. The key outcome is the provision of services responsive to the community's needs, within the constraints set by available resources. This outcome sets the framework for strategic planning, and may challenge current attitudes and practices.

Demand analysis also considers the use of non-asset solutions, where demand may exceed supply and where demand also needs to be managed to reduce the demand or reduce the required level of service (GFMAM; Asset Management Landscape, 2nd Edition). Typical non-infrastructure solutions are PPPs, leasing of property, transport arrangements, technology, transfer of properties from other government institutions, etc. Projects should be removed from the Draft IAM Plan once an alternative solution has been agreed to.

Risk Management Strategy

The IDMS risk management approach is based on the concept of 'Risk Based Thinking'. Risk based thinking is a SANS/ISO 55000 requirement and is also prescribed in the National Immovable Asset Maintenance Management (NIAMM) Standard and supporting Guidelines, Section 3.4.10.

Risk is the **possibility** of events or activities impeding the achievement of an organisation's strategic and operational objectives. The concept of 'risk', in the context of these standards, relates to the **uncertainty in achieving stated objectives**.

Risk based thinking makes preventive action part of the planning routine. Risk is often thought of only in the negative sense, but risk-based thinking can also help to identify opportunities. This is considered as the positive side of risk.

The IDMS approach to risk management is founded on the following requirement in National Treasury's "*Public Sector Risk Management Framework*", (April 2010):

"The Accounting Officer / Authority should

• *establish service delivery and other performance objectives that are consistent with the Institution's Constitutional mandate*

• *ensure that:*

(a) objectives are established through a rigorous analysis of the costs and benefits associated therewith;

*(b) the Institution has and maintains an effective process to **identify the risks inherent in the chosen objectives**; and*

*(c) the Institution is able to **manage such risks** effectively, economically and efficiently."*

The establishment of *'service delivery and other performance objectives'* is a core element of strategic planning. The '*identification of the risks inherent in the chosen objectives'* implies integration of the performance and risk planning processes. This integrated planning approach is generally referred to as '**risk-based thinking'.**

The general risk-based methodology for managing a portfolio of infrastructure assets, is outlined as follows:

• Define strategic outcomes in terms of 'levels of service' and functional requirements;

• Define strategic objectives and performance measures;

• Identify performance standards in terms of:

  • Milestones;

  • target dates;

  • output changes;

  • quality standards;

  • mandatory requirements;

  • financial affordability;

• Determine the resource requirements for portfolio management in terms of:

  • People;

  • Systems, processes and procedures;

  • Funding requirements;

• Identify risks;

• Develop contingency plans to eliminate or mitigate the impact of the identified risk;

• Determine the cost of the contingency plans;

• Determine the benefits associated with achieving the stated strategic objectives;

• Do analysis of cost of contingency plan versus benefit of achieving objectives;

• Develop processes for monitoring, evaluating and reporting performance, in terms of the strategic and performance objectives;

• Review strategic and performance objectives and associated Risk Register;

• Develop processes for improving performance of the infrastructure asset portfolio.

The Risk Register becomes essential, as it records identified risks, the severity, and the actions steps to be taken. It can be a simple document, spreadsheet, or a database system, but the most effective format is a table. A table presents a great deal of information in just a few pages.

Organisations should also prepare a risk management plan, which describes the potential likelihood and outcomes of risks, and strategies to be implemented for the infrastructure assets under their control.

Monitoring and review is an essential and integral step in the process for managing risk. Risks, and the effectiveness of the risk management plan, need to be monitored whilst infrastructure assets are utilised, to ensure that changing circumstances do not alter the risk priorities.

Funding Strategy

Broad, full costs, need to be understood in the asset management strategy. Costs need not to be so detailed as to detract from the direction-setting purpose of the strategy document.

The asset management strategy requires a 15 to 20-year planning horizon.

Organisations controlling infrastructure assets must consider the options available for funding capital (capex) and operational (opex) asset expenditure.

The funding plan should be based on an analysis of all available possibilities (e.g. infrastructure grants, equitable share, sponsor contributions, etc.), including the utilisation of private sector funding (e.g. borrowed funds), where appropriate.

The funding plan must address:

- total life cycle costs of infrastructure assets;
- the proposed sources of funding asset acquisition and maintenance, including funding of annual cash flow requirements;
- the proposed use of funds retained from the sale of infrastructure assets;
- the potential costs to be incurred as result of the disposal of infrastructure assets.

Resourcing Strategy

The purpose of this section is to provide guidance on the development of a strategy for the resourcing of the infrastructure programmes, projects and operational tasks, as described in the Consolidated Lifecycle Management Plan (with Zero-based Maintenance requirements).

The focus of the Resourcing Strategy is on the organisational arrangements, the human resource and procurement requirements, and the Information Systems, required to manage the workload as reflected in the Consolidated Lifecycle Management Plan.

The Resourcing Strategy (component of the Delivery Management Strategy), is of specific importance in that it provides guidance to the Programme Management function on the delivery management arrangements, and the procurement of service providers that needs to be considered when undertaking the Programme Resourcing process of preparing the Delivery Plan and the Infrastructure Procurement Strategy (for further guidance, refer to IDM Toolkit 2018, Module 7: Programme Management, Section 6: Programme Resourcing).

The objectives of the Resourcing Strategy are to:

- develop an understanding of the workload in the MTEF portion of the IAM Plan;
- identify the work to be done by in-house resources, based on an assessment of the workload in the MTEF portion of the IAM Plan;
- identify work to be outsourced to Professional Service Providers (PSPs) and CIDB registered contractors. (This informs the Delivery Plan and the Infrastructure Procurement Strategy to be developed at the programme management level for the delivery of the prioritized list of work in the MTEF).
- review the organisational arrangements for infrastructure delivery;

- develop/review a **Recruitment and Retention Strategy** and a **Training and Development Strategy,** based on an analysis of the available human resources (i.e. an assessment of the current and projected in-house capacity);

- develop/review a **Targeting Strategy** for attainment of the identified developmental goals in accordance with the organisation's Developmental Procurement Policy. SANS10845-1 (2015) contains guidance under section 4.3 Procurement policy and section 4.3 Developmental Procurement Policy;

- develop/review an **Infrastructure ICT Strategy** to support the delivery of the infrastructure as documented in the Infrastructure (AM) Plan.

It is recommended that separate Resourcing Strategies be developed for the Acquisitions and Renewal (Capital) programmes and the Operations & Maintenance programmes, respectively.

Infrastructure Planning

The objective of the **Infrastructure Planning Process** is to develop lifecycle management (LCM) plans and IAM Plans for the work required at each Facility or Network of Infrastructure Asset, and to provide a summary at the portfolio level.
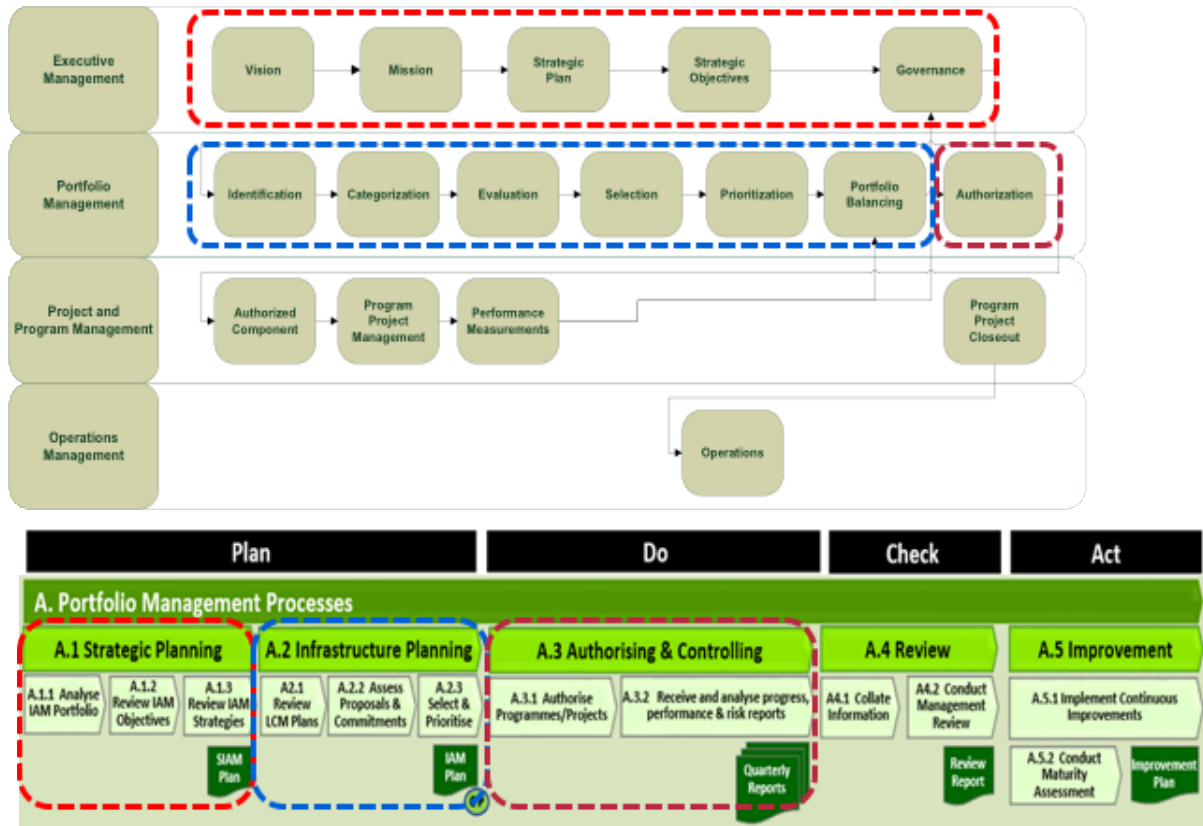
Identification

The purpose of this process is to create an up-to-date list, with sufficient information, of ongoing and new components that will be managed through portfolio management.

Key activities within this process include:

•   Comparing ongoing components and new component proposals with a predetermined component definition and related key descriptors

•   Rejecting components that do not fit within the predetermined definition

•   Classifying identified components into predefined classes of components, such as project, program, portfolio, and other works.

Categorization

The purpose of this process is to group identified components into relevant business groups to which a common set of decision filters and criteria can be applied for evaluation, selection, prioritization, and balancing. The categories are defined on the basis of the strategic plan. The components in a given group have a common goal and can be measured on the same basis, regardless of their origin in the organization. The categorization of the components allows the organization to balance its investment and its risks between all strategic categories and strategic goals.

Key activities within this process include:

- Identifying strategic categories based on the strategic plan
- Comparing identified components to the categorization criteria
- Grouping each component into only one category.

Evaluation

This is the process for gathering all pertinent information to evaluate components, with the purpose of comparing them in order to facilitate the selection process. Information is gathered and summarized for each component of the portfolio. The information can be qualitative or quantitative, and comes from a variety of sources across the organization. The data collection is iterated several times, until reaching the required level of accuracy. Graphs, charts, documents, and recommendations are produced to support the subsequent selection process.

Key activities within this process include:

- Evaluating components with a scoring model comprising weighted key criteria
- Producing graphical representations to facilitate decision-making in the selection process
- Making recommendations for the selection process.

Selection

This is the process necessary to produce a short list of components based on the evaluation process recommendations and the organization's selection criteria. The evaluation determines the value of each component and produces a list of components that are ready for prioritization.

Key activities within this process include selecting components based on the evaluation results and comparison to selection criteria. This process will produce a list of components for prioritization.

Prioritization

The purpose of this process is to rank components within each strategic or funding category (e.g., innovation, cost savings, growth, maintenance, and operations), investment time frame (e.g., short, medium, and long-term), risk versus return profile, and organizational focus (e.g., customer, supplier, and internal) according to established criteria. This step ranks the components to support subsequent analysis required to validate and balance the portfolio.

Key activities within this process include:

- Confirming the classification of components in accordance with predetermined strategic categories
- Assigning scoring or weighting criteria for ranking components
- Determining which components should receive highest priority within the portfolio.

Portfolio Balancing

The purpose of this process is to develop the portfolio component mix with the greatest potential, to collectively support the organization's strategic initiatives and achieve strategic objectives. Portfolio balancing supports the primary benefits of portfolio management - the ability to plan and allocate resources (i.e., financial, physical assets, and human resources) according to strategic direction, and the ability to maximize portfolio return within the organization's predefined desired risk profile.

Balancing of activities involves reviewing selected and prioritized portfolio components. The portfolio is then balanced to support established strategic objectives using predefined portfolio management criteria, the organization's desired risk profile, portfolio performance metrics, and capacity constraints. A recommendation for either maintaining the portfolio "as is" or adjusting the portfolio is issued at completion of the balancing activities. In essence, this process includes:

• Adding new components that have been selected and prioritized for authorization

• Identifying components that are not authorized based on the review process

• Eliminating components to be suspended, reprioritized, or terminated based on the review process.

Processes Overview

Review Lifecycle Management (LCM) Plans

An overview of the **Review LCM Plans** process are outlined in the process shown in the figures below. These processes are further expanded in the table below.
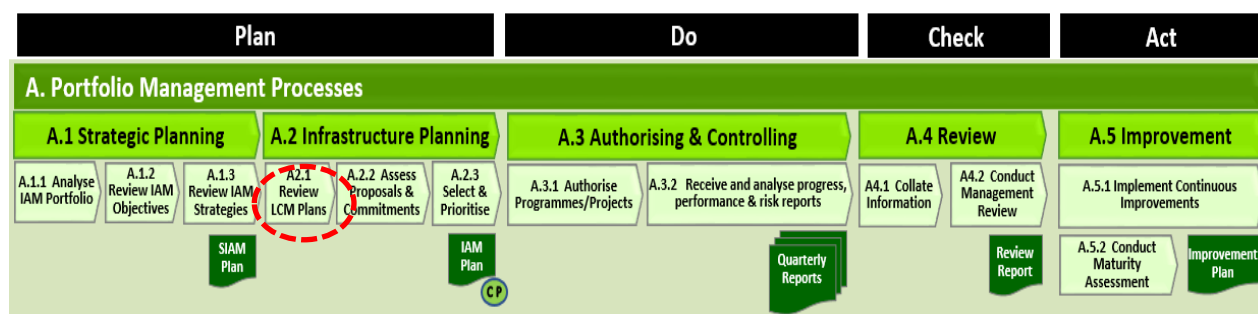
Figure 24: IDM "Placemat" showing only Portfolio Management Processes
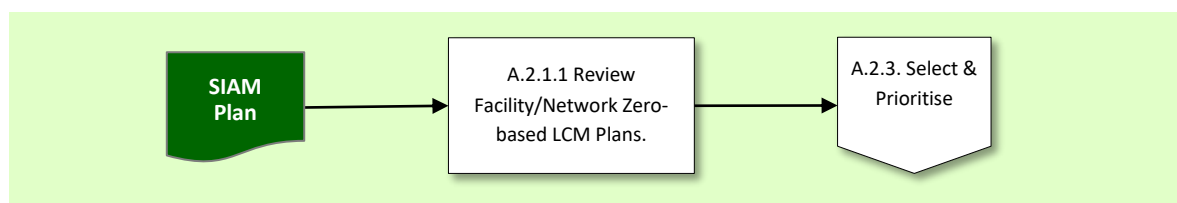
Figure 25: Process Mapping – A.2.1 Review LCM Plans

Table 7: Infrastructure Planning Processes - Review LCM Plans

No.	Process	Definition	Description
A. 2.1	Review LCM Plans.	The objective of the Review LCM Plans is to develop or update facility/network zero-based LCM Plans.	
A. 2.1.1	Review Facility/Network Zero-based LCM Plans.	The process is to update the existing Facility/Network Zero-based LCM Plans by aligning it with the LCM strategies documented in the SIAMP. LCM Plans should be guided by the SIAMP and should be developed for both existing and new facilities in the planning, design or construction stages.	**Step 1:** Review Zero-based operations, maintenance and renewal LCM plans for all existing and proposed facilities/IA networks in accordance with the updated LCM strategies. **Step 2:** Review acquisition and disposal LCM plans for all existing and proposed facilities/IA networks in accordance with the updated LCM strategies.

Assess Proposals and Commitments

An overview of the **Assess Proposals and Commitments** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below.
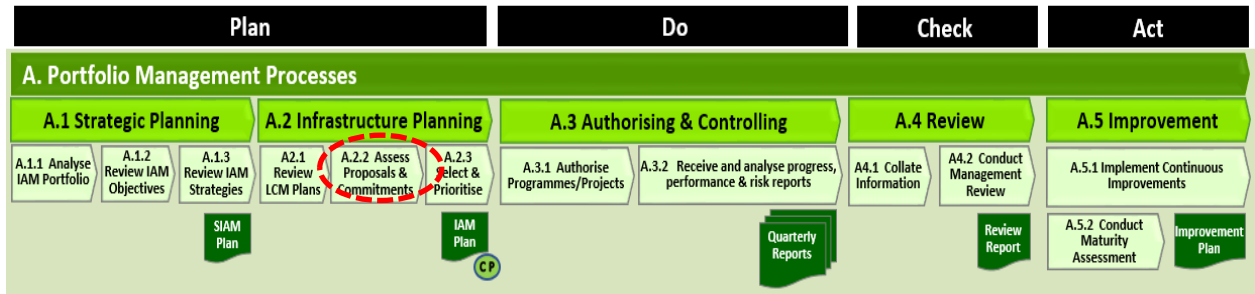
Figure 26: IDM "Placemat" showing only Portfolio Management Processes
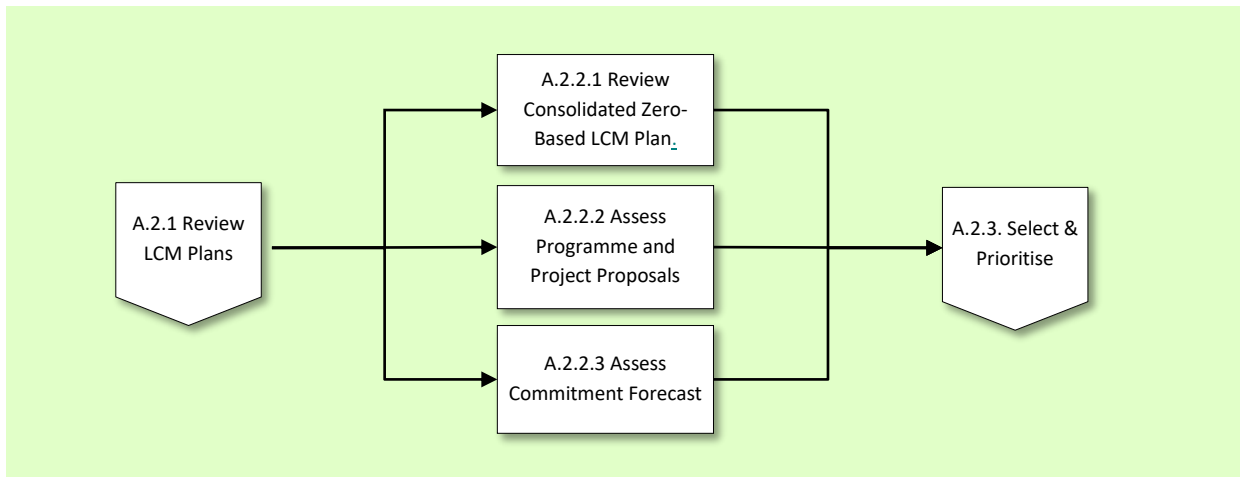
Figure 27: Process Mapping – A.2.2 Assess Proposals and Commitments

Table 8: Infrastructure Planning Processes - Assess Proposals and Commitments

No.	Process	Definition	Description
A.2.2	Assess Proposals and Commitments	The objective of the Assess Commitments and Proposals processes is to assess the availability of funds for the initiation of proposed programmes.	
A.2.2.1	Review Consolidated Zero- Based LCM Plan.	The '*Review Consolidated Zero-Based LCM Plan*' process is to update the existing Consolidated Zero- Based LCM Plan for the management of the portfolio of infrastructure assets in accordance with the OEM requirements. The Consolidated Zero-based LCM Plan is the aggregation of all the Facility LCM Plans (based on Zero-based Maintenance Plans) and aimed at providing a true reflection	**Step 1:** Consolidate zero-based LCM plans at portfolio level. **Step 2:** Determine funding shortfall.

No.	Process	Definition	Description
		of the real cost requirements for the management of the infrastructure asset portfolio.	
A.2.2.2	Assess Programme and Project Proposals	The '*Assess Programme and Project Proposals*' process leads to the updating of the Project Pipeline Register (PPR) based on confirmed alignment of the proposed programmes and projects with the organisation's strategic objectives.	**Step 1:** Assess compliance to the requirements as prescribed **Step 2:** Assess alignment with organisational strategic objectives **Step 3:** Assess affordability and value for money **Step 4:** Assess "State of Readiness" for implementation. **Step 5:** Update Project Pipeline Register (PPR)
A.2.2.3	Assess Commitment Forecast	The '*Assess Commitment Forecast*' process is to determine the impact of current programmes and projects on the availability of funding for the proposed projects and the planned operation and maintenance requirements. The Cashflow Forecast for a project implemented over more than one financial year will provide estimates of the expenditure in each year, i.e. the current year, the next year, and all subsequent years. The estimated expenditure in the next year and each of the subsequent years is defined as being the Commitment Forecast.	**Step 1**: Accept monthly expenditure reports and cashflow projection. (i.e. feedback from Programme Managers on implementation of current programmes and projects). **Step 2:** Update existing Commitment Forecast.

Select and Prioritise

An overview of the **Select and Prioritise** process are outlined in the process maps shown in Figure 35 and 36. These processes are further expanded in the table below.

Figure 28: IDM "Placemat" showing only Portfolio Management Processes
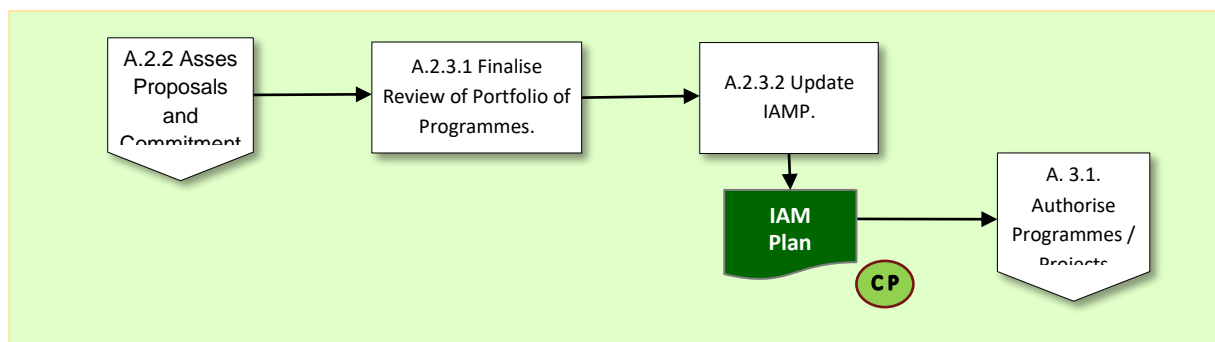
Figure 29: Process Mapping – A.2.3 Select and Prioritise

Table 9: Infrastructure Planning Processes - Select and Prioritise

No.	Process	Definition	Description
A.2.3	Select and Prioritise	The objective of the 'Select and Prioritise' is the culmination of the planning for the Portfolio of Programmes, where decision taken are based on a sequence of well documented assessments and reviews. That ends with an Updated IAM Plan	
A.2.3.1	Finalise Review of Portfolio of Programmes	The 'Select and *Prioritise Programmes and Projects*' is the Planning Finalisation of the Portfolio of Programmes process that leads to the updating of the "MTEF List of Approved programmes and projects" (to be incorporated into the Strategic Programme Brief for each Infrastructure Programme). The recommended infrastructure planning	**Step 1:** Assess updated Commitment Forecast. **Step 2:** Assess Consolidated Zero-based LCM Plans. **Step 3:** Assess funding available for the Maintenance Programme. **Step 4:** Assess funding available for the implementation of 'new' projects during the MTEF Period. **Step 5:** Balance budgets allocation for the Maintenance, Renewals and Acquisition Programmes. **Step 6:** Update MTEF List of Prioritised

		approach assumes that the maintenance of existing facilities/infrastructure assets should have priority when planning and budgeting for infrastructure delivery.	Programmes and Projects. **Step 7:** Update Strategic Programme Briefs.
A.2.3.2	Update IAMP	The *'Update IAMP'* process leads to updating of the existing IAMP. The IAMP is updated in a staged approach, i.e. a "draft" plan as predecessor for a "final" plan with the Draft IAM Plan based on the previous IAM Plan.	**Step 1:** Update LCM Plans (in existing IAM Plan) based on updated MTEF List of Prioritised Programmes and Projects. **Step 2:** Review narrative in existing IAM Plan. **Step 3:** Assess Indicative MTEF Budget (announced in the October Budget Adjustment process). **Step 4:** Review updated LCM Plans (prepared in Step 1). **Step 5:** Assess MTEF Budget (announced in the February Main Budget process). **Step 6:** Accept Budget Allocation Letters. **Step 7:** Prepare updated IAM Plan for approval by the Accounting Officer.

Process Description

The purpose of this section is to describe a recommended approach for Infrastructure Planning, i.e. the process for the development or review of the IAM Plan(s) (see Figure 24). The IAM Plan is defined as a **prioritised list of programmes and projects** to be implemented against a forecasted infrastructure budget over the **prescribed planning period**.

The *prescribed planning period, as* mentioned in the definition above: Is a 'rolling planning period', i.e. if the prescribed planning period is five years, then the plan prepared in 'the current year' should address the five years immediately following on the 'current year', with 'the current year' defined as the year in which the IAM Plan is prepared;

- Should be a minimum of five years, but it varies from one organisation to the next, and is usually prescribed in the organisation's IAM Policy;
- Should build on the three-year MTEF Planning Period as required in the PFMA and the MFMA.

It is recommended that the process be approached as a multi-day planning workshop, or a series of planning meetings, chaired by the Portfolio Manager and/or Programme Managers, aimed at:

- The review of the organisation's IAMP;
- The review of the Organisation's IPMP (as described in Module 7: Programme Management).
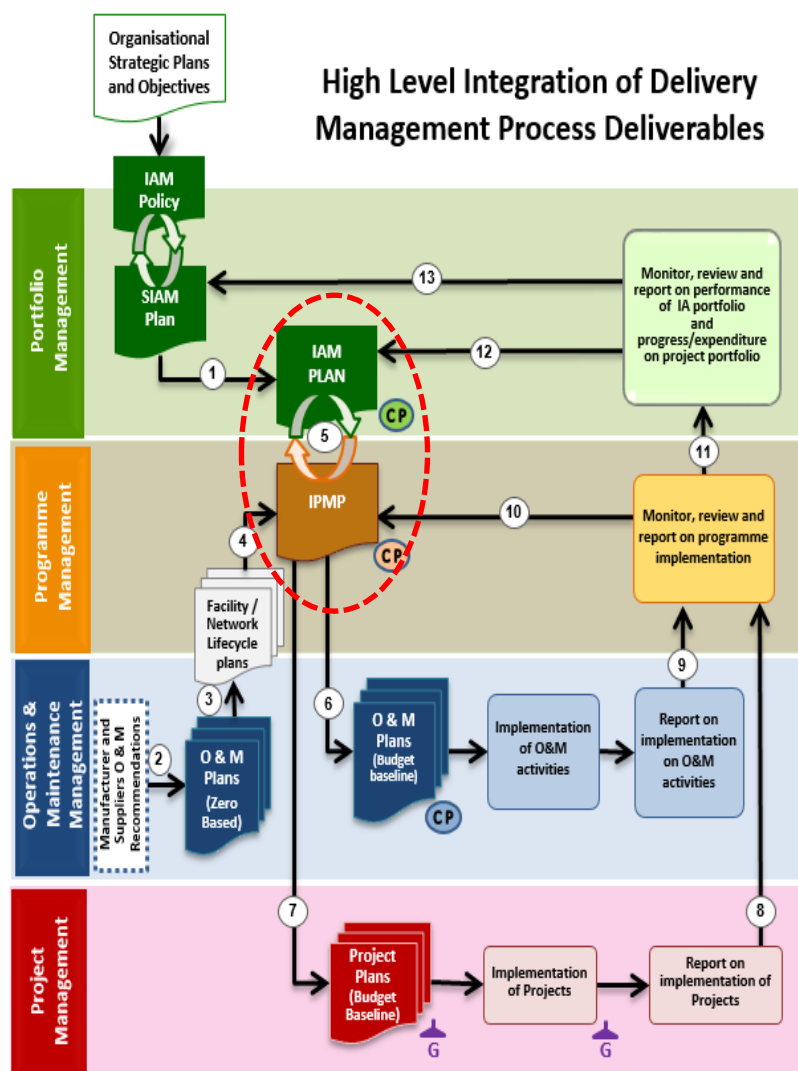
Figure 30: Infrastructure Planning Process
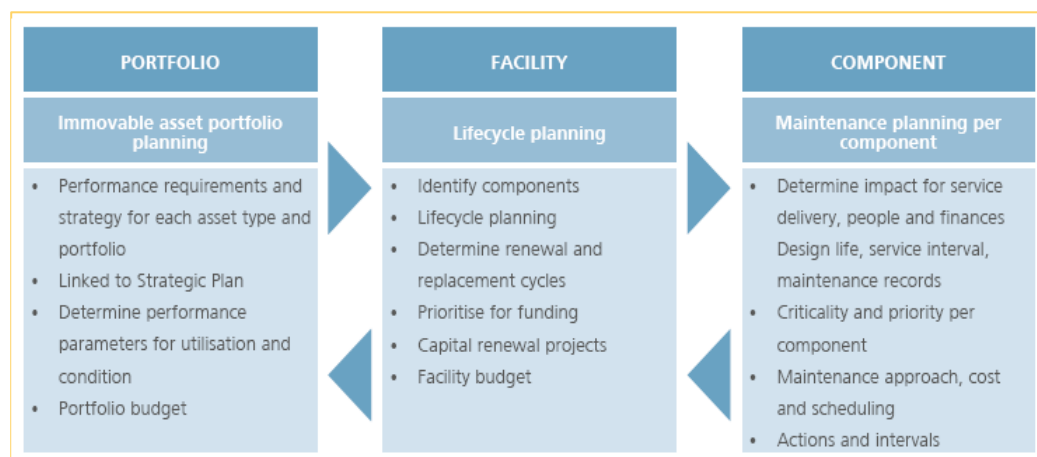
Figure 31: Flow of information between portfolio and facility level (Source: NIAMM Standard)

Consolidated Lifecycle Management Plan

The Consolidated Lifecycle Management Plan is the aggregation of all the Facility Lifecycle Management Plans, based on Zero-based Maintenance Plans, and aimed at providing a true reflection of the real cost

requirements for the management of the infrastructure asset portfolio. The purpose of the **Consolidated Lifecycle Management Plan** is to create a benchmark for the total infrastructure asset funding requirement, and to sensitise top management about the ongoing funding shortfall.

• The Programme View, as shown in Figure 43, is the foundation of the programme management approach, as described in Module 7: Programme Management.

• The Portfolio Funding Requirement, as shown in Figure 44, is normally well in excess of the available funds, as reflected in the MTEF Budget allocation.

The consolidated LCM Plan should:-

1. Assess Consolidated Zero-based Lifecycle Management Plan

2. Assess Programme and Project Proposals
    o   Review State of Readiness of projects
    o   Review the Project Pipeline

3. Assess Commitment Forecast
    o   Committed Projects
    o   Operations, Maintenance and Renewal Commitments

4. Select and Prioritise Programmes and Projects

The Infrastructure Asset Management Plan

Approval of the IAM Plan is a Control Point for Portfolio Management.

Figure 45 shows that infrastructure asset planning is a continuous and iterative process, and that it is developed in a staged approach, i.e. a 'draft' plan as predecessor for a 'final' plan.
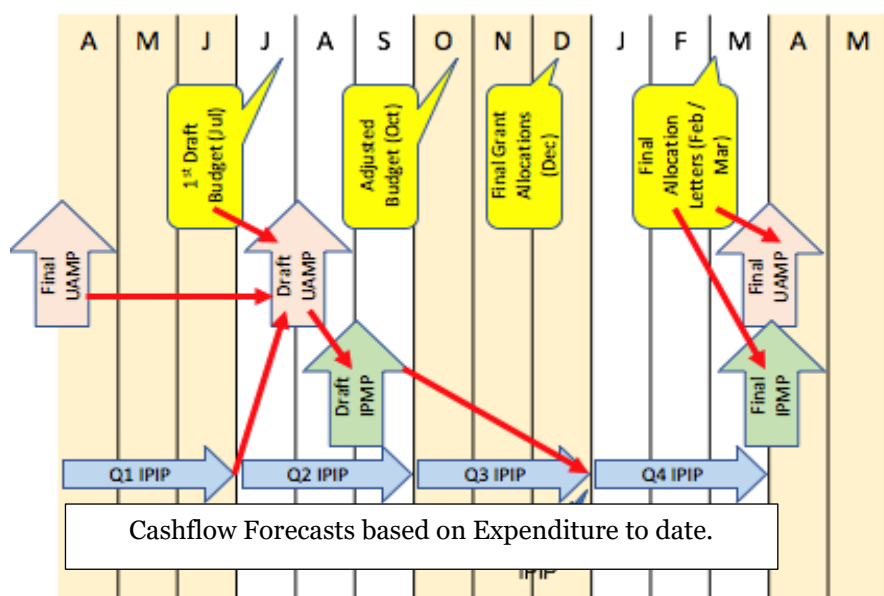
Figure 32: Annual review process

Figure 45 also shows that:

• The Draft IAM Plan is based on the previous IAM Plan;

• The Infrastructure Budget is usually not known when the Draft IAM Plan is prepared and submitted;

• An Indicative Budget is made known during the Budget Adjustment process (October/beginning of the third quarter), at which time the review of the Draft IAM Plan can commence;

• The Final Budget is usually made known, and the Final Allocation Letters posted, in March, at which time the Final Draft of the IAM Plan can be prepared and approved.

Minimum requirements

The minimum requirements for an IAM Plan are as follows:

1. Summary of the
   a. organisation's strategic goals;
   b. key AM policies; and
   c. Political imperatives, i.e. projects proposed by political leaders (usually based on *'promises'* to communities);

2. Levels of service, performance standards and reporting processes;

3. Demand forecasts and management techniques (The demand for additional facilities, etc. based on the demand for public service delivery, upgrading and renewals etc.);

4. Description of the asset portfolio;

5. Description of the Lifecycle management activities for operating, maintaining, renewing, developing and disposing of assets in the asset portfolio for each existing facility, asset network and individual asset, as summarised in the Lifecycle Management Plans;

6. Delivery Management Strategy

7. Prioritised 'MTEF List of Projects' and corresponding Strategic Programme Brief for each Infrastructure Programme, (see guidance on Strategic Programme Briefs in *Section X*);

   a. List the ***proposed*** programmes and projects that have been rejected during the pre-screening process, with a brief motivation for the rejection of the proposals;

   b. List the ***proposed*** programmes and projects to be assessed/approved, for inclusion in the *Final* IAM Plan;

   c. Contain the Proposals and supporting Business Cases for new ***proposed*** programmes and projects;

   d. Provide a summary of the ***proposed*** year-on-year changes to the 'list of programmes and projects';

   e. List the programmes and projects ***proposed*** for implementation over the MTEF Period;

   f. Contain the ***Draft*** Strategic Programme Briefs for the various Infrastructure Programmes;

   g. List the encumbrances, and provide estimated timeframes for resolving the listed encumbrances for the ***proposed*** projects;

   h. List the ***proposed*** projects and associated encumbrances to be resolved as prerequisite for the authorisation or initiation of the said projects.

8. A long-term cash-flow forecast including current commitments, on multiyear projects.

9. Resourcing strategy, i.e. recruitment, training, procurement and ICT requirements;

10. Key AM improvement actions, with resource and timeline requirements.

2.6 Do

Subsection 2.6 Do

Authorisation and Controlling

The purpose of this process is to formally allocate financial and human resources required to either develop business cases or execute selected components and to formally communicate portfolio-balancing decisions.

Activities within this process include:

- Communicating portfolio balancing decisions to key stakeholders, both for components included and those not included in the portfolio
- Authorizing selected components and inactivating or terminating components of the portfolio
- Reallocating budget and resources for inactive and terminated components
- Allocating financial and human resources to execute selected portfolio components
- Communicating expected results (e.g., review cycles, timeline performance metrics, and required deliverables) for each selected component.

The authorisation of projects is linked to their 'State of Readiness' as discussed in section 6.2.1. It should be noted that approval of the Infrastructure Budget (in the MTEC process) is a pre-requisite for the authorisation of projects, but should not be an 'automatic' authorisation. Proper project governance requires that projects included in the approved MTEF Budget proposal, should be assessed in terms of their applicable 'Readiness Requirements' before they may be authorised for implementation.

The purpose of the authorisation process is to formally allocate financial and human resources required to either develop business cases, or execute selected programmes and projects.

Activities within this process include:

- authorising selected programmes and projects;
- inactivating or terminating selected programmes and projects of the portfolio;

- reallocating budget and resources for inactive and terminated programmes and projects;

- allocating financial and human resources to execute selected portfolio programmes and projects;

- communicating portfolio balancing decisions to key stakeholders, both for programmes and projects included, and those not included in the portfolio;

- communicating expected results (e.g. review cycles, timeline performance metrics, and required deliverables) for selected programmes and projects.

The information resulting from the abovementioned processes, should be documented and communicated to the programme managers in the various Strategic Programme Briefs (see Template C6.T01). The programme managers should similarly prepare and issue Project Charters for authorising projects, as described in Module 7 Programme Management.

Process Overview

Authorise Programmes/ Projects

An overview of the **Authorise Programmes/ Projects** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below.
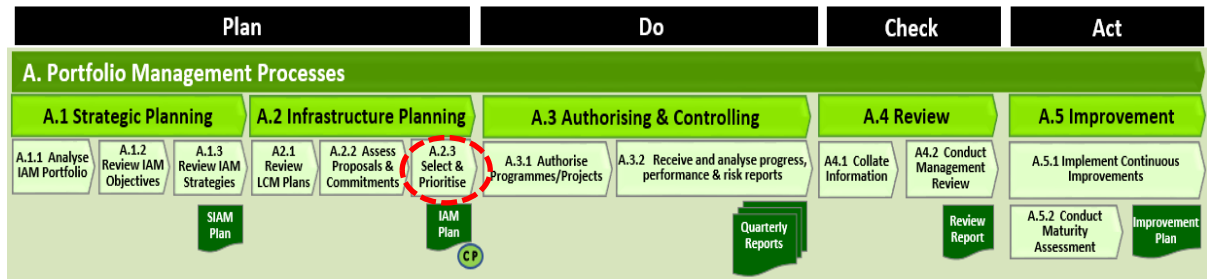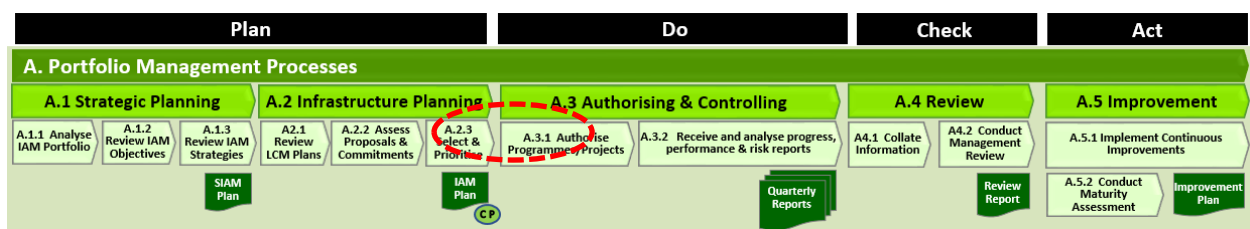

**Figure 33: IDM "Placemat" showing only Portfolio Management Processes**
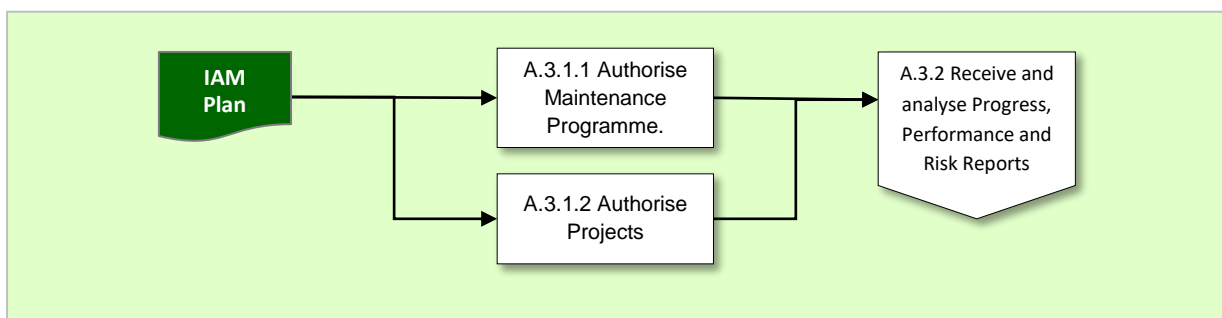
Figure 34: Process Mapping – A.3.1 Authorise Programmes / Projects

Table 10: Authorising and Controlling Process - Authorise Programmes / Projects

No.	Process	Definition	Description
A.3.1	Authorise Programmes / Projects	The objective of the Authorise Programmes and Projects is to formalise the acceptance and approval of all pre-requisites for implementation of the proposed programmes and projects.	
A.3.1.1	Authorise Maintenance Programme	The 'Authorise Maintenance Programme' process is to formally allocate the financial	**Step 1:** Accept approved IAM Plan and associated MTEF Budget Allocation Letters.

No.	Process	Definition	Description
		and human resources required to execute the maintenance programme.	**Step 2:** Update the Maintenance Programme Strategic Brief. **Step 3:** Approve draft Maintenance Programme Charter (see Initiating process in Module 7: Programme Management).
A.3.1.2	Authorise Projects	The objective of the '*Authorise Projects*' process is to formally allocate financial and human resources required to execute selected 'new' projects. The approval of the IAM Plan and the Infrastructure Budget (in the MTEC process) are pre-requisites for the authorisation of 'new' projects but not an "automatic" authorisation of projects. Proper project governance requires that projects included in the approved MTEF Budget proposal, should be assessed in terms of its applicable "Readiness Requirements" before it may be authorised for implementation.	**Step 1:** Accept approved IAM Plan and associated MTEF Budget Allocation Letters. **Step 2:** Update the Renewal, Acquisition and Disposal Programme Strategic Briefs including the updated "List of approved Projects" for the Renewal, Acquisition or Disposal Infrastructure Programmes respectively. **Step 3:** Approve draft Renewal, Acquisition and Disposal Programme Charters (see Initiating process in Module 7: Programme Management).

Receive and analyse Progress, Performance and Risk Reports

An overview of the **Receive and analyse Progress, Performance and Risk Reports** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below

Figure 35: IDM "Placemat" showing only Portfolio Management Processes
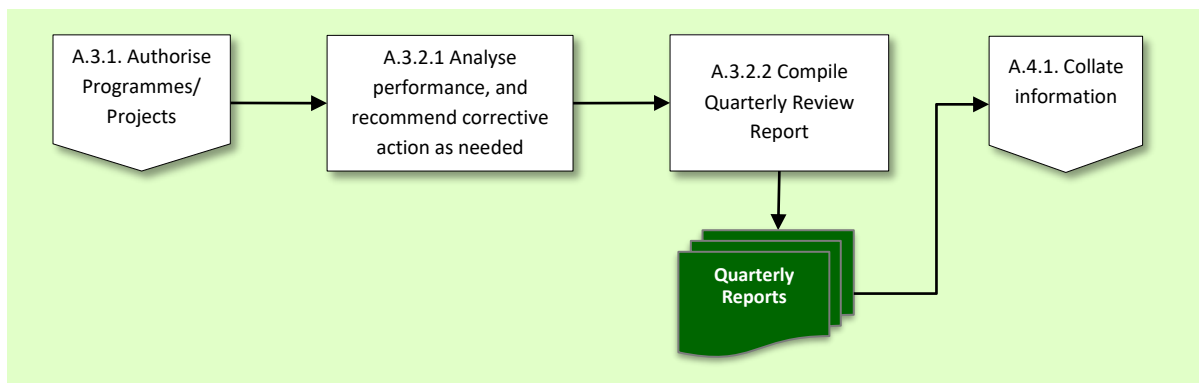
Figure 36: Process Mapping – A.3.2 Receive and Analyse Progress, Performance and Risk Reports

Table 11: Authorise and Controlling Process - Receive and Analyse Progress, Performance and Risk Reports

No.	Process	Definition	Description
A.3.2	Receive and analyse Progress, Performance and Risk Reports.	The objective of the Receive and analyse Progress, Performance and Risk Reports is to analyse performance and risks and update quarterly reports	
A.3.2.1	Analyse performance and recommend corrective action as needed	The objectives of the 'Receive and analyse Progress, Performance and Risk Reports' process are to compare actual performance with planned performance, to analyse variances, to assess trends, to evaluate possible alternatives actions and to recommend	**Step 1:** Accept monthly programme reports, i.e. progress, expenditure, performance and risk reports. **Step 2:** Identify deviations from plan. **Step 3:** Provide instructions and guidance on alternative or

		appropriate corrective action as needed." Performance monitoring is a continuous process. Once a portfolio component (i.e. a programme or a project) is authorized, it becomes the responsibility of the programme/project management to take control of the component and apply the correct management processes to ensure that the work is done effectively and efficiently.	corrective actions as required. **Step 4:** Update the Risk Register
A.3.2.2	Compile Quarterly Review Report	The objectives of the 'Compile Quarterly Review Report' process are to track actual progress and expenditure against the budget at portfolio level and to adjust the portfolio expenditure forecast according to expenditure trends.	**Step 1:** Report on variances. **Step 2:** Assess trends and adjust expenditure forecasts accordingly. **Step 3:** Report on alternative or appropriate corrective action as needed."

Quarterly Review Reports

Both the PFMA and the MFMA specify monthly, quarterly and end-of-year reports, each with specific requirements (financial and non-financial) as prescribed by National Treasury from time to time. Information on grants made under the DoRA must be reported in terms of that Act. The accounting officer effecting the payment must report to the relevant treasury on the funds transferred to each government entity within 15 days of the end of every quarter.

2.7 Check

Subsection 2.7: Check

Performance and Risk Review

The objective of the Performance and Risk Review Process is to review, at planned intervals, the actual performance of the organisation's assets and its asset management system against the planned performance as determined in the planning processes in section 5.2.4, and to review the associated performance risks.

Note: The IDMS Performance and Risk **Management** approach, as documented in Module 10, provides detailed guidance on the performance and risk **review** approach described in this section.

Performance measurement provides an indication of an organisation's performance against its objectives (SANS/ISO 55000).

Performance measures (i.e. KPIs) are established to set performance targets related to the IAM objectives and to indicate how the organisation is performing in terms of achieving these targets (see sections 5.2.4). It should be noted that customer (external) and technical (internal) performance measures, have different purposes. In setting customer performance measures, the focus is on measuring how the customer receives the service and making sure that the organisation is providing customer value. Technical performance measures are focused more on technical criteria, that demonstrate effective organisational performance (SANS/ISO 55000).

At the portfolio level Performance Management is primarily used to determine whether services have been delivered in accordance with the strategic objectives. Performance measurement in terms of achieving strategic objectives should not be done without a review of the strategic risks identified during the strategic planning processes and the associated mitigation plans as documented in the Risk Register.

Process Overview

Collate Information

An overview of the **Collate Information** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below.
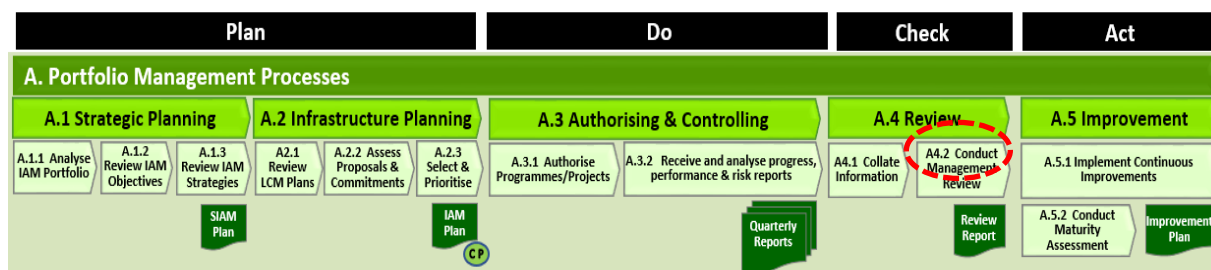
Figure 37: IDM "Placemat" showing only Portfolio Management Processes
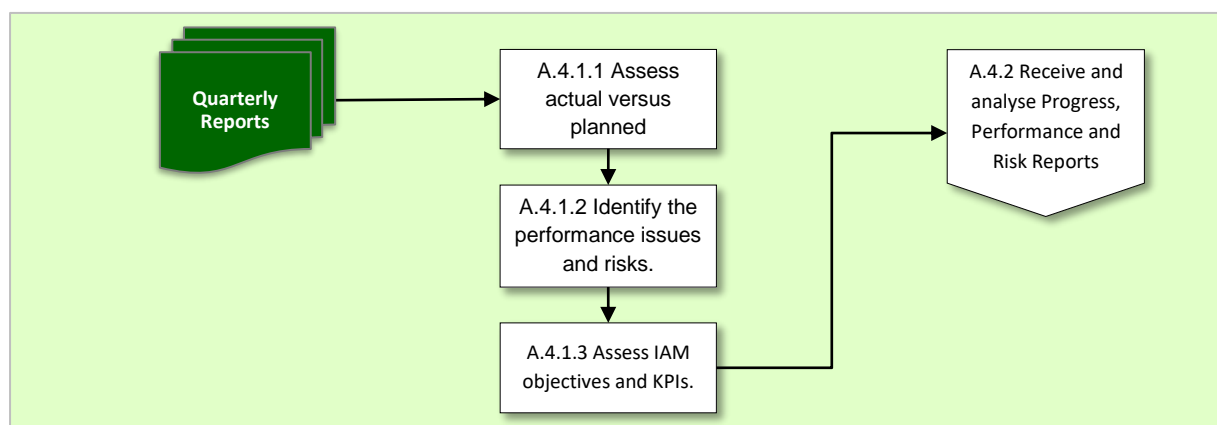
Figure 38: Process Mapping – A.4.1 Collate information

Table 12: Review Process - Collate information

No.	Process	Definition	Description
A.4.1	Collate information.	The objective of the 'Collate information' process is to collate and analyse the documented performance and risk information for consideration in the Management Review Meeting(s).	
A.4.1.1	Assess actual versus planned performance.	The '*Assess actual versus planned performance*' process is to assess actual performance against the planned performance based on analyses of the progress and performance reports.	**Step 1:** Analyse progress and performance reports. **Step 2:** Identify deviations from performance targets.
A.4.1.2	Identify the performance issues and risks.	The '*Identify performance issues and risks*' process is to list the reported performance issues and risks.	**Step 1:** Assess the reported performance issues and risks. **Step 2:** Update the Issue Log and Risks Register.

No.	Process	Definition	Description
A.4.1.3	Assess IAM objectives and KPIs.	The 'Assess IAM objectives and KPIs' process is to propose changes to the stated IAM Objectives and/or the KPIs in line with the identified performance issues and risks.	**Step 1:** Analyse the updated Issue Log and Risks Register. **Step 2:** Assess validity of IAM objectives and KPIs. **Step 3:** Adjust the stated IAM Objectives and/or the KPIs in line with the identified performance issues and risks.

Conduct Management Review

An overview of the **Conduct Management Review** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below
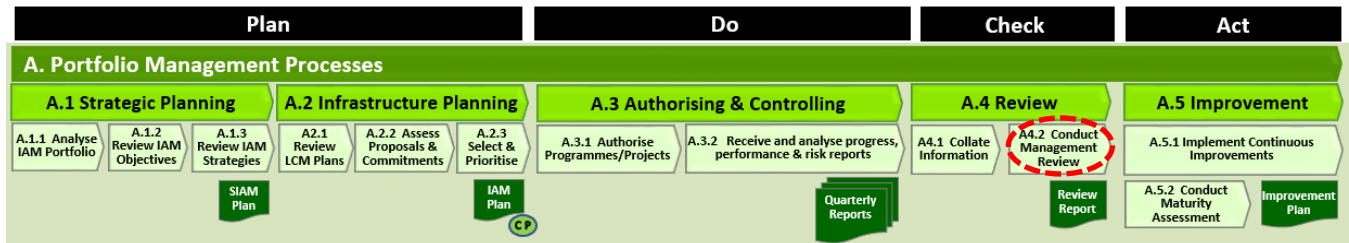
Figure 39: IDM "Placemat" showing only Portfolio Management Processes
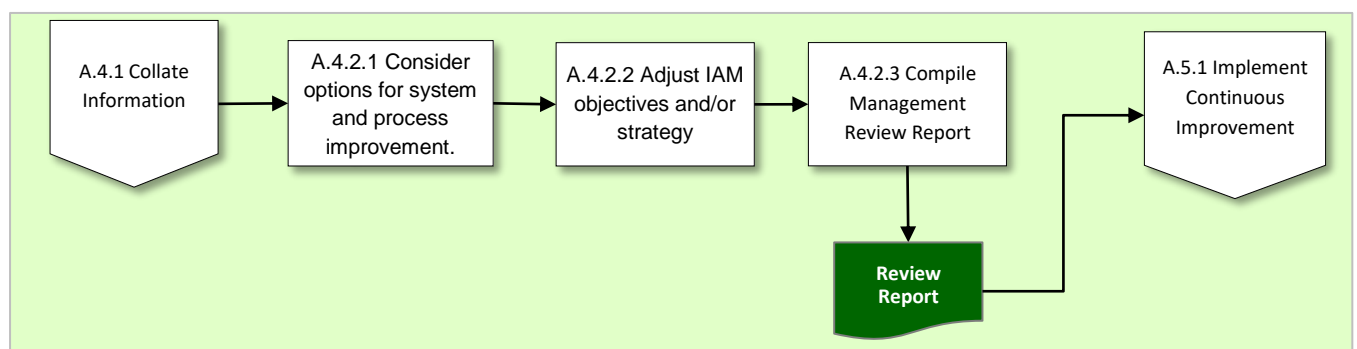
Figure 40: Process Mapping – A.4.2 Conduct Management Review

Table 13: Review Process - Conduct Management Review

No.	Process	Definition	Description
A.4.2	**Conduct Management Review**	**The objective of the Conduct Management Review process is to review, at planned intervals, the performance of the organisation's assets, its asset management system and the associated performance objectives and risks.**	
A.4.2.1	Consider options for system and process improvement.	The '*Consider options for system and process improvement*' process is to consider changes to the management system and /or processes as solutions for the identified performance issues.	**Step 1:** Consider possible system/ and/or process solutions to the performance issues and risks. **Step 2:** Analyse risk versus cost of the options.
A.4.2.2	Adjust IAM objectives and/or strategy.	The '*Adjust IAM objectives and/or strategy*' process is to assess proposed adjustments to the IAM objectives and/or strategies.	**Step 1:** Assess proposed changes to the IAM Objectives and/or KPIs. **Step 2:** Consider adjustment of the LCM Strategies. **Step 3:** Consider adjustment of

			the Delivery Management Strategies.
A.4.2.3	Compile Management Review Report	The objective of the '*Compile Management Review Report*' process is to document the findings of the management review.	Report on: 1. Reviewed Objectives and/or KPIs. 2. Reviewed Risk Register 3. Proposed adjustments to the SIAMP and/or IAM Plan.

The Management Review Report[1]

Conduct Management Review Meeting(s) - The frequency or intervals of management reviews should be defined in the IAM Policy, but the aim is to do a management review at least once a year.

Management action must be appropriate to the level of the measured variance. For example, it would be inappropriate for a strategic level manager to take management action by intervening directly at a project or operational level, based on out-of-scope Impact Level Indicator variances. Management action aimed at addressing the root causes, through possible policy changes or funding changes, would be more appropriate.

Much more direct management actions, aimed at responsible individuals, would, however, be required where input / activity, or output indicator, variances occur for portfolio management work.

Management review meeting minutes should be retained as documented information. Observations, conclusions, and recommendations for further action must be recorded in the minutes. All management reviews must be documented in a Management Review Report.

If any corrective action must be taken, management should follow up to ensure that the action was effectively implemented.

---

[1]

2.8 Act

Subsection 2.8: Act

Improvement

The objective of the Improvement Process is to identify, assess and implement opportunities for improvement across the organisation, through a combination of monitoring and corrective actions for the assets, asset management, or asset management system.

Opportunities for improvement should be identified, assessed and implemented across the organisation as appropriate, through a combination of monitoring and corrective actions for the assets, asset management and asset management system (SANS/ISO 55000 Cl 10.3.1).

Although the opportunities for improvement can be widely different in size and effect, the approach for processing these improvements consists of the following steps:

- identification of improvement needs and potential;
- evaluation of options;
- estimation and determination of financial and non-financial consequences;
- risk assessment and management of change aspects;
- links with decision-making criteria;
- selection and execution;
- tracking of outcomes and review.

Process Overview

Implement Continuous Improvement

An overview of the **Implement Continuous Improvement** process are outlined in the process maps shown in the figures below. These processes are further expanded in the table below.
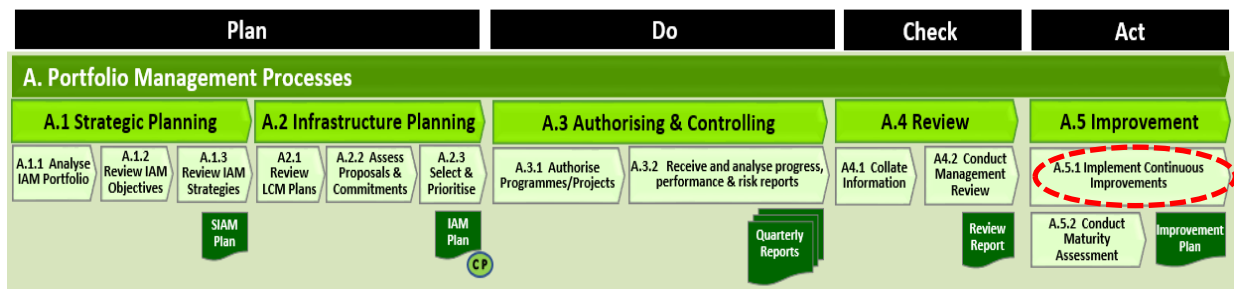
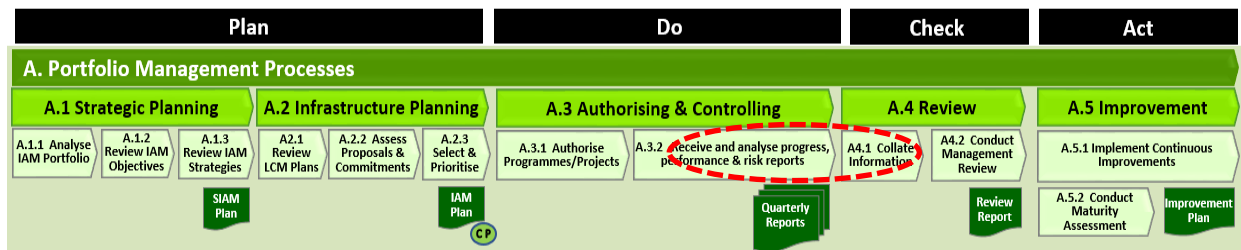**Figure 41: IDM "Placemat" showing only Portfolio Management Processes**
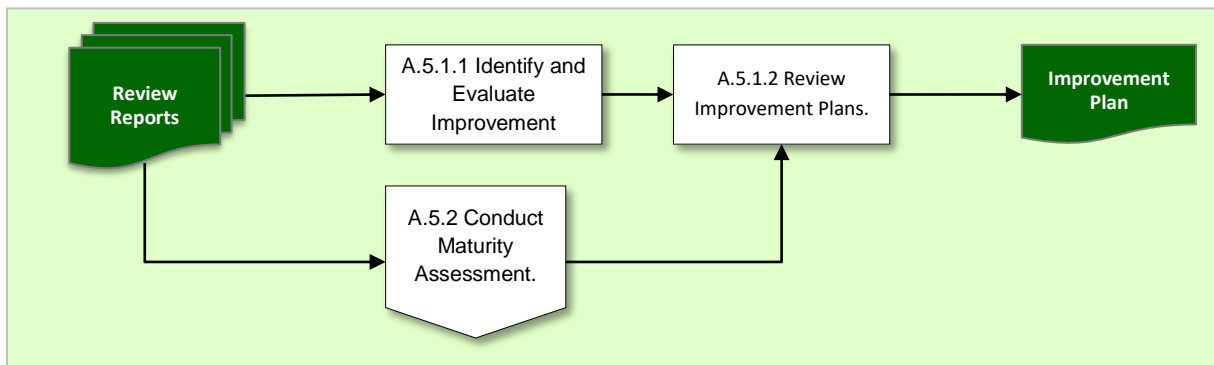
Figure 42: Process Mapping – A.5.1 Implement Continuous Improvement

Table 14: Improvement Process - Implement Continuous Improvement

No.	Process	Definition	Description
A.5.1	Implement Continuous Improvement	The objective of the 'Implement Continuous Improvement' process is to develop, and obtain approval of, the Improvement Plan	
A.5.1.1	Identify and Evaluate Improvement Opportunities	The 'Identify Continuous Improvement opportunities' process is aimed at the continuous and incremental improvement of the portfolio management function.	**Step 1:** Identification of improvement needs and potential **Step 2:** Evaluation of options **Step 3:** Estimation and determination of financial and non-financial consequences **Step 4:** Risk assessment and management of change aspects **Step 5:** Links with decision-making criteria **Step 6:** Selection and execution **Step 7:** Tracking of outcomes and review.

No.	Process	Definition	Description
A.5.1.2	Review Improvement Plans	The objective of the '*Review Improvement Plan*' process is to update the existing Improvement Plan that serves as the base for the subsequent review of the SIAMP.	**Step 1:** Assess Management Review Report. **Step 2:** Assess Updated Maturity Assessment. **Step 3:** Accept continuous improvement proposals and actions. **Step 4:** Update Improvement Plan.

Conduct Maturity Assessment

An overview of the **Conduct Maturity Assessment** process are outlined in the process maps shown in Figure 57 and 58. These processes are further expanded in the table below.
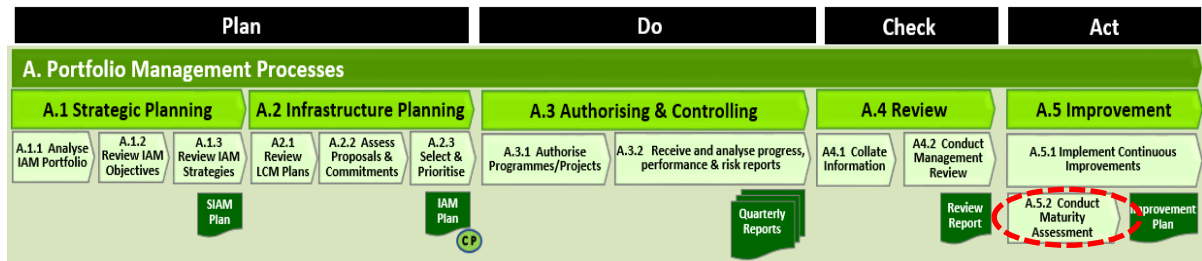
Figure 43: IDM "Placemat" showing only Portfolio Management Processes
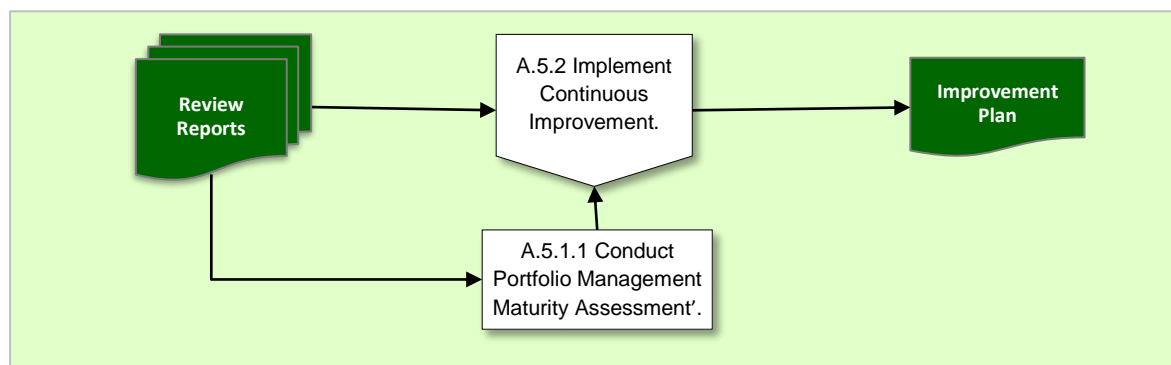
Figure 44: Process Mapping – A.5.2 Conduct Maturity Assessment

Table 15: Improvement Process - Conduct Maturity Assessment

No.	Process	Definition	Description
A.5.2	Conduct Maturity Assessment	The objective of the 'Conduct Maturity Assessment' process is to develop, and obtain approval of, the Improvement Plan	
A.5.2.1	Conduct Portfolio Management Maturity Assessment'	The '*Conduct Portfolio Management Maturity Assessment*' process is aimed at the periodic assessment and benchmarking of the organisation's infrastructure asset management processes maturity against an agreed Maturity Index to identify opportunities for improvement of the management processes. National Treasury's Infrastructure Progression Model (IPM, developed in 2017) is a capability and maturity model for infrastructure delivery management in the provincial sphere of government. The implementation requirements for the IPM is provided in C6.G14.	**Step 1:** Agree on levels of maturity as documented in the Maturity Index. **Step 2:** Agree on targeted maturity level. **Step 3:** Conduct Maturity Assessment. **Step 4:** Assess maturity rating against targeted maturity level on Maturity Index.

2.9 Exercises

Subsection 2.9: Exercises

Exercise 1 - Consolidated Lifecycle Management Plan

The Consolidated Lifecycle Management Plan is the aggregation of all the Facility Lifecycle Management Plans, based on Zero-based Maintenance Plans, and aimed at providing a true reflection of the real cost requirements for the management of the infrastructure asset portfolio. The purpose of the **Consolidated Lifecycle Management Plan** is to create a benchmark for the total infrastructure asset funding requirement, and to sensitise top management about the ongoing funding shortfall.

• The Programme View, as shown in Figure 43, is the foundation of the programme management approach, as described in Module 7: Programme Management.

• The Portfolio Funding Requirement, as shown in Figure 44, is normally well in excess of the available funds, as reflected in the MTEF Budget allocation.

The consolidated LCM Plan should:-

1. Assess Consolidated Zero-based Lifecycle Management Plan

2. Assess Programme and Project Proposals
   - o   Review State of Readiness of projects
   - o   Review the Project Pipeline

3. Assess Commitment Forecast

- o   Committed Projects
- o   Operations, Maintenance and Renewal Commitments

```




```

4.   Select and Prioritise Programmes and Projects

```



```

Exercise 2 – Infrastructure Asset Management Plan

The minimum requirements for an IAM Plan are as follows:

1.   Summary of the

   a.   organisation's strategic goals;

   b.   key AM policies; and

   c.   Political imperatives, i.e. projects proposed by political leaders (usually based on *'promises'* to communities);

List Strategic Goals?

List ALL policies that will impact on IAM?

Where can the accessed?

How often Updated?

2.   Levels of service, performance standards and reporting processes;

Where can they be accessed?

List Performance standards?

List reporting processes?

3.   escription of the asset portfolio;

Describe:-

4.   Description of the Lifecycle management activities for operating, maintaining, renewing, developing and disposing of assets in the asset portfolio for each existing facility, asset network and individual asset, as summarised in the Lifecycle Management Plans;

Describe Activities:-

Operating,

Maintaining,

Renewing,

Acquisition

Disposing

5.   Delivery Management Strategy - A Delivery Management Strategy indicates how these needs are to be met for each category of expenditure and lifecycle management strategies (in form of infrastructure programmes).

Demand for infrastructure assets:- Demand forecasts and management techniques

Strategic infrastructure risks

Availability of funds

Identification of suitably capacitated human resources. Resourcing strategy, i.e. recruitment, training, procurement and ICT requirements

6.   Prioritised 'MTEF List of Projects' and corresponding Strategic Programme Brief for each Infrastructure Programme, (see guidance on Strategic Programme Briefs in *Section X*);

List proposed programmes and projects that have been rejected

List the *proposed* programmes and projects to be assessed/approve

Proposals and supporting Business Cases for new *proposed* programmes and projects

Summary of the *proposed* year-on-year changes to the 'list of programmes and projects

programmes and projects *proposed* for implementation over the MTEF Period;

Contain the *Draft* Strategic Programme Briefs for the various Infrastructure Programmes

List the encumbrances, and provide estimated timeframes for resolving the listed encumbrances for the *proposed* projects - encumbrances to be resolved as prerequisite for the authorisation or initiation of the said projects

A long-term cash-flow forecast including current commitments, on multiyear projects

Key AM improvement actions, with resource and timeline requirements

Section 3: Programme Management

3.1 Introduction

Section 3: Programme management

Subsection 3.1: Introduction

Overview

The primary purpose of this subsection is to is to provide an overview of Programme Management in the public sector, in order to realise the following benefits for the reader:

- understand the programme management processes;
- understand the benefits of programme management;
- understand the requirements of infrastructure programmes;
- understand programme management performance and risks;
- provide infrastructure programme estimating, budgeting and prioritisation;
- create alignment between infrastructure planning and budget cycles;
- understand Programme Resourcing in the context of Programme Management processes;
- prepare a Delivery Plan and an Infrastructure Procurement Strategy.

By the end of the training on this section you should:

- Will understand the **context** of the Programme Management module of the IDMS
- Will have knowledge of the **key concepts** and components of best practice Programme Management
- Will have knowledge on the performance management elements that relate to infrastructure Programme Management;
- Will understand the monitoring and controlling requirements for infrastructure Programme Management.
- Will know what is expected of Executives to **institutionalise** the IDMS across your Municipality

Context within the IDMS

This subsection focuses on the Programme Management component of Infrastructure delivery Management processes.
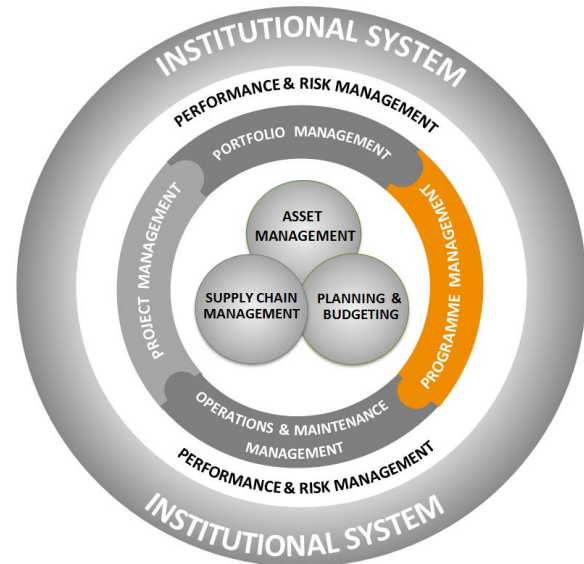
Figure 45: Programme Management in the IDMS Concept Diagram

The IDM Processes Placemat - Highlighting Portfolio Management Processes, the figure below shows:

- the major delivery management processes and deliverables;
- the lifecycles and Control System for the delivery management processes;
- alignment of the Programme Management Lifecycle with the Plan-Do-Check-Act management cycle.

Figure 46: IDM Processes Placemat - Highlighting Programme Management Processes

Program and project management each measure actual-to-planned schedule, effort, and budget for individual components to anticipate potential problems and to ensure corrective action is occurring, and reports this analysis to portfolio management. This information is used in portfolio reviews to determine required actions. Program and project management may work together with portfolio management to determine "go/no go" criteria for proposed and current components, including "termination criteria" (phase gates). Program and project management may work together with portfolio management in capacity planning by inputting resource requirements (e.g., human resources, financial, and physical assets).

Portfolios rely on projects (either standalone or within programs) in order to achieve their strategic intent. For this reason, they are all interconnected by the sharing and allocation of goals and resources. Regularly scheduled reviews and planned, continuous communication among project management, program management, or portfolio management ensures that the appropriate resources are allocated to their assigned, authorized portfolio components.

Table 16: Linkages between Portfolios, Programmes and Projects

PROJECT	PROGRAMS	PORTFOLIOS
Projects have a narrow scope with specific deliverables.	Programs have a wide scope that may have to change to meet the benefit expectations of the organization.	Portfolios have a business scope that changes with the strategic goals of the organization.
The pA programme is defined as a "temporary structure of interrelated programme components managed together, that provides advantages, contributes to the achievement of strategic and operational objectives, and realizes benefits". Programme Management is defined as the "coordinated activities to direct the interrelated programme components, to achieve objectives and to realize benefits". project manager tries to keep change to a minimum.	Program managers have to expect change and even embrace it.	Portfolio managers continually monitor changes in the broad environment.

Success is measured by budget, on time, and products delivered to specification.	Success is measured in terms of Return On Investment (ROI), new capabilities, and benefit delivery.	Success is measured in terms of aggregate performance of portfolio components.
Leadership style focuses on task delivery and directive In order to meet the success criteria.	Leadership style focuses on managing relationships, and conflict resolution. Program manager's need to facilitate and manage the political aspects of the stakeholder management.	Leadership style focuses on adding value to portfolio decision-making.
Project managers manage technicians, specialists, etc.	Program managers manage project managers.	Portfolio managers may manage or coordinate portfolio management staff.
Project managers are team players who motivate using their knowledge and skills.	Program managers are leaders providing vision and leadership.	Portfolio managers are Leaders providing insight and synthesis.
Project managers conduct detailed planning to manage the delivery of products of the project.	Program managers create high-level plans providing guidance to projects where detailed plans are created.	Portfolio managers create and maintain necessary process and communication relative to the aggregate portfolio.
Project managers monitor and controls tasks and the work of producing the projects products.	Program managers monitor projects and ongoing work through governance structures.	Portfolio managers monitor aggregate performance and value indicators.

Alignment with SANS/ISO 55000 Asset Management System

The figure below shows how the 'key elements of an asset management system' (as in SANS/ISO 55000 Standard for Asset Management) has been adapted for IDMS purposes.
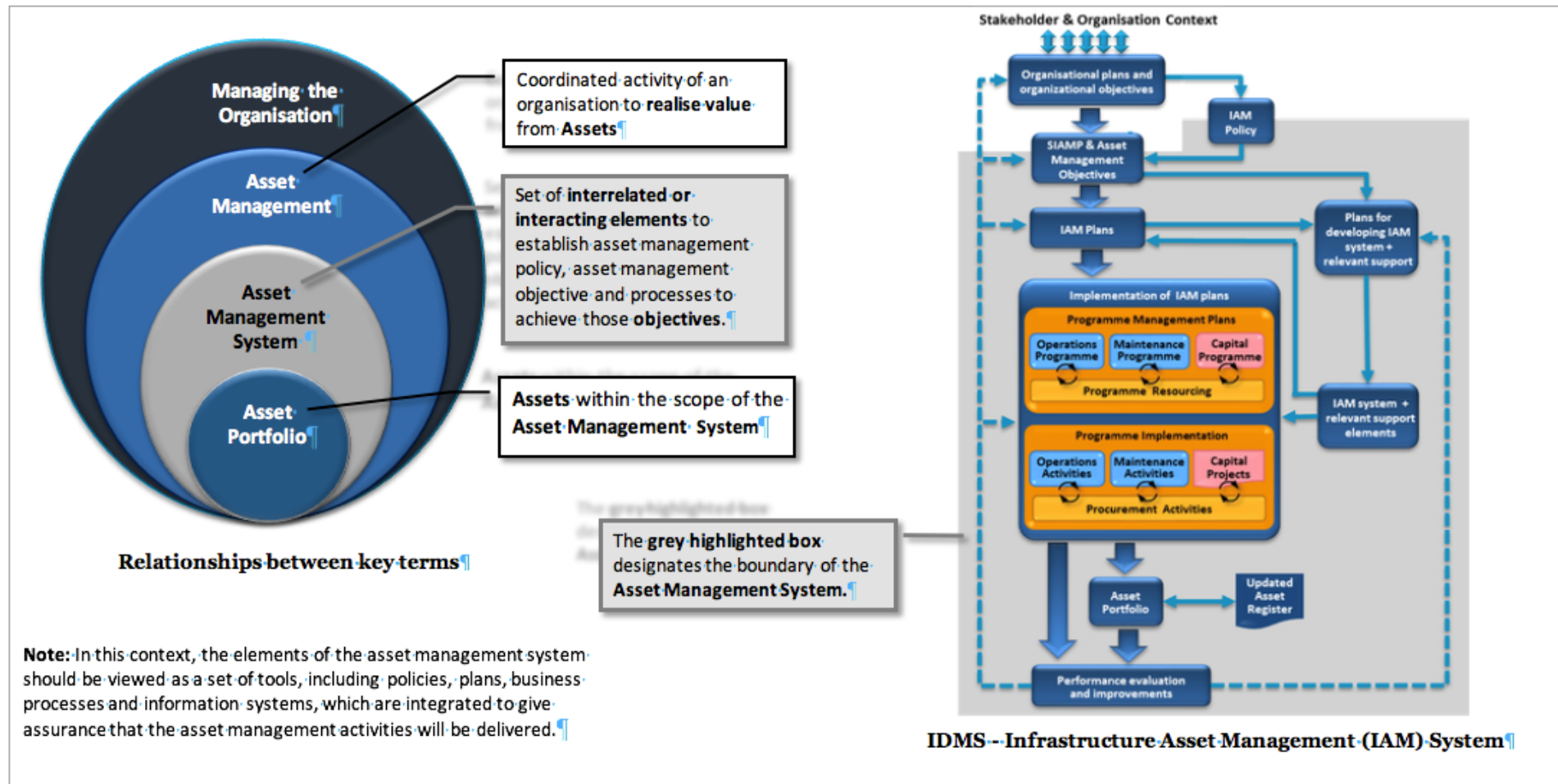
Figure 47: IDMS adaptation of SANS/ISO 55000 elements of an asset management system

The figure below shows alignment of the adapted SANS/ISO 55000 'key elements of an asset management system (shown in Figure 3) with the IDM Processes shown on the IDM Placemat, e.g.

- Portfolio Management Processes focused on strategic decision making;
- Programme Management Processes focused on tactical decision making
- Operations and Maintenance Processes and Project Management Processes aimed at operational decision making.
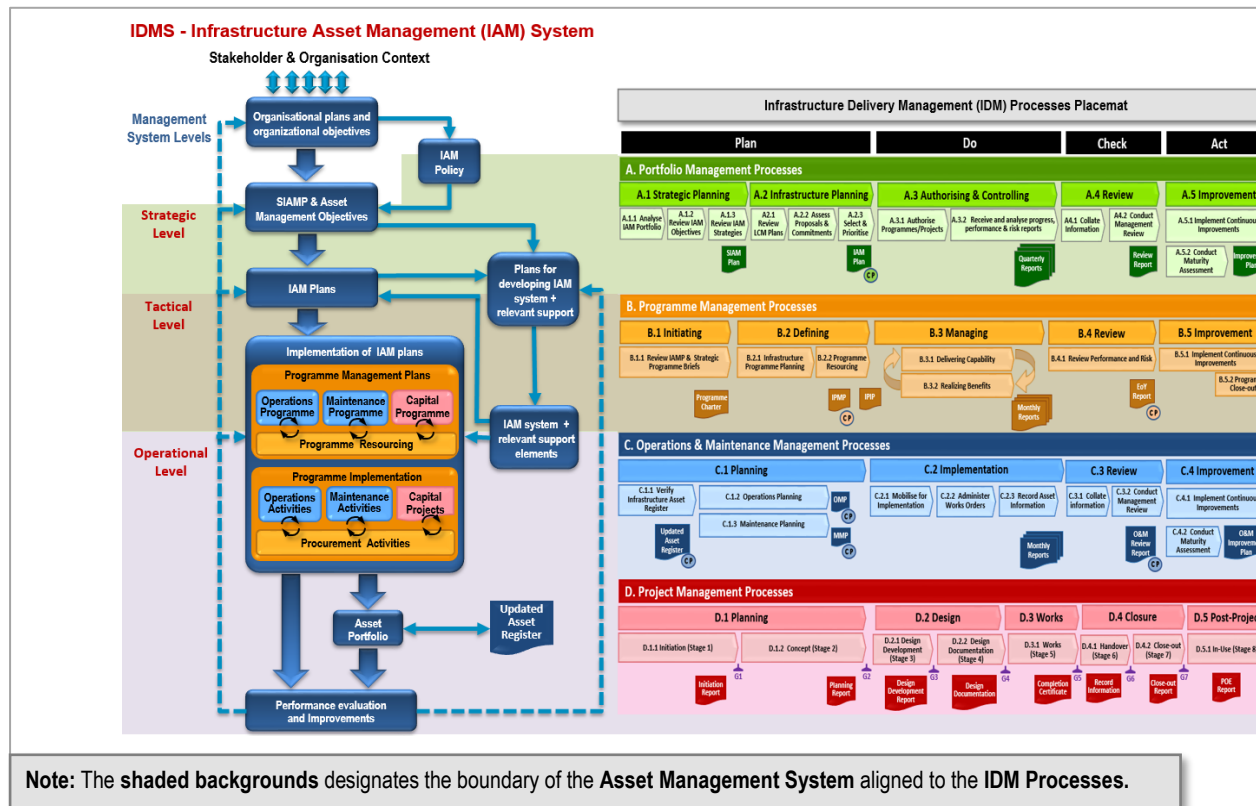
Figure 48: The Asset Management System aligned to the IDM Processes Placemat

Module 3 – Infrastructure Delivery Management Processes

Definitions

SANS 21503, (First Edition 2017-08), defines a **programme** as a "temporary structure of interrelated programme components managed together that provides advantages, contributes to the achievement of strategic and operational objectives, and realizes benefits". It further defines a **programme component** as "project, programme or other related work".

It is important to recognise that infrastructure **programmes within the IDMS** are comprised of various components. These components are primarily concerned with the operations and maintenance of an organisation's infrastructure, as well as the acquisition of new infrastructure, through the delivery of projects. However, another component is the management effort and resources (people, processes and technology), required to deliver these programmes. Thus, programmes may include components of related work (e.g. managing the programmes), which are outside the scope of the distinct operations, maintenance and projects in a programme.

The PMI Standard for Program Management (Fourth Edition 2017), defines a **programme** as "related projects, subsidiary programs, and program activities managed in a coordinated manner to obtain benefits not available from managing them individually". A **benefit** is described as "the gains and assets realized by the organization and other stakeholders as the result of outcomes delivered by the program". Programmes of grouped operations, maintenance and projects, are intended to **deliver benefits** to organizations, by enhancing **current capabilities** or developing **new capabilities** for the organization to use.

Within the South African government context, infrastructure programmes are a means of achieving organizational strategic goals and objectives, often in the context of the organisation's strategic plan. Certain progress, as related to maintenance activities and project delivery outputs, can provide useful incremental benefits to the organization, before the programme is completed.

SANS 21503 defines **programme management** as *"coordinated activities to direct the interrelated programme components* (3.3) *to achieve programme objectives and to realize benefits"*; whereas, the definition included within the PMI Standard for Program Management is *"the application of knowledge, skills, and principles to a program to achieve the program objectives and to obtain benefits and control not available by managing program components individually"*.
The PMI further defines as follows:

- **Program Management Plan:** "*a document that integrates the program's subsidiary plans and establishes the management controls and overall plan for integrating and managing the program individual components"*.

- **Programme Manager:** *"the individual authorized by the performing organization to lead the team or teams responsible for achieving program objectives"*. In the **context of**

governance (see below), this role interfaces with the programme steering committee and sponsor (funder), and manages the programme to ensure the delivery of the intended **benefits. Governance** within the programme management environment is critical to achieving objectives. The PMI Standard for Program Management defines **programme governance** as *"the framework, functions, and processes by which a program is monitored: managed and supported in order to meet organizational strategic and operational goals"*. SANS 21505, (First Edition 2017-03), notes that *"governance of programmes should be supported by processes, procedures and standards as appropriate for governance requirements"*. **Through structured governance** and processes, programme management enables appropriate planning, scheduling, executing, monitoring, and controlling of the operations and maintenance activities, as well as the delivery of projects within the various programme components. Programme management provides a framework for managing related programmes, considering available resources.

Acquisitions, operations and maintenance within a programme are related through a common outcome, or a collective capability, that is delivered. In programmes, it is important to identify, monitor and control the interdependencies among the components. Programme management focuses on these interdependencies and helps to determine the optimal approach to managing them. Actions related to these interdependencies may include:

- Coordinating the planning, budgeting and procurement of work components or phases, as determined in the construction or maintenance of facilities;
- For internal programmes, resolving resource constraints and/or conflicts that affect multiple projects within a programme;
- Mitigating risk activities that run across components;
- Evaluating performance;
- Aligning the strategic direction of organisations, that affects projects and programme goals and objectives;
- Resolving issues and scope/cost/schedule/quality changes, within a shared governance structure.

Through structured governance, programme management enables appropriate planning, scheduling, executing, monitoring, and controlling, across the operations, maintenance and acquisitions within the programme.

Programme management life cycle

The PMI's *Standard for Programme Management* (4th Edition, 2017) describes a **Programme life cycle** as non-sequential, due to the nature of a programme's delivery phase. This is managed through the application of the **cyclical processes of Initiating, Defining, Managing, Review and Improvement**, as contained within the IDM Control Cycle for Programme Management, described in section 3.5. In an infrastructure programme, the iterative pursuit of components is expected to produce a stream of outputs and outcomes that contribute to organizational benefits. The PMI defines a 'benefit' as "the gains and assets realized by the organization and other stakeholders as the result of outcomes

delivered by the program". Programme benefits may be realized incrementally throughout the duration of the programme, or may be realized at, or after, the end of the programme i.e. closure.

Infrastructure programmes function similarly to infrastructure projects, in that the programme is defined, benefits are delivered, and the program is closed. However, unlike projects, programmes involve the coordination and sequencing of multiple components, above what is required at an individual project level. The activities executed within the programme life cycle are dependent on the specific type of programme, and typically begin before funding is approved, or when the Programme Manager is assigned. There is often considerable effort expended, at a Portfolio and Programme Management level, prior to defining and approving a programme (see IDM Toolkit Module 6: Portfolio Management).

During programme delivery, components are authorized, planned and executed, and benefits are delivered. The PMI's *Standard for Programme Management* (4th Edition, 2017) recommends that the programme closure is approved by a *"programme steering committee"* when the desired benefits or programme objectives have been realized, or the steering committee has determined that the programme should be terminated. Reasons for early termination may include a change in organizational strategy, with which the infrastructure programme is no longer aligned, or an assessment that the planned benefits may no longer be achievable.

Programme management plans

An assessment of an organisation's portfolio of infrastructure assets leads to the identification of a 'portfolio of work', i.e. the portfolio of infrastructure programmes to be carried out to ensure that the infrastructure assets provide the required level of service in the most cost-effective manner. The '**portfolio of work'** is divided, for management purposes, into five **'infrastructure programmes'** (to differentiate from all other programmes in the public service), each with distinct objectives in terms of the asset lifecycle management requirements, as illustrated in the figure below.
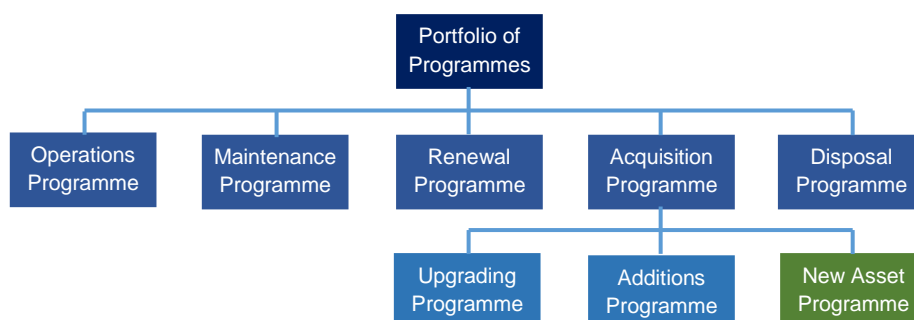
Figure 49: Portfolio of Programmes

The Infrastructure Programme strategies are identified at the Portfolio level and documented in the Infrastructure Asset Management Plan (IAMP). In the Portfolio level planning process, Portfolio Management and Programme Management must go through an iterative planning and consultative

processes. This includes investigating short and long term asset implication decisions, where the usefulness and benefits of each asset is considered, leading to a consolidation and prioritization process, for the long and short term, that ultimately identifies the infrastructure programmes to be budgeted for over the forthcoming MTEF.

The decisions taken during this iterative planning process are documented in the Infrastructure Programme Management Plan (IPMP). The process that follows the IPMP planning, places greater emphasis on short to medium term programme requirements, with special attention being paid to those programmes that are committed in the current MTEF period.

The figure below illustrates the high-level integration of delivery management process deliverables, and shows:

- how the programme management plans are central to the IDM processes;
- how the IPMP incorporates the Lifecycle Plans contained in the IAMP;
- the linkages between portfolio / programme / operations & management and project management processes.
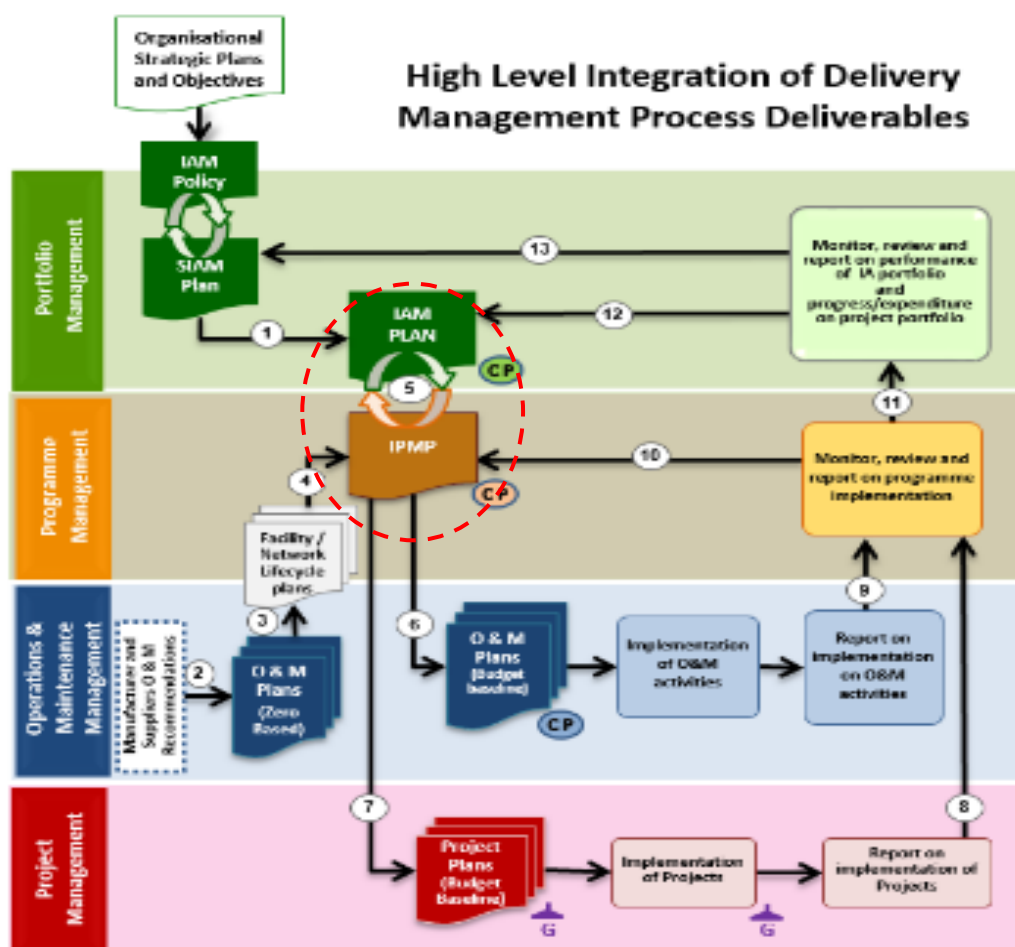
Figure 50: High-level integration of Delivery Management Processes

The figure below indicates the role that Programme Management Plans play in the overall context of infrastructure delivery.
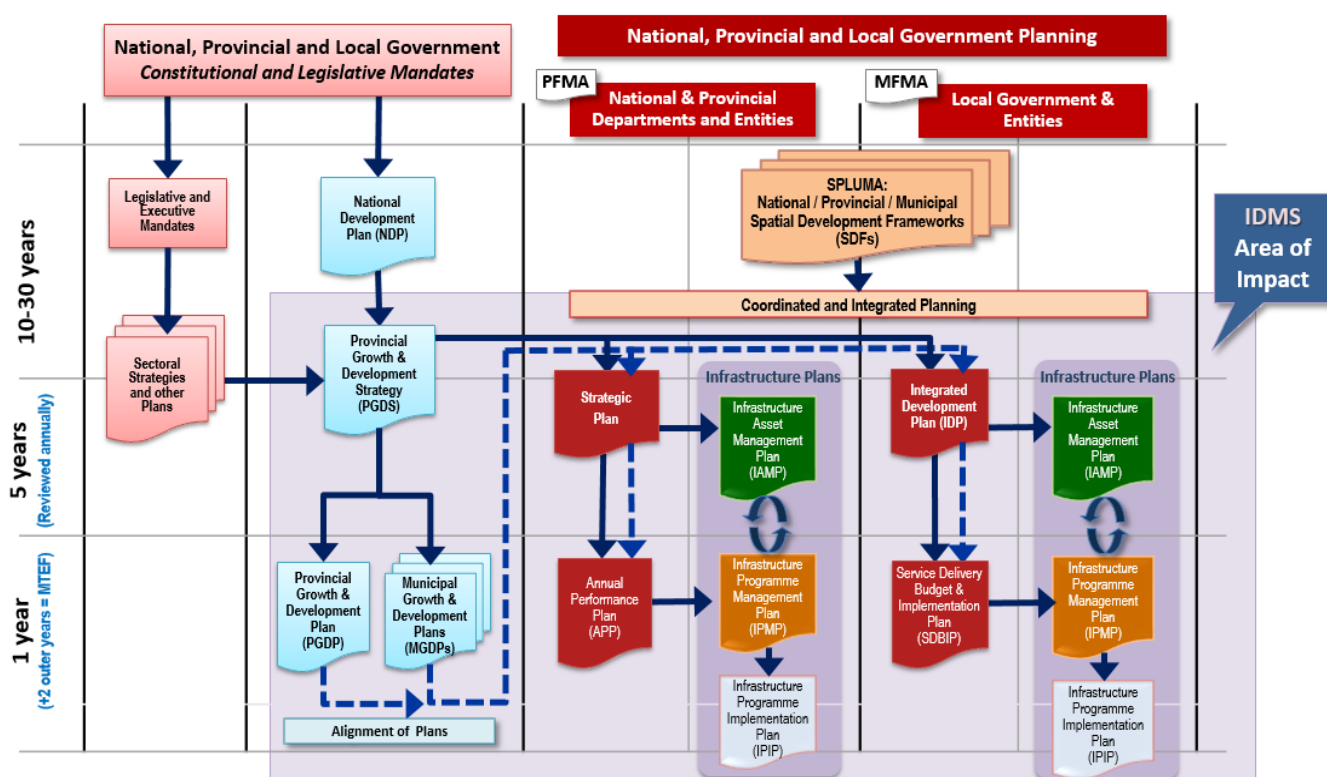
Figure 51: Alignment of the Programme Management Plans in context of infrastructure delivery

3.2 Control Cycle for Programme Management

Subsection 3.2 Control Cycle for Programme management

Public Sector programme processes are **cyclical in nature,** informing and being informed by each other, on an ongoing basis. The cyclical reference is also enforced by the alignment of Infrastructure Delivery Management processes to Government's Planning and Budgeting Cycles. These alignment processes are commonly referred to as the '**Alignment Model'** (see IDM Toolkit Module 4 – Planning & Budgeting). Moreover, the deliverables associated with these processes, for example, contain lists of projects and activities, some already at implementation, some planned for implementation in the MTEF / MTREF, and some only planned for implementation in many years' time.

The Programme Management Control Cycle should be implemented in accordance with the following principles:

- The Control Cycle for Programme Management prescribes five processes, which cover the full spectrum of work and management activities encountered on infrastructure programmes; namely
  - Initiating;
  - Defining;
  - Managing;
  - Review;
  - Improvement;
- Additional processes may be added to the Control Cycle, if deemed necessary. This may be particularly important in the Managing Process, which is generally the longest and costliest part of the implementation of a programme. Thus, the introduction of what could be seen as a monitoring sub-process is advisable. Such a sub-process could include, for example,

monitoring and oversight activities necessary to ensure that programme management activities are appropriately carried out by Implementer the;

- The Control Cycle for Programme Management Phases is ongoing and repeated annually;
- The phases of the Control Cycle for Programme Management should be developed in line with organisation's Infrastructure Planning and Budgeting cycle.

A **Control Point (CP) Deliverable,** specified in the Programme Management Control Cycle, supports Legislative requirements including DoRA and the MFMA.

Figure 52: Infrastructure Programme Management Processes

Table 17: Programme Management Control Cycle

Table 3: Programme Management Control Cycle		
Process	**Control Cycle**	
Name	**Control Point CP Deliverable**	**Description**
B.2 Defining	Infrastructure Programme Management Plan (IPMP)	The IPMP is a formally approved document prepared by an organisation that specifies how its infrastructure programme will be executed, monitored and controlled over the planned MTEF period. The IPMP documents the deliverables to be achieved by each party in accordance with the designated roles and responsibilities defined in the agency agreement. Minimum contents of the IPMP include: - Programme Objectives - Programme Scope Management - Programme Cost Management - Programme Time Management Plan - Key success factors and the performance indicators - Review Programme and Project Quality requirements - Review health, safety, socio-economic and environmental risks - Review Communication plan - Review Internal and external resources

Table 3: Programme Management Control Cycle		
Process	**Control Cycle**	
Name	**Control Point CP Deliverable**	**Description**
		• Programme Resources The programme governance framework is also developed during this process, by defining the strategies for quality, stakeholder engagement, risks and issues, benefits, resources, planning and control and information management.
	The Infrastructure Procurement Strategy (IPS)	(i) The IPS shall include a list of programmes and projects covering the prescribed planning period and include the following minimum contents: • *Delivery Plan* • *Contracting Arrangements* • *Procurement Arrangements* **The control point deliverable is complete when the Infrastructure Procurement Strategy is approved**
	Infrastructure Programme Implementation Plan (IPIP) *(Only applicable when an Organ of State provides agency service)*	i. The IPIP must specify how the infrastructure programme will be executed, monitored and controlled over a specified financial year and the outer two years that make up the planned Medium-Term Expenditure Framework (MTEF) period ii. The IPMP must inform the development of the IPIP, with respect to describing the infrastructure programmes and projects that will be executed, monitored and controlled over the planned MTEF period. This will ensure that all programmes implemented over the MTEF period are aligned with broader strategic objectives of government iii. The IPIP documents the deliverables to be achieved by each party in accordance with the designated roles and responsibilities defined in the agency agreement when applicable. **The control point deliverable is complete when the Infrastructure Programme Implementation Plan is approved.**

Table 3: Programme Management Control Cycle		
Process	**Control Cycle**	
Name	**Control Point CP Deliverable**	**Description**
B.4 Review	End of Year Report (EoYR)	The EoY report assesses the performance of the organisation against its annual objectives and goals and the completeness of delivery of the IPMP, Delivery Management Strategy and an Infrastructure Procurement Strategy.
		In order to manage the service delivery objectives of infrastructure, it is necessary to engage in a thorough and effective evaluation process for each funding programme. These evaluations, which is the systematic investigation of merit, worth or significance of a program, should focus on the service delivery outcomes as stipulated in the IAMP and IPMP.
		The EoY Report forms an integral part of other planning and reporting documents, thus there should be consistency and alignment between the different reports as prepared in terms of different stages of the Infrastructure Delivery Management System [IDMS]. The main purpose of the EoY Evaluation is to assess: • Progress made by the end of financial year by the Programmes against the objectives and outcomes. • Past financial and non-financial performance of the infrastructure service delivery of the Department. • Impact that the previous year's performance will have on planning and implementation on the next and subsequent year's delivery. • Monitoring and the key competencies deployed to track and report on progress. • Risks on Programme and Project Management levels. • Overall management of the Programme. • Organisation capability and individual capacity to manage infrastructure. Minimum contents of the EoY Report include: • Introduction • Description of Funding Source • Financial Allocation and Expenditure Overview

Table 3: Programme Management Control Cycle		
Process	**Control Cycle**	
Name	**Control Point CP Deliverable**	**Description**
		• Nature of Investment, Commitments, Rollovers and State of Readiness • Programme Management • Operations and Maintenance • Project Management • Infrastructure Results • Conclusion and Way Forward • Glossary

3.3 Programme Management Processess

Subsection 3.3 Programme Management processes

Programme management processes is accomplished through processes, using relevant knowledge, skills, tools, and techniques that receive inputs and generate outputs.

Programme management processes includes:

- Initiating
- Defining
- Managing
- Reviewing and
- Improvement of a programmes

Figure 53: Programme Management process cycle

3.4 Plan

Initiating

Review Infrastructure Asset Management Plan (IAMP) & Strategic Programme Briefs

The purpose of the 'Initiating' process, at programme management level, is to initiate the further development of these Strategic Programme Briefs for each new programme, and to start the review of existing programme briefs. The initiating process leads the Programme Manager to the first key decision of whether or not to commit resources to defining each new programme, and its management approach, in detail i.e. whether or not it is sensible and worthwhile to allow the new programme to proceed to the 'Defining' process.

A programme that is currently being implemented (existing programme), requires a review of its Programme brief with respect to:

- Programme mandate and scope of work;
- Recognition of ongoing committed projects and programmes in the prioritization model;
- Allocation of resources to manage the programmes (personnel, funding, operational etc.);
- Identification of risks.

The **'Initiating'** process involves the Programme Manager conducting a review of the Strategic Programme Briefs (in the IAM Plan) and preparing a **Programme Charter** for approval, so that the approved Programme Charter becomes a **mandate** to proceed with each new infrastructure programme in the specific MTEF. The PMI Standard for Program Management (4th Edition, 2017) defines *"Program Charter"* as *"a document issued by a sponsor that authorizes the program management team to use organizational resources to execute the program and links the program to the organization's strategic objectives"*.

The Programme Charter authorizes the Project Manager to commit organisational resources to execute new infrastructure programmes linked to the strategic objectives of the organisation. The Programme

Charter outlines the purpose, objectives, scope, benefits, cost, timescale, risks and resourcing arrangements applicable to the new infrastructure programme.

Any modifications or changes to existing infrastructure programmes, that impact on resourcing and cost, will similarly require an approved Programme Charter to enable progression beyond the 'Initiating' process. Thus, an approved Programme Charter for new and existing infrastructure programmes serves as a trigger to proceed from the 'Initiating' process to the 'Defining' process.

The Strategic Programme Briefs (in the IAM Plan) form the basis for developing the detailed Programme Briefs that are documented in the Infrastructure Programme Management Plan (IPMP). The IPMP is the output (control point deliverable) of the 'Defining' process and the Programme Briefs describe in detail the purpose, objectives, scope, benefits, cost, timescale, risks, stakeholder considerations, governance and resourcing arrangements for the new and existing infrastructure programmes.
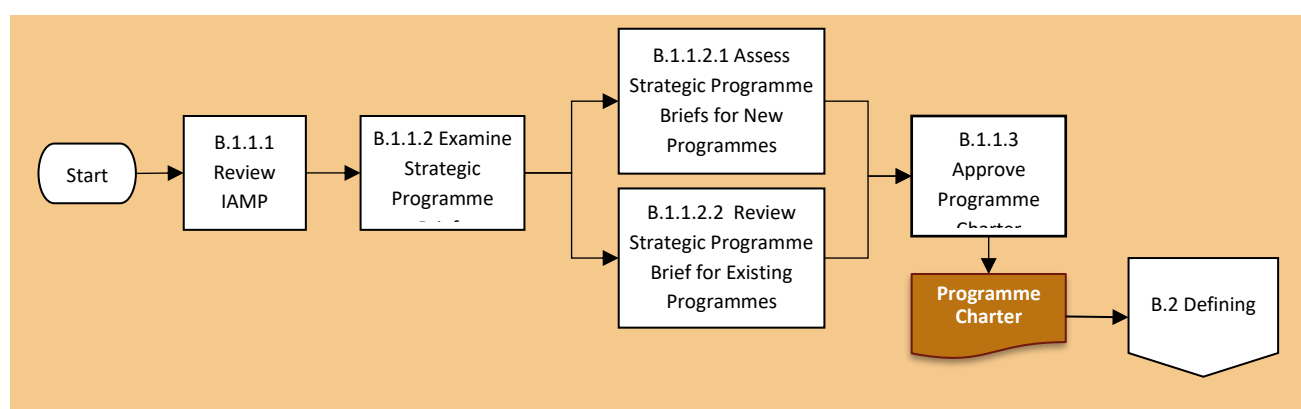
Figure 54: Process Mapping – B.1.1 Review IAMP & Strategic Programme Briefs

Table 18: Initiating Procesess - Review IAMP & Strategic Programme Briefs

No.	Process	Definition	Description
B.1.1	Review IAMP & Strategic Programme Briefs	The objective of the Initiating process is the review of the IAMP and the Strategic Programme Briefs (for New and Existing Programme(s)) to develop and approve a Project Charter for programmes and projects to be delivered in the MTEF period.	

No.	Process	Definition	Description
B.1.1.1	Review IAMP	The objective of reviewing the Infrastructure Asset Management Plan (IAM Plan), developed at a portfolio management level, is to understand the activities that an organisation intends to undertake to deliver its infrastructure asset management objectives, along with the resources required, associated timescales and estimated costs. The IAM Plan is underpinned by Infrastructure Asset Lifecycle Plans for each facility or infrastructure asset network. The Programme Manager accepts the approved Infrastructure Asset Management Plans (IAM Plan) from the Portfolio Manager.	The accepted IAM plan must be the version approved by the organisations Accounting Officer. The approved IAM Plan represents the organisations long-term plans (usually 20 years or more for infrastructure assets) that outline the asset activities for each facility or asset network, and the resources to provide a defined level of service in the most cost-effective way. At a programme management level, it is mandatory for the Programme Manager in the "Initiating process" to scrutinise the contents of the IAM Plan, so as to understand the strategic objectives of the organization. The typical contents of the IAM Plan form an integral input into the programme management processes.
B.1.1.2	Examine Strategic Programme Briefs	Strategic Programme Briefs in the IAM Plan outline the programme vision, objectives, scope, timescales, funding, perceived risks, expected outcomes and benefits for new and existing infrastructure programmes.	The purpose of the "Initiating" process at programme management level is to examine the Strategic Programme Briefs for each new programme and the existing programmes. The "Initiating" process prompts the Programme Manager to obtain approval to support the decision to commit organisational resources necessary to define each new programme in further detail in the "Defining" process.
B.1.1.2.1	Assess Strategic	A new infrastructure programme is identified at	Strategic Programme Briefs for new programmes contain typical information

No.	Process	Definition	Description
	Programme Briefs for New Programmes	the portfolio management level with a Strategic Programme Brief outlining the definition of what the new programme is expected to achieve in terms of benefits, dis-benefits, outcomes, scope and objectives.	that is required for the development of detailed Programme Briefs for inclusion in the IPMP, and includes: • Programme definition • Funding of the programme • Confirm the programme mandate • Appointment of the appropriate resources to manage the programme • Develop the programme management plans (milestones, timescales and risks etc.) • Governance arrangements • Delivery Management Strategy / Resourcing strategy • State of readiness of the programme • Approval to proceed
B.1.1.2.2	Review Strategic Programme Briefs for Existing Programmes	An existing infrastructure programme is modified at the portfolio management level with a revised Strategic Programme Brief.	The revised Strategic Programme Brief for an existing programme requires a review with respect to:- • Programme mandate and scope of work • Programme changes (additions and omissions) • Recognition of ongoing committed projects and programmes in the prioritization model • Allocation of resources to manage the programmes (personnel, funding, operational etc.) • Identification of risks
B.1.1.3	Approval of Programme Charter	The objective of obtaining approval for the Programme Charter for new and existing programmes to be delivered in the MTEF, is to:	The Programme Charter authorizes the Project Manager to commit organisational resources to execute new infrastructure programmes linked to the strategic objectives of the organisation.

No.	Process	Definition	Description
		Obtain approval to commit resources for the development ("defining") of detailed Programme Briefs for new and existing infrastructure programmes, Identify the programme manager(s) and her/his responsibilities and authorities Outline the purpose, objectives, scope, benefits, cost, timescale, risks and resourcing arrangements applicable to new and existing infrastructure programmes.	The approved Programme Charters for new and existing infrastructure programmes serve as a trigger to proceed from the 'Initiating' process to the 'Defining' process.

Defining

The **'Defining'** process is where the Programme Manager refines the detailed elements of the Strategic Programme Briefs, for new and existing infrastructure programmes. The Infrastructure Programme Management Plan (IPMP) is then developed to explain what the infrastructure programmes are going to do and how they are going to do it, who is involved, how it will be controlled, and the justification for going forward. The programme governance framework is also developed during this process, by defining the strategies for quality, stakeholder engagement, risks and issues, benefits, resources, planning and control and information management. The plans/schedules are also developed to provide information on the resources, dependencies and timescales for delivery of the benefits.

Infrastructure Programme Planning

The **IPMP** is a natural (and important), succession to the IAMP, with respect to describing the infrastructure programmes and projects that will be executed, monitored and controlled over the planned MTEF period. This will ensure that all programmes implemented over the MTEF period are aligned with broader national, provincial and sector strategic objectives.

The IPMP also indicates the allocation of the MTEF budget to the programmes and projects to be implemented over the period, and identifies all the service life planning requirements to be implemented in the MTEF for the organization.

The MTEF view is an output which is directed by the organisation's infrastructure asset management objectives and corresponding lifecycle strategies, but constrained as a result of available budget and resources. Each of the following infrastructure programmes must therefore be aligned with one or more of the infrastructure asset objectives and strategies:

- Operations Programme;
- Maintenance Programme;
- Renewal Programme;
- Acquisitions Programme;
- Disposal Programme.

IPMPs are the result of balanced priorities and considerations that impact on the organisation's portfolio of assets, firstly from an **unconstrained** financial view, and then a **constrained** financial view. This means that the tactical planning of

programme management is a balance of the top down unconstrained requirements, and the bottom up constraint of programme commitments. 'Active and Contracted Commitments' are defined as: 'Where the expenditure has been approved and the contract has been awarded at the reporting date'.. The **constrained** view is then framed within the MTEF.

	Cost Category	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17
Total Infrastructure Estimate		12 105	26 705	46 735	30 505	7 090	12 430	14 000	6 360	4 740	8 020	4 740	4 740	6 770	4 740	8 820	4 740	4 740
Maintenance	Current	2 600	2 600	2 600	2 600	3 800	3					4 200	4 200	4 200	4 200	4 200	4 200	4 200
Rehabilitation	Capital	-	-	1 600	-	-						-	-	2 000	-	4 000	-	-
Acquisition	Capital	8 500	23 100	41 500	26 900	1 700	7 940					-	-	-	-	-	-	-
Extension	Capital	-	-	-								-	-	-	-	-	-	-
Upgrading	Capital	-	-	-								-	-	-	-	-	-	-
Disposal	Capital	-	-	-	-	1 000	-					-	-	-	-	-	-	-
Programme xx	yy											-	-	-	-	-	-	-
Programme xx	yy											-	-	-	-	-	-	-
etc.	etc											-	-	-	-	-	-	-
Organisation & Support	Current	1 005	1 005	1 035	1 005	590	690	730	560	540	620	540	540	570	540	620	540	540

Programme Management Plan Component

Infrastructure programmes managed by the organisation. Programmes match reporting requirements which are linked to goals and priorities

Figure 55: Programme Management Plan Component of Consolidated IAM Plans for a portfolio of assets

The following defining process's need to be included in the development of the IPMP:

- Programme Objectives;
- Programme Scope Management;
- Programme Cost Management;
- Programme Time Management Plan;
- Key risk factors and the performance indicators;
- Review Programme and Project Quality requirements;
- Review health, safety, socio-economic and environmental risks;
- Review Communication plan;
- Review Internal and external resources;
- Programme Resources (Delivery Plan and Infrastructure Procurement Strategy).

Programme Resourcing

The ultimate purpose of the Defining process is to obtain approval for the IPMP, which is a control point (CP) deliverable in the Programme Management Control Cycle.

This section is concerned with Programme Resourcing process, which is undertaken by the Programme Manager, when **Defining** programmes as part of the Programme Management Control Cycle. Control Cycles are specific to Portfolio Management, Programme Management and Operations & Maintenance Management processes; they produce Control Cycle Deliverables, each of which must be signed off but

which are not seen as pre-requisites for moving to another process, as these processes are generally cyclical in nature and inform, or are informed by, each other.

The IDM Toolkit 2018 describes **Programme Resourcing** as the identification of current and future resource needs, for the organisation to achieve its infrastructure programme goals. The output of the Programme Resourcing process is a **Delivery Plan** and an **Infrastructure Procurement Strategy**, which are process deliverables in the Programme Management Control Cycle.

The Delivery Plan and an Infrastructure Procurement Strategy are documented in a descriptive and tabular format and included as components of the **Infrastructure Programme Management Plan (IPMP)**.

Although the Delivery Plan and IPS are formulated at an organisation's programme management level, they both draw on the organisation's strategic decisions taken at a portfolio management level. For example, the Delivery Plan and IPS are directed and aligned to the contents of the organisation's Infrastructure Asset Management Plan (IAM Plan), which is the Portfolio Management Control Cycle deliverable for Infrastructure Planning. Specific alignment is to the Procurement Policy and Delivery Management Strategy, which includes a: Demand Strategy, Risk Management Strategy, Funding Strategy and Resourcing Strategy. The Procurement Policy includes the organisation's Developmental Procurement Policy.The minimum requirements for a Procurement Policy are described in SANS 10845-1: 2015 Construction processes – Part 1, section 4.3.

Thus, the procurement process for the delivery of infrastructure involves the initial and subsequent recurring updating of planning processes at a portfolio management level, flowing out of an assessment of public sector service delivery requirements. Thereafter, a Delivery Plan and a corresponding Infrastructure Procurement Strategy is formulated at a programme management level. This is followed by detailed planning at a project management level, and the procurement and management of a network of suppliers, including professional service providers, contractors and subcontractors, that enable the provision of the desired service and/or infrastructure asset e.g. a school building etc. Similarly, the Delivery Plan and Infrastructure Procurement Strategy inform and facilitate activities at an operations and maintenance (O&M) management level, as Facility/Network O&M Baseline Plans are communicated to O&M teams for implementation.
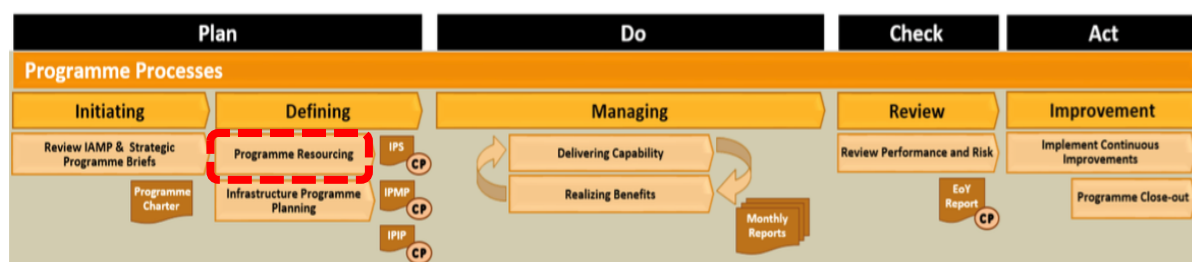
Figure 56:: Process Mapping – B.2.2 Programme Resourcing
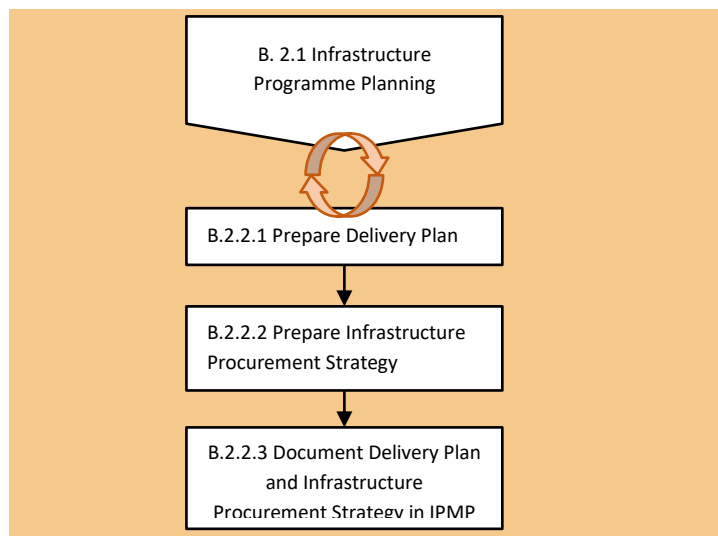
Figure 57:: Process Mapping – B.2.2 Programme Resourcing

Table 19 Defining Processes - Programme Resourcing

No.	Process	Definition	Description
B.2.2	Programme Resourcing	Programme Managers are required to undertake the process of Programme Resourcing, which involves the review and identification of current and future resource needs, for the organisation to achieve its infrastructure programme goals. The output of the Programme Resourcing process is a Delivery Plan and an Infrastructure Procurement Strategy, which are documented as components of the IPMP.	
B.2.2.1	Prepare a Delivery Plan	A Delivery Plan documents decisions related to procurement objectives, delivery management and the packaging/grouping of work for delivery under a single contract or an order (framework contract). Definitions: Contract: *"legally enforceable agreement to supply goods, execute work or provide services"* . (SANS/ISO 10845-1:2015). Order: *"An instruction to provide goods, services or any combination thereof*	A Delivery Plan is eveloped in 4 steps, namely: 1. Analyse information, 2. Document procurement objectives, 3. Document delivery management arrangements, 4. Package / group works.

No.	Process	Definition	Description
		under a framework agreement (contract)" (SIPDM, 2015). Framework Agreement: "An agreement between an employer and one or more contractors, the purpose of which is to establish the terms governing orders to be awarded during a given period, in particular with regard to price and, where appropriate, the quantity envisaged".	
B.2.2.2	Prepare an Infrastructure Procurement Strategy (IPS)	The Infrastructure Procurement Strategy documents the Programme Manager's decisions related to the Contracting Arrangements and Procurement Arrangements for a particular procurement in the Delivery Plan. SANS 10845-1 defines a *"procurement strategy"* as the *"selected packaging, contracting, pricing and targeting strategy and procurement procedure for a particular procurement"*.	Decide on: Contracting arrangements for the works contractor and professional services; Procurement arrangements for the works contractor and professional services.
B.2.2.3	Document the Delivery Plan and corresponding Infrastructure Procurement Strategy in the Infrastructure Programme Management Plan (IPMP)	The goal of documenting the Delivery Plan and IPS is to communicate the logic behind the decisions and choices made at each step so that, where applicable, it can be implemented by others.	The Delivery Plan and IPS are outputs of the Programme Resourcing process, and should be included as components of the Infrastructure Programme Management Plan (IPMP).

Delivery Plan and Infrastructure Procurement Strategy
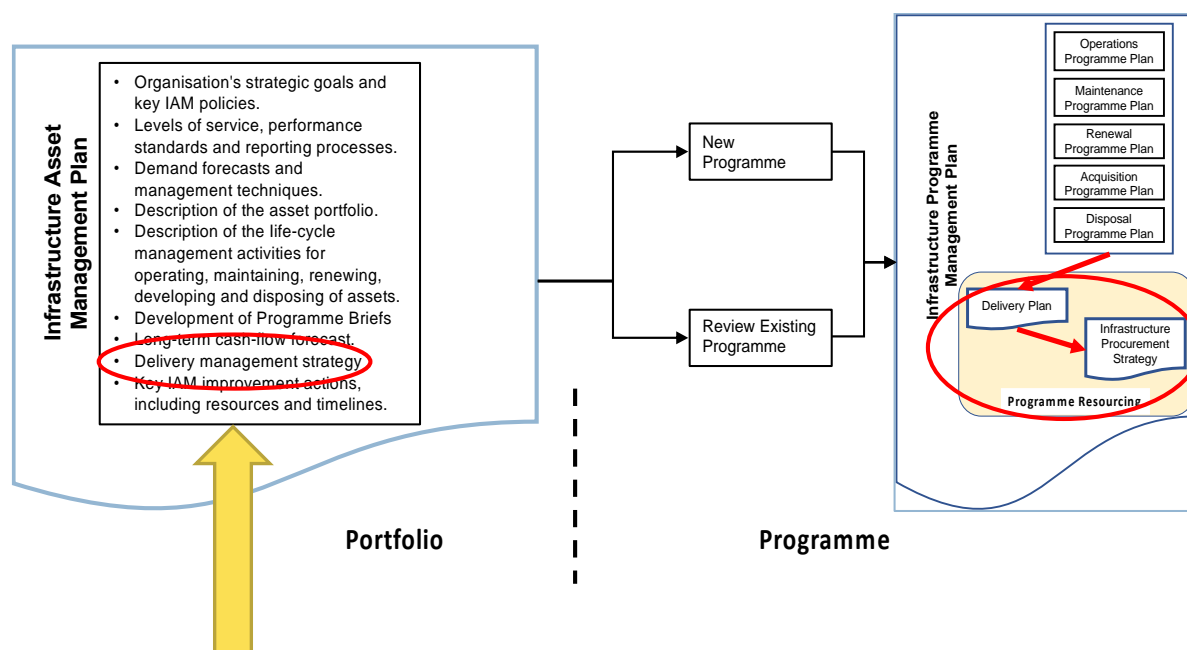
Figure 58: Delivery plan and Infrastructure procurement strategy

Delivery Management is defined in the IDM Toolkit 2018 as *"the application of the infrastructure delivery management processes of portfolio, programme, operations, maintenance and project management to plan, implement and control the work required to sustain the performance of infrastructure assets for public service delivery".* Developing a plan for infrastructure delivery involves making considered decisions, in relation to available options and prevailing circumstances, followed by the documentation of these decisions as a plan of action, that can be implemented with the optimal use of resources, to achieve intended outcomes.
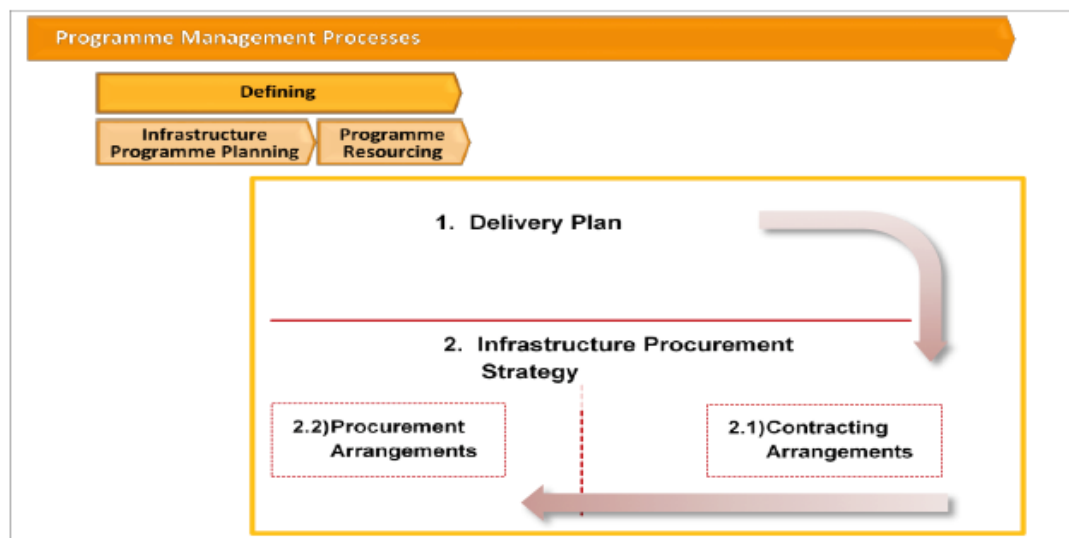
Figure 59: Programme Management Processes

The goal of developing the **Delivery Plan** is to define procurement objectives, delivery management arrangements and package/group work, so as to enable the development of a corresponding Infrastructure Procurement Strategy (IPS) for the complete list of approved programmes, sub-programmes and projects to be delivered in the MTEF. This approach aims to elicit value-for-money in the procurement and delivery of infrastructure, by achieving the best results possible from the money spent, or maximum benefit derived from the resources available.

SANS 10845-1:2015, Part1 defines a *"procurement strategy"* as the *"selected packaging, contracting, pricing and targeting strategy and procurement procedure for a particular procurement".* The IDM Toolkit 2018 is aligned with this definition and broadly describes an **Infrastructure Procurement Strategy** (IPS) as the combination of the Contracting Arrangements and Procurement Arrangements for a particular procurement. The goal of developing an IPS is to confirm the optimal combination of Contracting Arrangements and Procurement Arrangements for each contract and order in the Delivery Plan. The IPS is formulated to identify the best way of achieving procurement objectives and value for money, whilst considering risks and constraints. The SIPDM defines "value for money" as "the optimal use of resources to achieve intended outcomes".

The Delivery Plan and the Infrastructure Procurement Strategy arrived at by applying the Framework and procedures provided in this section needs to be documented in such a manner that the logic behind the decisions and choices that are made at each step, can be communicated to others, for review and implementation. Accordingly, the specific inputs and outputs of the actions at each stage in the process needs to be documented. For this purpose, the IDM Toolkit 2018 contains recommended document headings and a generic template for a Delivery Plan and an Infrastructure Procurement Strategy, so that

these deliverables may be documented in a standard format and included as components of the organisation's IPMP.

The following documents are especially relevant for the application of this Framework for a Delivery Plan and an Infrastructure Procurement Strategy, namely:

- CIDB Standard for Uniformity in Construction Procurement (July 2015).
- SANS 10845-1:2015 Construction procurement: Part 1 - 4,· South African Bureau of Standards, with specific reference to the following parts:
  - ➢ Part 1: Processes, methods and procedures
  - ➢ Part 2: Formatting and compilation of procurement documentation
  - ➢ Part 3: Standard conditions of tender
  - ➢ Part 4: Standard conditions for the calling for expressions of interest

Programme Resourcing

1. Delivery Plan

1.1 Analyse information	1.2 Document procurement objectives	1.3 Document delivery management arrangements	1.4 Decide on packages / grouping of works
IAM Plan (Delivery Management Strategy)	Delivery procurement objectives	Own resources	Package / group work for delivery under a single contract
IPMP (Programme briefs)	Developmental procurement objectives	Implementing Agent (IA)	Package / group work for delivery as an order (Framework Agreement)
Consolidated Lifecycle Management Plan for MTEF		Framework Agreement (another organ of state)	
		Outsource specific services	
		Lease agreement	
		PPP – follow NT PPP procedures	

2. Infrastructure Procurement Strategy

2.1. Contracting Arrangements for works contractor

2.1.1 Identify service requirements for works

Service requirement options:
- Construction,
- Maintenance,
- Construction & maintenance
- Construction, operation & maintenance,
- Supply and install

2.1.2 Decide on Contracting strategy

Contracting Strategy options:
- Management contract,
- Design & Construct,
- Develop & Construct,
- Design by Employer

2.1.3 Decide on Pricing strategy

Pricing Strategy options:
Select standard pricing strategy according to contract type:
- Price-based contract or;
- Cost-based contract

2.1.4 Decide on Form of contract

Forms of contract selected for each contract type:
- Engineering & construction works contract
- Service contract
- Supply contract

2.2. Contracting Arrangements for professional services

2.2.1 Identify Professional service areas

Professional service areas include:
- Design,
- Cost control,
- Engineering,
- Project Management,
- Construction management
- Etc.

2.2.2 Decide on Contracting strategy

Contracting Strategy options:
- Single discipline,
- Multi-disciplinary,
Appointment mode:
- Programme/sub-programme
- Individual project,
- Package (multiple projects,
- Framework agreement

2.2.3 Decide on Pricing strategy

Pricing Strategy options:
Select standard pricing strategy according to contract type:
- Priced-contract,
- Cost of construction contract,
- Cost based contract

2.2.4 Decide on Form of contract

Form of contract options:
- Professional service contracts – select from CIDB's approved list of standard forms of contract

2.3. Procurement Arrangements for works contractor and professional services

2.3.1 Decide on functionality and quality strategy

Functionality and quality strategy options: Select permitted functionality and quality criteria from CIDB's Standard for Uniformity in Construction Procurement and SANS 10845-1

2.3.2 Decide on procurement procedure

Procurement procedure options:
- Competitive selection
- Competitive negotiation
- Negotiation procedure

2.3.3 Decide on targeted procurement procedure

Targeted procurement procedure options:
- Targeted procurement procedures – select from list of permitted targeted procurement procedures

2.3.4 Decide on tender evaluation method

Tender evaluation method options: Select from CIDB's Standard for Uniformity in Construction Procurement and SANS 10845-1 list of permitted tender evaluation methods

Figure 60: Framework for a Delivery Plan and an Infrastructure Procurement Strategy

Infrastructure Programme Planning

Figure 61: Process Mapping – B.2.1 Infrastructure Programme Planning

Figure 62: Process Mapping – B.2.1 Infrastructure Programme Planning

Table 20: Defining Processes - Infrastructure Programme Planning

No.	Stage / Process	Definition	Description
B.2.1	Infrastructure Programme Planning	Programme Managers are required for the planning, monitoring and control of infrastructure programmes. The Programme Manager should timeously verify input information and provide consistent, timeous and accurate output data, for each infrastructure programme, which will assist the organisation to make sound decisions to achieve the available benefits.	
B.2.1.1	Manage Programme Scope	IPMP should specify the programme scope, and reports generated by the implementers should be aligned to this.	All the projects are generally assigned to an infrastructure programme and/or sub-programme structure. These infrastructure programmes should be designed around criteria that will be beneficial to the Client. Each Implementer should receive details of its programme formulation, which must define the following elements or sub-programmes within the IPMP: • Prioritized project lists • Details of projects, including: • Commitment status • Project details • Categories and Sub-categories • Current progress status • Milestones for delivery with timeframes • Projects in the planning stages (approved, proposed and potential) that will be implemented in the MTEF period • Programme Resourcing (Delivery Plan and Infrastructure Procurement Strategy)
B.2.1.2	Allocate & Manage Programme Cost	IPMP should specify cost management requirements and allocate the programmes and their budgets / costs to the different implementers.	The IPMP must provide the projected budget for the MTEF period and full implementation period. This will enable the Client to monitor the baseline forecasted cashflows for programmes and projects against the actual expenditure incurred monthly, so that the programme and project budgets can be adjusted by the Client's Programme Manager if necessary.

No.	Stage / Process	Definition	Description
			Programme cost management is important for managing conditional grants, as funds not utilized may be lost to the organization, if not spent in a financial year.
B.2.1.3	Develop Key risk factors and the performance indicators	The IPMP should provide a description of each programmes key risk factors and Key Performance Indicators (KPIs), as described in the organization's Strategic Plan / Annual Performance Plan and Infrastructure Asset Management Plan.	The key risk factors and performance indicators should be both programme and project specific, and should be:- • Developed as part of the IPMP process; and • reported against throughout the infrastructure delivery programme • Reviewed annually with improvements and recommendations identified
B.2.1.4	Review Programme and Project Quality requirements	The IPMP should contain the minimum quality requirements, for all the works forming part of a programme or package, and how they will be measured and monitored.	These programme and project quality requirements are often based on norms, standards and reporting requirements. In addition, use of best practices should be included in implementation requirements.
B.2.1.5	Review health, safety, socio-economic and environmental risks	The IPMP should specify the controls and measures, which will address health and safety, socio-economic and environmental risks, and describe arrangements for the monitoring and oversight thereof.	The health, safety and risks must be identified and described by the Client as far as possible up front.eg.: • Socio-economic risks – labour, low skilled local workforce, community unrest, • Environmental risk - protected areas/sites, wetlands, coastal dune veld, endangered species, drought areas, sinkholes, earthquake zone etc. • Unrest possibilities, • Labour issues, • Traditional leader protocols, • Developmental policy implications etc. The IPMP should indicate its requirements in terms of the legislation and

No.	Stage / Process	Definition	Description
			allocate responsibilities both internally and externally.
B.2.1.6	Review Communication plan	A Communication Management Plan for the infrastructure programme must be formulated, including determining the lines of communication, major events within the infrastructure programme etc.	Programme communication should include the following key activities in respect of communication management: • Engagement Planning • Reporting requirements • Communications Planning • Information Distribution • Performance Reporting • Administrative Closure of both programmes and projects.
B.2.1.7	Review Internal and external resources	The roles and responsibilities of the Client and Implementers must be clearly defined and be in line with the approved Provincial Protocols for the implementation of the Infrastructure Delivery Management System (this document should be referred to and be readily available).	Programme and Project management resources, of both the client and implementers, must be clearly defined. The IPIP should specify the internal and external resource requirements to effectively implement and manage the infrastructure programme. These resources should be clearly indicated at both the programme and project level, including an organogram and table of responsibilities.
B.2.1.8	Review Programme Resourcing	Review and develop a Delivery Plan and Infrastructure Procurement Strategy	The Infrastructure Programme Planning process is closely linked to the Review of Programme Resourcing. The two sub-processes of Defining inform each other, as they are undertaken simultaneously.
B.2.1.9	Develop Infrastructure Programme Management Plan (IPMP)	The Infrastructure Programme Management Plan (IPMP), is a formally approved document, prepared by a Client, that specifies how its infrastructure programme	The IPMP indicates the allocation of the MTEF budget to the programmes and projects to be implemented over the MTEF period, and identifies all the service life planning requirements to be implemented in the MTEF for the organization. The purpose of the IPMP is thus to:

No.	Stage / Process	Definition	Description
		will be executed, monitored and controlled, over the planned MTEF period.	• Establish arrangements for the efficient and effective management of the Client's infrastructure programme over the MTEF period, • Align these with the adopted Programme Resourcing strategy (i.e. the Delivery Plans and Infrastructure Procurement Strategy), • Indicate the allocation of the MTEF budget to the programmes and projects to be implemented over the MTEF period, • Used to inform the MTEF budget process • Document to provide information on value for money • Motivate to stakeholders on the state of readiness (status of projects, resources available and programme management capacity) of the client for the infrastructure delivery

Development of the Infrastructure Programme Management Plan (IPMP)

The Infrastructure Programme Management Plan (IPMP), is a formally approved document, prepared by a Client, that specifies how its infrastructure programme will be executed, monitored and controlled, over the planned MTEF period.

The figure below shows what the IPMP contents needs to convey, premised on the information required by the different stakeholders.
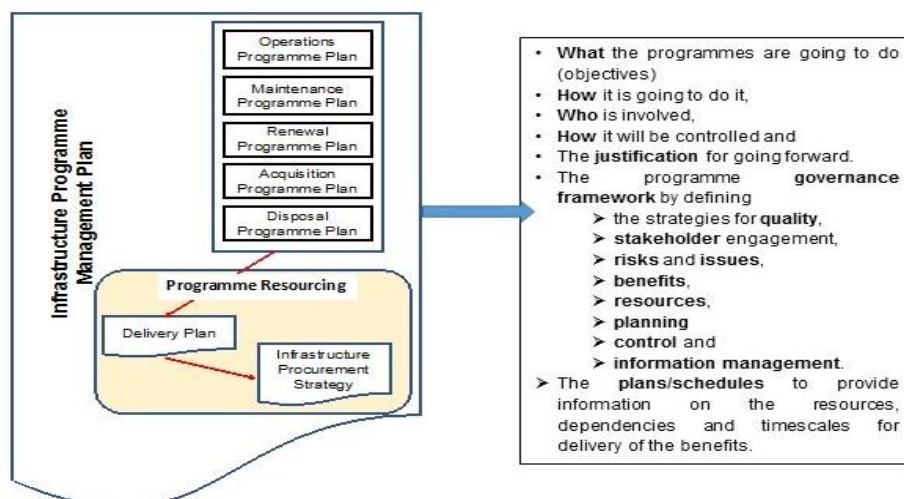
Figure 63: IPMP information

Note: If all, or part of, the implementation is assigned to one or more Implementer, the IPMP defines the scope, deliverables, targets and requirements of each of the specific Implementers.

The IPMP documents the deliverables to be achieved by each party, in accordance with the designated roles and responsibilities in the Service Delivery Agreement (SDA). The IPMP should thus be included as an appendix to the Service Delivery Agreement.

Programme Objectives

The objectives to be achieved by the Infrastructure Programme must be clearly described in the IPMP, as these provide the guiding framework for the programme, against which its performance will be judged. The objectives must align with the strategic objectives of the organization, as defined in the Organization's Strategic plan, Operational Plans and work plans.

The Client must clearly identify in the IPMP what its delivery and developmental objectives are, as per the Delivery Management Strategy in the IAM Plan, to guide the Implementer in formulating its response, in the form of an IPIP.

Programme Scope Management

The projects and operational work to be implemented for the MTEF period will:

- Originate in the IAM Plan, with a programme brief;
- Be contained in the IPMP, which will be updated annually.

All the projects are generally assigned to an infrastructure programme and/or sub-programme structure. These infrastructure programmes can be designed around criteria that will be beneficial to the Client, for example:

- Based on allocations to the different Implementers (the client itself can also be an Implementer);
- Geographical location or organisational factors (regions, districts etc.);
- Similar types of projects or projects of similar characteristics (new build or maintenance programmes);
- Common client strategic objective achievements;
- Projects in similar stages (i.e. projects in planning/ initiating stage etc.).

Each Implementer should receive details of its programme formulation, which must define the following elements or sub-programmes within the IPMP:

- Prioritized project lists, per Implementer, for the MTEF period, against the available budget allocations;
- Details of projects, per Implementer, that will be implemented in the next financial year, including:
- Commitment status, with cash flows submitted from the PIAs, in their IPIP submissions, for all active projects currently being implemented. Commitment status of projects within the sub-programme is defined as Active and Contracted Commitments, where the expenditure has been approved and the contract has been awarded at the reporting date. For example, projects with

tender awarded and contract in place i.e. Design-by-Employer contracts at Infrastructure Stages 7 (Works), 8 (Handover) and 9 (Close-out);

- Project details such as scope of work, dates, budget details, expenditure to date etc.;
- Standard Chart of Accounts (SCOA);
- Categories and Sub-categories;
- Current progress status;
- Milestones for delivery with timeframes;
- Projects in the planning stages (approved, proposed and potential), that will be implemented in the MTEF period.

Programme Cost Management

The IPMP must provide the projected budget for the MTEF period, and the infrastructure programme / project budgets for their full implementation period. This will enable the Client to monitor the baseline forecasted cashflows for programmes and projects, against the actual expenditure incurred monthly, so that the programme and project budgets can be adjusted by the Client's Programme Manager, if necessary. It is important that any adjustment of programme and project budgets must follow a formal approval process, as documented in the Client's IPMP and Service Delivery Agreement with the Implementer(s).

Programme cost management is important for managing conditional grants, as funds not utilized may be lost to the organization, if not spent in a financial year.

Programme Time Management Plan

The IPMP must provide:
   a) Programme management timelines, indicating milestones and target dates;
   b) A time management plan for each project, i.e. the baseline against which progress towards the attainment of milestone (key deliverables) target dates, can be measured.

Key risk factors and the performance indicators

The IPMP should provide a description of each programmes key risk factors and Key Performance Indicators (KPIs), as described in the organization's Strategic Plan / Annual Performance Plan and Infrastructure Asset Management Plan. These factors should be both programme and project specific, and should be reported against throughout the infrastructure delivery programme. (Refer to the IDM Toolkit Module 10: Performance & Risk management).

The risks and key performance indicators identification is initially done through the portfolio management process and must be included in the IAMP and the strategic programme briefs. The programme manager should thereafter elaborate and define the specific programme risks in the final

approved programme brief and in the IPMP. The risks and performance indicators are important information to be fed through to the implementers who should respond (in the IPIP) as to how they mitigate the risks and report on the performance against the indicators.

Risk Management

A risk assessment and management plan is formulated for the infrastructure programme, including determining the major risks which could occur, measures to mitigate the risks, and how the risks will be managed. The key factors for success are then documented in the IPMP and monitored.

The risk management plan in the IPMP will inform the Implementer of any external risks, constraints and/or assumptions that need to be considered, in the implementation of the specific programme.

Performance Indicators

Performance Indicators at programme level will differ from Impact Indicators at a portfolio or strategy level, in that they can be derived or rolled up from lower level project or operational indicators. The programme management function thus has a role to design a performance indicator framework, for all its programmes, sub-programmes and projects, to ensure that this roll-up can be achieved.

Review Programme and Project Quality requirements

The IPMP should contain the minimum quality requirements for all the works forming part of a programme or package, and how they will be measured and monitored. This plan is often based on norms, standards and reporting requirements. In addition, use of best practices should be included in implementation requirements.

The **ISO definition of quality is** *"The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs". In simpler words, one can say that a product has good* **quality** *when it 'conforms to the requirements specified by the client'.*

Quality Management is generally the 'hands-on' responsibility of the Contractor. Quality Monitoring is generally the 'hands-on' responsibility of the PSPs, who comprise of the consultant design team on a package or project. The Implementer must allocate programme and project managers to monitor and supervise the specific projects, to achieve a quality product. The Client will conduct spot checks on the quality aspects of projects during the construction stage (G7).

Quality management for an infrastructure programme is largely addressed by ensuring that construction outputs are delivered as per plan, and that the building industry norms and standards are applied. Such norms and standards include, but are not limited, to the following:

- National Building Regulations (NBR);
- South African National Standards (SANS). The South African Burea of Standards (SABS) is a statutory body that is mandated in terms of Standards Act, 2008 (Act No. 8 of 2008) as the national standardisation institution in South Africa, mandated to 'develop, promote and maintain South African National Standards';
- JBCC, GCC, FIDIC and NEC3 contract documentation;
- SA Institute of Architect's Client/Architect Agreement;

- Norms and quality standards as provided by DBE, NDoH, DoT & DPW etc.

Review health, safety, socio-economic and environmental risks

The IPMP should specify the controls and measures, which will address health and safety, and describe arrangements for the monitoring and oversight thereof.

Review communication plan

Programme communication management should include the following key activities:

- **Engagement Planning** – meeting schedules, participation requirements etc.;
- **Reporting requirements** – report formats, when they should be submitted, level of detail etc.;
- **Communications Planning** - determining the information and communications needs of the stakeholders such as who needs what information, when will they need it, and how will it be given to them;
- **Information Distribution** - making needed information available to project stakeholders in a timely manner;
- **Performance Reporting** - collecting and disseminating performance information, including status reporting, progress measurement, and forecasting;
- **Administrative Closure** - generating, gathering, and disseminating information to formalise phase or project completion.

A Communication Management Plan for the infrastructure programme must be formulated, including determining the lines of communication and major events within the infrastructure programme (e.g. launches and handover ceremonies, target market, message, medium, frequency, responsibility, risks, activities and cost).

Review Internal and external resources

The roles and responsibilities of the Client and Implementers must be clearly defined, and be in line with the approved Provincial Protocol for implementation of the Infrastructure Delivery Management System (this document should be referred to and be readily available).

The Client will:

- Communicate the organisation's Delivery Management Strategy / Resourcing Strategy to the Implementer and relevant stakeholders;
- Inform the Implementer of any specific requirements in respect of the Implementer. The Implementer should establish the necessary management and support structures required to deliver the allocated infrastructure programmes;
- Define the institutional management arrangements, roles and responsibilities, and contractual arrangements between the various stakeholders;
- Indicate its own internal organisation roles and responsibilities, including
  - o Responsible officials' names and accountabilities;
  - o Systems and procedures.

The programme structure function in the Client organisation will focus on ensuring that:

- The interface between the Client and the Implementer is managed effectively and efficiently, in accordance with an agreed set of rules formalizing the relationship;
- Implementers performance is monitored on a regular basis, and that corrective actions are instituted to address variances when required.

The IPIP should specify the internal and external resource requirements to effectively implement and manage the infrastructure programme. These resources should be clearly indicated at both the programme and project level, including an organogram and table of responsibilities.

The IPMP must establish the requirements of the IPIP with each Implementer, with corresponding programme and project management arrangements, including resources (persons and support resources), the organogram and a responsibility matrix. It must also indicate work time availability of both the implementer and the client to implement the allocated programmes and projects.

Developing the Infrastructure Programme Implementation Plan (IPIP)

The programmes and projects identified for implementation and currently being implemented in the MTEF period need to be communicated by means of a formal process in which all parties agree to do exactly what needs to be done, where, by whom, when, and at what cost. To facilitate the process of agreement between from the client department to the implementer, the following plans have to be put in place:

- The IPMP by the client department including the programme resourcing strategy; and
- The Infrastructure Programme Implementation Plan (IPIP) by the implementer.

The IPMP stipulates what the client department intends to achieve in the MTEF period of implementation. The implementer responds to the IPMP through the development of an IPIP which validates the implementers' understanding of what needs to be done and explicitly indicates how this will be achieved, when and by whom.

Once the client department has approved the IPIP submitted by the implementer, the implementer is able to continue with detailed project designs, followed by the project tendering process.

Multi-year project implementation for projects planned in Year 0 of the MTEF would typically start in Year 2 of that MTEF allowing for one year lead for project design and tendering. These phases should take up most of the following year resulting in a detailed strategic programme briefs from the IAMP with associated realistic costing, timeframes and cash flows for each project. The detailed planning and design undertaken would assist in establishing exactly what multi-year commitments are required to complete the projects.

The Infrastructure Programme Implementation Plan (IPIP) is thus developed to assist the funding organ of state to:

- Manage programmes and projects, financial and non-financial performance and targets;
- Meet the legislative requirements described below.

It is an approved document prepared by the Implementer in response to the sub-programme/s assigned to it through the IPMP. The Implementer can be the department itself, or another organ of state

The purpose of the IPIP is to:

- Establish arrangements for the efficient and effective management of the Client's infrastructure programme over the MTEF period;
- Align these with the adopted infrastructure procurement strategy;
- Set out precisely how the Implementer intends complying with the IPMP, in the implementation of the programme / projects allocated to it.

The IPIP requirement is embedded in the following legislation:

- **MFMA Section 17.** (3) (c), contents of annual budgets and supporting documents for a projection of cash flow for the budget year by revenue source, broken down per month.

The IPIP must be reconciled against the regular (at least monthly) project expenditure reports, provide budget forecasts per project, and must specify how the Implementer will execute, monitor and control the infrastructure programme allocated by the client.

Note 1: there are two parallel processes involved in the preparation and application of the IPMP and IPIP.

i.   The first is for the monitoring of performance and progress of all programmes and projects implemented in the current financial year;

ii. The second is for planning purposes for the next financial year, being forecasted projects per programme, and projects allocated to implementers.
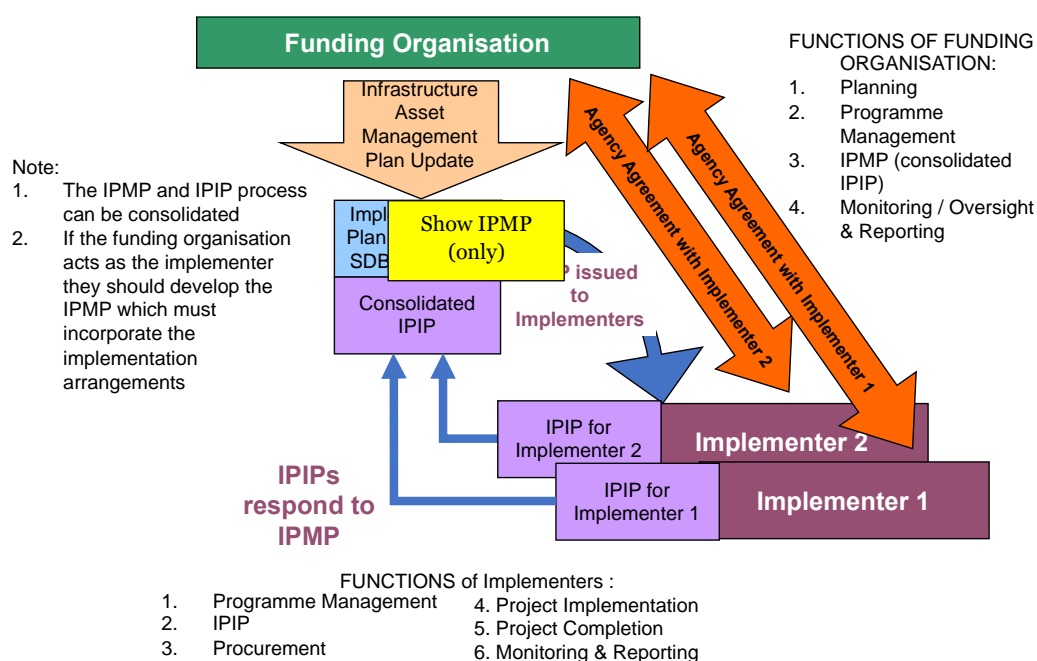
Figure 64: IPIP Relationships
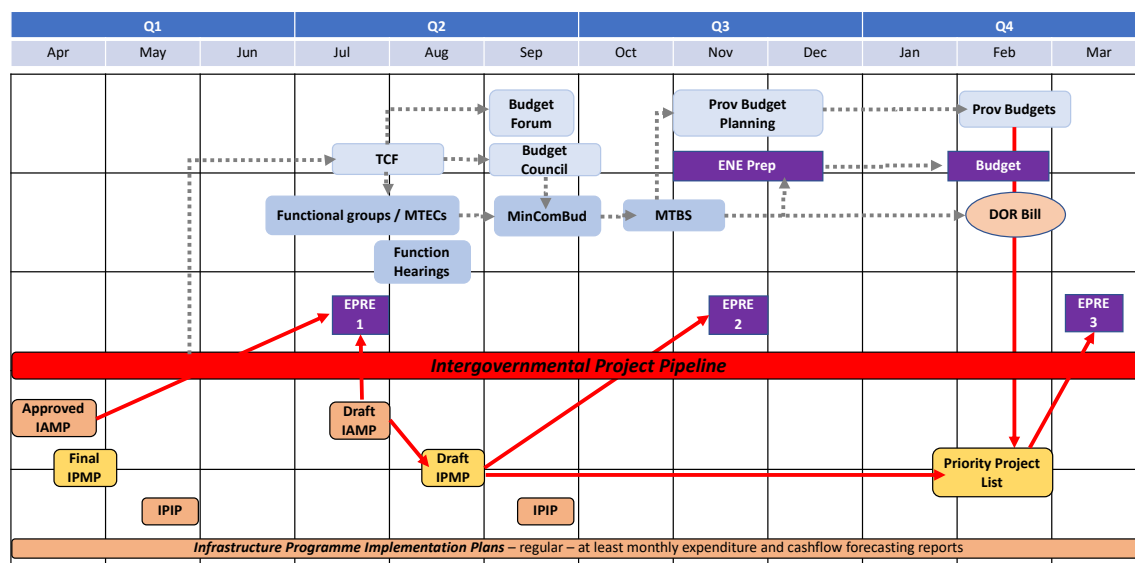
Figure 65: Linkages between IPIPs with IPMPs and IAMPs

Service Delivery Agreements (SDA)

The Infrastructure Asset Management Plan indicates the high-level intention to outsource, whereas the detailed assignment of the projects to be outsourced, is contained in the Programme Management Plan (IPMP), which is updated annually.

The development of the SDA should be completed in parallel to the development or review of the Programme Management Plans. In most cases, once an SDA has been agreed with a specific Implementer, for example the Provincial Public Works Department, then few changes to the agreement would be required annually. An SDA could also have a 3-5-year agreement lifespan. The Programme Management Plans (IPMP), on the other hand, must be revised annually to reflect the current situation. The purpose of the SDA is to set in place the rules that will govern the relationship between the Client organisation and the Implementing organisation. One could say it defines the conduits across the interface between the organisations. The Programme Management Plans (IPMP / IPIP), in turn, define the nature and magnitude of objects and data that will flow in these conduits, and this will differ from year to year.

3.5. Do

Subsection 3.5: Do

Managing

The **'Managing'** process is achieved by:

- **Delivering the Capability** is the process by which the Implementer initiates projects to create outputs and new capability.
- **Realising the Benefits** is used to ensure that the project outputs are properly embedded into 'business as usual', the required changes in operational practices and culture are achieved, and, as a result, benefits are realised and measured.

Delivering the Capability and Realising the Benefits are distinct processes, that need to work closely together to harmonise the programme objectives with programme and project delivery.

Delivering Capability

The **Delivering Capability** process covers the activities for coordinating and managing programmes and the O & M delivery, according to the IPMP, Delivery Management Strategy and an Infrastructure Procurement Strategy. The effective delivering of capability will:

- assist organizations to better understand, and effectively integrate the programmes ability and capacity to achieve strategic and current operational objectives;
- develop and provide solutions.
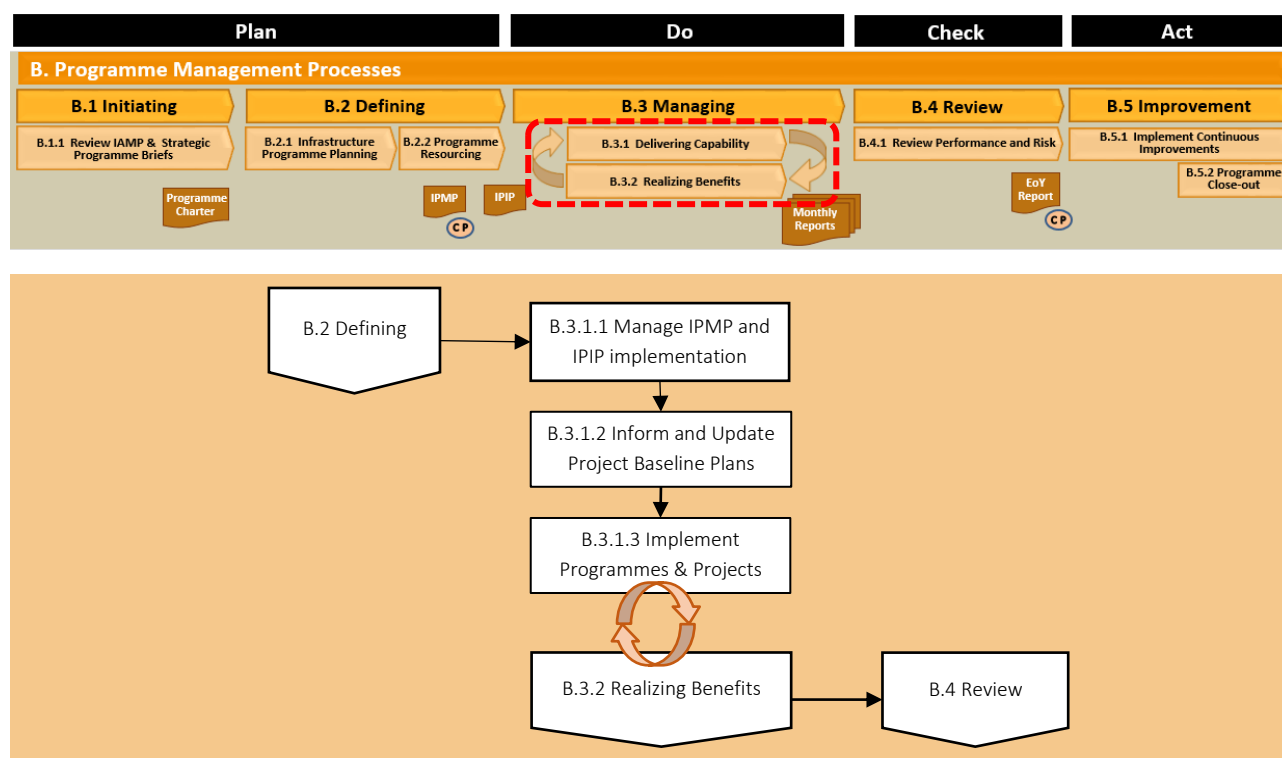
Figure 66:: Process Mapping – B.3.1 Delivering Capability

Table 21 Managing Processes - Delivering Capability

No.	Process	Definition	Description
B.3.1	Delivering Capability	Delivering capability aims to balance the programme implementation primary and secondary objectives, with the sustainable use of current capabilities, and the development of future capabilities.	
B.3.1.1	Managing IPMP and IPIP implementation	The Managing of the IPMP and IPIP requires the implementation of the defined governance arrangements for the identified programmes. Governance meaning the functions, processes and procedures that define how the programme is set up is managed and controlled in the IPMPand IPIPs.	The Managing of the IPMP and IPIPs should lead to better and quicker responses to operations, maintenance and project issues, queries, approvals, etc. These benefits will contribute greatly to the efficiency of the management processes and to improved coordination and control of the projects in the infrastructure programme. The infrastructure programmes being implemented could be, for example: • Programmes and sub-programmes i.e. per district / region, projects of similar nature etc. • Operations programme • Maintenance programme • Acquisition programme • Renewal programme

No.	Process	Definition	Description
			• Disposal programme As the programme progresses, especially at the end of each tranche (a milestone), it reviews the effectiveness of its governance arrangements and the continued viability of components in the IPMP and IPIPs. Updates to approved baselines are captured under updated version control.
B.3.1.2	Inform and update Programme / Project Baseline Plans	A baseline is defined as the approved version of a work product that can be changed only through formal change control procedures, and is used as a basis for comparison; the purpose of the Programme / Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare updated versions of Programme / Project Baseline Plans when different milestones are reached: • Cost Baseline: Approved project budget • Schedule Baseline: Approved project timeframe • Scope Baseline: Approved project scope
B.3.1.3	Implement Programmes and Projects	Manage the day-to day activities to implement the Programmes and Projects.	The activities cover monitoring the progress of the programmes and projects to ensure that the outputs are fit for purpose and can be integrated into the organisations operations, such that the benefits can be realised.

Realizing Benefits

Benefits Realization (BR) has clear roles and responsibilities, processes, principles and deliverables. The main beneficiaries of a programme should identify, plan and review the expected benefits from the change, and programme managers who deliver the reliable capability on time and within budget. Benefit Realisation is used to ensure that the organization maintains a benefits focus during programme implementation

A benefit is a measurable positive impact of change and the process should include:

- Identify the outcomes

- Define benefit measures for each outcome

- Collect current benefit measure data to have a quantitative basis for decision making

- Plan the new or changed capabilities necessary to realize the benefits

- Optimize the programme to have acceptable levels of resource, risk, cost, quality and time

- Review the impact of the programme implementation

- On completion of the programme, ensure that the capabilities and realisation of benefits are sustained
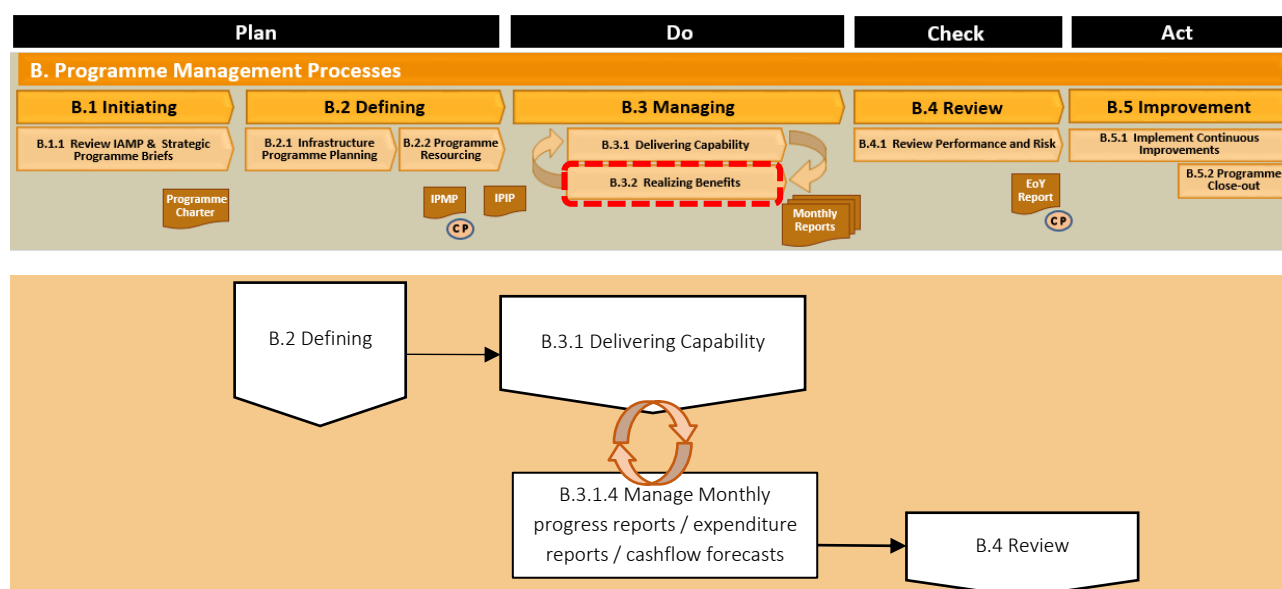
Figure 67: Process Mapping – B.3.2 Realizing Benefits

Table 22 Managing Processes – Realizing Benefits

No.	Process	Definition	Description
B.3.2	Realizing Benefits	Benefits realisation is the process for the identification, definition, tracking, realisation and optimisation of benefits ensuring that potential benefits arising from	

No.	Process	Definition	Description
		a programme of change are realised. Measurable improvement resulting from an outcome which is perceived as an advantage by a stakeholder (Managing Successful Programmes (MSP))..	
B.3.2.4	Monthly Progress Reports, Monthly expenditure reports, Monthly cashflow forecasts,	Benefits realisation is determined through regular meetings (at least monthly), where project progress, expenditure reports, budget forecasts per project and how the Implementer will execute, monitor and control the infrastructure programme allocated by the client.	No matter who the implementer is, there should, as a minimum, be a management system which provides regular reports, indicating at least the following: • Approved budget allocations • An outline of the capacity within the implementer to carry out the work • Annual infrastructure budget, broken down per project • Project cash flow projections per month, aligned with Client's allocated budget in IPMP • Forecasted cashflows aligned to projected schedules, as prepared by the Implementer(s), from information received from appointed PSPs • Expenditure reporting per month, per project • Change order / variation order per project reports • Risk reporting per programme and project

3.6 Check

Subsection 3.6: Check

Review

Review Performance and Risk

Performance management review encompasses activities that ensure objectives, goals, and targets are consistently met, efficiently and effectively. Risk-based planning review determines effectiveness and also lessons learnt identified for areas of risk management improvement

Review performance and risk issues for service delivery involves:

- An ongoing, systematic approach to improving infrastructure management and infrastructure delivery results.

- Performance & risk results are defined and categorised as inputs, activities, outputs, outcomes and impacts) – refer to module 10.

- Performance & risk evaluation, based on critical reflection and managerial action, in response to analysis of the relationships between:

- Agreement on the desired impacts, flowing from the agreed planned strategic objectives

- The planning of the necessary outcomes and specific inputs, activities and outputs required to achieve those outcomes and associated impacts

- The deployment of inputs and the generation of service delivery outputs through planned activities

- The achievement of associated outcomes and impacts, resulting from the outputs delivered
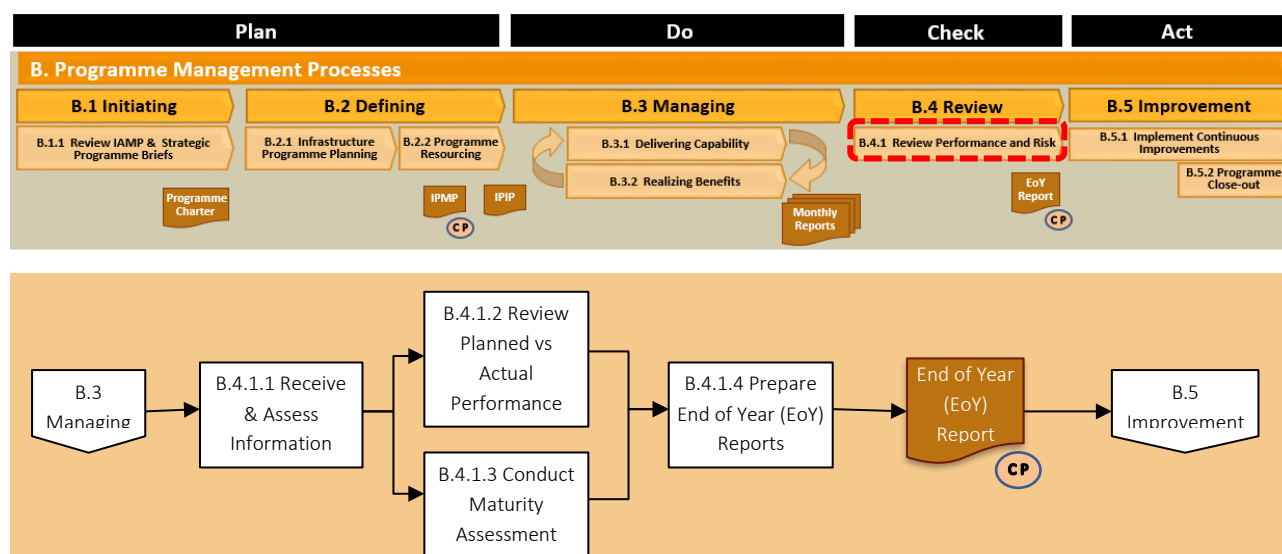
Figure 68: Process Mapping – B.4.1 Review Performance and Risk

Table 23 Review Processes - Review Performance and Risk

No.	Process	Definition	Description
B.4.1	Review Performance and Risk	The IAMP and IPMP should provide a description of each programmes key risk factors and Key Performance Indicators (KPIs). These factors and indicators should be both programme and project specific, and should be reported against throughout the infrastructure delivery programme and reviewed. The review of the risks and performance indicators are important information to be fed through to the whole system to ensure continuous improvement.	
B.4.1.1	Receive and Asses Information	Receive monthly reports for each programme reported and asses performance and risk issues	The monthly report involves collating data and information and assessment of performance and risk issues against organizational strategic objectives, IAMP, IPMP, IPIP and any specific service delivery requirements. Note: assessment would include reasons • Why performance targets were achieved or not achieved. • How risks issues were managed
B.4.1.2	Review planned vs actual performance	Performance management encompasses activities that ensure objectives, goals, and targets are consistently met, efficiently and effectively.	Review planned vs actual performance for service delivery involves: • An ongoing, systematic approach to improving infrastructure management and infrastructure delivery results. • Performance & risk results are defined and categorised as inputs, activities, outputs, outcomes and impacts).

No.	Process	Definition	Description
		The performance-management system links and align roles, responsibilities, behaviours, processes, and goals to the organizational strategies and objectives.	• Performance & risk evaluation, based on critical reflection and managerial action, in response to analysis of the relationships between: o Agreement on the desired impacts, flowing from the agreed planned strategic objectives o The planning of the necessary outcomes and specific inputs, activities and outputs required to achieve those outcomes and associated impacts o The deployment of inputs and the generation of service delivery outputs through planned activities o The achievement of associated outcomes and impacts, resulting from the outputs delivered
B.4.1.3	Conduct Maturity Assessment	Assess maturity status level of all programme management deliverables (strategic programme briefs, IPMP, IPIP and EoY Report) . Refer to module 10 for the levels of maturity i.e. from Aware to Basic to Core to Intermediate to Advanced	The level of maturity is evidenced by the available skills, experience, and capacity of the organization to deliver what is fully required and expected in all the Programme Management process's. These deliverables include requirements of :- • Best practice guidelines • Legislation • the IDM Control Cycle for Programme Management and the IDM Control Framework for Infrastructure Procurement The principle of scalability as an organisation matures and progresses with respect to skills, experience, and capacity, so it will be able to progressively implement the content as outlined in this module. Progressive Maturity Principles: • Cooperative governance and coordination • Emphasis on learning and improvement • Ownership of the Maturity Model by provincial stakeholders • Both capability and performance important • Simple tools and processes, yet robust • A systems-approach to guides and informs how we choose to integrate the respective developments in the IDMS. • Evidence-based approach

No.	Process	Definition	Description
			• Balance and triangulation • Use existing, attributable data
B.4.1.4	Prepare End of Year Evaluation Report (EoY)	The EoY report assesses the performance of the organisation against its annual objectives and goals, and the completeness of delivery of the IPMP, Delivery Management Strategy and an Infrastructure Procurement Strategy.	To manage the service delivery objectives of infrastructure, it is necessary to engage in a thorough and effective evaluation process, for each funding programme. This evaluation, which is the systematic investigation of merit, worth or significance of a programme, should focus on the service delivery outcomes, as stipulated in the IAMP an IPMP. The EoY Report forms an integral part of other planning and reporting documents. There should be consistency and alignment between the different reports related to the different stages of the Infrastructure Delivery Management System [IDMS]. The main purpose of the EoY Evaluation is to assess: • Progress made by the end of financial year by the Programmes, against the objectives and outcomes. • Past financial and non-financial performance, of the infrastructure service delivery, of the Department. • Impact that the previous year's performance will have on the planning and implementation of the next, and subsequent year's, delivery. • Monitoring and the key competencies deployed to track and report on progress. • Risks on Programme and Project Management levels. • Overall management of the Programme. • Organisation capability, and individual capacity, to manage infrastructure.

End of Year Evaluation Report

To manage the service delivery objectives of Infrastructure service delivery programmes, it is necessary to engage annually in a thorough and effective evaluation process, for each funding programme. These evaluations are the systematic investigation of merit, worth or significance of a programme. The EoY evaluation report was developed for conditional grant evaluations, which has now been adopted by the relevant Treasuries as a standard for all infrastructure programmes. Legislative references include:

- Service delivery outcomes, as stipulated in both the business plans and the conditional grant framework, published in terms of section 16 of the 2014 Division of Revenue Act.
- The requirements stipulated in sections 9, 10, 11 and 12 of the 2014 Division of Revenue Act fall within the ambit of outstanding obligations from previous year's implementation, as they must take place after the financial year has ended. It is therefore necessary to implement a process that will culminate in the submission of comprehensive evaluation reports to National Treasury.

Each year National Treasury develops a template to assist with the compilation of the evaluation. The template can be used to capture information relevant to the evaluation, such as purpose, evaluation team members, stakeholder information, program description, evaluation design and data collected. While some provision is made to assist with the interpretation of the data, departments must take full responsibility for interpretation of the data, conclusions and recommendations. These evaluations, which are the systematic investigation of merit, worth or significance of each programme, should focus on the service delivery outcomes, as stipulated in the IAMP an IPMP.

Organisations administering or implementing Infrastructure programmes using conditional grants, must set up evaluation teams for each grant, with at least one member from the *Monitoring and Evaluation* unit, or directorate of the department, as the coordinator of the evaluation exercise. It is imperative that the programme and/or project manager for each grant is part of this team. The roles and responsibilities of each team member must be clearly identified.

The EoY report assesses the performance of the organisation against its annual objectives and goals, and the completeness of delivery of the IPMP, Delivery Management Strategy and an Infrastructure Procurement Strategy.

As the EoY Report forms an integral part of other planning and reporting documents, there should be consistency and alignment between the different reports, as prepared in terms of different stages of the IIDMS. The main purpose of the EoY Evaluation is to assess:

- Progress made by the Programmes against the objectives and outcomes, by the end of financial year;
- Past financial and non-financial performance of the infrastructure service delivery of the Department;
- Impact that the previous year's performance will have on planning and implementation on the next and subsequent year's delivery;
- Monitoring and the key competencies deployed to track and report on progress;
- Risks on Programme and Project Management levels;
- Overall management of the Programme;
- Organisation capability and individual capacity to manage infrastructure.
  Local government are required to provide an annual performance monitoring report ito Section 72 of the MFMA.

3.7 Act

Subsection 3.7: Act

Improvement

Implement Continuous Improvement

Programme Management involves a continual review, assessment and improvement process, whereby the outcomes of the infrastructure programmes are evaluated and reviewed against the strategic programme objectives and deliverables. The objective is to recommend programme improvements back into the full IDM System.

It is critical that programmes are reviewed, and improvement identified, for future programme performance. Some of the improvement requirements should include:

- Determine the programme and project management knowledge improvement and lessons learnt;
- Align to the ongoing tactical and operations of processes, to achieve conformity of products and services;
- Recommend and direct processes to sustain knowledge and make it available;
- Consider the current organizational knowledge and compare it to changing needs and trends;
- Make recommendations to acquire the necessary additional knowledge and training.

The IPMP should provide a self-assessment of the contents of the document, and indicate where there are sections that have a material impact on the interpretation, which could be improved.
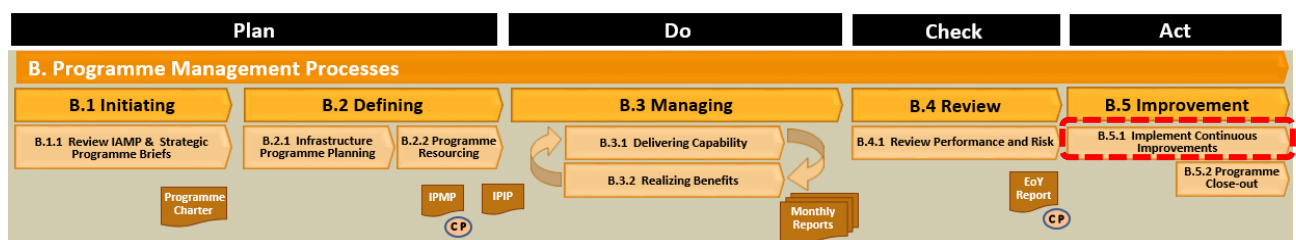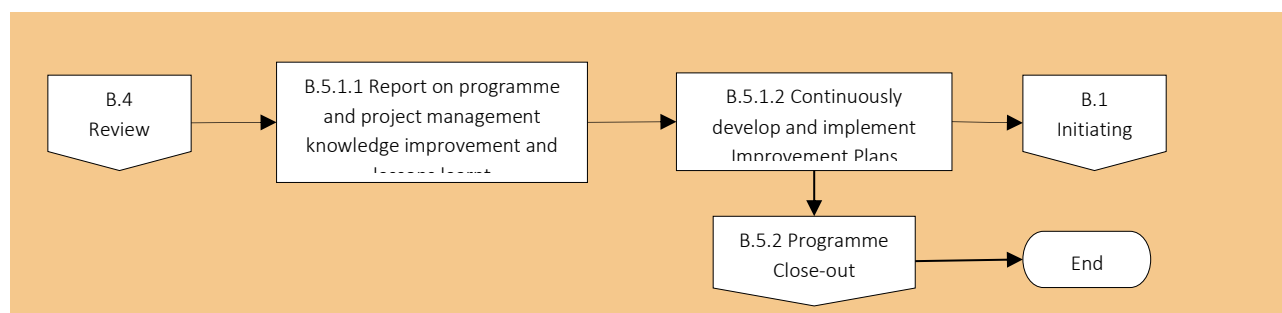
Figure 69: Process Mapping – B.5.1 Implement Continuous Improvement

Table 24 Improvement Processes- Implement Continuous Improvement

No.	Process	Definition	Description
B.5.1	Implement Continuous Improvement	The 'Improvement' process is focused on variations to the achievement of deliverables of time, cost, quality and communications, understanding why and how these variations occurred, and then planning to take advantage of these variations, or recover from the variations; and serves to inform other and future programme planning. Improvement is also used to also identify gaps in performance, what caused them, what are the impacts, and then recommend appropriate action.	
B.5.1.1	Report on programme and project management knowledge improvement and lessons learnt	Programmes and projects maturity levels, capability and performance reported on to inform knowledge improvement and lessons learnt reviewed and improvements identified and implemented for future programme performance.	All programme management deliverables are cyclical and are submitted sometimes twice annually. Each version needs to be continuously reviewed and possible improvements identified and worked on. Improvement requirements should include: • Determine the programme management knowledge improvement and lessons learnt; • Align to the ongoing tactical and operations of processes to achieve conformity of products and services; • Recommend and direct processes to sustain knowledge and make it available; • Consider the current organizational knowledge and compare it to changing needs and trends. Make recommendations to acquire the necessary additional knowledge improvements and training requirements
B.5.1.2	Continuously develop and Implement	All programme management deliverables are cyclical and are submitted	Specific recommendations should be made for programme and project operational performance, to develop and improve the: • IAMP processes

No.	Process	Definition	Description
	Improvement Plans	sometimes twice annually. Each version needs to be continuously develop and implement improvement plans	• IPMP processes • IPIP processes • Monthly progress, expenditure reporting and cash flow forecasts. • EoY reporting processes

Programme Close-out

The **'Closing the Programme'** process is implicit in the 'Improvement' process, and is usually initiated when programmes have been delivered, and benefits have materialized to a sufficient degree to satisfy the programme's objectives. However, benefits realisation and measurement activities, as well as documenting of lessons learnt for application in future programmes, continue after the programme has closed.

The main activities at programme closure are:

- Notify stakeholders that the programme is about to close;

- Assess completeness of delivery;

- Ensure all projects have been completed satisfactorily;

- Review the performance of the programme;

- Identify lessons that may benefit other programmes;

- Assess realisation of benefits to date (hold a final Benefits Review meeting);

- Update the Programme Brief and confirm that it has been satisfied;

- Allocate responsibility for post-programme reviews of benefits;

- Ensure ongoing ownership of any outstanding risks and issues;

- Confirm that ongoing operational support arrangements are in place;

- Finalise the programme documentation and archive it in accordance with organisational policy.
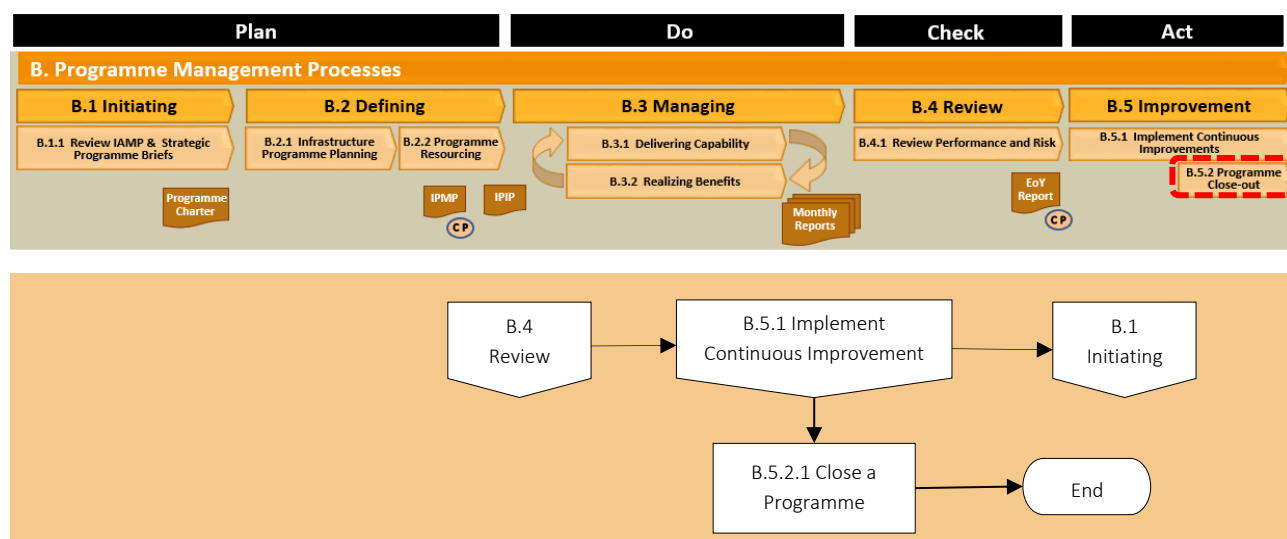
Figure 70: Process Mapping – B.5.2 Programme Close-out

Table 25 Improvement Processes - Programme Close-out

No.	Process	Definition	Description
B.5.1	Programme Close-out	The objective of the Programme Close-out is to Close-Out is document the processes carried out during the programme life-cycle	

No.	Process	Definition	Description
B.5.2.1	Close a Programme	A programme close-out means that a particular programme is terminated	The 'Closing the Programme' process is usually initiated when programmes have been delivered, and benefits have materialized to a sufficient degree to satisfy the programme's objectives.

However, benefits realisation and measurement activities, as well as documenting of lessons learnt for application in future programmes, continue after the programme has closed.

All of the documented processes during the programme life-cycle are packaged with the programme close-out Report. |

3.8 Exercise

Subsection 3.8: Exercise

1   Develop a Programme Brief

While this outline structure for a Programme Brief has been successfully adopted by many organisations, it is noted that there is no ideal structure, and the proviso is the key programme requirements are covered in a logical order. It may be useful to consider this as a 'checklist' of content rather than a prescriptive template.

A   Programme Title

Insert programme name

B   Programme Manager

Insert name of the Senior Responsible Official, if appointed or designated office..

C   Description and Justification

Give a brief description of the budget programmes and briefly explain why the budget programmes are needed, including the alignment with the organisational objectives and the IAM objectives. Provide origin or source of the programme requirements. Highlight and provide any relevant information on any new projects

D   Programme Strategy

Indicate how the programme supports the organization's vision and strategic goals (and which are supported). Include specific references to any organisational key performance indicators (KPIs) contributed to.

E   Purpose/Vision Statement

Set out the Vision Statement for this programme.

F   Key Business Drivers

List the key external drivers that influence the need for the programme and indicate the degree of relevance or priority accorded to each.

G   Scope of Work

Provide a summary of the projects or work for each infrastructure programme to be implemented over the MTEF Period. Identify KPIs and develop programme risk register. Provide detailed list of approved projects and operational work in an Appendix to this document.

Note what is IN and OUT of scope

Provide a summary of the programme management terms of reference (include areas of responsibilities and duties to be performed) Identify KPIs and develop programme management risk register. (Align and expand in item I below).

H   Programme Benefits

- Benefit Forecast

Provide a forecast of the key benefits to be realised by the budget programme (in terms of infrastructure delivery and programme management systems and processes)

- Benefit Realisation Timescale

Indicate over what period will these benefits be realised.

I   Programme Management

- Key Roles

Indicate how the programme will be organised and managed and who will fulfil the key roles (if decided at this stage).

- Method and Approach

Indicate which process(es) will be required/used for this programme and briefly describe the approach that will be adopted for the programme e.g. formal programme management methods etc.

J   Customers

Indicate who is/are the intended recipient(s) or beneficiaries of the outcomes/outputs produced by the programme

K   Key Stakeholders

Identify the key stakeholders that have either an interest in or some influence over the programme outcomes or outputs. Full details should be recorded in the Stakeholder Register.

L   Resourcing Options

Indicate how the proposed programme will be resourced and briefly describe the resourcing options that offer best value for money procurement of the required outcome/output

M   Financial Summary

Indicate the estimated programme expenditure over the MTEF period.

N   Timescales and Milestones

Indicate the initial estimates of start and end dates for each stage of the programme (this template uses a generic set of Process Stages – substitute this with your organization's own development framework/process).

Include an outline programme plan as an Appendix.

- Key Milestones

List the key programme milestones for development, delivery and benefit realisation, and any required alignment e.g. to corporate business and reporting cycles

- Dependencies

List the key programme dependencies both internal and external. (Further details should be included in the Projects Dossier)

O   Risk Summary

Briefly describe the significant risks (you could restrict this to the top-six) identified for the programme and, for each, indicate (where known at this stage) the potential impact and likelihood of the risk. Full details should be recorded in the Risk Register

P   Issues Summary

Briefly describe the current issues (you could restrict this to the top-six) identified for the programme and, for each, indicate (where known at this stage) how the issue will be addressed and who is responsible. Full details should be recorded in the Issues Log

APPENDIX: Programme Plan
APPENDIX: Risk Register
APPENDIX: Issues Log
APPENDIX: Stakeholder Register

2   Develop a Infrastructure Programme Management Plan (IPMP)

a   Infrastructure Programme

a.1   Programme Scope Overview

- New Programmes

- Existing Programmes

- Consolidated Programmes for MTEF period

- Lists of all projects in each programme

- Allocations per Implementer

a.2   IPMP Information

- Objectives of Programme

- Infrastructure Programme Timelines and Milestones

- Key Programme Success Factors and Key Performance Indicators

    o   Strategic Level

    o   Programme Reporting

    o   IPIP Submissions

- Programme & Sub Programme Risks

- Programme & Project Quality Requirements

- Programme controls and measures, which will address health and safety

- Programme Communication Plan

- Programme-assigned Internal and External Resources

b   Procurement Strategy

- Delivery Management Strategy
- Contracting Arrangements
- Procurement Arrangements
    o   Works
    o   Professional Services

3   Develop a Infrastructure Programme Implementation Plan (IPIP)

a   Infrastructure Programme

a.1   Programme Scope Overview

- New Programmes
- Existing Programmes
- Consolidated Programmes for MTEF period
- Lists of all projects in each programme
- Allocations per Implementer

a.2   IPIP Information

- Infrastructure Programme Timelines and Milestones
- Key Programme Success Factors and Key Performance Indicators
    o   Strategic Level
    o   Programme Reporting
    o   IPIP Submissions
- Programme & Sub Programme Risks
- Programme & Project Quality Requirements
- Programme controls and measures, which will address health and safety
- Programme Communication Plan
- Programme-assigned Internal and External Resources

b   Procurement Strategy

- Delivery Management Strategy
- Contracting Arrangements
- Procurement Arrangements
    o   Works
    o   Professional Services

Section 4: Operations and maintenance management

4.1 Introduction

Section 4: Operations and maintenance management

Subsection 4.1: Introduction

This module provides guidance on the Management of **on-going** operations, required to ensure that **an existing facility, or an existing network of infrastructure assets, or an existing individual infrastructure asset,** remains in service and that it functions at a pre-determined level of service throughout its life. Note: 'Operations', shown in the figure below, refers to business operations and includes the O&M of infrastructure assets.

The primary purpose of this module is to provide an overview of O&M Management in the public sector, in order to is to realise the following benefits for the reader:

- Understand the linkages with the O&M management processes at a strategic (i.e. portfolio management) level and tactical (i.e. programme management) level;

- Understand roles and responsibilities for the management of the O&M activities of a facility, or network of infrastructure assets;
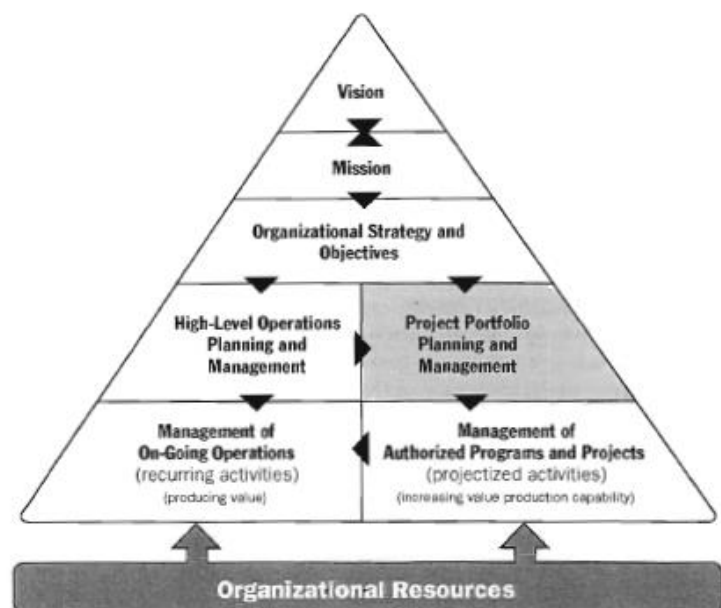
Figure 71: Portfolio of programmes, projects and operational work

- Understand the development of Operation Management Plans and Maintenance Management Plans, at a facility or an infrastructure asset (IA) network level, i.e. plans that document how the assets comprising a facility, or an infrastructure asset network will be operated and maintained, on a day to day basis;
- Understand the development of Maintenance Management Plans at component level;
- Understand the management of O&M performance and related risks;
- Understand the continuous improvement methodology of the O&M function.

By the end of the training on this module you:

- Will understand the context of the Operations and Maintenance Management module of the IDMS
- Will have knowledge of the key concepts and components of best practice Operations and Maintenance Management
- Will have knowledge on the performance management elements that relate to infrastructure Operations and Maintenance Management;
- Will understand the monitoring and controlling requirements for infrastructure Operations and Maintenance Management.
- Will know what is expected of Executives to institutionalise the IDMS across your Municipality

The IDM Processes Placemat shows:

- the major delivery management processes and deliverables;
- the lifecycles and Control System for the delivery management processes;
- alignment of the Programme Management Lifecycle with the Plan-Do-Check-Act management cycle.
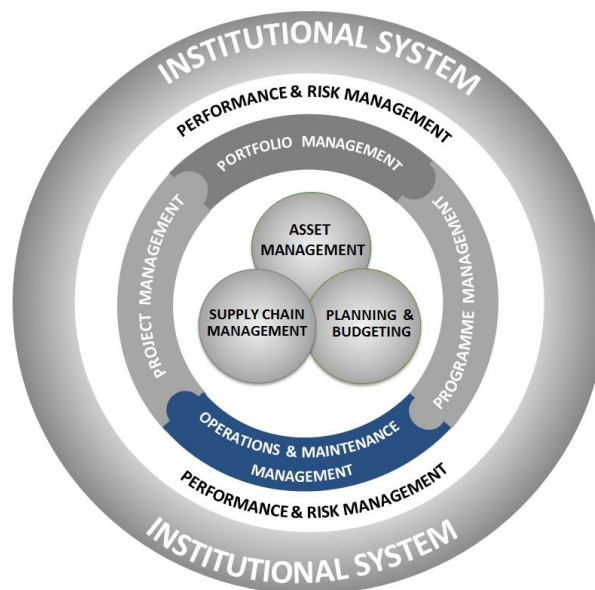
Figure 72: Operations and Maintenance Management in the IDMS Concept Diagram

Definitions

"It is estimated that 95% of the infrastructure assets required to support service delivery are already in operation. Therefore, if the ultimate goal of infrastructure delivery is to support service delivery, then it makes perfect sense that a significant focus of infrastructure delivery management should be on operating and maintaining existing infrastructure assets" (David Lievaardt, Asset Management, Ethekwini Municipality).

Operations

The International Infrastructure Management Manual (IIMM) defines Operations as "The active process of utilising an asset which will consume resources such as manpower, energy, chemicals and materials".

Asset Operations is concerned with processes that provide instructions to Operators about how to operate the assets, within the appropriate design, maintenance and operational parameters. Asset Operations includes the development of an Asset Operations Strategy and Operations Management Plans that outline the approach, activities and resources involved in managing and implementing operations.

'Infrastructure operations' is a subset of the wider concept of 'business operations', which includes functions such as manufacturing, marketing, distribution, etc. Infrastructure asset management activities are therefore, similarly, accepted as an important subset of business management activities.

Maintenance

The National Immovable Asset Maintenance Management (NIAMM) Standard defines Maintenance as "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".

The term 'maintenance', is used to describe activities required to ensure that infrastructure assets perform a required function(s), to a specific performance standard(s), over a predetermined, and therefore expected, period i.e. the expected 'useful life'.

Facility Management

The growing trend in the South African Public Sector towards Facilities Management necessitates the definition of related terms in this Module.

The International Standards Organisation (ISO) 41011, defines Facility (or Facilities) Management (FM) as **"**An organizational function which integrates people, place and process within the built environment with the purpose of improving the quality of life of people and the productivity of the core business".

A facility is defined by ISO as "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".

Asset Care

The NIAMM Standard uses the term 'asset care' to link maintenance with the periodic renewal of infrastructure assets, and defines Renewal as **"**Expenditure on an existing asset which returns the service potential of the asset or expected useful life of the asset to that which it had originally."

The NIAMM states that *"Asset care, comprising optimised **maintenance and renewal** planning, implementation and management, is a key objective of asset management".*

Infrastructure assets must be maintained to achieve their useful life expectations. Maintenance, however, only slows down the deterioration in the condition of infrastructure assets. If the demand for

services provided by an infrastructure asset is indefinite, the condition of the asset will, over time, deteriorate to such an extent that capital renewal will be required. The decision to renew therefore results from the maintenance planning function, and renewal is thus the link between maintenance and capital works.

Organisations must sustain the required operating or productive capacity (ability to render services), through a combination of:

- **maintenance** that ensures that assets reach their intended useful lives;
- **renewal** that entails capital expenditure on an existing infrastructure asset, to return the service potential, economic benefit or service life of the asset to that which it had originally, which then results in an extension of the asset's useful life. Note that the NIAMM Accounting Framework specifies that 'Renewal' was previously called 'Renovation, Refurbishment or Rehabilitation'.

Renewal

Renewal can include works to replace existing assets or facilities, with assets or facilities of equivalent capacity or performance capability.

Renewals therefore enable the entity to continue to provide asset-based services beyond the original useful life of individual assets, and supports long term business continuity.

Understanding Operations

To operate means:

- to run something, such as a piece of machinery or a business; and
- to control the functioning of a machine, process, a system or a business.

'Operations', in a business context, therefore refers to the running and controlling of an organisation's business activities.

'**Business Operations', i.e. the operations of the organisation's core business activities,** is aimed at converting inputs into outputs, resulting in the production of '*goods'* (i.e. products) and/or '*services'*. The outcome of 'business operations' is the harvesting of value from assets owned by an organisation. An example of value derived from a physical asset, like a building, is rent. An example of value derived from an intangible asset, like an idea, is a royalty. The effort involved in 'harvesting' this value is what constitutes 'business operations'.

There are several 'in use' activities, e.g. cleaning, pest control, fumigation, fire equipment, etc., that cannot be easily classified as either operations or maintenance. Management needs to make a ruling on the classification of these activities to clarify the planning and budgeting responsibility for these activities.

An entity or facility's Business Operations Unit is accountable for:

- Implementation of the asset management operations;
- Execution of Category 1 maintenance (see Table 1), being repetitive, routine type, 'first line' maintenance activities (handyman type jobs), that do not require specialist input in terms of skills,

staff, equipment, etc. The replacement of light bulbs, replacing of broken glass, repairing or replacing broken door handles, etc. are typically planned, budgeted for and implemented by the operating unit. The IIMM describes Category 1 maintenance as the 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. The costs associated with the infrastructure assets operations are generally accepted as a component of an infrastructure asset's 'lifecycle cost'. This cost should always be included in asset management decision making processes, because it impacts on the '*true cost of ownership*'.

Table 26: Maintenance Categories

Category	Description	Type	Example
One	Work that can be done by on-site personnel. No special skills, tools or equipment required. Responsibility of the Business Operations Unit.	• Corrective maintenance to restore operations • Preventative maintenance routines, carried out whilst the asset is in use (in operation).	Emergencies, deferred minor corrective maintenance, and preventative routines whilst asset in use.
Two	Work outside the capacity and capability of the on-site personnel. Specialist skills, tools and equipment required.	• Final repair of assets that have been restored to service • Planned maintenance procedures • Servicing of asset.	Minor modifications, preventative servicing by specialist service providers and off-site repairs (workshop).
Three	Works that requires design inputs or PSP involvement. Scope of the work may justify a competitive procurement process.	• Major maintenance projects related to shutdowns • Modifications • Major repair work of assets.	Major modifications, major corrective and preventative maintenance that requires shutdown of the facility or a part of the facility.

Given that two different management units share responsibility for the maintenance of a facility, strict rules and procedures should be put into place, to avoid possible planning or budgeting gaps.Understanding Maintenance

The maintenance requirements for infrastructure assets depend on:

- Age;
- asset criticality (in terms of the consequence of failure);
- function;
- geographical location;
- environment;
- operating procedures.

Maintenance Management System

The NIAMM Standard requires that each entity shall design, implement and operate a maintenance management system suitable to the scale, complexity and criticality of the asset portfolio(s) under its control.

"The maintenance management system shall enable:

a. allocation of roles and responsibilities, inclusive of a system of delegation;
b. development of standard work packages, inclusive of labour, material and equipment requirements for planned maintenance work;
c. scheduling and tracking of maintenance activities, personnel and logistical support;
d. management of inventories (capital loan, rotating and replacement assets such as transformers, generators and pumps, and consumables);
e. tracking of expenditure against budget, and costing of maintenance activities and outputs;
f. management of supplier contracts, warrantees and supplier activities related to maintenance work;
g. safekeeping of asset schemata (e.g. building plans and as built drawings), operating and maintenance manuals, and other documents;
h. maintenance staff to have access to documents described in (g) above to assist in planning for maintenance, and in undertaking maintenance activities; and
i. measurement against stated asset care objectives and targets."

The Maintenance Hierarchy

Planning for and implementation of IA Maintenance in all spheres of government requires a proper understanding of the maintenance types, approaches and actions, as described in the NIAMM

Standard's   Maintenance   Hierarchy,   and   shown   in   the   figure   below.
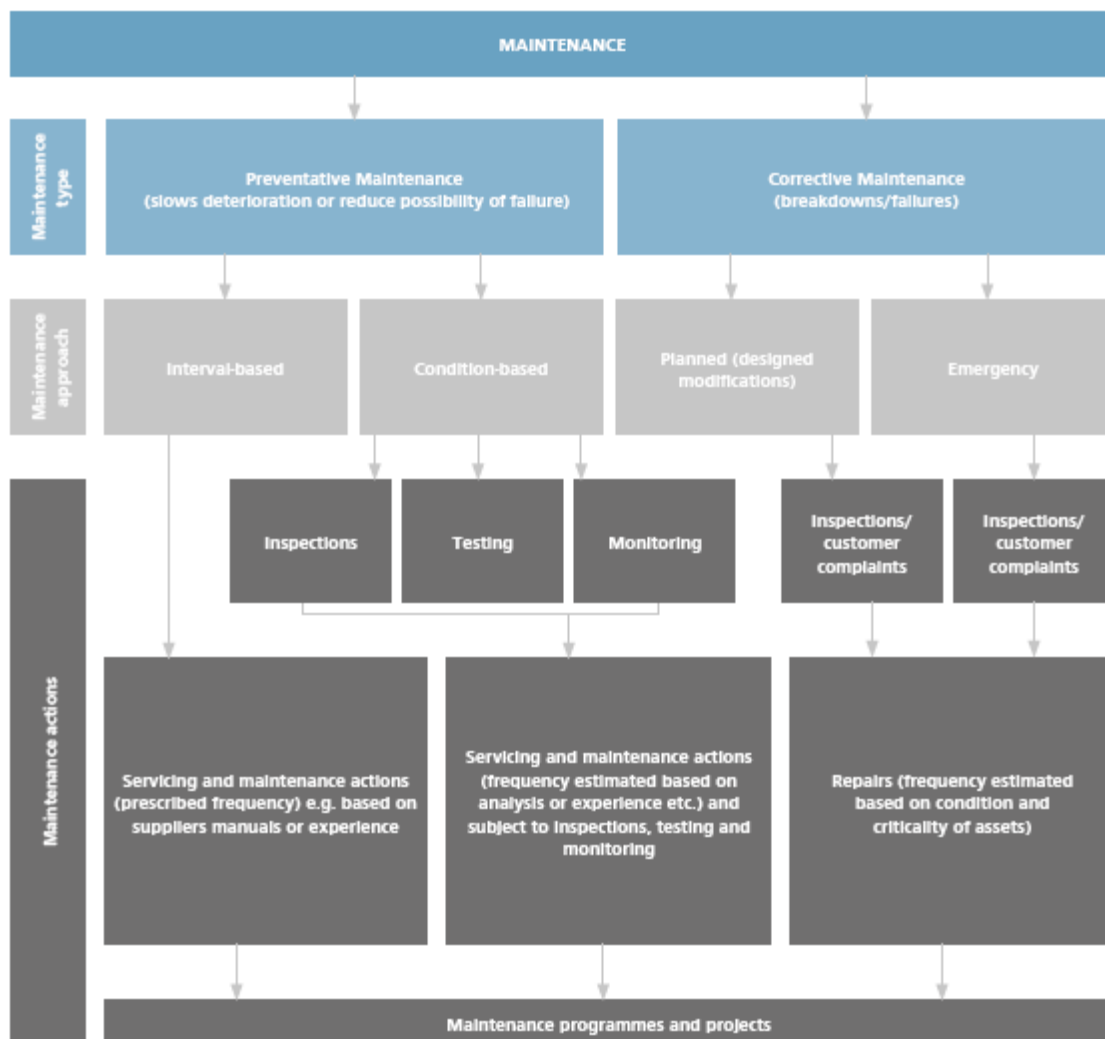
Source: National Immovable Maintenance Management Standard 2014

Figure 73: Maintenance Hierarchy

Definitions and descriptions

There are two broad types of maintenance activities, i.e. **Preventative** Maintenance and **Corrective** Maintenance.

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.

Preventative Maintenance
Maintenance carried out at pre-determined intervals, or corresponding to prescribed criteria, and intended to reduce the probability of failure or the performance degradation of an item."

Corrective Maintenance costs typically increase as Preventive Maintenance Activities decrease and vice versa, as shown in the figure below.
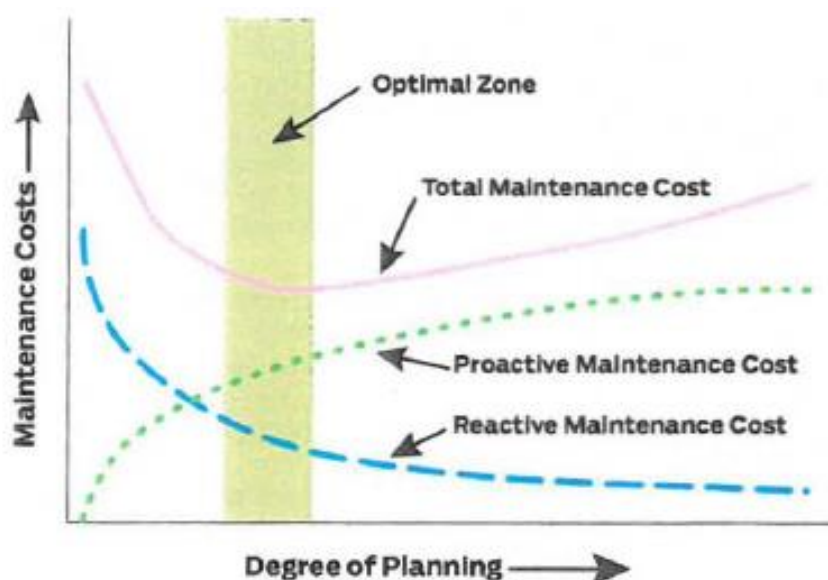
Figure 74: Relationship between Preventative and Corrective Maintenance Costs Maintenance requirements and costs are likely to change over an infrastructure asset's life. Some assets, as they age, need more and more maintenance, until they deteriorate to a point that they require **renewal**.

Preventative Maintenance

The purpose of preventative maintenance is to prevent faults and disruption of service, caused by faults. It includes 'Planned Maintenance' activities that help ensure that the asset reaches its planned useful life, slowing down asset deterioration and delaying the requirement for asset renewal.

Preventative Maintenance approaches can be summarised as follows:

- Interval-based: Maintenance actions are periodic in nature, and are planned and scheduled. It is often referred to as 'time-based' preventative maintenance, but could also be based on number of machine hours, number of outages, etc. This type of maintenance is informed by the manuals of the suppliers, but the frequency must be updated through the condition monitoring process. Frequency is dependent on many variables including operator skills and knowledge.

- Condition-based: This type of maintenance comprises servicing and maintenance actions based on analysis and experience, and is subject to inspections, testing and monitoring.

Corrective Maintenance

The purpose of corrective maintenance is to fix faults, conduct repairs and reinstate an infrastructure asset to full functionality. Corrective Maintenance approaches include:

- Emergency: This type of maintenance is a response to breakdowns/failures. Emergency actions interrupt the preventative maintenance schedule to be performed, and are planned and scheduled as they happen.

- Planned: Maintenance consists of planned and scheduled actions that aim to prevent breakdowns, and seek to eliminate the cause of repeated breakdowns or failures. This type of maintenance includes design modification.

4.2 Control Cycle for Operations and Maintenance

Subsection 4.2: Control Cycle for O&M

Table 2 summarises the IDM Control Cycle for O&M Management recommended for governance of infrastructure delivery in the South African public sector.

The Control Cycles prescribes the Control Cycle Deliverables, each of which must be signed off, but which are not seen as pre-requisites for moving to another process, as these processes are generally cyclical in nature and inform, or are informed by, each other. Accordingly, the Control Cycle processes are not referred to as stages and are not numbered, to avoid creating the impression that they are sequential.
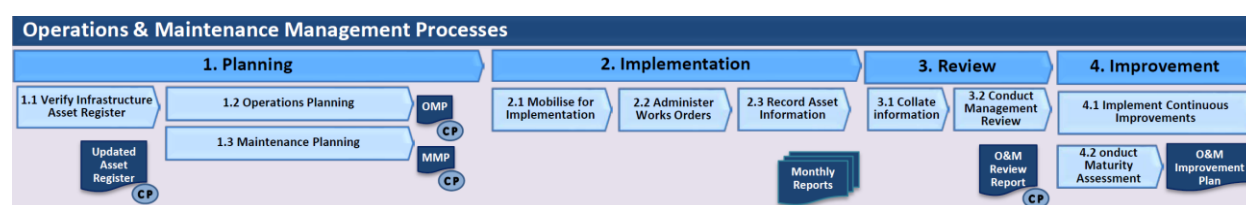
Figure 75: Process Mapping – Operations and Maintenance Management Processes

Table 27: Operations and Maintenance Management Control Cycle

Operations and Maintenance Control Cycle		
Process	**Control Cycle**	
Name	**Control Point C P Deliverable**	**Description**
Infrastructure Asset Verification	Updated Asset Register	Description:

Operations and Maintenance Control Cycle		
Process	**Control Cycle**	
Name	**Control Point** CP **Deliverable**	**Description**
	(for a Facility or IA Network)	Updated record of infrastructure asset information and data attributes, preferably quarterly, but at a minimum annually. These updates are required on completion of work carried out on the infrastructure assets i.e. acquisition, construction, renewal, maintenance and disposal. Typical contents: As prescribed by National Treasury and the National Immovable Asset Maintenance Management (NIAMM) Standard.
Operations Planning	Operations Management Plan (OMP)	Description: The OMP contains the Operations Work Schedules with the organizational structure and institutional arrangements for the planning, implementation, monitoring and controlling of all operational activities. Typical contents: - Annual Operations Plan describing operations requirements including: - Operating procedures. - Scheduling activities. - Emergency procedures. - Resource (staff, funding, equipment, materials, etc.) requirements. - Performance and quality requirements. - Risks and OHS provisions
Maintenance Planning	Maintenance Management Plan (MMP)	Description: Annual Maintenance Plan describing the actions required to keep infrastructure assets in as near as is practical to their original condition (without renewal), and to ensure their minimum availability and reliability, Typical contents: - Maintenance procedures and activities. - Scheduling of activities.

Operations and Maintenance Control Cycle

Process	Control Cycle	
Name	**Control Point (CP) Deliverable**	**Description**
		• Resource (staff, funding, equipment, materials, etc.) requirements. • Performance and quality requirements. • Risks and OHS provisions.
O&M Management Review	O&M Management Review Report	Description: O&M Management Reviews provide facility/infrastructure network management with an opportunity to review, at planned intervals, the O&M of the facility or IA network of assets, the O&M management system and O&M activities, as well as the operation of the O&M policy, objectives and plans, to ensure their suitability, adequacy and effectiveness. Typical contents: • The management review should focus on: • Achievement of the O&M objectives. • O&M performance in terms of the pre-determined performance measures. • Review of the O&M risks as documented in the Risk Register. • The Management Review Report should be presented to and signed-off by the head of the facility or infrastructure network.

4.3 Operating and Maintenance Processes

Subsection 4.3: Operating and Maintenance Processes

In order to be successful, the operating and maintenance processes includes:

- Planning
- Implementation
- Review
- Improvement
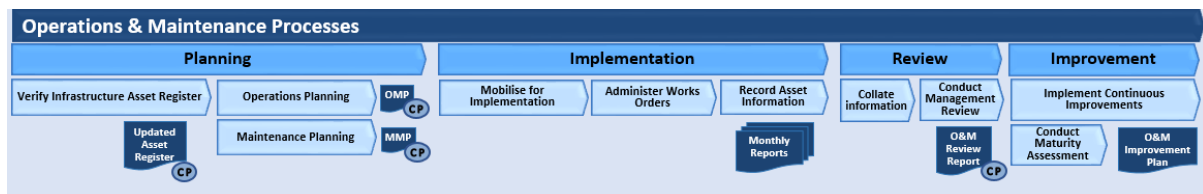
4.4 Plan

Subsection 4.4: Plan

Planning

The O&M of existing infrastructure assets is an ongoing function that should be taken care of as part of day-to-day routines, and through the implementation of scheduled pre-determined O&M activities.

During the planning process, the performance and condition of an immovable asset must be assessed. Performance relates to the ability of the immovable asset to meet target levels of service, while the condition of the immovable asset reflects the physical condition of the asset. Key to this assessment is information on financial, technical and operational performance of the immovable asset over time. Such information must be supplemented with physical condition assessments. The purpose of condition assessments is to:

> **Definitions and descriptions**
> The NIAMM Planning Guidelines prescribe that:
> *"Where no Maintenance Management Plan exists, the assets in the existing facility should be verified, the components identified, and a condition assessment completed.*
> *A Maintenance Management Plan can then be developed, taking cognisance of the condition of the components. This could include capital projects that improve the condition of the facility up to the minimum requirements."*

- Identify any defects, deterioration and deficiencies, either currently affecting the performance of the immovable asset or likely to do so over the planning period;
- Ensure that "it remains safe for continued use"[2]
- Identify the effect of the condition of an infrastructure asset on service delivery ability;
- Determine the maintenance required to return the immovable asset to the state in which it would provide the most effective service;
- Estimate cost of the maintenance activities identified.

---

[2] See Construction Regulations, 2014 in Module 3: Asset Management Section 3.5.4.1

Once the above assessment has been completed, maintenance priorities can be determined and scheduled. The key considerations in determining maintenance priorities are the following:

- o   Statutory requirements;
- o   Health, safety and environmental considerations;
- o   Financial and risk considerations;
- o   Resources (staff, equipment and material availability).

Infrastructure assets operated without O&M Management Plans, present significant risks to an organisation in terms of service delivery, reliability and business continuity.

O&M Management Plans are the core components of the Lifecycle Plans to be developed for a facility (or a network of infrastructure assets) in accordance with the NIAMM Standard.

Each facility or network of infrastructure assets should therefore, at any given point in time, have Operations Management Plans and Maintenance Management Plans, to guide the implementation of the ongoing, day-to-day work, for ensuring that the organisation receives the value and desired level of service from its portfolio of infrastructure assets.

It should be noted that Operations and Maintenance Management Plans, where they exist, should be annually reviewed against portfolio and lifecycle requirements.

Verification of Infrastructure Assets
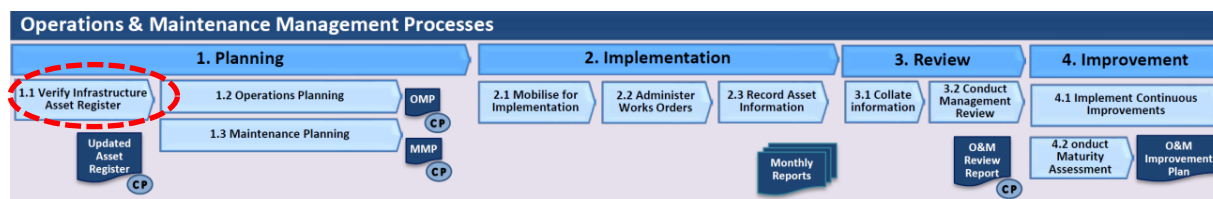
Figure 76: Process Mapping – 1.1 Verification of Infrastructure Assets

The Infrastructure Asset Register is a key component of infrastructure asset management and should be the source of most information required for maintenance planning.

The NIAMM Standard requires in Section 4.4 that:

"Each entity shall establish, maintain and update asset registers **supportive of asset care planning**, in the following manner:

Segment and classify its immovable asset portfolio(s) to at least the level of **maintenance-significant item,** (which is usually at a component level), in accordance with a predetermined asset hierarchy (see below), and shall furthermore, for purposes of maintenance and renewals planning, determine and record the following information against each asset in its asset register:

a. asset identification number;

b. physical description;

c. physical parameters;

d. estimated useful life;

e. actual and minimum acceptable asset failure mode ratings (condition, performance, capacity and cost-of operations);

f. remaining useful life;

g. current and depreciated replacement cost;

h. asset criticality rating;

i. any statutory obligations regarding the O&M of the asset; and

j. responsible person(s)

The entity shall, in maintaining and updating asset registers, update asset failure mode status and current replacement cost data for each asset on an annual basis."

The NIAMM Standard provides the following guidance for a 'predetermined asset hierarchy':

An Asset Hierarchy (see figure below from IIMM and NIAMM) is "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. The basis for asset identification and measurement is the asset hierarchy, that is a framework for segmenting an asset base into appropriate classifications to enable **componentisation,** (which is a GRAP 17 requirement)."
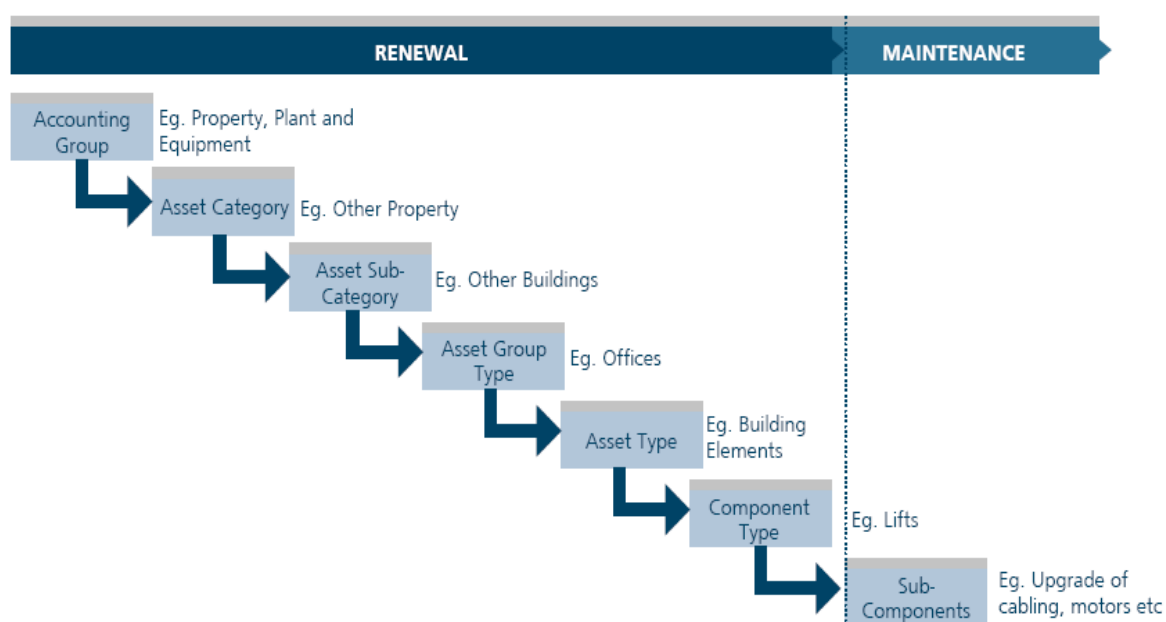
Figure 77: Asset hierarchy structure

"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, in accordance with the requirements of GRAP 17 to componentise assets.

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

Table 28: O&M Planning Processes

No.	Process	Definition	Description
C.1.1	Verify Infrastructure Asset Register	The purpose of the Infrastructure Asset Verification process is to ensure that changes to the infrastructure asset configuration (components) have been recorded in the Infrastructure Asset Register.	**Step 1:** Review current IA Register. **Step 2:** Verify that recent renewals, replacement, extensions and additions have been recorder on the IA Register. **Step 3:** Note components to be added to the maintenance schedule.

Operations Planning
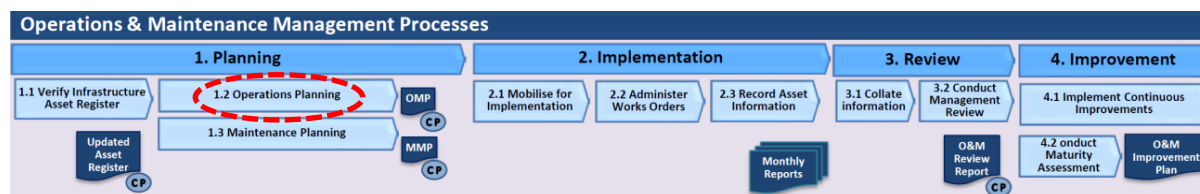
Figure 78: Process Mapping – 1.2 Operations Planning

Management of the Operations function is underpinned by an **Operations Management Plan,** for each facility or Infrastructure Asset network. These plans should meet the following requirements:

- specify the ongoing, day-to-day work to operate the infrastructure assets in accordance with manufacturers' and suppliers' recommendations;

- specify numbers, deadlines, staffing decisions, and other information that details who, what, when, where, and how the organisation will do its part, to achieve the organisation's mission and strategic objectives;

- Provide a detailed costing of the human resources, materials and equipment required for delivering the OP, to determine the operations funding requirements.

Key components of an Operations Plan include: -

- o Review operational objectives
- o Determine performance measures (KPI's)
- o Identify and analyse associated Risks
- o Determine operational actions
    - ▪ Manage operations cost and budget
    - ▪ Manage utility costs (water and electricity)
    - ▪ Manage Health and safety
    - ▪ Manage asset security
    - ▪ Manage operational risk
    - ▪ Manage environmental and sustainability information
    - ▪ Manage minimization, recycling and reuse
    - ▪ Manage Communications
    - ▪ Manage Information requirements
    - ▪ Plan for Emergencies, Crises and Incidents
- o Schedule operations actions

o   Update costing of operations actions

Preparing an Operations Management Plan

Management of the Operations function is underpinned by an **Operations Management Plan,** for each facility or IA network. These plans should meet the following requirements:

- specify the ongoing, day-to-day work to operate the infrastructure assets in accordance with manufacturers' and suppliers' recommendations;
- specify numbers, deadlines, staffing decisions, and other information that details who, what, when, where, and how the organisation will do its part, to achieve the organisation's mission and strategic objectives;
- provide a detailed costing of the human resources, materials and equipment required for delivering the OP, to determine the operations funding requirements

---

Table 29: Operations Planning

No.	Process	Definition	Description
C.1.2	**Operations Planning**	**The objective of the Operations Planning Process is to review the Operations Management Plan (OMP) for a Facility or Network of Infrastructure Assets.**	
C.1.2.1	Review Operational Objectives	The purpose of the Operational Objectives Review process is to acknowledge and accept changes to the IAM objectives.	**Step 1:** Study recent changes to the SIAMP and the IAM objectives. **Step 2:** Review Facility/Network Operational Objectives.
C.1.2.2	Review Operations KPIs and Risks.	The objective of the Operations KPIs and Risks Review process is to establish Key Performance Indicators (KPIs) for measuring actual performance against the stated objectives and to review the Operations Risk Register.	**Step 1:** Study Operations Management Review Report. **Step 2:** Review existing Operations KPIs. **Step 3:** Review Operations Risk Register.
C.1.2.3	Review recommended Operational Actions.	The objective of the Operational Actions Review process is to update the operational actions required to sustain the performance of the facility's infrastructure assets.	**Step 1:** Study changes to the IA configuration. **Step 2:** Study OEM's recommended O&M activities. **Step 3:** Study Handover Report(s). **Step 4:** Identify Operational Actions to be added to the list of operational actions.

C.1.2.4	Schedule Operations Actions	The objective of the Operations Actions Scheduling process is to prepare a schedule for implementation of the operational activities.	**Step 1:** Add newly identified operational activities to the existing schedule of operational activities.
C.1.2.5	Allocate Resources for Operations actions.	The objective of the Operations Resource Allocation process is to allocate resources for execution of the scheduled operational activities.	**Step 1:** Study Operations Procurement Strategy. **Step 2:** Review Resource allocation.
C.1.2.6	Update Costing of OEM recommended Operations actions	The objective of the Operations Costing Update process is to review the estimated cost of the scheduled operational activities.	**Step 1:** Update existing cost estimates for OEM recommended operational activities.
C.1.2.7	Review Zero-based Operations Plan.	The objective of the Zero-based Operations Plan Review process is to review the existing Zero-based Operations Plan for a Facility/Network.	**Step 1:** Prepare Zero-based Operations Plan.
C.1.2.8	Review Operations Management Plan (OMP) and Operations Control Budget.	The objective of the Review Operations Management Plan (OMP) and Operations Control Budget is to update the existing OMP and Control Budget.	**Step 1:** Assess Facility/Network Operations Workplan and Budget as agreed in the Infrastructure Planning Process. **Step 2:** Review Organisational Design requirements. **Step 3:** Review Roles and Responsibilities. **Step 4:** Review Procurement of Operations Service Providers.

Maintenance Planning
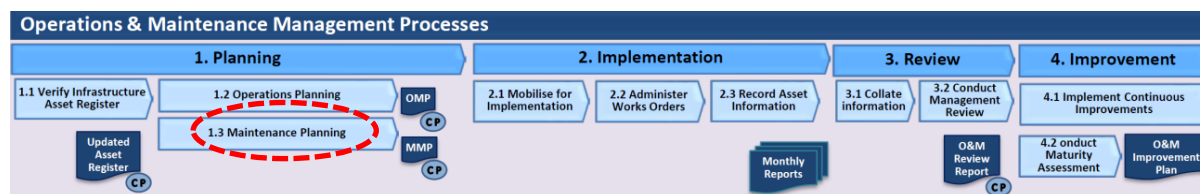
Figure 79: Process Mapping – 1.3 Maintenance Planning

The maintenance planning function should prepare a Maintenance Management Plan as a collaborative effort with the maintenance personnel, the contractor, the professionals and where specialist installations form part of the facility, the original equipment manufacturer.

A Maintenance Management Plan should be updated at appropriately defined intervals, informed by:

- any changes in the regulatory environment;

- any changes in organisational, asset management or maintenance objectives;

- ongoing condition monitoring and condition assessments or audits, and changes in the status of asset failure

- modes; and/or

- changes in the asset portfolio resulting from new asset additions, renewals, upgrading, decommissioning or

- disposal.

The cost schedule should be updated annually to current values.

Key components of a Maintenance Plan include: -

o   Review maintenance objectives

o   Determine Performance Measures

o   Identify and analyse risk

o   Collate information on the facility

o   Determine the components of a facility

o   Determine impact of component failure

o   Determine likelihood of component failure

o   Determine condition and reliability of component

o   Determine component Criticality

o   Determine component Priority

o   Determine Maintenance Approach

o   Maintenance Intervention Levels

o   Determine maintenance actions

o   Schedule maintenance actions

o   Allocate resources for maintenance actions

o   Update costing of maintenance actions

Management of the Maintenance function is underpinned by a **Maintenance Management Plan** for each facility, or IA network.

The requirements for a Maintenance Management Plan is prescribed in the NIAMM Standard, Section 4.1.3(d):

"a maintenance management plan shall be developed and included in the lifecycle plan section of the asset management plan, indicating:

   i.   the maintenance type and approach within the larger lifecycle strategy to be adopted for each asset type and asset portfolio, and for critical assets specifically (e.g. preventative or corrective, interval-based, etc.);

   ii.   the appropriate level of reliability chosen given performance expectations and the costs involved to achieve and/or maintain that level of reliability;

   iii.   the maintenance actions (e.g. monitoring, testing, serving, repairs) to be adopted per asset type, asset group and for business-critical assets; and

   iv.   appropriate resourcing methods."

It is further specified that:

"The Maintenance Management Plan should cover the following planning horizons:

- **Long-term planning:** The life of the facility from delivery to decommissioning. Normally for a period from **10 to 25 years** but may even be longer. Maintenance objectives, actions and performance indicators over the long-term plan should be scheduled in three-year intervals to ensure that all actions are covered for the life of the facility.

- **Medium-term planning:** The MTEF cycle is the **first three-year cycle** of the long-term plan and maintenance objectives, actions and performance indicators should be scheduled on an annual basis.

- **In-year planning:** The **current financial year** is the first year of the Maintenance Management Plan and maintenance objectives, actions and performance indicators should be scheduled on a quarterly basis.

- **Short-term planning (implementation planning):** Short term planning covers the **next three months** of the in-year planning. It focuses on determining all actions required to perform maintenance tasks and includes maintenance job planning".

Table 30: Maintenance Planning

No.	Process	Definition	Description
C.1.3	**Maintenance Planning**	**The objective of the Maintenance Planning Process is to review the Maintenance Management Plan (MMP) for a Facility or Network of Infrastructure Assets.**	
C.1.3.1	Review Facility/Network Maintenance Objectives	The objective of the Maintenance Objectives Review process is to update the Facility/Network Maintenance Objectives.	**Step 1:** Study recent changes to the SIAMP and the IAM objectives. **Step 2:** Review Facility/Network Maintenance Objectives.

C.1.3.2	Review Maintenance KPIs and Risks.	The objective of the Maintenance KPIs and Risks Review process is to establish Key Performance Indicators (KPIs) for measuring actual performance against the stated objectives and to update the Maintenance Risk Register.	**Step 1:** Study Maintenance Management Review Report. **Step 2:** Review existing KPIs. **Step 3:** Review Maintenance Risk Register.
C.1.3.3	Identify and collate information on the components of a facility.	The objective of the Facility Information Collation process is to collate the Original Equipment Manufacturer (OEM) Maintenance Guidelines and all other information applicable to the maintenance of the various IA components.	**Step 1:** Study changes to the IA configuration. **Step 2:** Study OEM's recommended O&M activities. **Step 3:** Study Handover Report(s). **Step 4:** Identify Maintenance Actions to be added to the list of maintenance actions.
C.1.3.4	Analyse components	The objective of the Analyse components process is to consider the likelihood of failure for each separate component.	**Step 1:** Determine likelihood of component failure. **Step 2:** Determine impact of component failure on service levels, people and finances. **Step 3:** Determine condition and reliability of component.
C.1.3.5	Determine component Criticality	The objective of the Component Criticality Determination process is to determine the criticality of an IA component.	**Step 1:** Determine most severe impact of component failure **Step 2:** Determine highest likelihood of failure. **Step 3:** Rate the impact of failure against the likelihood of failure.
C.1.3.6	Determine component Priority	The objective of the Component Priority Determination process is to determine the priority of each IA component.	**Step 1:** Determine the most severe impact of component failure. **Step 2:** Determine the most severe of the condition status or reliability of a component. **Step 3:** Rate the impact of failure against

			the condition status or reliability (select the most severe of the two) of a component.
C.1.3.7	Review Maintenance Approach.	The objective of the Maintenance Approach Determination process is to update the maintenance approach, i.e. from maximum prevention of failure to a "run to failure" approach.	**Step 1:** Update the maintenance approach (when the criticality or impact of a component changes).
C.1.3.8	Review Maintenance Actions	The objective of the Maintenance Actions Review process is to update the maintenance actions required to sustain the performance of the facility's infrastructure assets.	**Step 1:** Study changes to the IA configuration. **Step 2:** Study OEM's recommended O&M activities. **Step 3:** Study Handover Report(s). **Step 4:** Identify Maintenance Actions to be added to the list of maintenance actions.
C.1.3.9	Schedule Maintenance Actions	The objective of the Maintenance Scheduling process is to prepare schedules for the implementation of the maintenance actions. The Maintenance Management Plan should cover the following planning horizons: • Long term (10-20 yr) • Medium term (3 yr) • In-year • Short term (3 mnths)	**Step 1:** Schedule Maintenance actions at the frequency determined in the maintenance approach.
C.1.3.10	Allocate Resources for Maintenance Actions.	The objective of the Maintenance Resource Allocation process is to allocate resources for	**Step 1:** Study Maintenance Programme Procurement Strategy. **Step 2:** Review Resource allocation.

		execution of the scheduled maintenance actions.	
C.1.3 .11	Update estimated cost of maintenance actions	The objective of the of Maintenance Cost Updating process is to review the estimated cost of the scheduled maintenance actions.	**Step 1:** Determine the cost of maintenance by: • using elemental estimates as prescribed in the South African Association of Quantity Surveyors' 'Guide to Elemental Cost Estimating' (2013), or • by means of historic averages of similar maintenance action conducted.
C.1.3 .12	Prepare Zero-based Maintenance Plan and Cost Estimate	The objective of the Zero-based Maintenance Plan Preparation process is to review the existing Zero-based Maintenance Plan and Cost Estimate.	**Step 1:** Update existing Zero-based Maintenance Plan and Cost Estimate.
C.1.3 .13	Review MMP and Control Budget	The objective of the Review Maintenance Management Plan (MMP) and Maintenance Control Budget is to update the existing MMP and Control Budget.	**Step 1:** Update MMP and **Step 2:** Update Maintenance Control Budget.

4.5 Do

Subsection 4.5: Do

Implementation

Implementation of the Operations Management Plan and the Maintenance Management Plan is not as straightforward as may be expected. Breakdowns, emergency repairs, non-availability of people and/or material shortages, all impact on the carefully compiled O&M Management Plans. The unexpected, and unplanned, breakdown and subsequent repair of a component will, for example, negate the need for the scheduled and imminent servicing of that component i.e. the so-called 'knock-on effect'.

Both the Operational Plan and the Maintenance Management Plan should therefore be continuously updated, to reflect the impact of such 'break-in work'. Planning for the implementation of the Operational Plan and the Maintenance Management Plan, i.e. the assignment of O&M jobs to specific individuals or contractors, and the corresponding allocation of materials required for the O&M jobs, should therefore ideally be done on a weekly basis.

Given the users' responsibility, in terms of the principle of devolved accountability, to bear all cost relating to immovable assets, "it is therefore imperative that a uniform management framework be established to ensure consistent government-wide immovable asset management, which stipulates the roles and responsibility of users and custodians" (Government-wide immovable Asset Management Policy,2005).
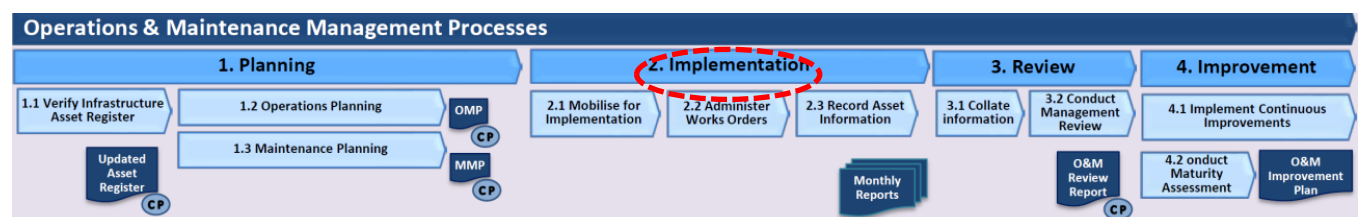
Figure 80: O&M Implementation Processes

Mobilise for implementation
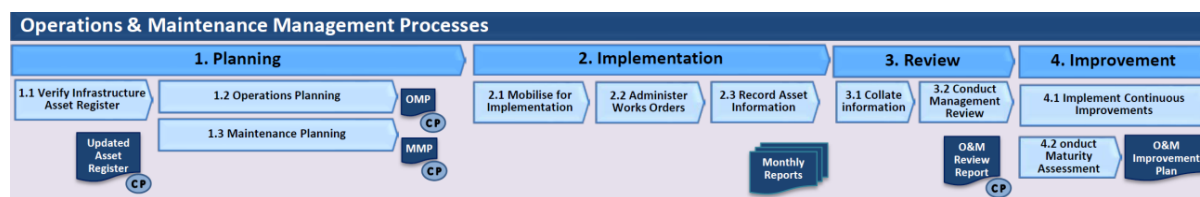
Figure 81: O&M Implementation processes- Mobilised for implementation
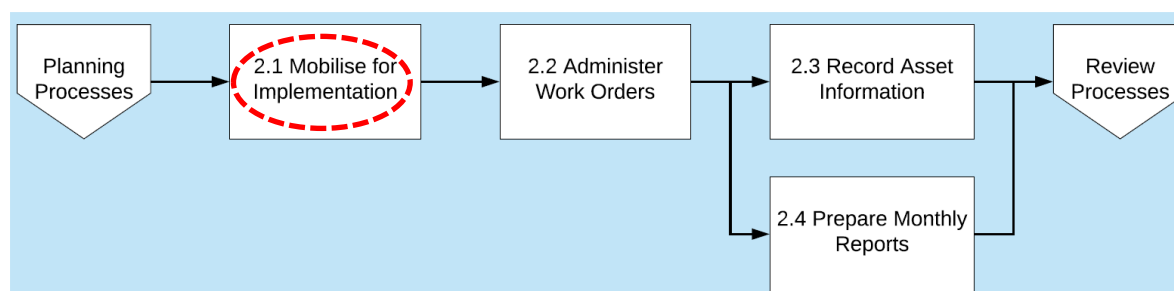
Figure 82: Figure 80: O&M Implementation processes- Mobilised for implementation

Table 31: Mobilise for implementation

No.	Process	Definition	Description
C.2.1	Mobilise for implementation	The objective of Mobilisation Process is to prepare for the implementation of the Operations and Maintenance Management Plans for a Facility or Network of Infrastructure Assets.	
C.2.1.1	Review the implementation strategy.	The objective of the Strategic Implementation Decision Making process is to review the available options for implementation of the Operations and Maintenance Management Plans.	**Step 1**: Assess available options for implementation of the Operations and Maintenance Management Plans.
C.2.1.2	Establish Roles and Responsibilities.	The objective of the Roles and Responsibilities Establishment process is to allocate roles and responsibilities for the implementation of the Operations and Maintenance Management Plan.	**Step 1**: Review existing Roles and Responsibilities.
C.2.1.3	Review Logistical support.	The objective of the Logistical Support Planning Review process is to consider the options for the acquisition and distribution of the materials	**Step 1**: Review existing Logistical Support Plan.

No.	Process	Definition	Description
		and equipment required for implementing the Operations and Maintenance Management Plans.	
C.2.1.4	Procure Operations and Maintenance service providers.	The objective of the Operations and Maintenance Service Provider Procurement process is to procure and contract with service providers for implementing the Operations and Maintenance Management Plans.	**Step 1:** Review existing Delivery Plan and Procurement Strategy for the Operations Programme and the Maintenance Programme respectively. **Step 2:** Procure service providers.

Administer Work Orders

The implementation of O&M works comprises large numbers of separate 'job' transactions. Most organisations use Work Orders (WOs) for managing the implementation of O&M actions, regardless of whether:

- The work is done by in-house staff or contracted service providers;
- The work is planned (i.e. Preventative Maintenance); or
- The work is unplanned (Corrective Maintenance).

Work Orders specify what work is to be done, authorizes its execution and serves to collect information about the work done. The various functions of a work order, as listed by John D Campbell, James V. Reynes-Pickell in Uptime: strategies for excellence in maintenance management, are:

- "To identify and authorise work to be done;
- To facilitate planning and scheduling for complex jobs;
- To record what work is assigned to individuals, contractors, etc.;
- To collect cost information for labour, store requisitions, purchase orders, and services to charge against a piece of equipment or production cost centre;
- To record the 'sign-off' or approval of work that has been done, accepting the equipment for production use;
- To capture information about work duration and maintenance related delays, to use in measuring productivity;
- To provide work estimates to determine and manage work backlogs;
- To provide a means of acquiring equipment history data, to be used in analysing failures and the effectiveness of preventative maintenance effort."
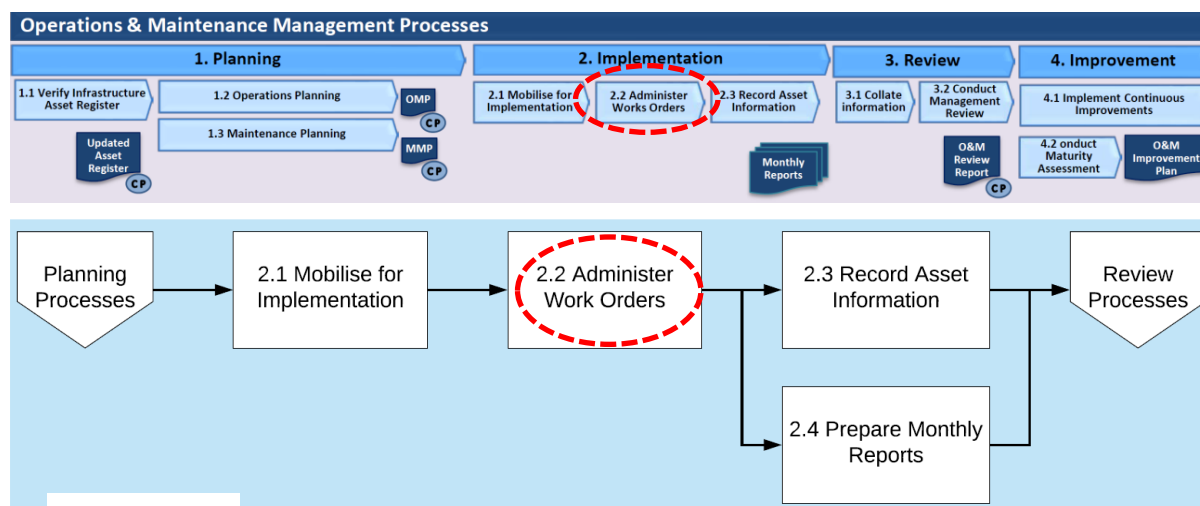
Figure 83 Operations and Maintenance processes - 2.2 Administer Works Order

Figure 84: Administer Works Orders

No.	Process	Definition	Description
C.2.2	Administer Works Orders	The objective of Work Order Administration Process is to issue and monitor execution of Works Orders for Operations, Preventative, Corrective and Emergency Maintenance as and when required.	
C.2.2.1	Implement planned O&M actions	The objective of the process is to prepare, issue Work Orders and to monitor and report on execution thereof.	Step 1: Prepare Work Order Step 2: Assign Resources Step 3: Issue Work Order Step 4: Execute Work Order Step 5: Record time and cost information Step 6: Capture information on relevant system Step 7: Close Work Order
C.2.2.2	Implement Corrective Maintenance	The objective of the Implement Corrective Maintenance process is to	Step 1: Receive and register Work Request Step 2: Prepare Work Plan Step 3: Prepare Work Plan Step 4: Issue Work Order Step 5: Restore Service Step 6: Repair asset. Step 7: Close Work Request
C.2.2.3	Attend to Emergencies	The objective of the Attend to Emergencies process is attend to emergency repairs.	Step 1: Document approach to emergencies (Standard Operating Procedure) Step 2: Identify emergency Step 3: Assign Resources Step 4: Execute tasks Step 5: Close works order Step 6: Conduct evaluation of emergency response

Record Asset Information

Information that reflects the scope and cost of operational, preventative and corrective maintenance should be recorded on the Asset Register, for accounting purposes and as reference for future application in the various asset management processes.

Work Requests, Work Orders and Asset Registers should ideally be computerised. Computerised management systems enable users to plan, schedule, control and report on the maintenance of an organisation's infrastructure assets.
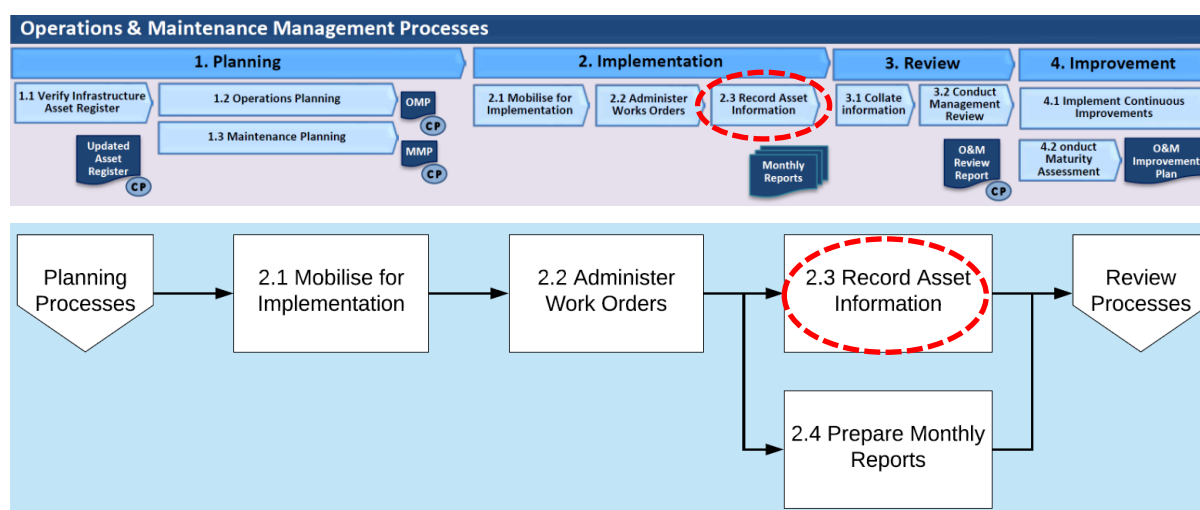
Figure 85: Operations and Maintenance Management Processes - Record Asset Information

Table 32: Record Asset Information

No.	Process	Definition	Description
C.2.3	Record Asset Information	The objective of the Record Asset Information Process is to record scope, time and cost information on the IA Register.	
C.2.3 .1	Verify completed Work Orders data requirements.	The objective of the Verification of Data Process is to ensure that the actual time and cost related data for the execution of the Work Order have been properly recorded.	**Step 1**: Verify accurate recording of Materials used. **Step 2**: Verify accurate recording of Resources used. **Step 3**: Verify accurate recording of Time spend.
C.2.3 .2	Update IA Register.	The objective of the Record Asset Information process is to record the time and cost information on the IA Register.	**Step 1**: Record time and cost of the maintenance work against specific component(s) on the IA Register.

Monthly Reports

The MFMA specifies monthly, quarterly and end-of-year reports, each with specific requirements (financial and non-financial) as prescribed by National Treasury from time to time.

Furthermore, information on grants made under the DoRA must be reported in terms of that Act. The accounting officer effecting the payment must report to the relevant treasury on the funds transferred to each government entity within 15 days of the end of every month.
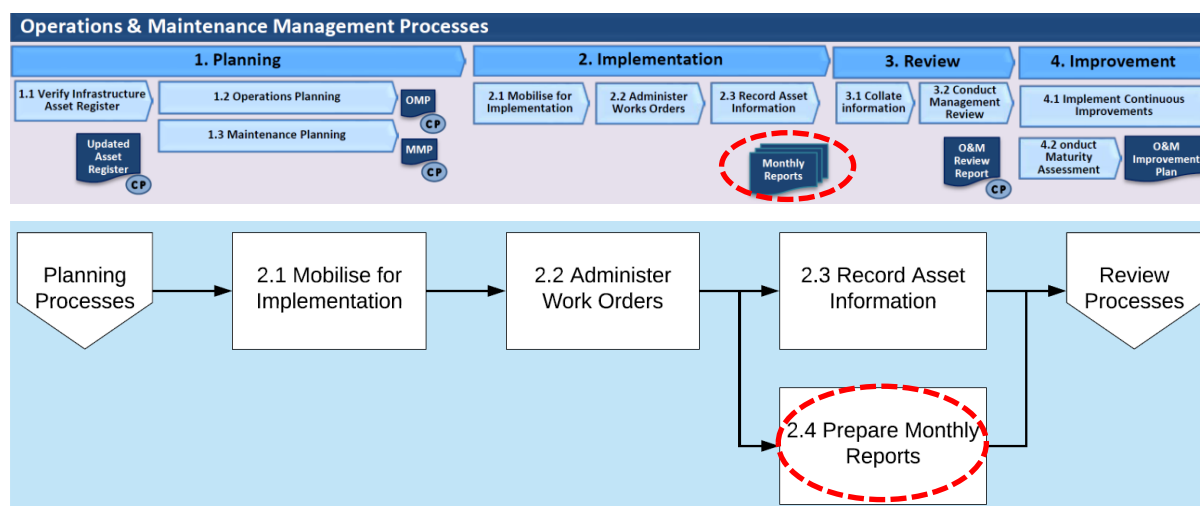
Figure 86: Operations and Maintenance Management Processes- Prepare Monthly Reports

Table 33: Prepare Monthly Progress and expenditure reports

No.	Process	Definition	Description
C.2.4	Prepare Monthly Progress and Expenditure Reports and Cashflow Forecasts	The objective of the Monthly Progress and Expenditure Reports and Cashflow Forecasts Preparation Process is - for Facility/Network Managers - to report - to the Operations and Maintenance Programme Managers respectively - on the actual progress and expenditure against the scheduled O&M activities.	
C.2.4.1	Update O&M Work Schedules.	The objective of the O&M Work Schedule Updating process is to adjust the Work Schedules as and when required.	**Step 1**: Study impact of Emergency and other unplanned Maintenance Work on existing O&M Work Schedules. **Step 2**: Update O&M Work Schedules accordingly.
C.2.4.2	Update O&M Cashflow Forecast.	The objective of the O&M Cashflow Forecast Update is to adjust the Cashflow Forecast as and when required.	**Step 1**: Study changes to the O&M Work Schedules. **Step 2**: Update O&M Cashflow Forecast accordingly.

4.6 Check

Review –

O&M Management Reviews provide facility/infrastructure network management with an opportunity to review, at planned intervals, the O&M of the facility or IA network of assets, the O&M management system and O&M activities, as well as the operation of the O&M policy, objectives and plans, to ensure their suitability, adequacy and effectiveness.
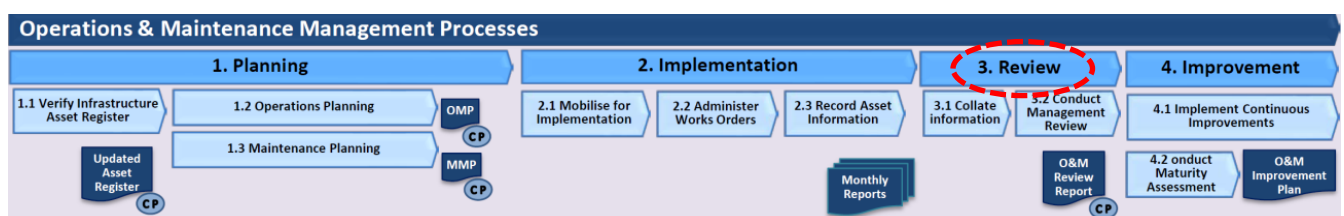
Figure 87 : Review Processes

Collate information

The management review process must therefore ensure that the necessary information is collected ahead of time to allow management to effectively perform the review.

Implementation of the O&M processes and actions should produce documented information to verify that the processes were followed as designed, and that the expected outputs of the processes have been achieved. The documented information could be in the form of completed and signed-off work orders, that could be used as justification for payments and accounting purposes.
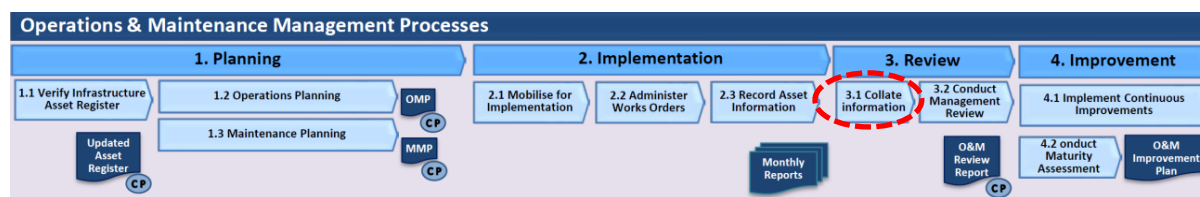
Figure 88 : Review Processes – Collate information
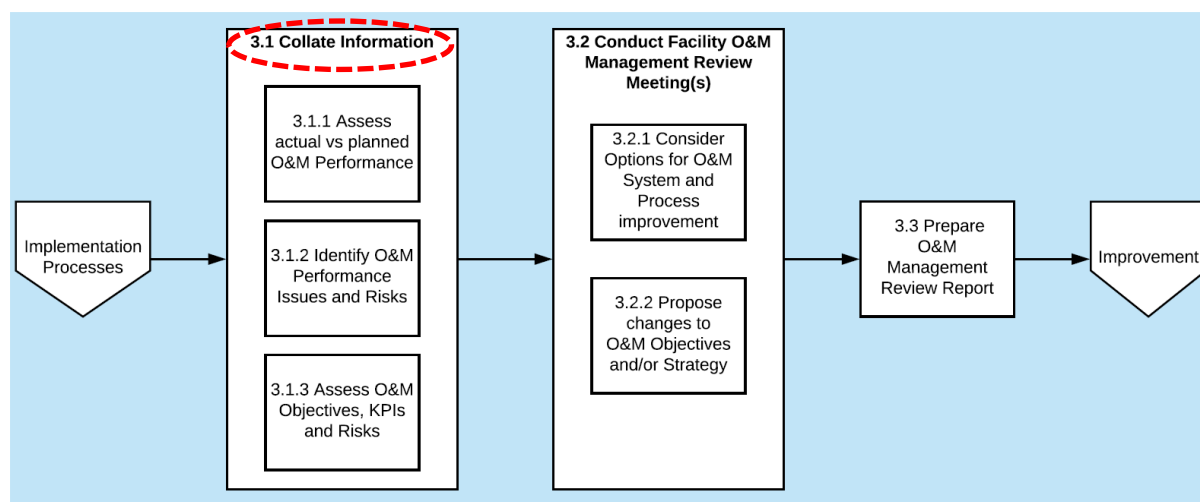
Table 34: Collate information

No.	Process	Definition	Description
C.3.1	Collate Information	The objective of the Collate Performance and Risk Information Process is to collate and analyse the documented O&M performance and risk information for consideration in the Management Review Meeting(s).	
C.3.1 .1	Assess actual versus planned O&M performance.	The '*Assess actual versus planned O&M performance*' process is to assess actual performance against the planned performance based on analyses of the O&M progress and performance reports.	**Step 1**: Analyse O&M progress and performance reports. **Step 2**: Identify deviations from O&M performance targets.
C.3.1 .2	Identify the O&M performance issues and risks.	The '*Identify O&M performance issues and risks*' process is to list the reported performance issues and risks.	**Step 1**: Assess the reported O&M performance issues and risks. Step 2: Update the O&M Issue Log and Risks Register.
C.3.1 .3	Assess O&M objectives and KPIs.	The 'Assess O&M objectives and KPIs' process is to propose changes to the stated	**Step 1**: Analyse the updated O&M Issue Log and Risks Register. **Step 2**: Assess validity of O&M

No.	Process	Definition	Description
		O&M Objectives and/or the KPIs in line with the identified performance issues and risks.	objectives and KPIs. **Step 3**: Adjust the stated O&M Objectives and/or the KPIs in line with the identified performance issues and risks.

Conduct Facility O&M Management Review Meetings

The frequency or intervals of management reviews should be defined in the IAM Policy, but the aim is to do an O&M management review at least once a year.
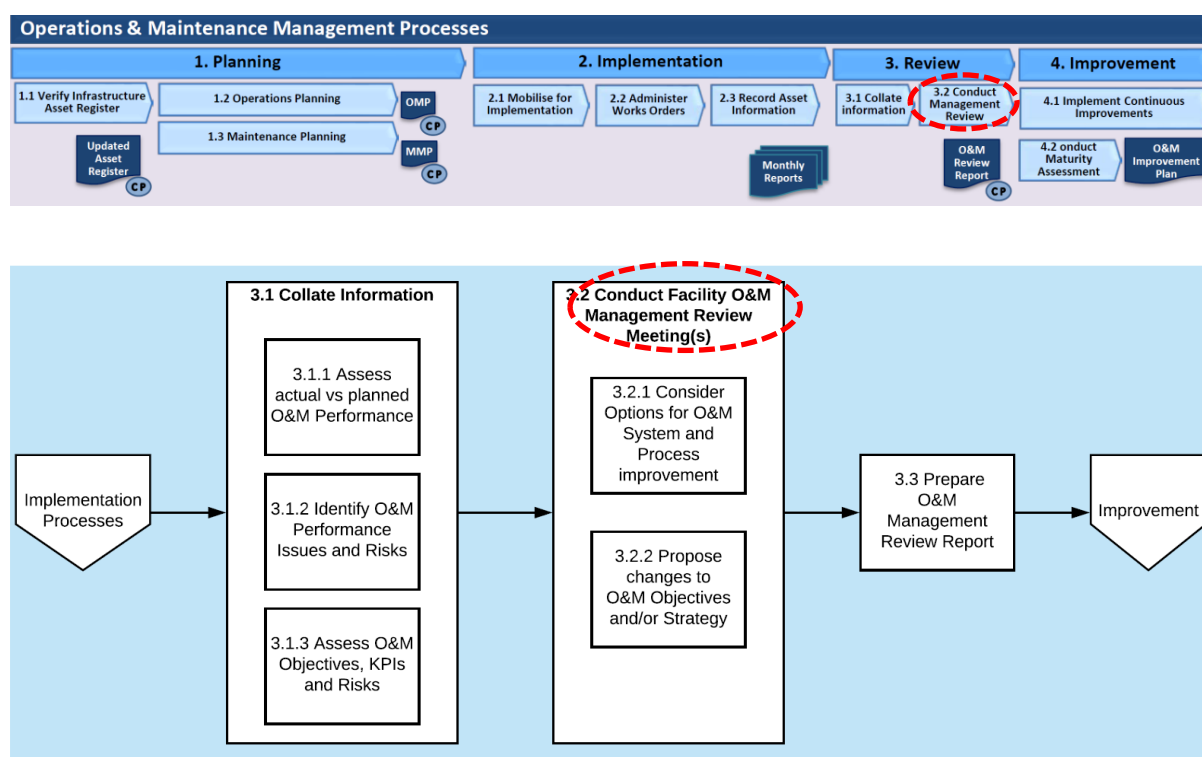
Figure 89: Operations and maintenance management processes – Conduct management review

Table 35: Conduct management review

| No.	Process	Definition	Description
C.3.2	Conduct Management Review	The objective of the Management Review Meeting Process is for management to review, at planned intervals, the O&M of the facility or IA network of assets, the O&M management system and O&M activities, as well as the operation of its O&M policy, objectives and plans, to ensure their suitability, adequacy and effectiveness.	
C.3.2 .1	Consider options for	The '*Consider options for O&M system and process*	**Step 1**: Consider possible O&M system/ and/or process solutions to the

No.	Process	Definition	Description
	O&M system and process improvement.	*improvement*' process is to consider changes to the O&M management system and /or processes as solutions for the identified performance issues.	performance issues and risks. **Step 2**: Analyse risk versus cost of the options.
C.3.2.2	Adjust O&M objectives and/or strategy.	The '*Adjust O&M objectives and/or strategy*' process is to assess proposed adjustments to the O&M objectives and/or strategies.	**Step 1**: Assess proposed changes to the O&M Objectives and/or KPIs. **Step 2**: Consider adjustment of the O&M LCM Strategies.

O&M Management Review Reports

O&M Management review meeting minutes should be retained as documented information. Observations, conclusions, and recommendations for further action must be recorded in the minutes. All management reviews must be documented in an O&M Management Review Report.

If any corrective action must be taken, management should follow up to ensure that the action was effectively implemented.
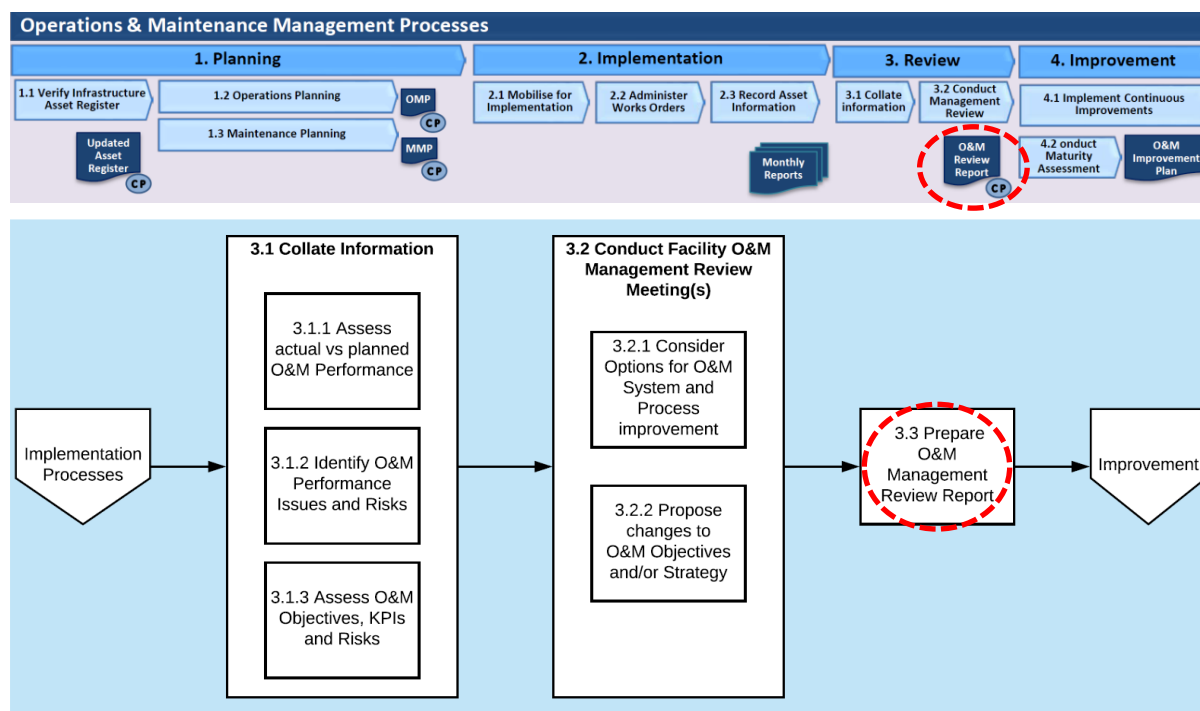
Figure 90: Operations and Maintenance Processes – Prepare O&M management review report

Table 36: Compile O&M management review report

No.	Process	Definition	Description
C.3.3	Compile O&M Management Review Report	The objective of the Compile O&M Management Review Report process is to document the findings of the O&M management review.	Report on: 1. Reviewed O&M Objectives and/or KPIs. 2. Reviewed O&M Risk Register 3. Proposed adjustments to the OMP and MMP.

4.7 Act

Subsection 4.7: Act

Improvement
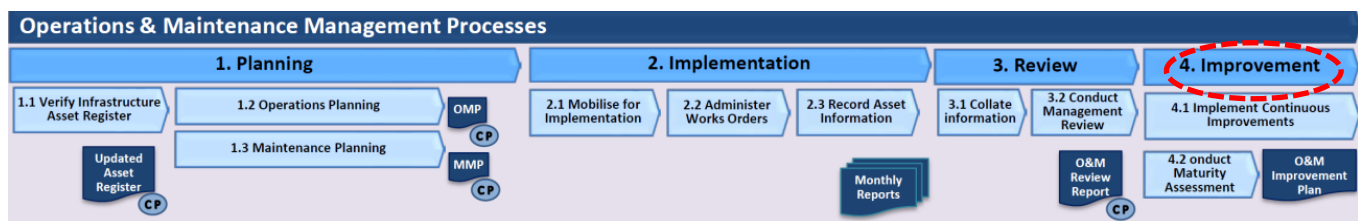
Figure 91: Operations and Maintenance Processes –Improvement

Continuous Improvement

The concept of Continuous Improvement and its relationship with performance measures and targets are clearly explained in the Plan-Do-Check-Act Cycle.

 "Opportunities for improvement should be identified, assessed and implemented across the organisation as appropriate, through a combination of monitoring and corrective actions for the assets, asset management, or asset management system" (SANS/ISO 55000 Cl 10.3.1).

Although the opportunities for improvement can be widely different in magnitude and effect, the approach for processing them may consist of the following steps:

- identification of improvement needs and potential;
- evaluation of options;
- estimation and determination of financial and non-financial consequences;
- risk assessment and management of change aspects;
- links with decision-making criteria;
- selection and execution;
- tracking of outcomes and review.
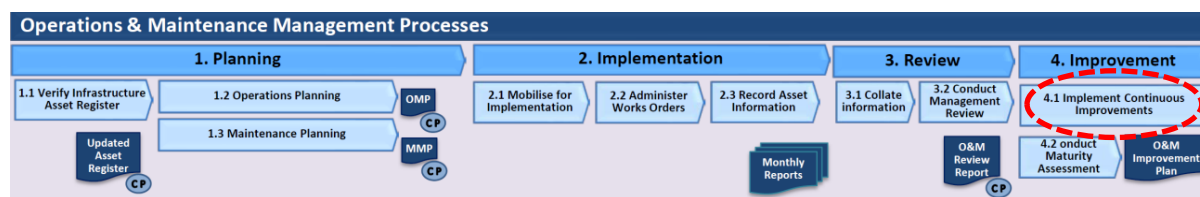
Figure 92: Operations and Maintenance Processes –Continuous improvement
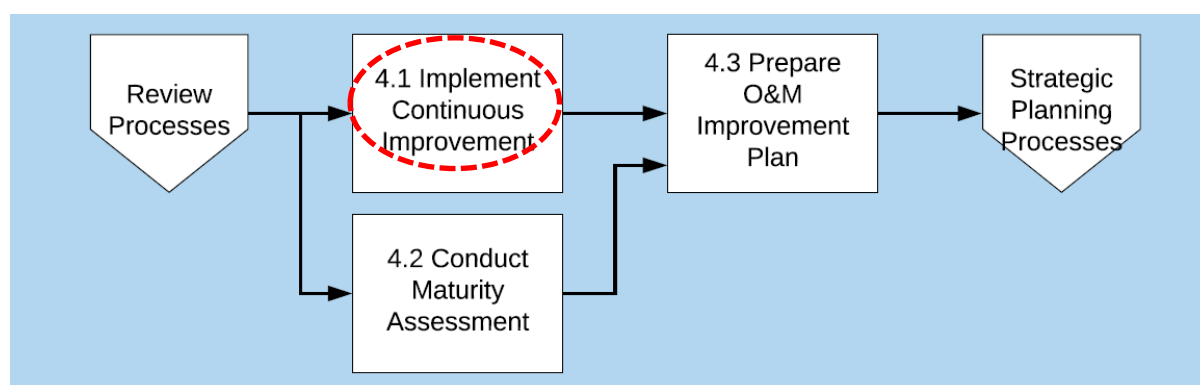
Figure 93: Operations and Maintenance Processes –Continuous improvement process

Table 37: Implement continuous improvements

No.	Process	Definition	Description
C.4.1	Implement continuous improvements.	The 'Identify Continuous Improvement opportunities' process is aimed at the continuous and incremental improvement of the O&M management system and processes at facility/network level.	**Step 1:** Identification of improvement needs and potential **Step 2:** Evaluation of options **Step 3:** Estimation and determination of financial and non-financial consequences **Step 4:** Risk assessment and management of change aspects **Step 5:** Links with decision-making criteria **Step 6:** Selection and execution **Step 7:** Tracking of outcomes and review.

Conduct Maturity Assessment

One of the principles of the IDMS is 'scalability', aimed at making the IDMS implementable in all spheres of government, and in all departments and municipalities, irrespective of size.

Maturity models are widely used as a best practice for 'continual improvement' of asset and other management processes, i.e. improvement actions based on the (usually) annual maturity assessments of asset management processes.

Top Management's commitment to the improvement of IAM processes will be a key success factor in the Maturity Based Improvement Processes. The involvement of Top Management will be required in determining the appropriate level of 'maturity' for O&M management in the organisation. The capabilities and capacity of an organisation will be the key factors determining an 'appropriate' level of maturity for an organisation.
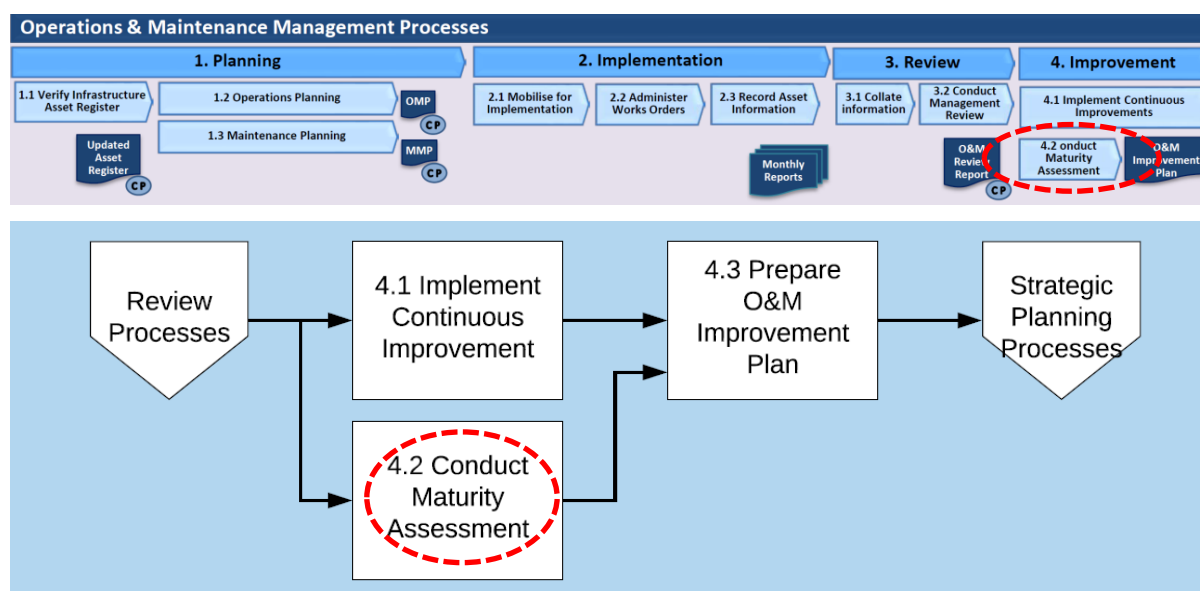
Figure 94: Operations and Maintenance Processes –Maturity assessment

Table 38: Conduct maturity assessment

No.	Process	Definition	Description
C.4.2	Conduct Maturity Assessment	The *'Conduct Facility/Network O&M Management Maturity Assessment'* process is aimed at the periodic maturity assessment of the O&M management processes at Facility/Network level against an agreed Maturity Index to identify opportunities for improvement of the O&M management system and/or processes.	**Step 1:** Agree on levels of maturity as documented in the Maturity Index. **Step 2:** Agree on targeted maturity level. **Step 3:** Conduct Maturity Assessment. **Step 4:** Assess maturity rating against targeted maturity level on Maturity Index.

The Improvement Plan

Continuous and maturity-based improvement processes should result in the updating of Improvement Plans. Improvement Plans should serve as an input document for the review of the O&M strategies and objectives.
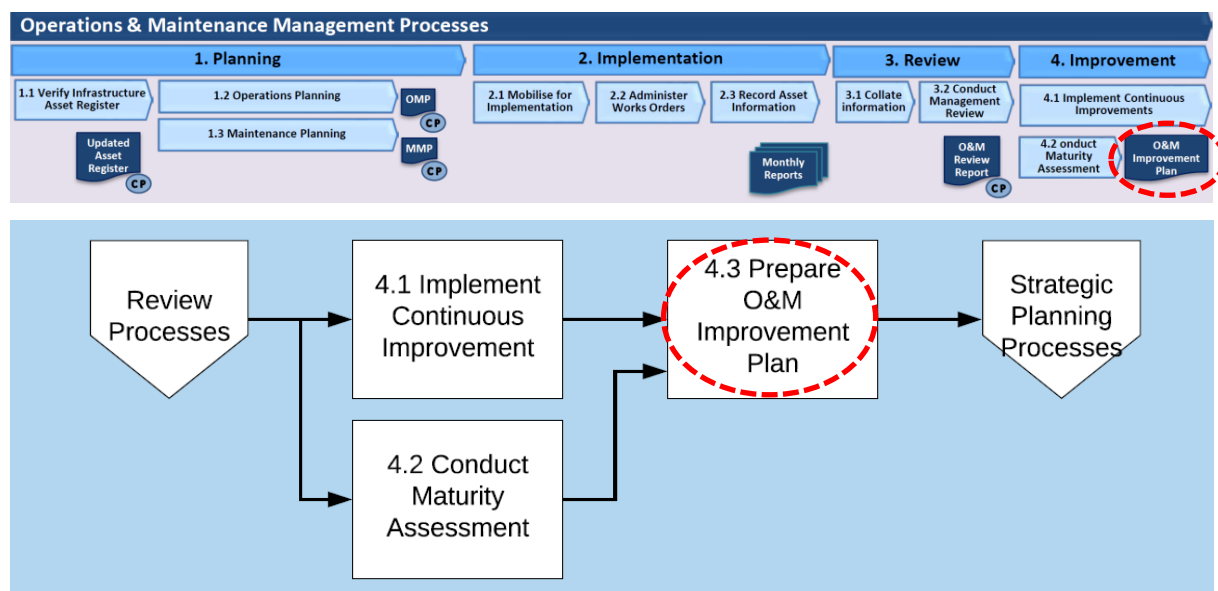
Figure 95: Operations and Maintenance Processes - Improvement Plan

Table 39: Review O&M Improvement Plans

No.	Process	Definition	Description
C.4.3	Review O&M Improvement Plans	The objective of the '*Review O&M Improvement Plan*' process is to update the existing O&M Improvement Plan that serves as the base for the subsequent review of the O&M LCM Strategies.	**Step 1:** Assess Management Review Report. **Step 2:** Assess Updated Maturity Assessment. **Step 3:** Accept continuous improvement proposals and actions. **Step 4:** Update Improvement Plan.

4.8 Exercise

Subsection 4.8: Exercise

Exercise 1 :- Develop a Maintenance Management Plan

A maintenance management plan should at least comprise the following:

1. The scope of assets included in the plan.
2. Maintenance requirements and objectives and how they relate to asset management objectives.
3. Asset criticality profile.
4. Asset failure mode status.
5. Asset risk exposure by type of failure mode at appropriate levels within the asset hierarchy.
6. The approach(es) to maintenance by asset type and/or component type as appropriate.
7. For each component type, the actions and resources required to:
   a. restore each component to working order based on the assessed condition of the component (condition- based maintenance);
   b. repair components that have failed (corrective maintenance);
   c. prevent failure based on monitoring the condition of components (preventative maintenance);
   d. undertake scheduled maintenance, including the frequencies of thereof (preventative maintenance); and
   e. prevent deterioration of the component based on the reliability of the component (preventative maintenance).
8. Costing of resource requirements.
9. A schedule of maintenance actions, prioritised based on risk exposure (maintenance priority).
10. A budget for maintenance actions prioritised based on risk exposure (maintenance priority).
11. Maintenance management roles and responsibilities.

Exercise 2 :- Develop an Operations Maintenance Management Plan

A operations management plan should at least comprise the following:

1. The scope of assets included in the plan.
2. Operations requirements and objectives and how they relate to asset management objectives.
3. Asset criticality profile.
4. Asset failure mode status (see Section 8.3.1 for failure modes).
5. Asset risk exposure by type of failure mode at appropriate levels within the asset hierarchy.
6. The approach(es) to operations by asset type and/or component type as appropriate.
7. For each component type, the actions and resources required to operate the system.
8. Costing of resource requirements.
9. A schedule of operations actions, prioritised based on risk exposure (maintenance priority).
10. A budget for operations actions prioritised based on risk exposure (maintenance priority).
11. Oprations management roles and responsibilities.

Section 5: Project Management Process

5.1 Introduction

Section 5: Project Management Processes

Subsection 5.1: Introduction

Context within IDMS concept diagram and placemat

This section looks at project management processes as part of the infrastructure delivery management processes

Figure 96: Project Management in the IDMS Concept Diagr
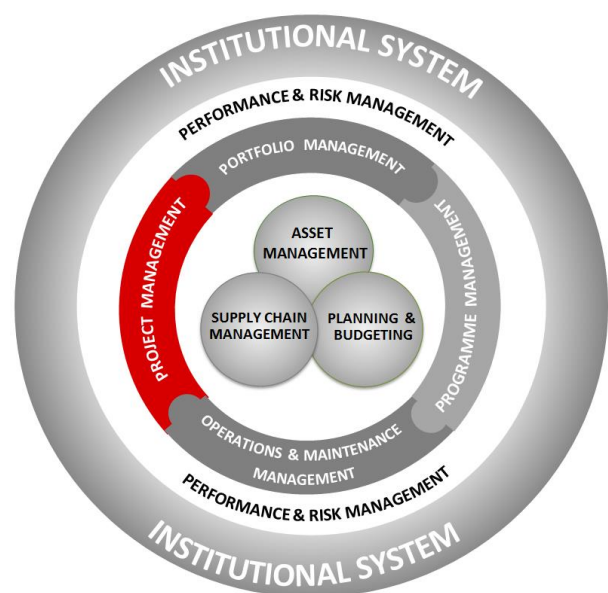
The IDM Processes Placemat - Highlighting Portfolio Management Processes in Figure 2 shows:

- the major delivery management processes and deliverables;
- the lifecycles and Control System for the delivery management processes;
- alignment of the Programme Management Lifecycle with the Plan-Do-Check-Act management cycle.
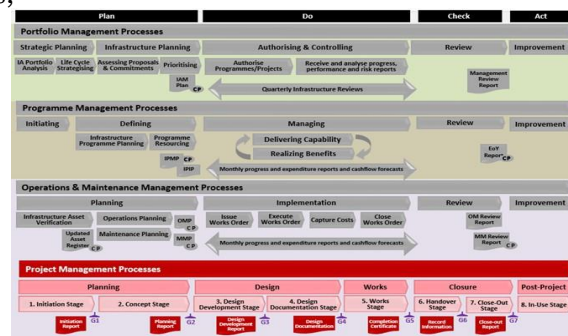
Figure 97: IDM Processes Placemat - Highlighting Project Management Processes

Definitions

A **project**, in the words of SANS 21500, "consists of a unique set of processes consisting of coordinated and controlled activities with start and end dates, performed to achieve project objectives. Achievement of the project objectives requires the provision of deliverables conforming to specific requirements". It further goes on to state that, "Although many projects may be similar, each project is unique. Project differences may occur in the following:

- Deliverables provided;
- Stakeholders influencing;
- Resources used;
- Constraints;
- The way processes are tailored to provide the deliverables.

Every project has a definite start and end, and is usually divided into phases(SANS 21500:2014, Guide on Project Management, p.3, SABS). In the IDM Control System for Project Management, these phases are referred to as stages, and are named as follows:

- Stage 1: Initiation;
- Stage 2: Concept;
- Stage 3: Design Development;
- Stage 4: Design Documentation;
- Stage 5: Works;
- Stage 6: Handover;
- Stage 7: Close-Out;
- Stage 8: In-Use.

Project Life Cycle

Generically, all infrastructure projects can be mapped to follow the following **Project Life-Cycle** structure:

- Planning;
- Design;
- Works;
- Closure;
- Post-Project.

A specific **Project Life-Cycle** outlines and describes the stages in the life of a project, from start to end. The specific stages are determined by the specific project's governance and control needs and follow a logical sequence with a start and an end, the latter normally being accompanied by a deliverable of some kind.

Infrastructure projects in the South African public sector are governed by the stages contained in the IDM Control System for Project Management. Accordingly, the Infrastructure Project Life-Cycle that should be managed by utilising the Project Management Process, reflects as follows:

Generic Life-Cycle		Planning		Design		Works	Closure	
Infrastructure Project Life-Cycle	**Stage No.**	1	2	3	4	5	6	7
	Stage Name	Initiation	Concept	Design Development	Design Documentation	Works	Handover	Close-Out

Table 40: Infrastructure Project Life-Cycle

Project Management

Project Management, in the words of SANS 21500, is "the application of methods, tools, techniques and competencies to a project... [including] the integration of the various phases of the project life cycle".This is achieved through the implementation of five primary process groups, as illustrated in the figure below:
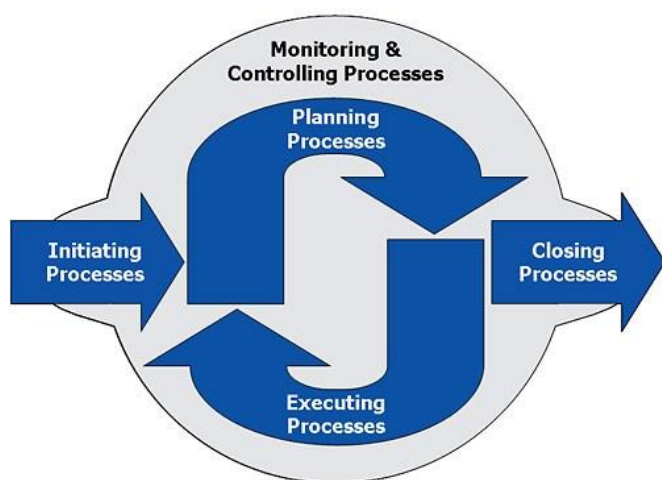
Figure 98: Project Management Process Groups

1. **Initiating Process Group:** The initiation processes are used to start a project, to define its objectives and to authorise the project manager to proceed with the project work;

2. **Planning Process Group:** The planning processes are used to develop planning detail. They culminate in the development of the Project Plan, which should contain enough detail to establish baselines against which the implementation of the project can be managed, and its performance measured and controlled;

3. **Implementing Process Group:** The implementing processes are used to perform project management activities and to enable the provision of the project's deliverables, in line with the project plan;

4. **Monitoring and Controlling Process Group:** These processes monitor, measure and control the project's performance against the project plan. Accordingly, preventative and corrective actions might need to be taken, and change requests made, to achieve the project objectives;

5. **Closing Process Group:** The closing processes formally close the project phase or project and document lessons learnt through the project.

Contract Management

The SIPDM prescribes as follows with respect to Contract Management:

The person responsible for the administration of the contract or an order on behalf of the employer shall:

a) act as stated in the contract that is entered into, subject to any constraints that may be imposed by the employer or the employer's supply chain management policy for infrastructure procurement and delivery management, using any standard templates that are provided for communications required in terms of the contract;

b) provide at least the following data within two weeks of the award of a contract or an order for capture on a contract management system:

> *1) name and contract particulars;*

> *2) the programme or project number, as relevant;*

> *3) the contractual dates associated with the contract or order;*

> *4) except in the case of very low value goods or services contracts, a cash flow forecast;*

> *5) the agreed total of prices or forecasted total of prices; and*

> *6) where applicable, whether or not provision is made for price adjustment for inflation, delay damages, performance bond and retention, and if so, what the quantum or estimated quantum of such provisions is;*

c) retain on a contract file, copies of certificates of insurances, bonds and the like;

d) make an assessment of the amount due to the contractor where required in terms of the contract, or review the contractor's assessment of the amount due and timeously certify payment;

e) revise the estimates for price adjustment for inflation where provided for, prepare an updated cash flow for the remainder of the contract based on the contractor's schedule, and capture these amounts together with the amounts due to the contractor and the retention amounts, if relevant, on a monthly basis;

f) provide the revised total of the prices or completion date or delivery date for the contract, or an order, within one week of a contractor revising a forecast of the total of prices, or an event being implemented, which in terms of the contract increases the total of prices or delays delivery or completion, for capture on a contract management system;

g) manage, if relevant, the interface between the contractor and those responsible for providing client inputs where a management, design and construct or develop and construct contracting strategy is utilised;

h) develop and maintain a contract risk register;

i) provide a monthly report on events which, in terms of the contract, cause the total of prices to increase or the contract completion date to be changed;

j) report all insurance claims made within one week of the claim being lodged; and

k) make inputs, if applicable, to the close out report in stage 9, including those relating to cost norms, contractor performance and the attainment, or not, of projective objectives. [emphasis added]

In addition, the SIPDM notes that:

The person responsible for administering the contract shall as necessary report on a monthly basis on the following:

a) the attainment of key performance indicators, if any, provided for in the contract or required by the sponsor of the project or in terms of legislation;

b) the number of improvement, contravention and prohibition notices issued by the health and safety agent; and

c) incidents reportable in terms of the Construction Regulations issued in terms of the Occupational Health and Safety Act, briefly indicating the nature of the incident.

Finally, the SIPDM notes that,

The person responsible for the administration of a contract or order relating to the provision of new infrastructure or the rehabilitation, refurbishment or alteration of existing infrastructure, shall be registered in a professional category of registration in terms of the Architectural Profession Act, the Engineering Profession Act, Landscape Architectural Profession Act, the Project and Construction Management Professions Act or Quantity Surveying Profession Act. [emphasis added]

Client vs. Implementer Responsibilities

The definitions used throughout this module, as noted earlier, are as follows:

- **Client**: The organisation that initiates, commissions and pays for the project (budget holder), owns the business case and leads the project.
- **Implementer**: Typically, responsible for specifying project requirements to external participants and managing project delivery outcomes.

As public sector infrastructure project progresses, from the Programme Management processes through to the Project Management processes, through to when the project's specific deliverable is achieved and the project is eventually closed out, the specific roles and responsibilities of the Client, versus that of the Implementer, must remain clear and distinct. However, the allocation of role execution within the two bodies, depends firstly on who the Client decides will be the Implementer (i.e. will it play the role itself, or will it decide on an external IA), and secondly, on what specific contracting strategy is adopted (Design and Construct, Management Contractor etc.).

Figure 15 provides a useful overview of the generic primary roles and responsibilities of the Client and the Implementer, (here referred to as the "delivery team"), in planning and delivering a project. It is important to ensure that these various roles are assigned to specific individuals within each or either of the Client and Implementer organisations. (Guidance on client and delivery teams – Focus on National Treasury Standard for Infrastructure Procurement and Delivery Management, Department: National Treasury, February 2016).

The figure below illustrates that the role of the 'delivery team' can be broken down into three basic categories of:

- Project management and cost control;
- Design services;
- Health and safety services.

The project management, cost control, design, construction and manufacturing services clearly all fall within the ambit of the built environment profession, and the scope of these services is clearly spelt out in documents published by the various professional bodies such as the Engineering Council of South Africa, the South African Council for the Architectural Profession, South African Council for Quantity Surveying Professionals, etc.). An assessment of the scope reflected in the documents published by the various professional bodies reveals an overlap in the range of services offered.

Consequently, it is possible, and often preferable, for the built environment professional to carry out several the roles shown in the figure below

Figure 99: Client and Delivery Teams and Typical Responsibilities
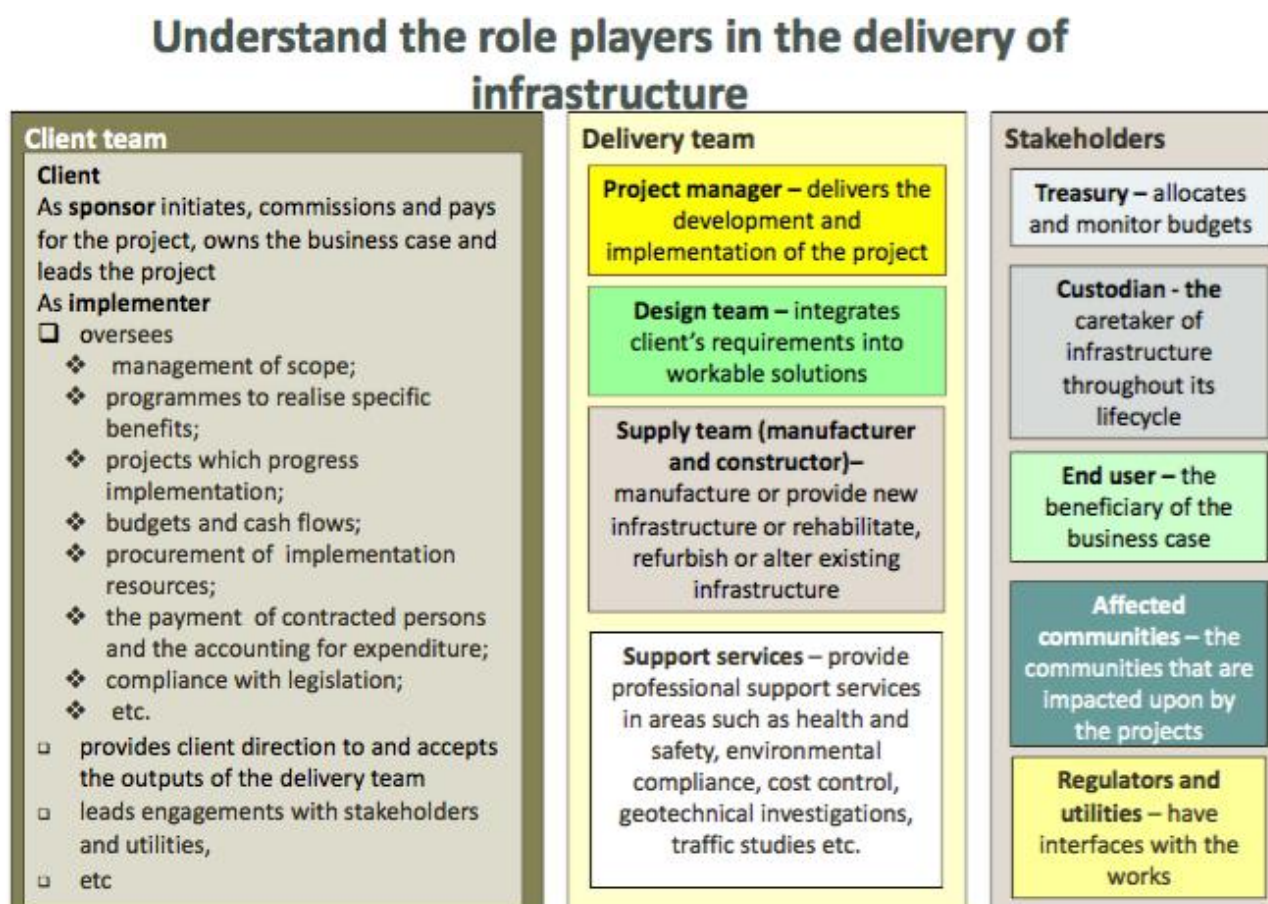
Figure 100: Client and Delivery Teams and Typical Responsibilities

An overall summary of the primary design services provided by the various professions, is provided in the table below (Guidance on client and delivery teams – Focus on National Treasury Standard for Infrastructure Procurement and Delivery Manageme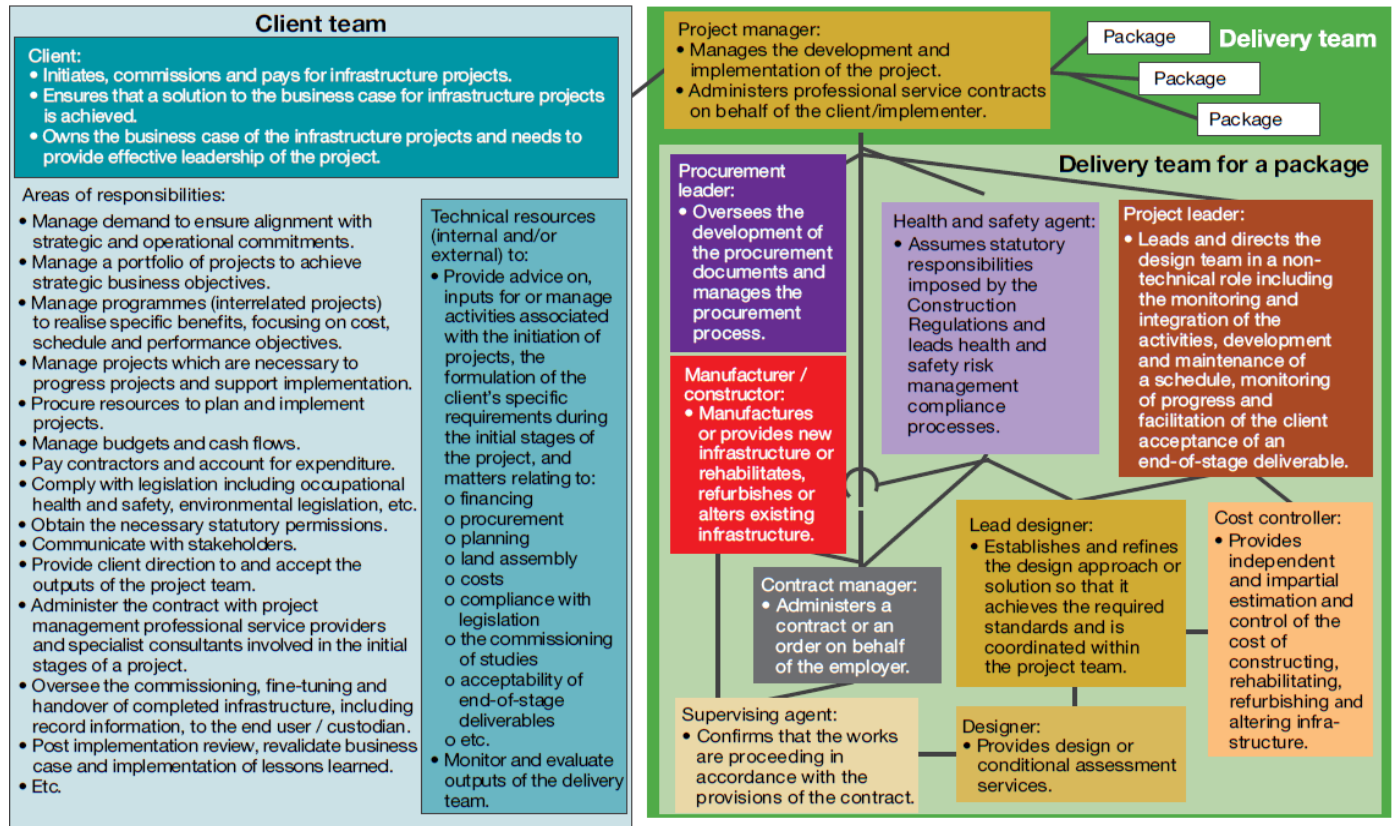nt, Department: National Treasury, February 2016).. The role of the Client in the design, is to provide the brief, to give direction, review, and ultimately to approve and accept the outputs of the design team.

Table 41: Design Services per Profession

Service	Principal Activities
Architectural Design	Plan, design and review the construction, extension or refurbishment of buildings, spaces, structures and associated site works for the use of people, by the creative organisation of materials and components with consideration to mass, space, form volume, texture, structure, light, shadow, materials and the project brief.
Civil Engineering	Plan, design and review the construction of site works comprising a structure such as a road, pipeline or sewerage system, or the results of operations such as earthworks or geotechnical processes.
Electrical Engineering	Plan, design and review the installation of the electrical and electronic systems for and in a building or structure.

Fire Safety	Plan, design and review the fire protection system to protect people and their environments from the destructive effects of fire and smoke.
Landscape Architectural Design	Plan, design and review the construction of outdoor and public space to achieve environmental, socio behavioural, or aesthetic outcomes, or any combination thereof.
Mechanical Engineering	Plan, design and review the construction, as relevant, of the gas installation, compressed air installations, thermal and environmental control systems, materials handling systems or mechanical equipment for and in a building.
Civil / Structural Engineering	Plan, design and review the construction of buildings and structures, or any component thereof, to ensure structural safety and structural serviceability performance during their working life in the environment in which they are located when subject to their intended use in terms of one or more of the following: • External and Internal environment agents • Maintenance scheduled and specified component design life • Changes in form or property
Sustainability Consultant	Ensure that the proposed infrastructure is sustainable with respect to: • Energy and water use • Materials use • Land use • Ecology • Outdoor and indoor environmental quality and emissions • Transport • Waste generated
Wet Services	Plan, design and review the construction, within buildings or from a point of drainage, installations intended for the reception, conveyance, storage or treatment of sewerage, and water installations which convey water for the purpose of firefighting or consumption, and roof drainage arrangements within a building.

While health and safety services are not provided by the built environment profession directly, it is important to emphasise that health and safety professionals are required to be registered in terms of the Project and Construction Management Professions Act; and more importantly, that the client, the designer and the contractor all have a role to play in ensuring that the execution of the works is carried out in accordance with the provisions of the Occupational Health and Safety Act of 1993, and subsequent regulations.

Value-for-Money

"Value relates to the assessment of the benefits brought by something in relation to the resources needed to achieve it. In the context of construction projects, it is normally expressed as a ratio between a function and the whole life cost for that function... Thus, value can be increased by improved function or reduced whole life cost." (https://www.designingbuildings.co.uk/wiki/Value_in_building_design_and_construction). The concept of Value-for-Money (VfM) is thus "the **optimum balance between the benefits expected of a project and the resources expended in its delivery**".

(https://www.designingbuildings.co.uk/wiki/Value_in_building_design_and_construction).

There are three important concepts associated with VfM:

- **Value Management**: All about 'getting the right project';
- **Value Engineering**: Carried out to 'get the project right';
- **Value Analysis**: Analysis to improve a construction, manufacturing, or management process, most particularly through a POE.

The process of achieving VfM begins long before a project is initiated; it begins as part of an organisation's strategy and policy directives, through to the infrastructure-specific Portfolio Management Processes, Programme Management Processes, and ultimately, Project Management processes. Arguably, the most important phase of VfM happens during the process of taking a project through each step of the IDM Control Stages for Project Management and IDM Control Framework for Infrastructure Procurement.

The three VfM concepts can generally be linked to the various IDM Control Stages for Project Management stages, as outlined and summarised in the table below:

Table 42: VfM Concepts – IDM Control Stages for Project Management

Stage No.	Stage Name	Primary VfM Concept/s	Summary of Primary VfM Activities
1	Initiation	Value Management	Ensure that proposed infrastructure solution, as outlined in Strategic Brief, aligns to overall strategic objective of organisation & is in line with policy directives.
2	Concept	Value Management	Ensure that proposed alternative concept designs are in line with estimated control budget and have taken cognisance of full life-cycle costs; cognisance must also be taken of delivery processes, ensuring these remain as lean as possible.
3	Design Development	Value Management	Ensure that approved concept remains in line with estimated control budget and continues to take cognisance of full life-cycle costs; cognisance must also be taken of delivery processes, ensuring these remain as lean as possible.
4	Design Documentation	Value Management	Ensure that approved concept remains in line with estimated control budget and continues to take

			cognisance of full life-cycle costs; cognisance must also be taken of delivery processes, ensuring these remain as lean as possible.
5	Works	Value Management, Value Engineering	At this stage Value Management is less important, though would continue, for example, in the case of manufacturing and production processes, ensure these are aligned to life-cycle cost approach. Value Engineering, however, becomes most prominent, where there is an ongoing focus on ensuring that the approved design, and brief are implemented, while at the same time ensuring that the control budget and schedule is adhered to. On-going improvements to construction and manufacturing techniques must also continue.
6	Handover	Value Analysis	Value Analysis would generally begin during this process - beginning the preparation of the Close-Out Report (due as part of Close-Out Stage –
7	Close-Out	Value Analysis	This stage – through the preparation of the Close-Out Report – is focussed on Value Analysis i.e. analysing the performance of the project through achievements (or otherwise) of specific KPIs for achieving VfM

5.2 Control Cycle for Project Management

Subsection 5.2 Control Cycle for Project Management

Infrastructure projects in the South African public sector are managed in accordance with the project management principles - a project's life span, or the Project's Life-Cycle, is divided into a number of sequential and distinct stages, each having has its own objectives and beginning and end points. The completion of each stage is signified as having been reached when one or more deliverables has been approved by a delegated authority. Stages in the life-cycle should generally only begin once the previous deliverable has been approved. The process of moving through the stages of a project aligns to what the Project Management Body of Knowledge (PMBOK) describes as 'progressive elaboration' which is an iterative process of "…. continuously improving and detailing a plan as more detailed and specific information and more accurate estimates become available" (PMBOK Guide, 6th Edition). This entire process, is referred to as the **IDM Control Stages for Project Management** and is part of the IDM Control System (See Module 2: What is the IDMS?).

It is important to distinguish between the IDM **Control Stages** for Project Management, and what are referred to as **Control Cycles.** The combination of the Control Cycles and Control Stages together make up the **IDM Control System.** These are specific to Portfolio Management, Programme Management and Operations & Maintenance Management processes; they produce Control Cycle Deliverables, each of which must be signed off, but which are not seen as pre-requisites for moving to another process as these processes are generally cyclical in nature and inform, or are informed by, each other. Accordingly, the Control Cycle processes are not referred to as stages, and are not numbered, to avoid creating the impression that they are sequential. The table to follow summarises the **IDM Control Stages for Project Management,** as prescribed for infrastructure projects in the South African
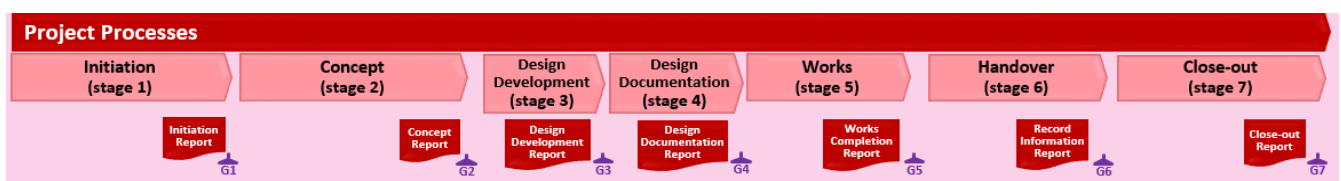
public sector.

Table 43: IDM Control Stages for Project Management

Generic Life-Cycle	Planning		Design		Works	Closure	
Stage No.	1	2	3	4	5	6	7
Stage Name	Initiation	Concept	Design Development	Design Documentation	Works	Handover	Close-Out
Objective	To develop, and obtain approval of, the Initiation Report	To develop, and obtain approval of, the Concept Report	To develop and obtain approval of the Design Development Report	To provide the detailing, performance definition, specification, sizing and positioning of all systems and components	To construct / deliver the works according to the working drawings and specifications	To hand the works over to the user, assured that it will be properly operated and maintained	To Close-Out the project with notified defects corrected, Final Account settled and the Close-Out Report issued
Key Support Tasks	Prepare Project Charter, Handover Strategy v1; Risk Assessments; Establish 1st version of the Control Budget; Conduct preliminary investigations, stakeholder consultations, site visits, desk top studies; Identify	Review & update Handover Strategy, Risk Assessments; Obtain site studies & specialist advice; Establish feasibility of satisfying strategic brief; within control budget – if not feasible, establish 2nd	Review & update Handover Strategy, Risk Assessments; Develop, in detail, accepted concept to finalise design and definition criteria; Establish 3rd version of Control Budget; Establish detailed form, character, function & cost	Review & update Handover Strategy, Risk Assessments; Produce final detailing, performance definition, specification, sizing & positioning of all systems & components enabling construction (except in certain instances, the Manufacture, Fabrication and	Produce the Manufacture, Fabrication and Construction Information for approval by implementer; Provide temporary works; Provide permanent works; Manage risks wrt OHS & environment; Administer contract in accordance with the terms and provisions of contract and ensure compliance with requirements, incl:	Complete and implement Handover Strategy, including, as appropriate, signing of, handover certificate; Complete training for personnel for both operation and maintenance; ensure receipt of compliance	Correct final defects (where applicable); issue relevant Defects Certificate or Certificates of Final Completion, in terms of the contract; certification and payment of Final Accounts; Record

	procedures, organizational structure, key constraints, statutory permissions & utility approvals etc. to take project forward; Prepare Project Baseline Plan v1	version of Control Budget; Determine initial design criteria & design options to carry out the work; Investigate alternative solutions, recommend preferred solution; Establish detailed brief, scope, scale, form & cost plan; Develop indicative schedule; Produce site development plan / schematic layout of works; Obtain statutory permissions, funding or utility approvals to proceed with works;	plan, defining all components in terms of overall size, typical detail, performance & outline specification; Confirm or revise cost plan; Prepare Project Baseline Plan v3	Construction Information for specific components of the work that the contractor might only need to provide once construction has begun); Project Baseline Plan v4	- Conducting of site meetings - Quality assurance - Issuing of Site Instructions - Monitoring of construction quality and progress - Control of scope and cost - Payment certification Review & update handover strategy; Prepare Project Baseline Plan v5	certificates; prepare & finalise Record Information; Correct defects; Prepare final version of Project Baseline Plan & Handover Strategy	updated asset information on Asset Register; Prepare Close Out Report

		Prepare Project Baseline Plan v2					
Local Authority Approval	Pre-application discussions	Planning applications made at most appropriate time, depending on specific context			Obtain compliance certificates to enable occupation and use of building/infrastructure asset as intended.	n/a	n/a
Key End of Stage Deliverable/s	Initiation Report: Strategic Brief / Prefeasibility Report, Handover Strategy v1 Project Charter, Project Baseline Plan v1	Concept Report / Feasibility Report, Handover Strategy v2, Project Baseline Plan v2	Design Development Report, Handover Strategy v3, Project Baseline Plan v3	Design Documentation, Handover Strategy v4, Project Baseline Plan v4	Completed Works capable of being used or occupied; Handover Strategy v5; Project Baseline Plan v5; completion certificates (Certificate of Practical Completion, Completion Certificate etc.)	Works which have been taken over by user or owner; completed training; Record Information; Handover Strategy implemented, final version of Project Baseline Plan	Defects Certificate or Certificate of Final Completion; Final Account; Close-Out Report, Section 42 Transfer to Asset Register

G1   G2   G3   G4   G5   G6   G7

Principles for Implementation of the IDM Control Stages for Project Management

The IDM Control Stages for Project Management should be implemented in accordance with the following principles:

i.   Procurement of PSPs and Contractors can occur at different points in the Control Stages.

ii.   As noted in 3.2 above, operations and maintenance activities do not constitute projects and as such, the IDM Control Stages for Project Management does not apply to operation and maintenance activities.

iii.   The IDM Control Stages for Project Management prescribes eight stages that cover the full spectrum of work and management activities encountered on infrastructure projects. However, it is important to note that **Stages 3 and 4 may be omitted** if it is considered by the budget holder, that the **Stage 2 deliverable contains sufficient information to enable the project to proceed directly to Works** (i.e. Stage 5). In the Design by Employer contracting strategy, the tender documentation includes the Concept Report, which needs to be sufficiently detailed to enable the tendering contractor to adequately price the work.

iv.   It should be noted that additional gates may be added to the IDM Control Stages, if deemed necessary. This may be particularly important in the Works Stage, which is generally the longest and costliest part of the implementation of a project. Thus, the introduction of what could be seen as monitoring gates / sub-gates is advisable. Such gates / sub-gates could include, for example, those necessary to ensure that project management activities are appropriately carried out by the Implementer and sub-gates linked to contract management activities, would, in many instances, be contingent upon the requirements of the specific contract being used.

v.   The IDM Control Stages for Project Management requires strict adherence to the principle of sequential stage controls i.e. the approval of certain stage deliverables is a prerequisite for the commencement of the subsequent stage of the project. The key deliverable at the end of each stage must also be approved, to ensure that scope creep is eliminated, and project risks are understood and agreed to, before proceeding to the next stage of implementation. Where the cost estimate indicates that the available budget will be exceeded, either additional budget must be obtained, or the project information adjusted, to ensure that the cost is within the available budget. This needs to be undertaken before proceeding to the next stage of implementation. The end of each stage is thus regarded as a 'Control Gate' which needs to be 'opened' to allow access into the next stage of the project. These control gates play a very important role in the planning and control of a project, because each gate approval is seen as a 'milestone' to be reached. Project progress is usually measured in terms of the actual date of achievement of the milestone, versus the planned date for reaching that milestone.

vi.   When reporting a specific project's progress using the Control Stages, it is important to emphasise that when the project is shown as being in a specific stage, **it is the deliverable of the previous stage that has been achieved and which must be reported on**. For example, if a project is shown as being at Stage 3 (Design Development), it implies that the deliverable for Stage 2 (i.e. the Planning Report) has been achieved, and that the deliverable for Stage 3 (i.e. the Design Development Report) is in the process of being prepared.

vii.   The development of the Stage 1 deliverable (Initiation Report) is the Client's responsibility, while that of Stages 2 to 7 is the responsibility of the Implementer. However, the Client may also choose to prepare the Stage 2 deliverable (Planning Report) itself, or procure a service provider to do it on its behalf. In addition, the Client may choose to take responsibility for the preparation of the Concept Report.

viii.   While Stages 2 to 7 are the responsibility of the Implementer, it is important that the Client, as the budget holder, is regularly consulted with respect to the design, throughout all stages.

ix.   The development of all deliverables should be carried out in a cooperative and consultative manner between both parties (i.e. between Client and Implementer), **as each deliverable is developed.** It is not advisable for a deliverable to be developed and signed off by one party, and then given to the other party as completed and irreversible, as this will undoubtedly lead to a less than optimal product and could, in many instances, lead to acrimony between the two parties.

x.   The terms 'Client', 'Implementer', and 'User', as applied throughout this module, are defined as follows:

   a.   **Client**: This is the organisation that initiates, commissions and pays for the project [budget holder], owns the business case and leads the project.

   b.   **Implementer**: Typically, responsible for specifying project requirements to external participants and managing project delivery outcomes.

   c.   **User**: This is the organisation, or unit within an organisation, that ultimately takes over use of, and operates, the completed infrastructure (Civilution, SAICE, 2016, p.33).

In certain instances, the Client might choose to implement projects itself, without engaging the assistance of an external Implementer (generally, referred to as an Implementing Agent). In these instances, the Client becomes the Implementer and would need to determine internal delegations for specific units, and personnel within these units, to prepare and sign off the Control

5.3 Project Management Processes

Subsection 5.3: Project Management Processes

Initiation (Stage 1)

The objective of the Initiation Stage is to develop, and obtain approval of, the Initiation Report. It should be noted, however, that this Initiation Report is different to the Project Proposals, that are developed as part of the Asset Portfolio Analysis in the Portfolio Management Processes. At that point, the project is not yet approved as a project – it needs to still go through an analysis and approval process, and thereafter, if approved, put into a programme as a project for Implementation in specifically designated years.

The Initiation Report can take the form of either a Strategic Brief or, in the case of a major capital project, a Pre-feasibility Report, and must include a Project Charter and Project Baseline Plan v1. A major capital project is a project where:

- The budget is provided by a major public enterprise and the project has a capital expenditure value that will exceed R1,5 billion (including VAT)

<p style="text-align:center;"><u>or</u></p>

- The budget is provided by an organ of state that is subject to the Public Finance Management Act, where the total project capital expenditure value will exceed R1,0 billion (including VAT), or where the expenditure per year for a minimum of three years exceeds R250 million per annum (including VAT).

The Initiation Report outlines the project objectives, the needs, acceptance criteria, client priorities and aspirations, and, ultimately, sets out the basis for the development of the Concept Report / Feasibility Report (Stage 2).

The following activities should form part of the process of the preparation of the Strategic Brief:

- Confirm the scope of the project and identify any constraints, including those relating to occupational health and safety;

- Where necessary, the conducting of preliminary investigations or desk top studies to obtain project information;
- Establish the project criteria, including the performance and reliability requirements, design life, service life of components, function, maintenance and replacement requirements, mix of uses, scale, location, quality, value, time, safety, health, environment and sustainability;
- Identify procedures, organisational structures, key constraints, statutory permissions (e.g. environmental, heritage, social, planning, building control), and utility approvals, policies (e.g. environmental, developmental, social, maintenance or facilities management) and strategies to take the project forward;
- Identify risks that need to be mitigated;
- Identify interfaces between projects, as necessary;
- Establish the first version of the control budget for the project, ownership costs and schedule for the project, or series of projects;
- Confirm organizational structure, roles, responsibilities and procedures for project implementation.
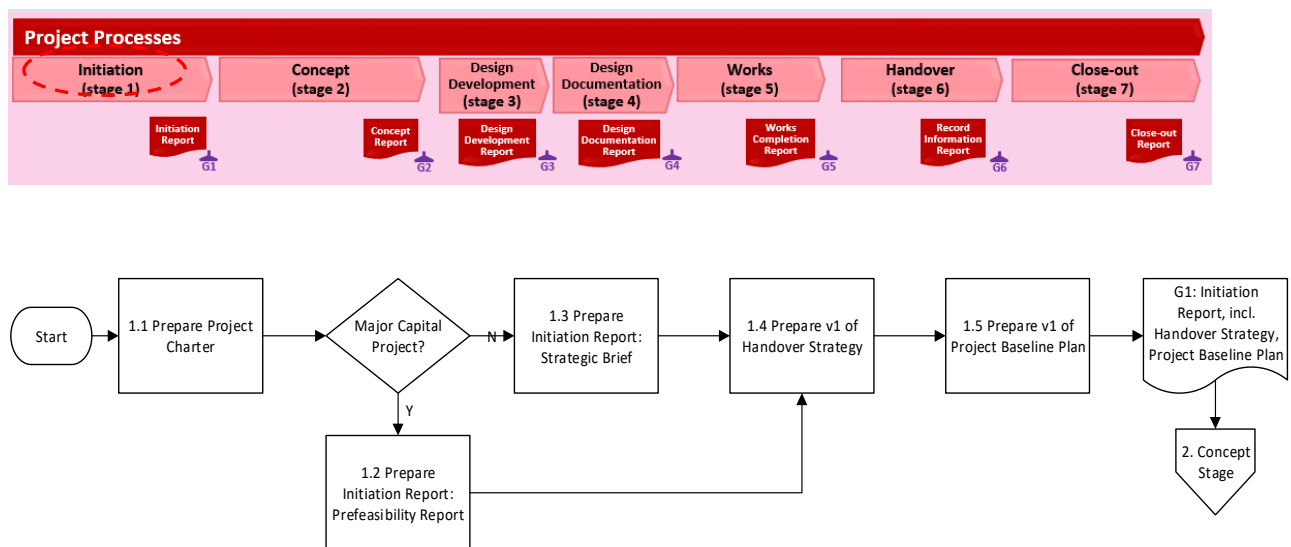
Figure 101: Process Map – Initiation (Stage 1)

No.	Stage / Process	Definition	Description
D. 1.1	**Initiation (Stage1)**	**The objective of the Initiation Stage is to develop, and obtain approval of, the Initiation Report**	
D.1.1.1	Prepare Project Charter	The objective of developing the Project Charter is to:	• Outline the vision for the project – its purpose, objectives, scope, deliverables

No.	Stage / Process	Definition	Description
		• Formally authorise a project or a new project stage • Identify the project manager and her/his responsibilities and authorities • Document the business needs, project objectives, expected deliverables and the expected economic aspects of the project	• Structure the project organization (project team members, roles & responsibilities, stakeholders etc.) • Plan the approach to the project implementation – phases, activities, timelines, dependencies, resources • Outline the risks and issues

D.1.1.2	Prepare Initiation Report: Pre-Feasibility Report	The objective of the Initiation Report is to define project objectives, needs, acceptance criteria client priorities and aspirations, and set out the basis for the development of the Concept Report, for major capital projects	Carry out work in line with National Treasury *Capital Planning Guidelines*, including,
			• Needs and demand analysis with specified outputs of the project
			• Options Analysis, including,
			  - Demand Analysis
			  - Technical Engineering Analysis
			  - Environmental Analysis
			  - Socio-economic Analysis
			  - Legal and Regulatory Due Diligence
			In addition:
			• Document the owner or user requirements and specifications
			• Shortlist the options that were considered
			• Provide a preliminary design for study options
			• Provide preliminary capital estimate and the proposed schedule
			• Present the study outcomes

D.1.1.3	Prepare Initiation Report: Strategic Brief	The objective of the Initiation Report is to define project objectives, needs, acceptance criteria, client priorities and aspirations, and set out the basis for the development of the Planning Report, for projects which are not major capital projects	• Confirm the scope of the work • Conduct desk-top studies to obtain project information • Identify procedures, organisational structures, key constraints, statutory permissions (e.g. environmental, heritage, social, planning, building control), and utility approvals, policies (e.g. environmental, developmental, social, maintenance or facilities management) • Identify risks

No.	Stage / Process	Definition	Description
			• Establish 1st version of control budget • Establish 1st version of project schedule • Confirm or revise details in Project Charter
D.1.1.4	Prepare v.1 of Handover Strategy	The Handover Strategy is the document that outlines how the completed works will be handed over to the user.	Determine the need (or otherwise) for phased handover, begin looking at how technical and functional commissioning will take place, and training requirements to enable successful occupation of the completed works.
D.1.1.5	Prepare v.1 of Project Baseline Plan	A baseline is defined as the approved version of a work product that can be changed only through formal change control procedures and is used as a basis for comparison. The purpose of the Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare 1st version of: • Cost Baseline: Approved project budget • Schedule Baseline: Approved project timeframe • Scope Baseline: Approved project scope

Table 44: Initiation (Stage 1) – Steps in Process

Concept (Stage 2)

The Concept Stage Process represents an opportunity for the development of different design concepts, to enable the client to establish the feasibility of satisfying the project requirements, as developed during Stage 1. It also presents, through the testing of alternative approaches, an opportunity for the Client to select a particular conceptual approach. The ultimate objective of this stage is to **determine whether the project is viable to proceed,** with respect to available budget, technical solutions, time-frame etc. This is documented in the Stage 2 deliverable, namely the **Concept Report,** or in the case of a major capital project, the **Feasibility Report.** The development of the Stage 2 deliverable is the responsibility of the Implementer and is normally carried out by the contractor or PSP (depending upon chosen contracting strategy), appointed on the behalf of the implementer.

Gateway Control Points in the Concept Stage

Approval of the Initiation Report (Strategic Brief or Prefeasibility Report), including the updated Handover Strategy (updated by the implementer, in conjunction with the Client) and Project Baseline Plan v1, is a pre-requisite for commencing with the detailed planning of the work as proposed. This detailed planning is aimed at the development of a **Concept Report** or the **Feasibility Report – approval of which is a Control Gate,** and a pre-requisite for initiating the Design Development Stage or Works Stage, if the former is not required.

The Concept Report should:

- Review and update the Handover Strategy, as prepared during Initiation Stage;
- Document the initial design criteria, cost plan, design options and the selection of the preferred design option, or the methods and procedures required to maintain the condition of infrastructure for the project;
- Establish the detailed brief, scope, scale, form and cost plan for the project, including, where necessary, the obtaining of site studies and construction and specialist advice;
- Provide an indicative schedule for documentation and construction or maintenance services, associated with the project;
- Include a site development plan, or other suitable schematic layouts of the works;
- Describe the statutory permissions, funding approvals and utility approvals required to proceed with the works associated with the project;
- Include a baseline risk assessment for the project, and a health and safety plan, which is a requirement of the Construction Regulations, issued in terms of the Occupational Health and Safety Act;
- Contain a risk report linked to the need for further surveys, tests, other investigations and consents and approvals, if any, during subsequent stages and identified health, safety and environmental risk;
- Contain an Operations and Maintenance (O&M) Plan which establishes the organisational structure required for the operation and maintenance of the works resulting from the project, or series of projects, over its service life; and the office, stores, furniture, equipment,

Information and Communications Technology (ICT), engineering infrastructure and staff training requirements;

- Confirm the financial sustainability of the project;

- Establish the feasibility of satisfying the strategic brief for the project, or series of projects, within the control budget established during the Initiation Stage (1) and, if not, motivate a revised Control Budget, where appropriate.
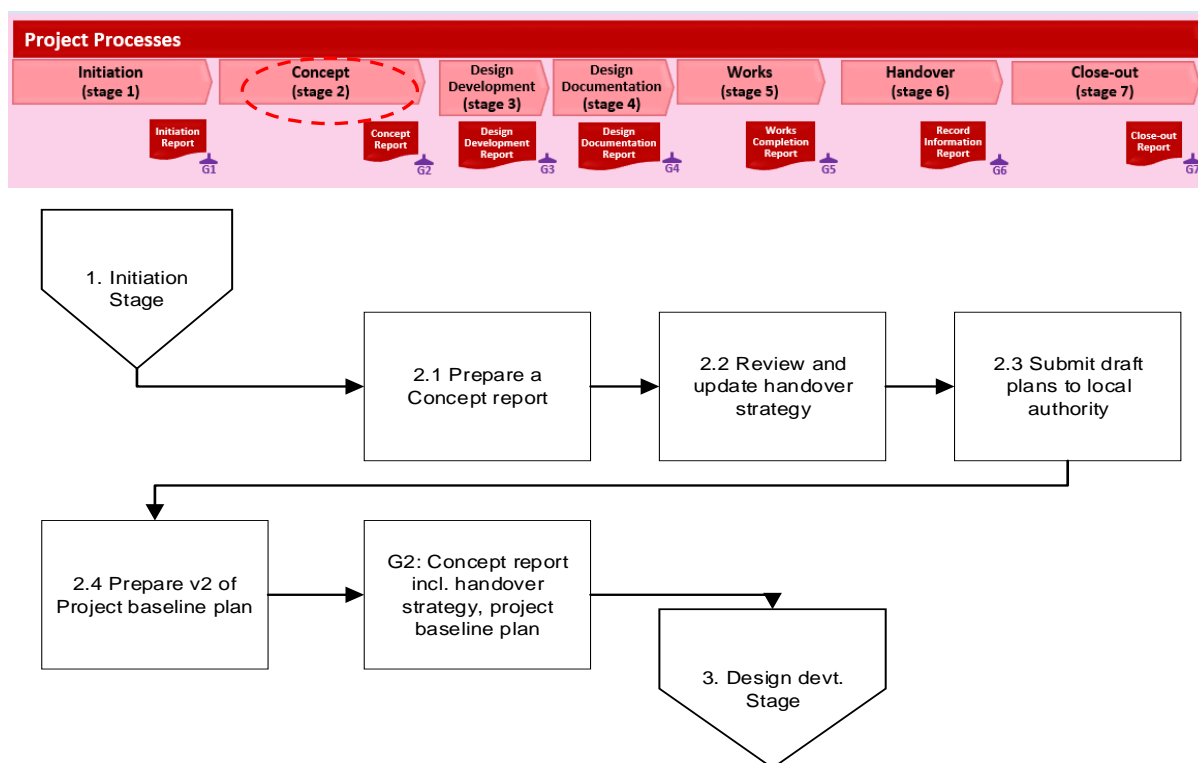
Figure 102: Process Map – Concept (Stage 2)

No.	Stage / Process	Definition	Description
D. 1.2	Concept (Stage 2)	**The objective of the Concept Stage is to develop, and obtain approval of, the Concept report**	

D.1 2.1	Prepare Feasibility or Concept Report	The objective of the *Feasibility Report* is to establish the detailed brief, scope, scale, form and control budget, and set out the integrated concept for one or more projects	Feasibility report
			
			• Details regarding the preparatory work covering:
			  - a needs and demand analysis with output specifications
			  - an options analysis
			• A viability evaluation covering:
			  - a financial analysis
			  - an economic analysis, if necessary

No.	Stage / Process	Definition	Description
		The objective of the of the ***Concept Report*** is to establish the detailed brief, scope, scale, form and control budget, and set out the integrated concept for the project	• A risk assessment and sensitivity analysis • A professional analysis covering: - a technology options assessment - an environmental impact assessment - a regulatory due diligence • An implementation readiness assessment covering: - institutional capacity • a procurement plan Concept report • Document the initial design criteria, cost plan, design options and the selection of the preferred design option, or the methods and procedures required to maintain the condition of infrastructure for the project • Establish the detailed brief, scope, scale, form and cost plan for the project, including, where necessary, the obtaining of site studies and construction and specialist advice • Provide an indicative schedule for documentation and construction or maintenance services associated with the project • Include a site development plan or other suitable schematic layouts of the works • Describe the statutory permissions, funding approvals and utility approvals required to proceed with the works associated with the project • Include a baseline risk assessment for the project, and a health and safety plan, which is a requirement of the Construction Regulations, issued in terms of the Occupational Health and Safety Act • Include a risk report linked to the need for further surveys, tests, other investigations and consents and approvals, if any, during subsequent stages, and identified health, safety and environmental risk;

No.	Stage / Process	Definition	Description
			• Include an Operations and Maintenance (O&M) Plan, which establishes the organisational structure required for the operation and maintenance of the works, resulting from the project, or series of projects, over its service life; and the office, stores, furniture, equipment, Information and Communications Technology (ICT), engineering infrastructure and staff training requirements; • Confirm the financial sustainability of the project; • Establish the feasibility of satisfying the strategic brief for the project, or series of projects, within the control budget established during the Initiation Stage, and if not, motivate a revised Control Budget, where appropriate.
D.1 2.2	Review & update Handover Strategy	The Handover Strategy is the document that outlines how the completed works will be handed over to the user.	Review and update Handover Strategy
D.1 2.3	Submit Draft Plans to Local Authority	Local Authorities require that building plans be submitted for approval before construction work can begin.	Exact requirements will depend on specific Local Authority and on context.
D.1 2.4	Prepare v.2 of Project Baseline Plan	A baseline is defined as the approved version of a work product that can be changed only through formal change control procedures, and is used as a basis for comparison. The purpose of the Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare 2nd version of: • Cost Baseline: Approved project budget • Schedule Baseline: Approved project timeframe • Scope Baseline: Approved project scope

Table 45: Concept (Stage 2) – Steps in Process

Design Development (Stage 3)

The objective of the Design Development stage is to develop, in detail, the approved concept, to finalise the design and definition criteria, to set out the integrated developed design, the cost plan, and the schedule for the project; and ultimately, to obtain approval of the **Design Development Report** (including the updated Handover Strategy and Project Baseline Plan). Stage 3 is the responsibility of the Implementer, and is normally carried out by the contractor or PSP (depending upon chosen contracting strategy), appointed on its behalf.

Gateway Control Point for the Design Development Stage

Approval of the Planning Report (Concept Report or Feasibility Report), is a prerequisite for beginning the Design Development. The approval by the Client of the Design Development is a Control Gate, and a prerequisite for continuing to Stage 4 (Design Documentation).
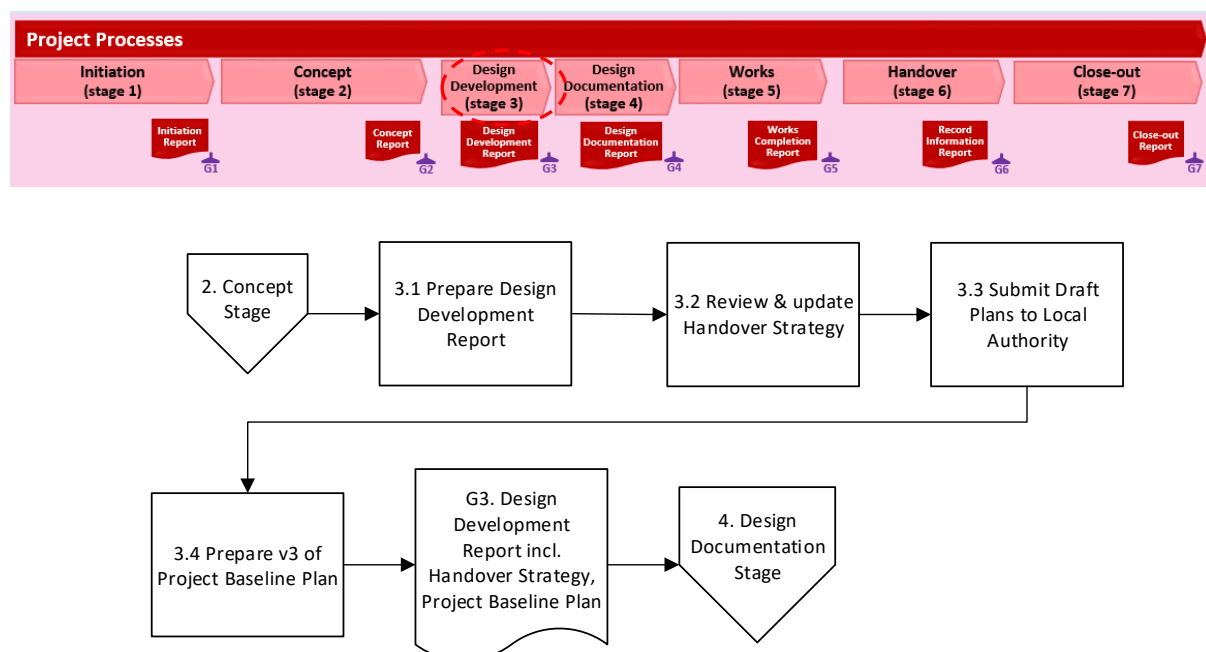
Figure 103: Process Map – Design Development (Stage 3)

No.	Stage / Process	Definition	Description
D.2.1	**Design Development**	**The objective of the Design Development Stage is to develop and obtain approval of the Design Development Report.**	
D.2.1.1	Prepare Design Development Report	The purpose of the Design Development Report is to develop, in detail, the approved concept, to finalise the design and definition	• Develop, in detail, the accepted concept to finalise the design and definition criteria; • Establish the detailed form, character, function and costings;

		criteria, to set out the integrated developed design, the cost plan, and the schedule for one or more projects; and ultimately, to obtain approval of the Design Development Report	• Define all components in terms of overall size, typical detail, performance and outline specification; • Describe how infrastructure, or elements or components thereof, are to function, how they are to be safely constructed, how they are to be maintained and how they are to be commissioned; • Confirm that the project, or series of projects, can be completed within the control budget, or propose a revision to the control budget.
D. 2.1. 2	Review & update Handover Strategy	The Handover Strategy is the document that outlines how the completed works will be handed over to the user.	Review and update 2nd version of Handover Strategy
D.2 .1.3	Submit Draft Plans to Local Authority	Local Authorities require that building plans be submitted for approval, before construction work can begin.	Exact requirements will depend on specific Local Authority and on context.
D.2 .1.4	Prepare v3 of Project Baseline Plan	A baseline is defined as the approved version of a work product, that can be changed only through formal change control procedures and is used as a basis for comparison. The purpose of the Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare 3rd version of: • Cost Baseline: Approved project budget; • Schedule Baseline: Approved project timeframe; • Scope Baseline: Approved project scope;

Table 46: Design Development (Stage 3) – Steps in Process

Design Documentation (Stage 4)

The objective of Stage 4 is to provide the detailing, performance definition, specification, sizing and positioning of all systems and components that would enable construction, except, in certain instances, the Manufacture, Fabrication and Construction Information for specific components of the work that the contractor might only need to provide once construction has begun. This stage is the responsibility of the Implementer, and is normally carried out by the contractor or PSP (depending upon chosen contracting strategy), appointed on its behalf.

Gateway Control Points for the Design Documentation Stage

Stage 4 shall commence on the Client's approval of the Design Development Report, produced during Stage 3 (Design Development); the **control gate for the continuation to Stage 5, is the Client's approval of the Design Documentation** (including the updated Handover Strategy and Project Baseline Plan)**.**
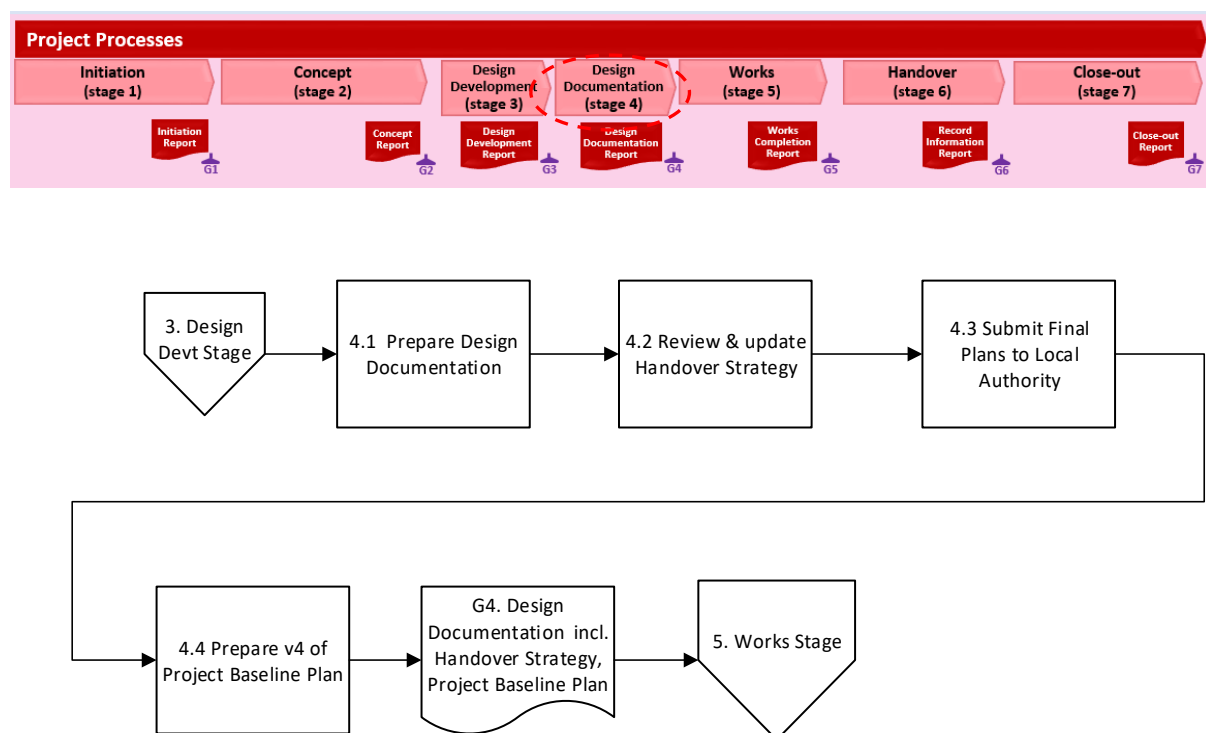
Figure 104: Process Map – Design Documentation (Stage 4)

No.	Stage / Process	Definition	Description
D 2.2	**Design Documentation (Stage 4)**	**To provide the detailing, performance definition, specification, sizing and positioning of all systems and components enabling construction.**	
D.2 .2.1	Prepare Design Documentation	This is the stage when all design and working drawings are prepared, along	• Adjust design detail, as required

No.	Stage / Process	Definition	Description
		with specifications, and communicated to all relevant stakeholders. In the process, some minor design changes might also be incorporated. Manufacture, Fabrication and Construction Information is excluded, as it is only required to be provided once construction has begun.	• Prepare final design and working drawings and specifications, and obtain approval
D.2.2.2	Review & update Handover Strategy	The Handover Strategy is the document that outlines how the completed works will be handed over to the user.	Review and update 3rd version of Handover Strategy
D.2..3	Submit Final Plans to Local Authority	Local Authorities require that building plans be submitted for approval before construction work can begin.	Exact drawing requirements will depend on specific Local Authority and on context, but it will be the final design and working drawings and specifications, which would be submitted.
D.2..4	Prepare v4 of Project Baseline Plan	A baseline is defined as the approved version of a work product that can be changed only through formal change control procedures, and is used as a basis for comparison. The purpose of the Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare 4th version of: • Cost Baseline: Approved project budget • Schedule Baseline: Approved project timeframe • Scope Baseline: Approved project scope

Table 47: Design Documentation (Stage 4) – Steps in Process

Works (Stage 5)

The objective of the Works Stage is to construct or deliver the works according to the working drawings and specifications.

Gateway Control Points for the Works Stage

The Works Stage can only begin once the Design Documentation Stage has been completed, or in the case of those projects where Stages 5 and 6 have been skipped, once the Concept Report has been approved and the relevant contract signed.

The IDM Control Stages for Project Management prescribes only one stage in the delivery of the Works, namely the Works Stage itself. However, the Client and / or Implementer may introduce additional gates and / or sub-gates, should it be considered appropriate or necessary.

The **deliverables** required for completion of the Works Stage, are:

- Completed Works;
- Completion certificates (Certificate of Practical Completion, Completion Certificate etc.);
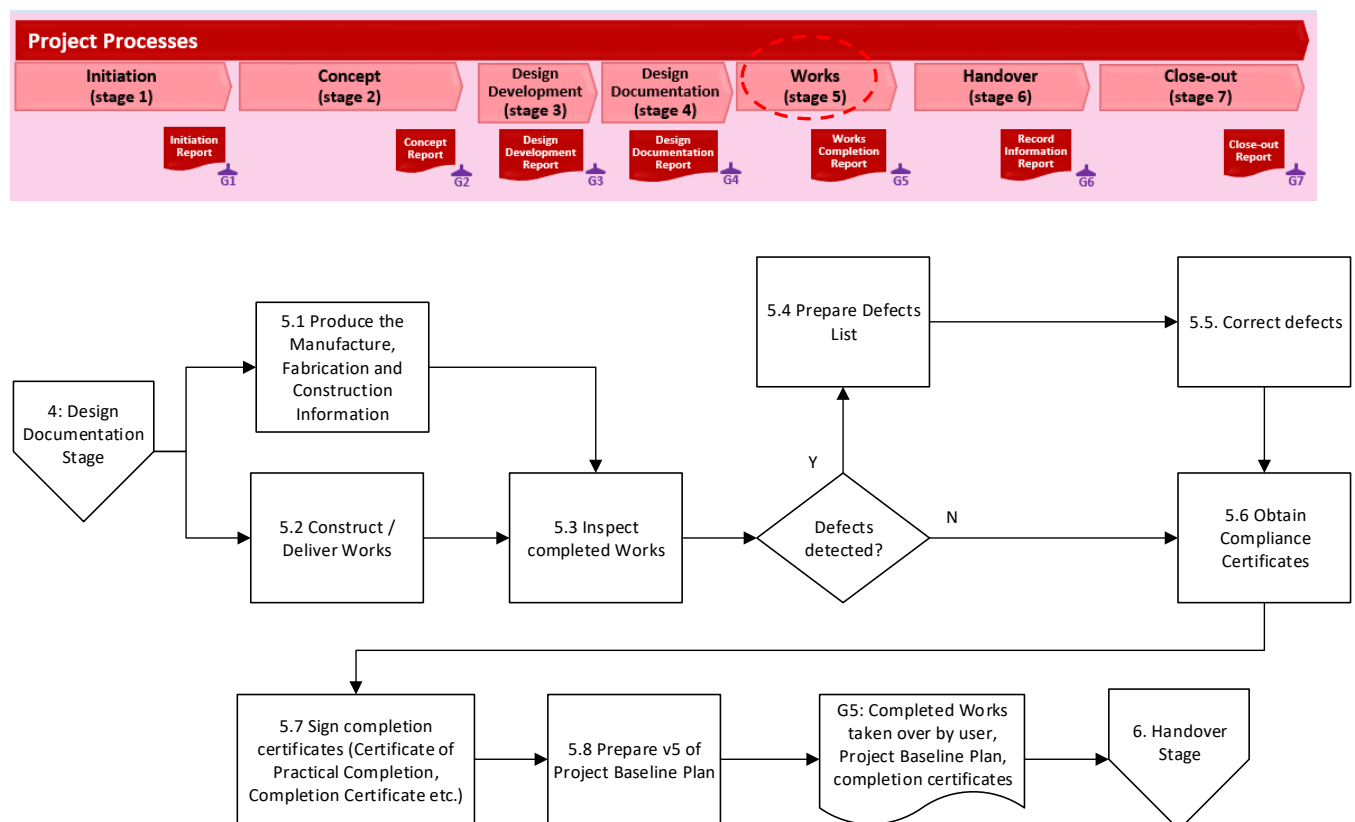- Compliance Certificates;
- Project Baseline Plan v5.

Figure 105: Process Map – Works (Stage 5)

No.	Stage / Process	Definition	Description
D.3.1	**Works (Stage 5)**	**To construct / deliver the works according to the working drawings and specifications**	
D.3.1.1	Produce the Manufacture, Fabrication and Construction Information	This is the information produced by, or on behalf of, the contractor, based on the production information (design documentation) provided for a project, which enables manufacture, fabrication or construction to take place.	The contractor (or his/her subcontractor), produces the Manufacture, Fabrication and Construction Information, based on the production information (design documentation) and obtains approval thereof
D.3.1.2	Construct / deliver Works	Construct / deliver the works according to the working drawings and specifications	Construct the works in accordance with the working drawings and specifications
D.3.1.3	Inspect Completed Works	Inspect the completed works to ensure that it is in accordance with brief, and highlight defects	The completed works are inspected
D.3.1.4	Prepare Defects List	Different Contract forms have different definitions: • NEC3 defines it as "A part of the works which is not in accordance with the Works Information"; • JBCC defines it as "any aspect of material and workmanship forming part of the works that, in the opinion of the principal agent, is due to the failure of the contractor to comply with his obligations in terms of the agreement".	Relevant contract-specific representative of the Client prepares a list of the defects that must be attended to.
D.3.1.5	Correct defects	Defects can be corrected during the Works, Handover, and Close-Out Stage, depending on the contracted 'defects date'.	The contractor must correct the defects as formally notified in the Defects List
D.3.1.6	Obtain Compliance Certificates	Depending on the type of infrastructure completed, different certificates of compliance will be required before that infrastructure can be occupied or used, including an Occupation Certificate, fire compliance certificate, electrical	Obtain the relevant Compliance Certificates from the relevant authorities.

No.	Stage / Process	Definition	Description
		compliance certificate, structural certificate etc.	
D.3.1.7	Sign completion certificates (Certificate of Practical Completion, Completion Certificate etc.)	Practical Completion (JBCC), or Completion (NEC3), is broadly defined as having occurred when all the works that are included in the contract, have been carried out.	The contract-appropriate completion certificates are signed by the relevant individuals representing the client e.g. Principal Agent (JBCC), Project Manager (NEC3 etc.)
D.3.1.8	Review & update Handover Strategy	The Handover Strategy is the document that outlines how the completed works will be handed over to the user.	Review and update 4th version of Handover Strategy
D.3.1.9	Prepare Version 5 of Project Baseline Plan	A baseline is defined as the approved version of a work product that can be changed only through formal change control procedures, and is used as a basis for comparison. The purpose of the Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare 5th version of: • Cost Baseline: Approved project budget • Schedule Baseline: Approved project timeframe • Scope Baseline: Approved project scope

Table 48: Works (Stage 5) – Steps in Process

Handover (Stage 6)

Gateway Control Points in the Handover Stage

The Handover Stage commences with the issuing of the contract-specific Completion Certificate and its accompanying Works Completion List / Defects List, and is concluded once the works included on the list has been completed, and the works have been handed over to the end-user, who then accepts liability for the works going forward**;** such acceptance is **accompanied by the Record Information** (including compliance certification)**.**

The following activities and deliverables should be included in the handover stage:

- **Training** of the end user in the operation of the delivered infrastructure (which also forms part of the Commissioning process);
- **Preparation of the Record Information,** by the Implementer / contractor, and issuing this to the Client, owner and end-user, including those responsible for operation and maintenance. This Record Information shall:
    - Accurately document the condition of the completed works associated with a project;
    - Accurately document the works as constructed or completed, including all relevant As-Built or Record Drawings;
    - Contain Final O&M Plans and O&M Manuals, including:
        - Information on the care and servicing requirements for the works, or a portion thereof;
        - Information or instructions on the use of plant and equipment;
    - Confirm the performance requirements of the Design Development Report and Production Information;
    - Contain certificates confirming compliance with legislation, statutory permissions and the like;
    - Contain guarantees that extend beyond the defects liability period provided for in the project;
- Arrangements in place by the client / user, to **secure the works** from the time that the contractor's liability for damage to the works ends, until such time that the works are handed over to the end user;
    - **Finalise the Commissioning of the facility**: Commissioning is an essential, and yet often neglected, part of the delivery of an infrastructure project, and while it comes to fruition during the Handover Stage, it is important to emphasise that it "starts at the onset of a project, i.e. before building on site commences" and "finishes with evaluation after the project has been completed and the facilities brought into use" (Commissioning New Hospital Facilities in South Africa - A Manual of Good Practice, p.6, Andrew Butcher, May 2002). Commissioning includes:
        - **Technical Commissioning:**
            - **Building Commissioning:** That part of the commissioning process which ensures that all building systems perform interactively according to the construction contract documents. The American Society for Healthcare

Engineering (ASHE) defines this commissioning as "a process intended to ensure that building systems are installed and perform in accordance with the design intent, that the design intent is consistent with the owner's project requirements, and that operations and maintenance staff are prepared adequately to operate and maintain the completed facility" (http://www.hfmmagazine.com/display/HFM-news-   article. dhtml?dcrPath=/templatedata/HF_Common/NewsArticle/data/HFM/Maga zine/2011/Jan/0111HFM_FEA_codes);

▪ **Operational Commissioning:** This refers to activities undertaken leading up to handover of the building to the users, including, for example, familiarisation of staff with safety, security, engineering services, and communication systems;

Service Commissioning - part of the commissioning that is concerned with the provision of the service itself, including the resourcing of the facility, the recruitment and training of staff, the procurement of service providers, service planning, operational procedures, opening sequencing, communication, financial planning etc.
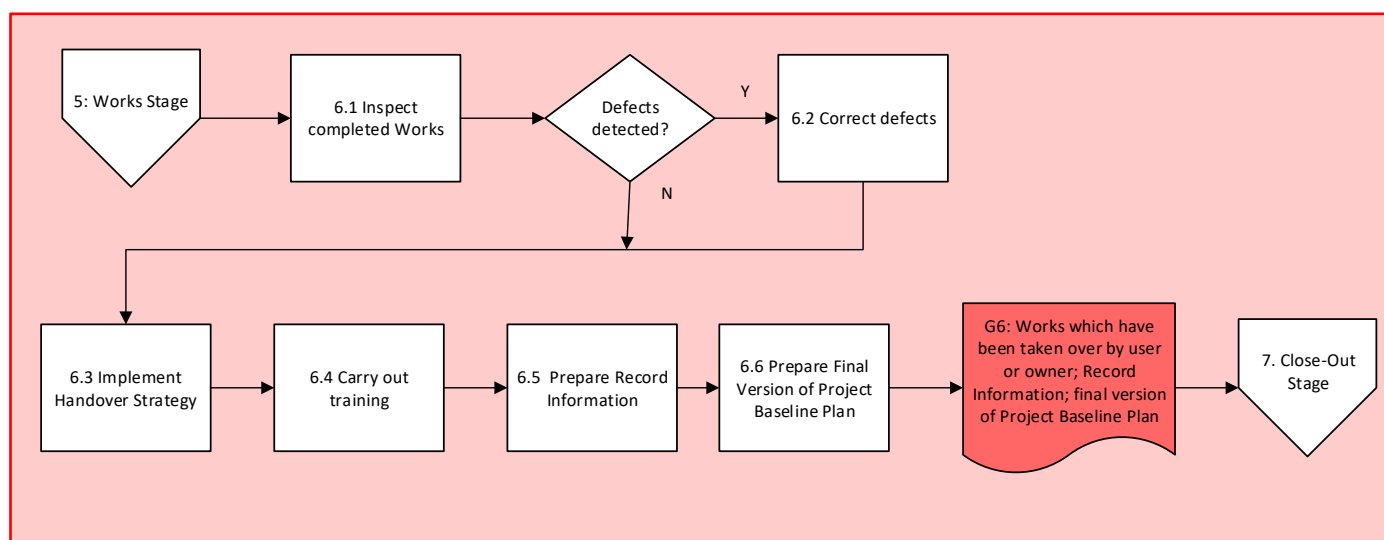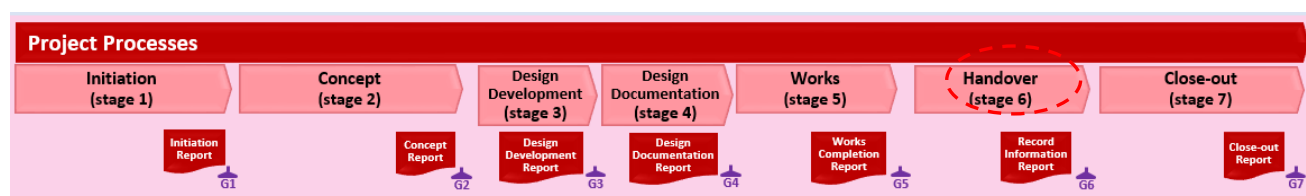

Figure 106: Process Map – Handover (Stage 6)

No.	Stage / Process	Definition	Description
D.4.1	Handover (Stage 6)	**The objective of the Handover Stage is to hand the works over to the user, assured that it will be properly operated and maintained.**	
D.4.1.1	Inspect Completed Works	Inspect the completed works to ensure that defects listed at end of Works Stage, have been corrected.	The completed works are inspected against Defects List
D.4.1.2	Correct defects	Defects can be corrected during the Works, Handover, and Close-Out Stage, depending on the contracted 'defects date'.	The contractor must correct the defects as formally notified in the Defects list.
D.4.1.3	Implement Handover Strategy	The Handover Strategy is the document that outlines how the completed works will be handed over to the user.	Finalise the Handover Strategy and implement accordingly.
D.4.1.4	Carry out training	Appropriate training for the use, operation and maintenance of the completed infrastructure must be provided.	The final Handover Strategy Document and the Record Information will outline the required training that must be given to appropriate staff who will use, operate and maintain the completed infrastructure.
D.4.1.5	Prepare Record Information	The Record Information is that which, as relevant: • Accurately documents the condition of the completed works associated with a project; • Accurately documents the works as constructed or completed; • Contains information on the care and servicing requirements for the works; • Contains information or instructions on the use of plant and equipment; • Confirms the performance requirements of the design development report and production information; • Contains certificates confirming compliance with legislation, statutory permissions and the like; • Contains guarantees that extend beyond the defects liability period provided for.	Prepare and obtain approval of the Record Information

MISA
Municipal Infrastructure Support Agent
REPUBLIC OF SOUTH AFRICA

D.4 .1.6	Prepare Final Version of Project Baseline Plan	A baseline is defined as the approved version of a work product, that can be changed only through formal change control procedures and is used as a basis for comparison. The purpose of the Project Baseline Plan is to determine and measure how a project deviates from its original plan.	Prepare final version of: • Cost Baseline: Approved project budget • Schedule Baseline: Approved project timeframe • Scope Baseline: Approved project scope

Table 49: Handover (Stage 6) – Steps in Process

Close-Out (Stage 7)

The objective of the Close-Out Stage is to formalise Final Completion of the works, in accordance with the contract.

Gateway Control Points in the Close-Out Stage

The Close-Out Stage commences when the end user accepts liability for the works; such acceptance being accompanied by the Record Information and Handover certificate. It is complete when:

- Defects certificates are issued;
- Certificates of final completion are issued, in terms of the contract;
- Final amount due to the contractor is certified, in terms of the contract;
- Close-Out Report is prepared by the Implementer and approved by the Client Department;
- Asset Register of the Custodian has been updated, in accordance with Section 42 (S42) of the PFMA, in the case of provincial government.

Close-Out is often a much-neglected phase of a project, although it is extremely important, as it not only signals the official end of a project, but also ensures that the Client is given the necessary documentation for future maintenance and operation, as well as for potential expansion of the facility to which the work was linked.

Preparation of the Close-Out Report

The Close-Out Report is most often the only record of the events, both positive and negative, that occurred during the project. This document provides essential information to the Implementer when evaluating new projects, and identifying the most appropriate methods to follow. As a minimum, it should:

- Contain details of financial performance i.e. budgeted vs actual expenditure, Variation Orders etc.;
- Contain details of time performance i.e. original contracted schedule vs actual schedule;
- Outline quality aspects of the works and any difficulties encountered;
- Outline any disputes that are unresolved;
- Outline all events of significance that occurred during the project;
- Indicate project and contract goals that were achieved;
- Contain suggestions for improvements to projects of a similar nature;
- As an annexure to the Close-Out Report, include each of the Project Baseline Plans, as developed during each stage of the project, from 1 to 6.
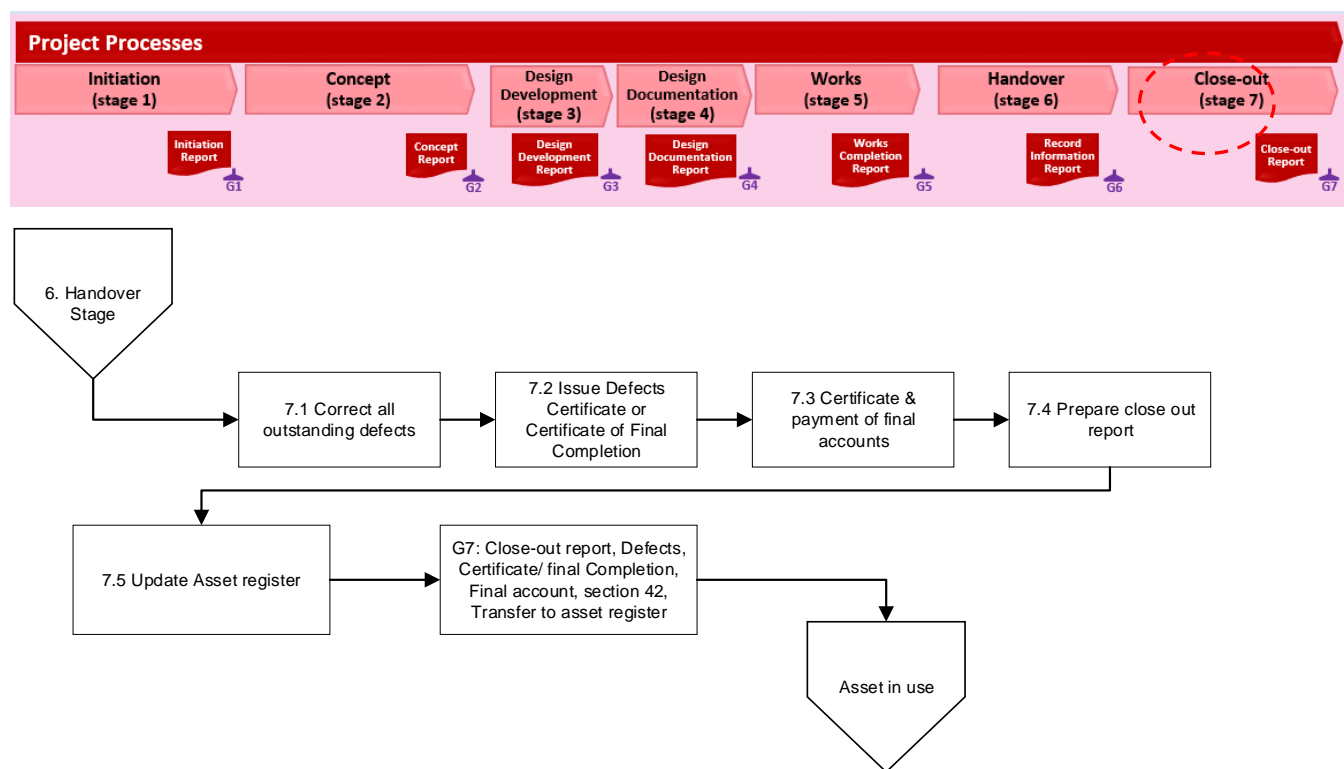
Figure 107: Process Map – Close-Out (Stage 7)

No.	Stage / Process	Definition	Description
D.4.2	Close-Out (Stage 7)	**The objective of the Close-Out Stage is to Close-Out the project with notified defects corrected, Final Account settled and the Close-Out Report issued**	
D.4.2.1	Correct all outstanding defects	Defects can be corrected during the Works, Handover, and Close-Out Stage.	The contractor must correct all the defects as included in the Defects List and not corrected during Works and Handover Stages; must be done by the stipulated defects date.
D.4.2.2	Issue Defects Certificate / Certificate of Final Completion / Performance Certificate etc.	All defects, as included in the Defects List, must be corrected by the Defects Date, which must be specified in the contract.	Different forms of contract call for different certificates
D.4.2.3	Certification and payment of final account/s	The final account is arrived at by calculating and agreeing any adjustments to the contract, so that the amount of the final payment can be determined. This	Once the defects date has been reached, the final amount due to contractor (or in rare instances, amounts owed by the contractor) must be agreed to, certified and paid.

		final amount is then reflected in the final payment certificate.	
D.4.2.4	Prepare Close-Out Report	A Close-Out Report shall outline what was achieved in terms of key performance indicators and suggestions for improvements on future projects of a similar nature; it should also comment on the performance of the contractor (where appropriate).	The appropriate individual, depending on contracting strategy implemented, will prepare the Close-Out Report.
D.4.2.5	Update Asset Register	An Asset Register is a database of information on each asset that supports the effective financial and technical management of the assets, and allows for the meeting of statutory requirements. The asset register should also facilitate proper financial reporting. An immovable asset is a capital asset consisting of land, infrastructure, buildings or a combination of thereof.	Updating of Asset Register by informing the Custodian, in a format and procedure agreed to with the Custodian, of the details of the completed infrastructure project. In some instances, Asset Registers of Clients would also need to be updated.

Table 50: Close-Out (Stage 7) – Steps in Process

5.4 Exercise

Subsection 5.4: Exercise

Exercise 1 : Project initiation stage:
 Choose a current active project

1.1 Develop a high level project charter :
- o   Outlining the vision for the project – its purpose, objectives, scope, deliverables
- o   Structure the project organization (project team members, roles & responsibilities, stakeholders etc.)
- o   Plan the approach to the project implementation – phases, activities, timelines, dependencies, resources
- o   Outline the risks and issues

1.2 Define Key elements of the pre-feasibility report:

1.3 List infromation required to develop a strategic brief

1.4 Define the scope of work and timeline

1.5 Develop a high level project plan

Exercise 2 : Project close out stage:

Choose a recently closed project:

Note that this stage tasks includes

- Correct all outstanding defects
- Issue Defects Certificate / Certificate of Final Completion / Performance Certificate etc.
- Certification and payment of final account/s

2. Write a high-level project close out report outlining

- what was achieved in terms of key performance indicators

- suggestions for improvements on future projects of a similar nature

- comment on the performance of the contractor (where appropriate).

Section 6:
Annexures
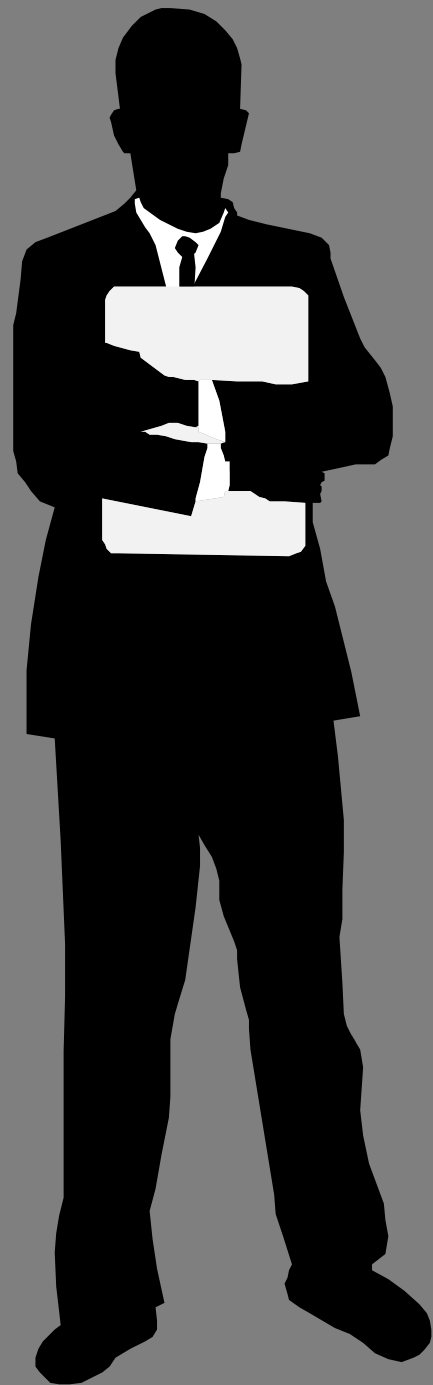
Section 6: Annexures

Annexure A: Abbreviations

Abbreviation	Meaning
AMMP	Annual Maintenance Management Plan
C-AMP	Custodian Asset Management Plan
CD's	Chief Directors
CFO	Chief Financial Officer
CP	Control Points
DD	Deputy Directors
DM	District Municipality
DoRA	Division of Revenue Act
EoY	End of Year Report
GIAMA	Government Immovable Asset Management Act
GIAMP	Government-wide Immovable Asset Management Policy
GRAP	Generally Recognised Accounting Practice
HoD	Heads of Department
IAMP	Infrastructure Asset Management Plan
IDM	Infrastructure Delivery Management
IDMS	Infrastructure Delivery Management System
IDMSBOK	Infrastructure Delivery Management System Body of Knowledge
IGRFA	Inter-Governmental Relations Framework Act
IPMP	Infrastructure Programme Management Plan
MFMA	Municipal Financial Management Act
MISA	Municipal Infrastructure Support Agent
MM	Municipal Managers
MMP	Maintenance Management Plan
MMRR	Maintenance Management Review Report
MTEF	Medium-Term Expenditure Framework

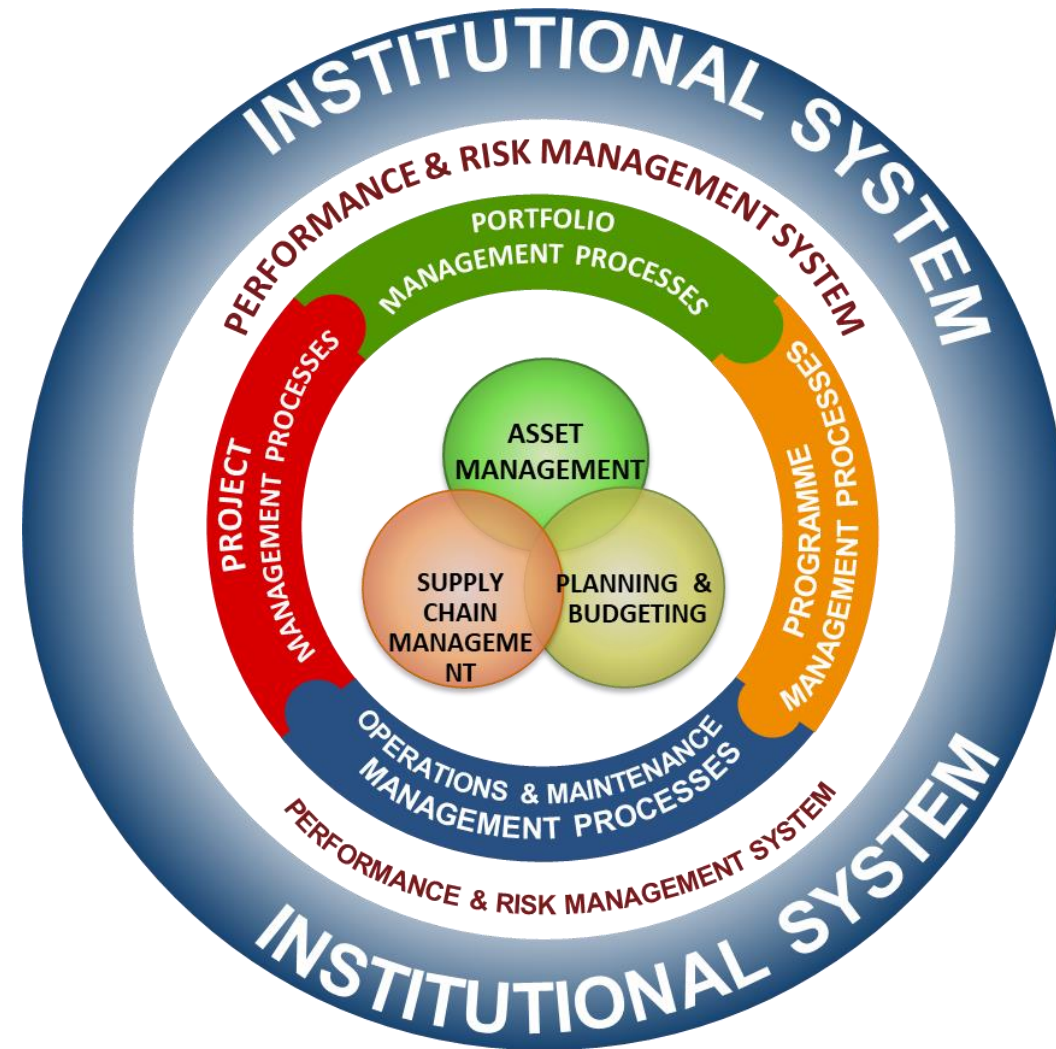| Abbreviation	Meaning
NDP	National Development Plan
NIAMM	National Immovable Asset Maintenance Management
O&M	Operations and Maintenance
OHS	Occupational Health and Safety
OMP	Operations Management Plan
PDCA	Plan, Do, Check, Act
PFMA	Public Finance Management Act
PICC	Presidential Infrastructure Coordination Committee
RAMP	Roads Asset Management Plan
RASCI	A responsibility matrix that assigns responsibilities as follows: Responsible, Accountable, Support, Communicate and Inform
RMSC	Regional Management Support Contract programme
SCM	Supply Chain Management
SIPDM	Standard on Infrastructure Procurement and Delivery Management
SPLUMA	Spatial Planning and Land Use Management Act; No. 16 of 2013
UAMP	User Asset Management Plan
CIDB	Construction Industry Development Board
IDP	Integrated Development Plan
MSCOA	Municipal Standard Chart of Accounts

Annexure B: List of References

- Client guide for improving infrastructure project outcomes, Dr. Ronald Watermeyer, First edition, April 2018. Published by the School of Construction Economics and Management, University of the Witwatersrand, Johannesburg, and Engineers Against Poverty;

- CIDB's Standard for Uniformity in Construction Procurement (July 2015);

- Civilution magazine, published by SAICE, February 2016, titled: "Focus on: National Treasury Standard for Infrastructure Procurement and Delivery Management";

- Close out Report of the New Universities Project Management Team on the Development of New Universities in Mpumalanga and the Northern Cape (01 November 2011 - 31 July 2017), Chapter 9: Procurement strategy;

- Construction Industry Board Development Board (CIDB) standard, issued in terms of sections 4(f), 5(3)(c) and 5(4)(b) of the Construction Industry Development Board Act 38 of 2000, to be read with Regulation 24 of the Construction Industry Development Regulations, 2004 (as amended) issued in terms of section 33;

- Duncan R, A guide to the Project Management Body of Knowledge, PMI Pennsylvania, USA;

- Occupation and Health Safety Act (OHSA), Act No. 85 of 1993;

- PMBOK Guideline, PMI, 6th Edition, 2017;

- Preferential Procurement Policy Framework Act (PPPFA), Act No. 5 of 2000);

- SANS 10845-1:2015 (ISO 10845-1:2010). Construction procurement – Part 1: Processes, methods and procedures, South African Bureau of Standards;

- SANS 21503, First Edition, 2017-08, South African Bureau of Standards;

- Standard for Programme Management, PMI, 4th Edition, 2017;

- Standards Act, Act No. 8 of 2008;

- The Engineering Council of South Africa (ECSA), statutory body established in terms of the Engineering Profession Act (EPA), 46 of 2000.

- Watermeyer RB, Facilitating sustainable development through Public and Donor Regimes: Tools and techniques. Public procurement Law Review, pages 30 – 55, issue 1, Sweet and Maxwell, 2004;

- Watermeyer, R B, Framework for the development of procurement strategy and tactics in the delivery of construction works. School of Construction Economics and Management, University of the Witwatersrand, Johannesburg, 2016;

- Watermeyer, R.W, Unpacking Framework Agreements for the delivery and maintenance of infrastructure, Civil Engineering magazine, Jan/Feb 2013.

- AM Policy (Lesedi Local Municipality, May 2016)

- Asset Management Maturity Indices (IIMM, 2015)

- Asset Management Plans (National Treasury, Cities IDMS Module 7, 2017)

- Extract from Monthly IRM Report (National Treasury)

- Guideline for Immovable Asset Condition Assessments (Extract from GIAM Policy, 2005)
- Guideline for Immovable Asset Register Information Fields (National Public Works, Feb 2010)
- Guidelines for Custodians: Custodian Asset Management Plan (National Public Works, Oct 2008)
- Guidelines for Infrastructure Asset Management in Local Government (DPLG, 2006)
- Guidelines for Users: User Asset Management Plan (National Public Works, Feb 2010)
- IAM Policy (eThekwini Municipality, May 2015)
- Immovable Asset Life Cycle Management Guideline for National and Provincial Custodians (National Public Works, March 2015)
- Infrastructure Budgeting Tables (National Treasury Budgeting Guidelines)
- Infrastructure Progression Model (IPM) (National Treasury, 2017)
- Infrastructure Project Assembly Tool (iPAT) (KZN Department of Health, March 2010)
- IRM Planning Requirements (National Treasury)
- Maintenance Management Standard for Immovable Assets (National Public Works & CIDB, May 2017)
- National Infrastructure Maintenance Strategy (NIMS) (National Public Works, CISR & CIDB, July 2007)
- NIAMM Planning Guidelines (National Public Works & CIDB, July 2017)
- Outline for a combined SIAMP and IAMP (IDMS, June 2018)
- Outline for a stand-alone IAM Plan (IIMM, 2015)
- Outline for a stand-alone SIAMP (IIMM, 2015)
- Outline for Management Review Report (IDMS, June 2018)
- Outline for Quarterly Infrastructure Delivery Review Report (IDMS, June 2018)
- Outline for Strategic Programme Brief (IDMS, June 2018)
- SAICE Infrastructure Report Card for South Africa (SAICE, 2017)
- Space planning Norms and Standards for office accommodation used by organs of state (Government Gazette 27986, September 2005)
- Template for Transport Infrastructure Plan (Department of Transport, August 2011)
- TMH 22 Roads Asset Management Manual (COTO, March 2013
- Weighted Multi Criteria Approach to Prioritisation (IDMS for Local Government, 2017 (unpublished))
- Asset Management, David Lievaardt, Ethekwini Municipality;
- Infrastructure Maintenance Budgeting Guideline, issued in support of the National Infrastructure Maintenance Strategy, NIMS, 2005;
- Maintenance Management Standard for Immovable Assets, National Public Works & CIDB, May 2017;
- NIAMM Maintenance Planning Guidelines, National Public Works & CIDB, May 2017;
- NIMS Infrastructure Maintenance Budgeting Guideline, CIDB, 2007;

- Organisation and establishment for the provisioning of Day-to-day, Routine and Emergency Building Maintenance, WC Health Department, May 2016;

- Peter Drucker, Organizational development and management;

- Public Sector Risk Management Framework, National Treasury, April 2010;

- Ted Bennett, TAPPI Conference, September 19, 2006;

- Uptime: Strategies for excellence in maintenance management, John D. Campbell and James V. Reynes-Picknell, Second Edition, 2006, Productivity Press;

- Uptime: strategies for excellence in maintenance management, John D Campbell, James V. Reynes-Pickell, 2nd edition, 2006.

- What is Facility Management? Deric Probst-Wallace, Synergis, Hong Kong;

- An overview of the Standard for Infrastructure Procurement and Delivery Management – Focus on National Treasury Standard for Infrastructure Procurement and Delivery Management, Department: National Treasury, February 2016;

- Civilution, SAICE., February 2016;

- Commissioning New Hospital Facilities in South Africa - A Manual of Good Practice, p.6, Andrew Butcher, May 2002;

- Early Contractor Involvement: Advantages and Disadvantages for the Design Team, Andreas Heier Sødal, Ola Lædre, Fredrik Svalestuen and Jardar Lohne, Proceedings IGLC-22, June 2014 | Oslo, Norway;

- Green Building in South Africa: Emerging Trends, Department of Environmental Affairs & Tourism, 2009

- Guidance on client and delivery teams – Focus on National Treasury Standard for Infrastructure Procurement and Delivery Management, Department: National Treasury, February 2016;

- Guide on Project Management, SANS 21500:2014, SABS;

- http://www.hfmmagazine.com/display/HFM-news-article. dhtml?dcrPath=/templatedata/HF_Common/NewsArticle/data/HFM/Magazine/2011/Jan/0111HFM_FEA_codes;

- https://postoccupancyevaluation.com;

- https://www.designingbuildings.co.uk/wiki/Value_in_building_design_and_construction;

- https://www.simplilearn.com/enterprise-environmental-factors-organizational-process-assets-article;

- https://www.sswm.info/planning-and-programming/implementation/project-design/writing-a-concept-note;

- NIAMM Standard for immovable assets under the custodianship of National and Provincial Departments of Works, July2015;

- NIAMM, Standard for immovable assets under the custodianship of National and Provincial Departments of Works, July 2015;

- PMBOK Guide, 6th Edition;

- Report on the development of a standard methodology for post occupancy evaluation for primary healthcare facilities in the Western Cape, Western Cape Government: Health, March 2010;

- SIPDM First edition, October 2015;

- The application of the National Building Regulations, SANS 10400-XA, Part X: Environmental sustainability and Part XA: Energy usage in buildings;

- The Occupational Health and Safety Act (No. 85 of 1993);

- Toolkit on Standard Operating Procedures, Department of Public Service and Administration, March 2013;

- Towards a Green Building Policy Framework, the Department of Public Works, in collaboration with the Council for Scientific and Industrial Research (CSIR).

Annexure C: IDMS concept diagram and placemat

IDMS concept diagram