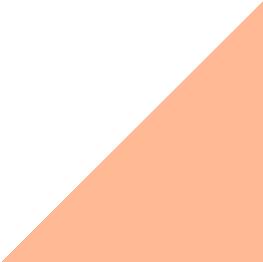




# Asset Management Competency Framework

September 2019



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# Foreword

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The Road Efficiency Group (REG) has worked with the wider sector, councils, the NZ Transport Agency, industry groups, consultants and contractors to identify how we can best support the development of capability and ensure we have a robust framework that identifies the competencies required for good activity or asset management. As leaders of our respective organisations we strongly believe that asset management requires a systematic approach to defining, developing and assuring the competence of people, teams and organisations.

REG recognises that individually and collectively as a sector we must ensure we have the right teams of appropriately skilled and experienced staff to plan for and deliver great service to our customers. To support the sector, REG has developed this competency framework for discussion. We acknowledge the significant industry input from local government, industry groups, and the consultant and supplier fraternities in the development of this framework.

Developing this approach is important because our sector holds the mandate from the public to manage activities and assets appropriately and in a way that allows for communities and businesses to thrive today and ensure sustainability in the long term.

Every day as governors, asset managers or engineers we make decisions that impact on people, whether they are immediately visible or set the stage for the future of our communities.

We strive to ensure our activities are focused on the right outcomes our customers require through good planning, decision making and delivery from the people involved. It is critical that everyone involved in asset management understands what is required and that we have good systems in place from across the whole of industry to support the development of our people. We need our sector committed to continual learning and development, which means a sector working together to ensure we have the capability in our individuals, our organisations and nationally.

The hardest part of ensuring we are able to manage our activities and assets is knowing we have the people, at all levels, with the capability and a common understanding of how we can plan for succession and development.

This is a living document that will be updated periodically. If you have any feedback regarding this guide, or you have photos that will help improve this guide, please feel free to contact [roadefficiencygroup@nzta.govt.nz](mailto:roadefficiencygroup@nzta.govt.nz)

The REG Governance Group supports this framework.

[www.nzta.govt.nz/roads-and-rail/road-efficiency-group/about/membership-and-support/#governance](http://www.nzta.govt.nz/roads-and-rail/road-efficiency-group/about/membership-and-support/#governance)



Jim Harland  
Chair Road Efficiency Group



Malcolm Alexander  
Chief Executive Officer LGNZ

# Strategic context

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The Road Efficiency Group (REG), a partnership between Government, Local Government New Zealand [LGNZ] and the NZ Transport Agency [the Transport Agency], has identified capability and capacity gaps across the spectrum of activities necessary to plan, design and deliver a transport system. This project focuses on asset management functions. The gaps are difficult to define or measure because the competencies required to effectively manage New Zealand's transport assets have not been defined or agreed on. Consequently, it is not possible to benchmark and monitor the effectiveness of initiatives such as strategic contribution, training, process investment and the work of sector groups, nor to provide assurance that such investments are improving the performance of the New Zealand road transport sector. As a result, there is ambiguity and a lack of direction across both the public and private sector in the competencies that are required for organisations and individual staff to deliver sound management of transport activities.

To address this need, REG has created a competency framework for New Zealand transport asset management. It covers the range of asset management capabilities needed to govern, procure and deliver effective management of transport assets and to understand the wider capabilities required to make sound investment decisions for transport activities in New Zealand.

The Asset Management Competency Framework [AMCF] defines the organisational and individual capabilities and skills required to effectively plan, invest in and deliver transport outcomes that are focused on realising benefits for the customer. The framework and competencies will provide governance, management and asset managers and engineers with a structure to understand the capability required at an organisational and individual level. It will help to:

- define good asset management
- create sector recognition and alignment through common thinking and language
- build confidence in how well activities are being managed across the country by establishing agreed standards
- provide a national framework for measuring the human aspects of asset management
- benchmark individual and organisational asset management capabilities and performance
- articulate career and educational pathways for those developing asset management skills
- attract quality asset managers into new roles.

The traditional understanding of 'asset management' – as being about managing physical assets – has been broadened in this competency framework to include the wider societal and organisational factors that deliver good asset management, often referred to as activity management. This broader understanding of activity management is included in the AMCF. This allows for users to more easily align the framework to existing reference material and standards (ie IIMM, ISO 55000).



# Using the framework

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THE ASSET MANAGEMENT FRAMEWORK CAN BE USED IN:

## INDIVIDUAL DEVELOPMENT

- Identify the capabilities a person requires to perform well in their role
- Identify professional development needs
- Address team member development needs during performance discussions
- Compare a person's perception of how well they are doing their job compared with how well others think they are doing their job
- Support individual career planning
- Identify any gaps in skills, knowledge and behaviours they want to develop for the future

## RECRUITMENT

- Understand the capabilities important to being successful
- Develop selection criteria when filling positions
- Map an applicant's capability
- Use competencies in an employment interview

## ORGANISATIONAL DEVELOPMENT

- Build asset management capability
- Clarify skills that are important in asset management roles and capability
- Prepare career development pathways
- Map asset management induction processes
- Heat map capability compared to industry standards

## SECTOR DEVELOPMENT

- Identify the current state of asset management capability
- Build asset management profiles expected within the sector
- Use the head map method to analyse current asset management capability
- Develop learning and training pathways
- Build industry capability through targeted training providers
- Implement a continuous improvement approach to asset management capability
- Future proof the sector

## SIX LEVEL ASSESSMENT

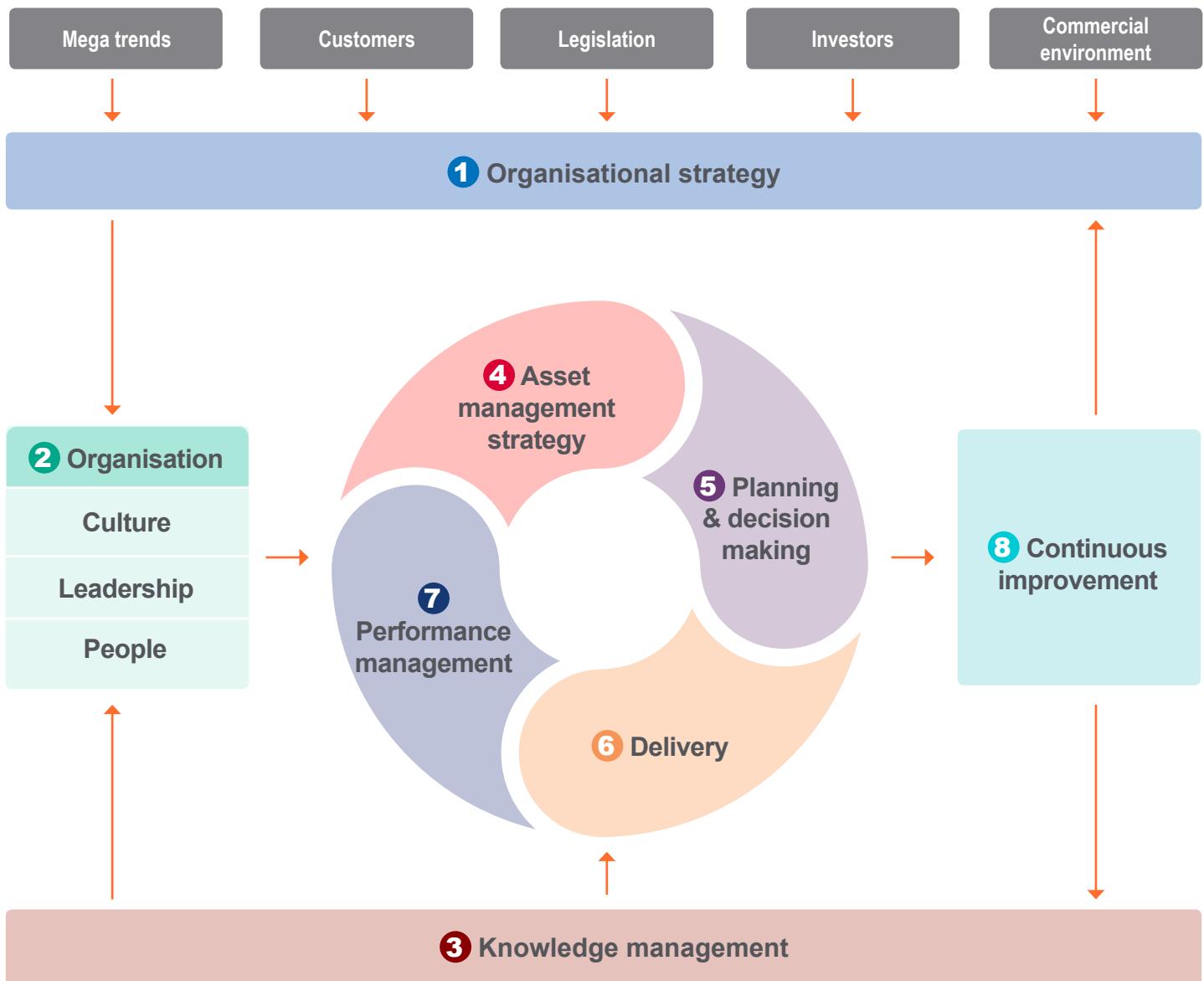
Asset management capability profiles can be built using a six-step assessment. This enables individuals and organisations to determine what level of competence is required for their organisation and for individual team members. The framework can also be used to assess how well a person is demonstrating the competency.

		Knowledge	Standard of work	Autonomy	Coping with complexity	Perception of context
0	Not relevant to role					
1	Novice	Minimal, or 'textbook' knowledge without connecting it to practice	Unlikely to be satisfactory unless closely supervised	Needs close supervision or instruction	Little or no conception of dealing with complexity	Tends to see actions in isolation
2	Beginner	Working knowledge of key aspects of practice	Likely to complete straight forward tasks to an acceptable standard	Able to achieve some steps using own judgement, but needs supervision for overall task	Appreciates complex situations but only able to achieve partial resolution	Sees actions as a series of steps
3	Competent	Good working and background knowledge of area of practice	Fit for purpose, though may lack refinement	Able to achieve most tasks using own judgement	Copes with complex situations through deliberate analysis and planning	Sees actions at least partly in terms of longer-term goals
4	Proficient	Depth of understanding of discipline and area of practice	Routinely achieves fully acceptable standard	Able to take full responsibility for own work (and that of others where applicable)	Deals with complex situations holistically; decision-making more confident	Sees overall 'picture' and how individual actions fit within it
5	Expert	Authoritative knowledge of discipline and deep tacit understanding across area of practice	Achieves excellence with relative ease	Able to take responsibility for going beyond existing standards and creating own interpretations	Holistic grasp of complex situations; moves between intuitive and analytical approaches with ease	Sees overall 'picture' and alternative approaches; vision of what may be possible

From the professional standards for conservation, Institute of Conservation (London) 2003 based on the Dreyfus model of skill acquisition. Dreyfus, HL and SE Dreyfus (1986) *Mind over machine: the power of human intuition and expertise in the age of the computer*, Oxford, Basil Blackwell)



# Asset management framework





# 1 Organisational strategy

An organisational strategic plan sets the long-term goals and vision. Asset management informs and responds to this plan. An organisational strategic plan sets priorities, and focuses energy and resources, to ensure that employees and other stakeholders are working toward common goals; establishes agreement around intended outcomes and results; and assesses and adjusts the organisation's direction in response to a changing operational environment. The plan articulates the organisational and customer expectations, benefits desired, and outcomes to be delivered through the organisation.

## 1.1 Apply organisational strategic plan to asset management

1.1.1	Develop a common vision, purpose, desired benefits and goals
1.1.2	Understand the operating environment (internal and external)
1.1.3	Set direction and actions to ensure long-term sustainability (economic, social, cultural and environmental)
1.1.4	Articulate the organisational asset management risk approach
1.1.5	Monitor and respond to the outcomes being reported from the asset management system
1.1.6	Establish the asset management policy

## 2 Organisational culture, leadership and people

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An organisation's culture, leadership and engagement with people create the environment for asset management to succeed. This environment establishes a way of working and a set of behaviours that shape the processes to support effective asset management, including change management. This function defines the competencies of decision makers, from those in governance through to asset manager level, and includes considering how to:

- provide organisational leadership to deliver asset management outcomes
- enable people to perform well
- develop and champion an organisational culture

### 2.1 Provide organisational leadership to deliver asset management outcomes

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2.1.1	Implement management techniques that promote robust, integrated decision making
2.1.2	Develop and implement a business case approach
2.1.3	Monitor performance and benefit realisation
2.1.4	Promote the impact and value of asset management
2.1.5	Advocate for resources to support the success of delivering asset management services
2.1.6	Drive continuous improvement (measure, monitor, analyse and respond)
2.1.7	Drive sustainable long-term decision making

### 2.2 Enable people to perform well

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2.2.1	Implement resource and workforce plans
2.2.2	Set clear delegations (authorities, accountabilities, objective setting)
2.2.3	Promote competency and capability development
2.2.4	Lead change management
2.2.5	Lead and enable collaboration

## 2.3 Develop and champion an organisational culture

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2.3.1	Engage organisational leaders at all levels
2.3.2	Engage with stakeholders
2.3.3	Create a values-based organisation
2.3.4	Develop a customer outcome-focused organisation

# 3 Knowledge management

Knowledge management is the process used to handle and oversee all the knowledge that exists within an organisation. Knowledge management relies on an understanding of knowledge, which consists of the discrete and intangible skills a person possesses, including:

- conceptual knowledge - about perspectives and systems
- factual knowledge – about measurable, observable and verifiable data stored within a cohesive Asset Information Management System
- expectational knowledge – about expectations and judgements of processes and procedures (eg institutional knowledge, standard operating procedures)
- methodological knowledge – about methods of decision making and problem solving. Technology platforms that are specific to the sector will be relevant to all these forms of knowledge.

## 3.1 Conceptual knowledge

3.1.1	Describe ISO55001: Asset Management Standards
3.1.2	Describe the International Infrastructure Management Manual (IIMM)
3.1.3	Describe data quality management standards (ISO 8000-61 and ISO 9001)
3.1.4	Understand relevant legislative requirements

## 3.2 Factual knowledge

3.2.1	Establish information governance processes to direct, control and assure that asset information is managed effectively as an organisational resource
3.2.2	Define the system architecture for the creation, receiving, validating/verifying, storing, sharing, archiving, analysing and reporting of information and data stored in the Asset Information Management System
3.2.3	Specify data design, such as asset definition standards, that embodies industry standards to provide common definitions of asset attributes, including defects and failures, performance, reliability, functionality and service-life requirements of assets
3.2.4	Define the interfaces of exchange of data and information between the corporate Asset Information Management System and other information systems used by the organisation
3.2.5	Specify requirements for the storage of information and data according to integrity, security and confidentiality requirements
3.2.6	Develop criteria for effective and relevant processes of data collection
3.2.7	Plan and manage the maintenance, storage and dissemination of data
3.2.8	Prepare data quality reports and know how to recognise anomalies

### 3.3 Expectational knowledge

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3.3.1	Develop and disseminate asset management processes and procedures for organisational use
3.3.2	Develop effective organisational training so that staff are skilled in the required processes and procedures

### 3.4 Methodological knowledge

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3.4.1	Process and analyse asset management data to provide effective business information as required
3.4.2	Apply root-cause analysis and critical thinking
3.4.3	Apply life-cycle costing and engineering economics
3.4.4	Apply prioritisation and optimisation techniques

# 4 Asset management strategy

An asset management strategy includes the development of a strategic asset management plan. It considers the organisational strategic plan, organisational policies, stakeholder needs and expectations, and establishes asset management decision-making criteria.

An asset management strategy:

- defines the scope of an asset management system
- identifies stakeholders and their requirements
- identifies risks and opportunities
- defines asset management objectives
- identifies investment needs and constraints
- defines an asset management system performance framework
- defines the planned approach to procurement

## 4.1 Define the scope of an asset management system

4.1.1	Develop an asset management policy
4.1.2	Identify the constraints (including financial) of an asset management strategy relative to the organisational strategic plan
4.1.3	Define the legislative, social, environmental and economic factors and trends relevant to an asset management strategy
4.1.4	Define the outcomes and objectives of an asset management strategy
4.1.5	Describe the elements of the asset management system
4.1.6	Develop key strategies for asset portfolios and classes covered by an asset management policy
4.1.7	Establish a decision-making approach
4.1.8	Establish processes to determine asset criticality

## 4.2 Identify stakeholders and their requirements

4.2.1	Analyse current and future customer requirements that must be considered in an asset management strategy
4.2.2	Define stakeholder groups that must be considered in an asset management strategy
4.2.3	Engage stakeholders as appropriate in the strategy development process

## 4.3 Identify risks and opportunities

4.3.1	Define risks and opportunities relevant to the asset management strategy
4.3.2	Assess the potential future impact of mega trends on asset and service performance (eg environmental, social, economic and technological mega trends)

#### 4.4 Define asset management objectives

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4.4.1	Use tools and techniques to analyse current demand
4.4.2	Use data, evidence, tools and techniques to forecast cost, demand and levels of service
4.4.3	Develop responses aligned to asset management strategy for asset portfolios and classes
4.4.4	Assess the implications (cost, risk and performance) of current and forecast asset management condition
4.4.5	Develop levels of service
4.4.6	Assess criticality of asset portfolios, classes and components
4.4.7	Prepare financial and performance projections

#### 4.5 Identify investment needs and constraints

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4.5.1	Apply valuation methodology
4.5.2	Analyse and report valuation adjustments
4.5.3	Apply a business case approach to identify the investment required to deliver short and long-term asset management objectives
4.5.4	Allocate investment costs into revenue expenditure and capital expenditure according to the organisation's rules
4.5.5	Communicate the outcomes of a business case approach to obtain funding commitment from financiers

#### 4.6 Define an asset management system performance framework

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4.6.1	Define how to measure and monitor the effectiveness of the asset management strategy
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#### 4.7 Define the planned approach to procurement

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4.7.1	Develop a procurement strategy
4.7.2	Understand risk(s) and how to allocate and manage it/them through procurement
4.7.3	Understand and apply the procurement model for the service sought

# 5 Planning and decision making

Establish, document and maintain asset management plans, aligned with the strategic asset management plan, including defining financial, risk management, human resources and other support functions required to deliver asset management objectives.

Asset management plans define:

- processes and methods employed in managing assets over their life cycles
- methods and criteria for decision-making and prioritising activities and resources
- options analysis
- determination of resource requirements
- financial and non-financial implications of the asset management plans
- the long-term (3-year, 10-year and 30-year) works programmes
- how assets are operated and maintained
- how the results will be evaluated

## 5.1 Define processes and methods employed in managing assets over their life cycles

5.1.1	Identify and evaluate appropriate life-cycle cost models
5.1.2	Forecast costs of key stages of an asset life cycle
5.1.3	Identify asset-related risks and opportunities
5.1.4	Identify responses to mega trends for critical asset activities
5.1.5	Define and justify asset class strategies

## 5.2 Define methods and criteria for decision making and prioritising activities and resources

5.2.1	Establish the scope and objectives for an Asset Management Plan aligned to the Strategic Asset Management Plan
5.2.2	Define methodologies for identifying and evaluating investment options
5.2.3	Identify investment options for achieving the asset management strategy and asset management plan objectives
5.2.4	Identify how costs of asset management activities will be determined

## 5.3 Define the analysis of options

5.3.1	For various options, assess costs, risks and benefits of asset creation, maintenance, disposal or acquisition
5.3.2	Optimise investment options
5.3.3	Prioritise investment options
5.3.4	Identify cross-asset optimisation opportunities

#### 5.4 Determine resource requirements

5.4.1	Determine the resources required to respond to incidents and emergencies
5.4.2	Determine how asset management activities and projects will be resourced
5.4.3	Identify risks and opportunities in the commissioning process and assess their potential impact on operations and asset management activities
5.4.4	Develop procurement strategy and policy to achieve optimum asset life-cycle performance
5.4.5	Determine how to allocate the resources, and assign the responsibilities and services required to deliver the asset management plan

#### 5.5 Financial and non-financial implications of an asset management plan

5.5.1	Analyse the risks and opportunities of various options
5.5.2	Analyse investment benefits and the impact of not investing
5.5.3	Analyse, select and justify the preferred investment option
5.5.4	Specify appropriate asset performance indicators

#### 5.6 Development of long-term works programmes (3, 10 and 30 years)

5.6.1	Develop processes to establish multi-year works programmes for each asset type
5.6.2	Develop processes to review asset strategies, including opportunities for cross-asset optimisation
5.6.3	Develop processes for and undertake component-specific prioritisation, risk analysis and justification including economic justification, eg NPV and LCCA and reliability analysis
5.6.4	Develop process for and undertake field validation for each asset type

#### 5.7 How assets are operated and maintained

5.7.1	Define inputs and roles (ie in-house and by who, outsourced) required to deliver the operational and maintenance requirements of an asset management plan
5.7.2	Develop strategies to deliver asset-specific operations and maintenance requirements consistent with the Asset Management Plan and Strategy

#### 5.8 Decide how the results will be evaluated

5.8.1	Define processes for tracking, analysing and verifying cost data
5.8.2	Define processes for tracking, analysing and verifying performance data
5.8.3	Define performance indicators to monitor asset management activities and projects consistent with the asset management plan objectives

# 6 Delivery

Delivery is the implementation of asset management plans to realise the organisation's outcomes. This is achieved by optimising the organisation's operational, maintenance, renewal, acquisition and divestment activities. To ensure successful delivery, the organisation needs to be able to:

- design assets
- create, acquire and dispose of assets
- carry out inspections and implement a defect management process
- develop short-term works programmes
- prepare and deliver works programmes
- implement quality management

## 6.1 Design assets

6.1.1	Apply the systems engineering approach of a specific project to an integrated system
6.1.2	Apply design practices embracing maintenance requirements to a project that looks at the holistic asset life cycle
6.1.3	Apply Safety in Design principles to detailed design
6.1.4	Undertake detailed design and treatment options
6.1.5	Specify requirements for investigations and testing

## 6.2 Create, acquire and dispose of assets

6.2.1	Develop specifications consistent with the requirements of the asset management plan and asset design requirements
6.2.2	Ensure assets are created and disposed of according to the plan
6.2.3	Undertake commissioning of assets as appropriate and, where required, transfer control of assets to others

## 6.3 Carry out inspections and defect management

6.3.1	Use the principles of timely intervention
6.3.2	Know defect severity and fault types
6.3.3	Conduct root-cause analysis and identify failure mechanisms
6.3.4	Develop asset class-specific, risk-based, inspection regimes
6.3.5	Develop maintenance intervention strategies and guidelines

6.3.6	Determine treatment selection
6.3.7	Design maintenance treatments
6.3.8	Apply preventative maintenance strategies
6.3.9	Ensure spare parts management supports the asset management strategy and plans

#### 6.4 Develop short-term works programmes

6.4.1	Develop specific works programmes according to asset class, including cross-asset coordination
6.4.2	Assess and plan for the impact of organisational activities on asset users and ensure there is adequate access to the assets for undertaking a works programme
6.4.3	Apply prioritisation, risk analysis and justification tools, including economic justification
6.4.4	Update the forecasting tool inputs and data sets (eg predictive modelling)

#### 6.5 Prepare and deliver works programmes

6.5.1	Consider the environmental, commercial and customer aspects of work packaging and timing
6.5.2	Prepare annual, and rolling 3-monthly, monthly and weekly programmes
6.5.3	Deliver the programme, including resources, plant, material and cost control
6.5.4	Monitor the success of programmes, treatments and maintenance intervention strategies

#### 6.6 Implement quality management (includes quality, environmental, and health and safety management)

6.6.1	Develop a quality management plan
6.6.2	Implement the quality management plan
6.6.3	Undertake safety audits and improvement plans
6.6.4	Deliver as-built information, including quality records and asset data

# 7 Performance management

Continuous improvement of asset management systems requires a robust performance management system that will allow organisations to understand the performance of various elements within the asset management system. Performance management includes financial and non-financial performance and the effectiveness of the asset management system.

The organisation will:

- design and establish performance measures that effectively drive performance improvement
- evaluate and report on the effectiveness of the processes and practices for managing risks and opportunities
- evaluate performance against asset management objectives
- evaluate performance of the asset management system
- manage an improvement plan

## 7.1 Design and develop performance measures that effectively drive performance improvement

7.1.1	Develop a performance management framework that meets the asset management system objectives, levels of service and requirements
7.1.2	Design a performance management framework that is balanced and concise
7.1.3	Test the performance framework to ensure it delivers the desired objectives and avoids unintended consequences
7.1.4	Articulate a performance management framework that has clear ownership of each measure within the organisation

## 7.2 Evaluate and report on the effectiveness of the processes for managing risks and opportunities

7.2.1	Review the risk register and report the performance of the mitigation measures
7.2.2	Identify benefits realised from the opportunities taken

## 7.3 Evaluate performance against asset management objectives

7.3.1	Assess performance of technical and financial outcomes
7.3.2	Assess achievement of the levels of service
7.3.3	Evaluate the effectiveness of the opportunity benefits being realised
7.3.4	Communicate performance and recommendations for improvement

#### **7.4 Evaluate performance of the asset management system**

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<b>7.4.1</b>	Assure the quality of the asset management system and processes
<b>7.4.2</b>	Review and audit compliance with legislative, regulatory, ethical and social requirements
<b>7.34.3</b>	Identify learnings from the performance outcomes and make recommendations for change

#### **7.5 Manage an improvement plan**

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<b>7.5.1</b>	Communicate effectively across all levels of the organisation on performance improvement opportunities
<b>7.5.2</b>	Develop and manage an asset management system improvement plan
<b>7.5.3</b>	Utilise a continuous improvement framework to drive performance management improvements

# 8 Continuous improvement

In the asset management context, continuous improvement enhances service delivery, and leads to increased efficiency and effectiveness. The key attributes of continuous improvement are a focus on learning, overall performance and improving the delivery of activities.

It covers how to:

- create a continuous improvement environment (that provides the support and capacity to best enable improvement to occur)
- identify and develop improvement opportunities
- evaluate and prioritise improvement opportunities
- implement continuous improvement initiatives
- monitor results and sustain improvements

## 8.1 Create a continuous improvement environment

8.1.1	Apply the principles of continuous improvement
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## 8.2 Identify and develop improvement opportunities

8.2.1	Identify stakeholder needs, particularly those of customers
8.2.2	Measure performance against desired standards
8.2.3	Identify issues or improvements needed, based on deviations and corrective actions required
8.2.4	Determine actions to address issues or improvements, including risk control strategies

## 8.3 Evaluate and prioritise improvement opportunities

8.3.1	Prioritise improvement actions using specified criteria
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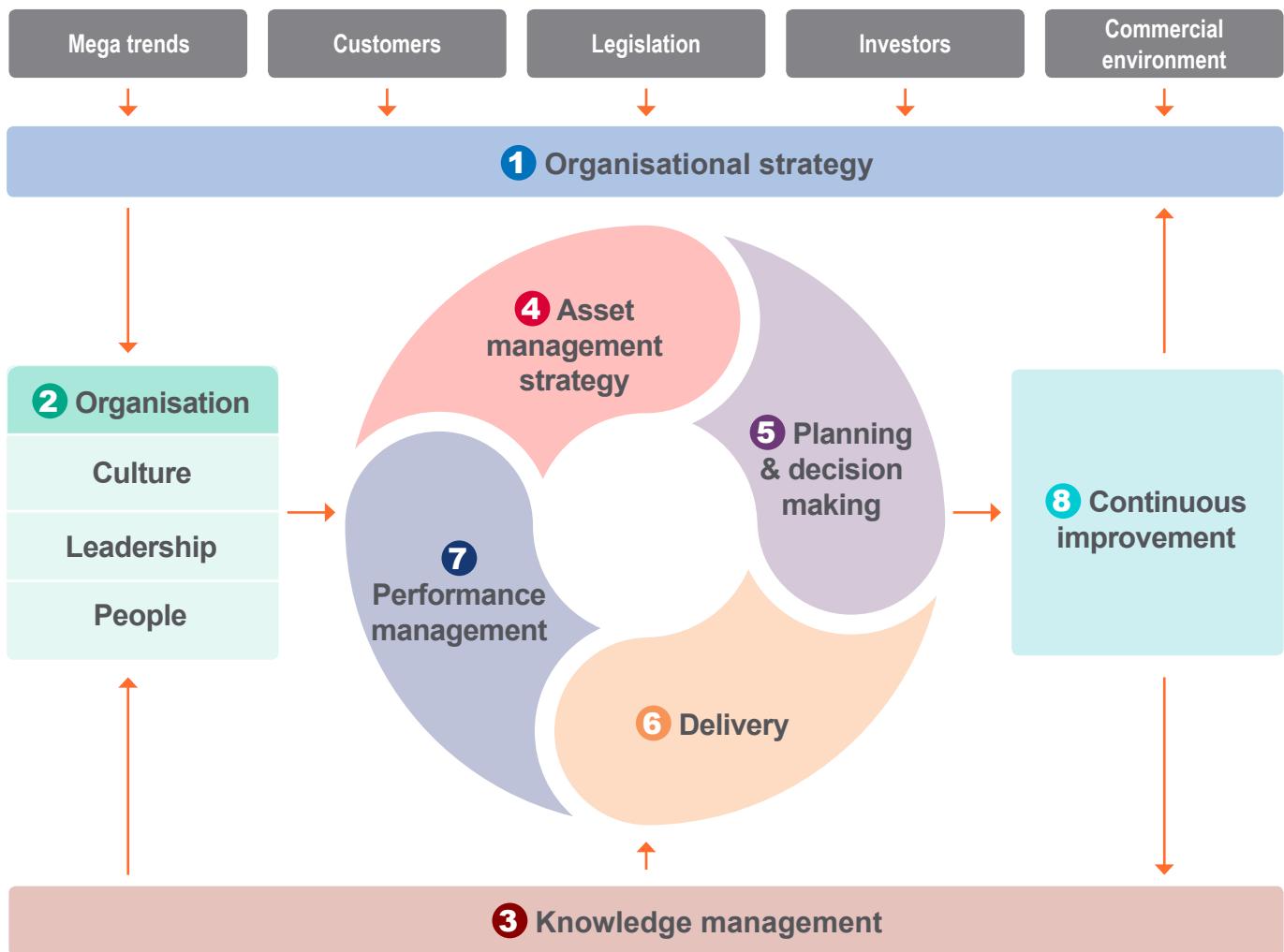
## 8.4 Implement continuous improvement initiatives

8.4.1	Develop a business case for improvement initiatives
8.4.2	Use project management skills for managing improvement projects

## 8.5 Monitor results and sustain improvement

8.5.1	Analyse benefits realised to identify any deficiencies against predicted outcomes
8.5.2	Communicate summary of findings and lessons learnt to relevant personnel
8.5.3	Communicate successes and learning across the organisation and/or sector with verification of benefits and cost savings

# Alignment to ISO 55001



8.2 Management of change  
 9.1 Monitoring, measurement, analysis and evaluation  
 9.2 Internal audit  
 4.2 Understanding the needs and expectations of stakeholders  
 5.1 Leadership and commitment  
 5.3 Organisational roles, responsibilities and authorities  
 9.3 Management review  
 7.1 Resource  
 7.3 Awareness  
 7.4 Communication  
 8.1 Operational planning and control  
 7.2 Competence  
 7.5 Information requirements  
 7.6 Documented information

4.1 Understanding the organisation and its context  
 4.3 Determining the scope of the asset management system  
 4.4 Asset management system  
 5.2 Policy  
 6.1 Actions to address risks and opportunities for the asset management system  
 6.2.1 Asset management objectives  
 10.1 Nonconformity and corrective action  
 10.2 Preventive action  
 10.3 Continual improvement  
 6.2.2 Planning to achieve asset management objectives  
 8.1 Operational planning and control  
 8.3 Outsourcing

The Asset Management Competency Framework is a REG product,  
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and the leadership provided by the project steering group comprising of  
Adam Bevins, Downer/Civil Contractors New Zealand  
Erik Barnes, LGNZ Equip  
Mark Yaxley, NZ Transport Agency  
Simon Hunt, Fulton Hogan  
Wayne Hatcher, WSP-Opus