

Engineering Standard Governance

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1. Introduction

1.1 General

Sydney Water provides world class water services to its customers, utilising collective engineering expertise and learnings from around the world.

In order to sustain and continuously improve the value to our customers of the services we provide, Sydney Water creates, maintains and updates Engineering Standards that are used to create and maintain Sydney Water's assets.

1.2 Asset Management System

It is a requirement in the Sydney Water's Operating Licence (2019-23), that Sydney Water must maintain a Management System in relation to Sydney Water's Assets that is consistent with the Australian Standard AS ISO 55001:2014.

Sydney Water's AMS is certified to the ISO55001 standard and is an enterprise wide system that covers all of the activities associated with its asset value chain. Sydney Water's Engineering Standards are created in line with requirements stated in the Asset Management System, which includes the following key documents.

- ISO55001 Standard,
- [Asset Management Policy \(AMQ0033\)](#)
- Asset Maintenance Policy (AMQ0002) and
- [Asset Creation Policy \(AMQ0033.02\)](#)

1.3 Purpose

This document provides guidance in managing engineering standards, with a priority of accommodating innovations and improvements.

1.4 Scope

The following key items in this Procedure provide better understanding to all personnel who develop, use, and influence contents of Engineering Standards:

- What are Engineering Standards
- Why an Engineering Standard is created
- How Engineering Standards are governed
- How contents of Engineering Standard are created and maintained (process and procedures)

The procedure does not include processes related to developing operational related standards or data standards for Sydney Water assets.

2. Engineering Standards

2.1 Definition

Engineering Standards are formal documents that establish uniform engineering or technical criteria, methods, processes and practices. The documents are prepared by competent professional engineers and set out proper engineering practices, which contain mandatory requirements.

In accordance with the Controlled Document Standard (Doc no 608701), Sydney Water defines a standard as “voluntary documents that set out specifications, procedures and guidelines that aim to ensure products, services, and systems are safe, consistent, and reliable”.

Engineering Standards are intended to provide more clarity in Sydney Water’s requirements to Sydney Water personnel, delivery contractors, suppliers and stakeholders in the lifecycle of an asset.

Sydney Water Engineering Standards are commonly created using available relevant National and International Standards, Lessons Learnt, Innovations and best industry practices.

2.2 Document Control

Engineering Standards developed by Sydney Water are controlled documents, created, reviewed, published and archived following the [Controlled Document Standard](#).

2.3 Asset Standardisation

Asset standardisation is used to minimise variation between asset types and across multiple sites to manage organisational risk through:

- control of costs
- accelerated delivery
- simplified, consistent operations and maintenance
- continuous improvement and
- removing preferential engineering.

2.4 Technical Requirements

Engineering Standards are written to define technical requirements for the following aspects of Sydney Water’s assets:

- safety in construction, operation and maintenance, and demolition
- functional requirements
- materials
- workmanship
- design life

Some aspects of the technical requirements included in Engineering Standards can be considered as Asset Standardisation for the specific component or properties of an asset. However, other key components in implementing Asset Standardisation, such as Procurement Strategy and Operational Readiness are not discussed in detail in this document.

3. Need for an Engineering Standard

3.1 Customer Value

Engineering Standards aim to provide customer value throughout the design, construction, operation and maintenance process by:

- Ensuring that the assets provided:
 - represent the lowest sustainable cost and best value for money over the life of the asset,
 - meets compliances (eg.: regulatory, environmental...etc.),
 - meets Sydney Water's risk appetite, and
 - are constructable, operable and maintainable.
- Delivering consistency in design, procurement, construction, operation and maintenance.
- Ensuring the approach to production is standardised, leading to efficiency and consistency.
- Ensuring processes are in place for repeatability of activities.
- Allowing opportunity throughout the process to focus on new problems and not latent issues, thereby driving innovation, and
- Allowing a "Lessons Learnt" process to be incorporated into the value chain and supply chain.

3.2 Stakeholders

Standards, and its use, achieve authority for widespread implementation by the industry through the principles of consensus and transparency.

Consensus means "General agreement, characterised by the absence of sustained opposition to substantial issues by any important part of the concerned interests and by a process that involves seeking to take into account the views of all parties concerned and to reconcile any conflicting arguments."¹ Stakeholder input and comments, and/or corrections to standards, by way of the feedback register creates a dialogue between Sydney Water and stakeholders in order to achieve consensus. Continuous dialogue promotes innovation and continuous improvements.

Transparency means that information on current work programs and proposals is available to all interested parties. Transparency also includes the concepts of openness, participation on a non-discriminatory basis, impartiality and a balanced participation in the Standards development process by interests that will be significantly affected by the Standard. Sydney Water standards can be accessed:

- [Asset Standards and Specification -iConnect](#)
- [Sydney Water Delivery Portal](#)
- [Sydney Water Public Website](#)

Sydney Water operates a large, diverse asset base with significant input and maintained relationships with a wide range of stakeholders, internally and externally. This Procedure is directed at ensuring that these principles of consensus and transparency are embodied in every Standard published by Sydney Water.

¹ Standards Australia: "Standards Development – SG-001: Preparing Standards", p5

3.3 Innovation

Standardisation drives innovation, which in turn enhances customer value. Innovation is not only the creation or implementation of new ideas but is a process which involves multiple activities to improve value. Standardisation is a critical component of this process of innovation.

A large majority of cases require standard solutions that can be implemented on a “business as usual” work activity. Where specific conditions deviate from standard solutions, innovate solutions create new value by renewing, updating or creating entirely new processes and techniques to a product or service.

Sydney Water operates a feedback process whereby stakeholder feedback and deviations from standards are recorded, approved or rejected, and included into cyclical updates/amendments to the standards.

3.4 Feedback

Engineering Standards are created, primarily to cater for the following needs of various internal and external stakeholders:

- requests for more definitive requirements, that can be repeated across multiple applications, from suppliers and delivery contractors
- to clearly communicate the needs of a particular type of asset where such clear requirements doesn't already exist in broader industry standards
- requests for more guidance in developing solutions in creating, maintaining, operating an asset, from all parties
 - to minimize effort, cost and time involved in re-producing similar solutions
- lessons learnt from major incidents and requirements set to minimize repetition of such incidents,
 - incidents may include public safety, construction safety and O&M safety
- lessons learnt from major environmental licence breaches and requirements set to minimize repetition of such incidents
- lessons learnt from significant cost variations in projects and requirements set to minimize repetition of such incidents
- lessons learnt from failures leading to significant cost to Sydney Water and requirements set to minimize repetition of such incidents
- Asset Standardisation to minimize cost and time in delivering a particular type of asset
 - when several of the same assets are planned to be built
- lessons learnt in reducing asset lifecycle cost in maintenance and renewals phase
- introducing innovations and improvements to technologies used across Sydney Water's works

3.5 Validating Application of Standards

A risk-based review of Complex and High-risk works are undertaken by Sydney Water Engineering, to validate application of engineering standards (Obtaining Sydney Water Engineering Review- QA-PRO-028). The outcomes of engineering reviews inform additional feedback and validity check on requirements set within the standards.

4. Standards Governance

4.1 Organisational Structure

The Engineering Team resides within the Asset Lifecycle Group which has the responsibility of delivering products and services across the asset lifecycle to Sydney Water customers through planning, infrastructure and long-term strategic focus.

Under the Asset Lifecycle Group, the Engineering and Technical Support group provides technical expertise, design and engineering services to the business.

In exercising its asset standard function, the Engineering Group is responsible for developing engineering governance and frameworks to support assurance of design, safety and integrity of assets for the whole of the asset's life cycle.

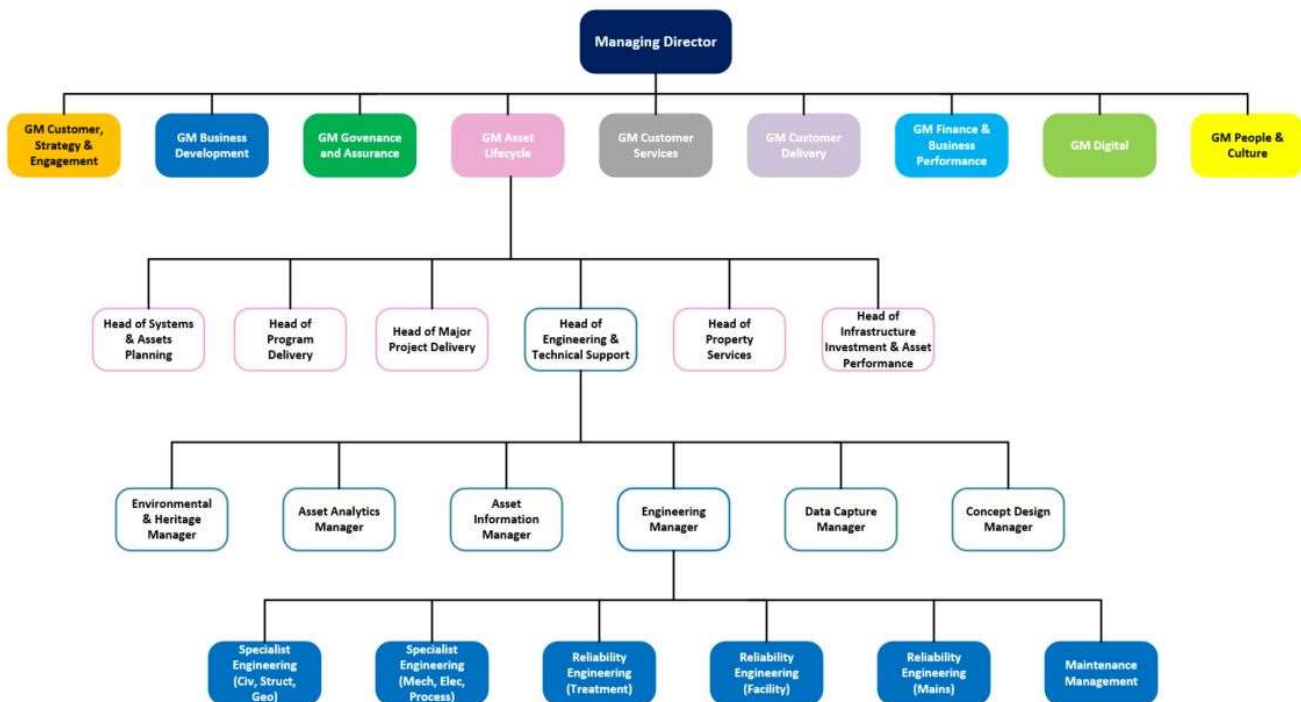


Figure 1: Organisational Structure

4.2 Ownership and Authority

Ownership and authority to approve Engineering Standards are spread cross different levels of Management.

The governance structure for the management of engineering standards is shown in Figure 2.

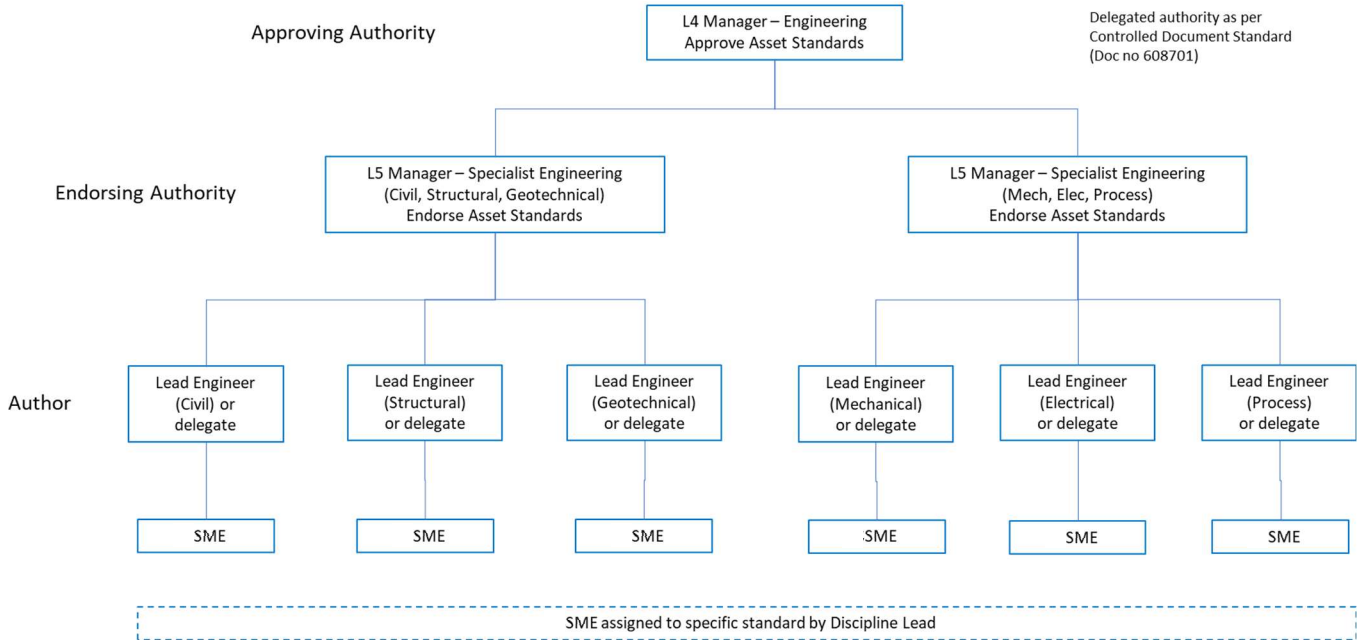


Figure 2: Governance Structure

Refer to Appendix A for a process map of developing or amending a standard. Refer to Appendix B for a Review Form of the standard.

4.2.1 Author

The Author of a standard is responsible for the standard and any amendments or changes required will be undertaken by the Author. The Author may draft and author a new standard or update an existing standard, and is responsible for obtaining relevant input from SMEs. The role of the Author is to:

- manage the creation and/or updating of a standard
- manage endorsement and approvals by relevant authorities within the organisation
- assign an SME to draft new standards or renew an existing standard
- manage dissemination of a new or updated standard to stakeholders and across the organisation
- capture feedback and innovation
- evaluate feedback and innovation, and reconstituting appropriate innovation back into the standard

4.2.2 Endorsing Authority

The Endorsing Authority, with support from the Author, has the following responsibilities:

- Manage the overall programme of work for the creation of new standards and/or updating of existing standards.
- Prioritize issues and innovations for inclusion into a new standard and/or updating of existing standards.
- In alignment with Sydney Water [Controlled Document Standard \(doc no 608701\)](#), set review dates for existing standards and manage the review process.
- Allocate funding and obtain approval of funding for the programme of works.

Once a standard has been created and/or updated, the Endorsing Authority will present the standard to the Approving Authority for implementation across the organisation.

The Endorsing Authority resides with the L5 Manager of the Engineering Team.

4.2.3 Approving Authority

In accordance with Table 1 of Sydney Water's Controlled Document Standard, the Approving Authority for Standards and Specifications resides with the L4 Manager.

Once a standard has been approved by the Approving Authority, it will be published which means officially releasing the Standard across Sydney Water and the wider industry for implementation.

5. Creating Engineering Standards

5.1 Identify Need

Standards are “living” documents which are updated and renewed as industry applies innovation to Sydney Water assets through development of new processes for the asset lifecycle. Consequently, stakeholders’ consultation and input are an integral part of the continuous development and improvement process of standards management.

Sydney Water operates various mechanisms that identifies issues during the lifecycle of its assets that relates to requirements around amending existing standards or authoring new standards.

- Feedback Register
 - The Feedback Register is maintained by the Engineering Team and relates to issues with existing standards that need clarification or improvement. Issues may be raised by any stakeholder, or person, that works with or on behalf of Sydney Water and may include government, industry or trade association, professional body, or consumer groups. Issues may be identified during the periodic review period from within the Engineering Team and then be actioned for improvement. Issues are also recorded by the Specialist Engineering Team during the course of their Project Review function e.g. when issues are identified during engineering review of projects.
- Deviations from Standards Register
 - The Deviations from Standards Register is maintained by the Engineering Team and relates to innovative solutions that have been developed for a non-standard scenario. Deviation from Standards is a process whereby a non-standard solution is presented for approval to the Engineering Team for a scenario where the standards do not apply, or where customer value can be increased by way a new or innovative solution. Whenever a standard solution is not achievable or preferred, a Deviation from Standards request is submitted which is then reviewed and approved or rejected. A register of Deviation from Standards is being kept which feeds into the review cycle of standards. In addition, the Engineering Team maintains close relationships with industry through membership to working committees, industry bodies, standards working groups, etc to capture new solutions and innovation.
- [Post Implementation Reviews \(PIR\) \(Doc no 573723\)](#). Sydney Water conducts PIRs to the planning and delivery of projects and policies. There are two types of PIRs i.e. Project Execution Review (PER) and Benefits Realisation Review (BRR). The PIRs:
 - identify lessons to be shared, both good and bad, so that future project managers can repeat practices that have led to successful projects and put in place measures to avoid, or better manage, problems that have been experienced previously
 - allow process owners to identify existing rules and procedures that prevent superior project performance
 - identify opportunities for improvement (for projects and organisation-wide), and create an action plan to implement them
 - show whether the forecast benefits of a project/policy were achieved.

- Sydney Water Incident Recording and Learning (SWIRL)
 - SWIRL is the recording tool used for all Sydney Water incidents/events. All Sydney Water staff and contractors with three letter user ID have access to this database. Managers are accountable for ensuring incidents/events are recorded in SWIRL.
- [Safety ICAM Investigation Procedure \(Doc no 1038195\)](#)
- [Root Cause Analysis Procedure \(Doc no 610444\)](#)

In addition, the need for change/amendment/new standard may also derive from:

- Business process changes
- Customer demand/ request
- Feedback from internal and external stakeholders
- Industry standard/ regulatory changes
- Actions from audits or any special investigations

5.2 Prioritise Standards

Prioritisation of standards occurs once a year during the development of the yearly works programme for the Engineering Team. The Author, in conjunction with the Endorsing Authority, will prioritise issues identified from the sources as listed in item 5.2 above.

Ad hoc amendments, or development of new standards, may occur outside the yearly prioritisation of standards process, as urgent requirements present themselves. For urgent ad hoc amendments, relevant issues will be assessed based on risk to Sydney Water, health and safety related concerns and/or regulatory requirements.

Generally, the prioritisation of the yearly works programme will be driven by:

- audit and review cycle of existing standards (QA),
- health and safety related incidents and/or accidents,
- risk to Sydney Water,
- innovation, value and benefit to Sydney Water and customers,
- guidance to industry on Sydney Water requirements

5.3 Prepare Task Brief

For Major Action standards, the Lead Engineer is responsible for preparing a CPQQRT task brief. Minor Action standards will be undertaken by the Engineering Team during the course of their normal standards review and amendment operations.

For Major Action items, the standard Sydney Water CPQQRT task brief will be developed which demonstrate the following criteria:

- a broadly-based need
- management of conflicts or interfaces with other standards, either published or in development
- consideration given to comparable national and international standards
- appropriate initial risk identification and analysis has been performed

- consideration of the impact across the life cycle of the process, system, or asset to which the standard applies
- resource allocation
- completion programme with milestones
- funding requirements

5.4 Approval of Task Brief

The Endorsing Authority will prioritize Major Action task briefs and obtain funding approval as part of the yearly works programme.

All proposals and task briefs will be reviewed and approved by the L4 Manager Engineering prior to commencement.

5.5 Create, Edit, Update

Depending on the level of risk and change impact associated with the development of new or changed standards and content, the level of engagement and collaboration with stakeholders and industry will vary.

All high impact or substantially changed standards and content require stakeholder engagement as agreed by the L4 Engineering Manager.

For standards and content that are assessed to have a high impact, a period of public comment (typically 3 months) is provided to allow submission of comments on the draft by interested parties.

Document editing is an integral part of the development of all documents to ensure the quality of documentation and consistency in structure and language. All standards are controlled documents and shall be developed in accordance with Sydney Water's Controlled Document Standard (608701).

The SME for the document shall consider all comments received.

A standard must be kept in BMIS. They must:

- use the relevant corporate template (where available)
- not be a duplicate of an existing document
- comply with the Sydney Water style guide.

5.6 Content Approval

A formal content approval process is undertaken by the Author after the drafting and collaboration stages.

As much as possible, through the various levels of engagement with stakeholders and industry, the aim of the Author is to collaborate to obtain an optimum outcome through consensus. However, the Engineering Team is accountable and responsible for the content of engineering standards on behalf of Sydney Water, and approves content based on technically justified and risk-assured decisions.

Where there is a collective sustained objection within a technical committee or by a major interest group, the Author is responsible to put forward their position and assurance argument to the L4 Engineering Manager for determination.

Sydney Water follows a risk-based approach to verification of the content. The Author will engage internal SMEs to conduct a review and verification of the content for minor or insignificant content creation or

changes/amendments. For major or significant content creation or changes, the Author will engage external SMEs or stakeholders to review and verify the content.

5.7 Publication

Key overarching standards (e.g. civil, mechanical, electrical specifications, etc.) are publicly available on the Sydney Water [website](#). Sydney Water encourages access to network standards in support of the Australian Government's principles on open public sector information.

All amendments are to be summarised and published on the Sydney Water iConnect page for [Asset Standards and Specifications](#) and [Sydney Water Delivery Dataportal](#).

5.8 Review Frequency

The maintenance of engineering standards after publication remains the responsibility of the Author.

Maintenance refers to the issuance of the following:

- technical notes – emergency changes or clarifications to network standards
- concessions – approved deviations from network standards
- periodic review – to ensure the currency of content in relation to technology, work practices and changes to the domain to which the requirements apply

6. Communications Plan

Publishing of new or amended standards must be communicated to relevant stakeholders and the industry at large. The only exceptions are where minor editorial changes have been made including spelling/grammar correction, formatting change, updating links etc. (Doc no 608701).

6.1 Standards Management

A nominated Author will record and keep up to date the Feedback Register and Deviations from Standards Register. Supported by the discipline leads, the Endorsing Authority (L5 Manager) will prepare and submit to the Approval Authority (L4 Manager) within the Engineering Team the following:

- a monthly summary report highlighting progress to milestones, activities completed in the period, activities to complete next period, issues and risks
- a schedule for standards review (annual update)
- summary reports for regular continuous improvement reviews with both internal and external stakeholders.

6.2 Standards

Changes to standards are to be communicated internally and externally as follows:

- Major changes and amendments highlighted as critical are to be disseminated within one week of the amendment approval.
- All amendments are to be summarised and published on the iConnect.
- Amendments to key standards, or creation of a key standard, will be publish on the Sydney Water external website
- Notification sent to all relevant:
 - Water Services Coordinators
 - Accredited Designers
 - Sydney Water Internal Stakeholders
 - Published on Sydney Water Delivery Portal or other equivalent
 - Sydney Water Webpage (as needed)
- Additional, informal awareness sessions to select high user groups of any major change or new standard

6.3 Hierarchy of Standards

In the context of standards management, the hierarchy of asset and engineering standards within Sydney Water places the Civil, Mechanical and Electrical Specifications at the top of the pyramid. The order of precedence cascades down according to Figure 3 below:

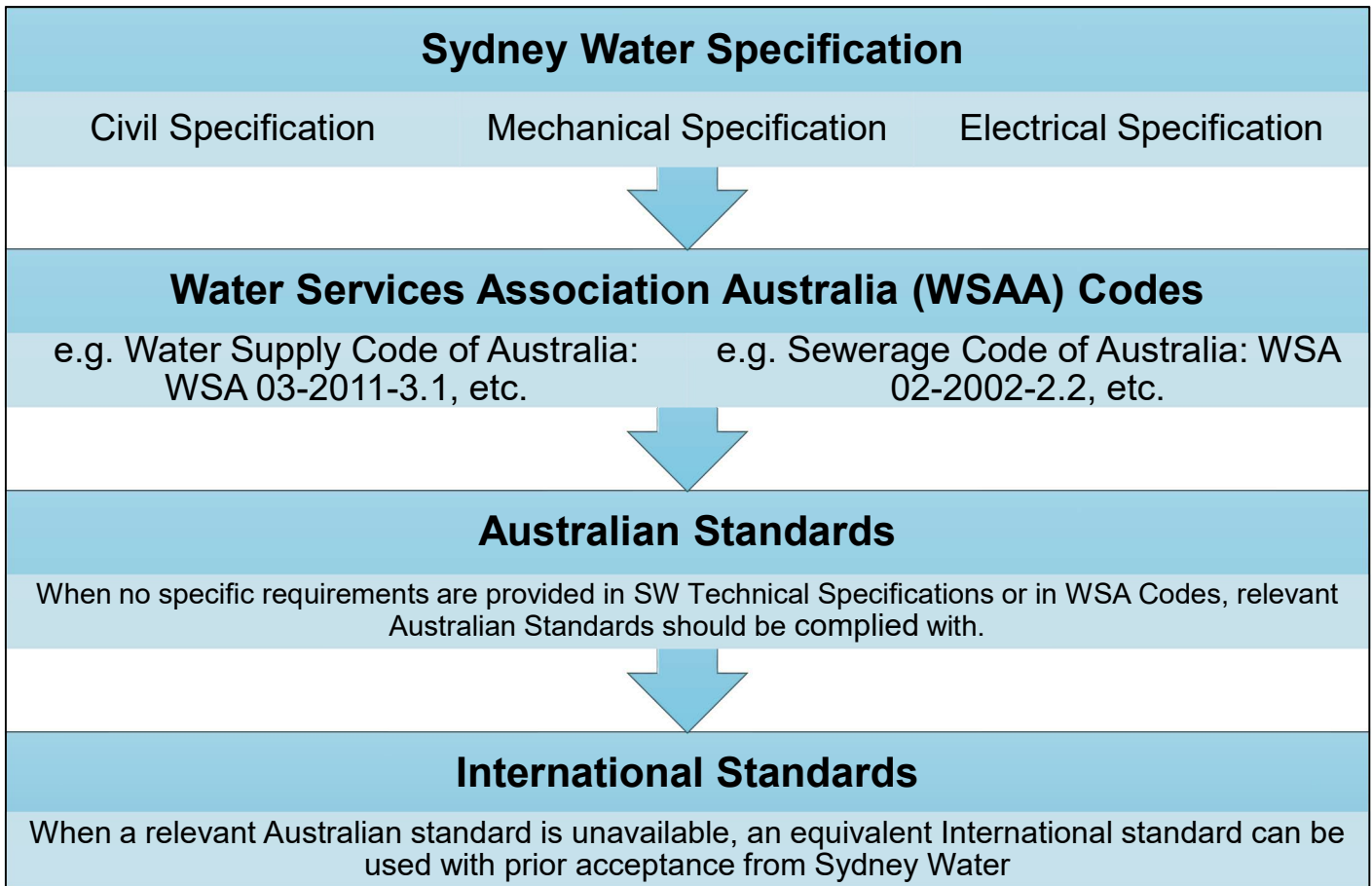


Figure 3: Hierarchy of Standards

The requirements detailed in the documents higher in the figure take precedence over the requirements detailed in the documents lower down in the figure. For example, Sydney Water’s Civil Specification takes precedence over WSA 03 Water Supply Code of Australia itself.

Should a document higher up in the figure be “silent” with regards to a particular design and construction requirement, then a document lower down in the figure shall be used to determine the requirement.

7. Definitions

Term	Definition
Engineering Standards	Engineering standards include creation, development, maintenance and management of engineering and asset standards for the whole of Asset Lifecycle.
SME	Subject matter expert

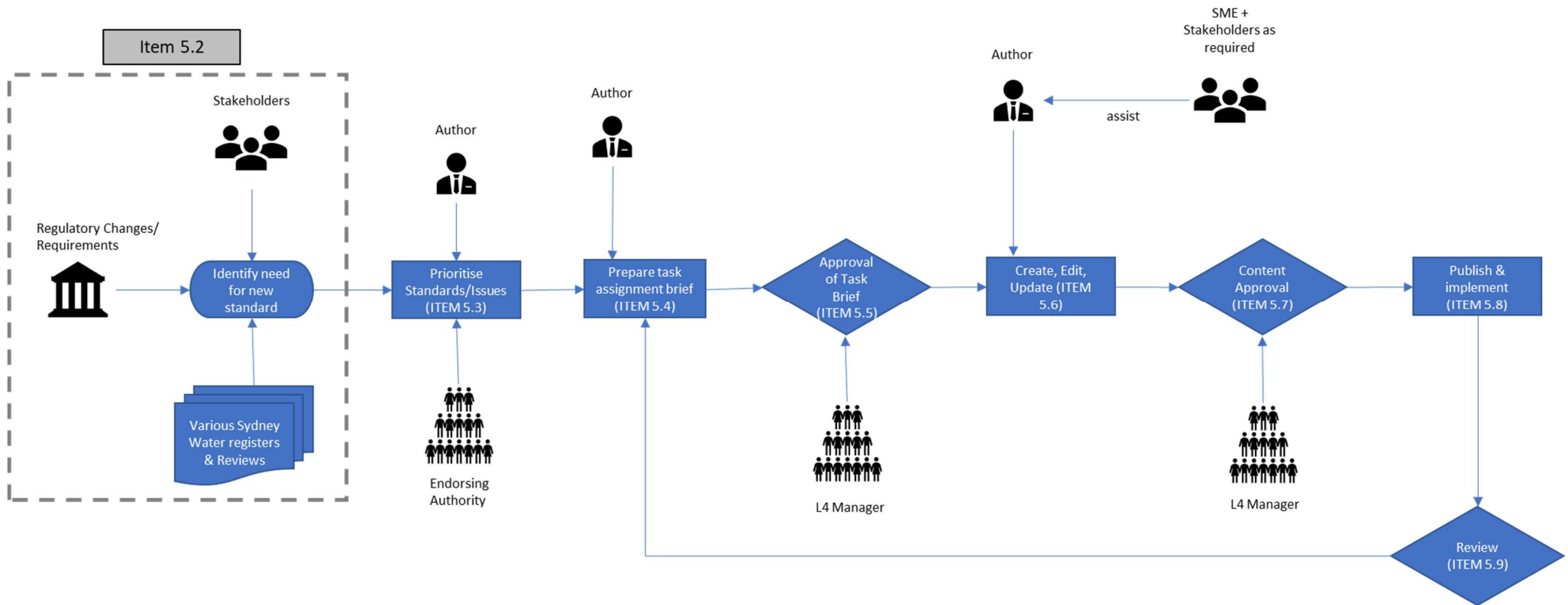
8. Ownership

Role	Title
Group	Engineering and Technical Support
Owner	Engineering Manager
Author	Gary de Leeuw, Senior Civil Engineer

8.1 Change history

Version	Issue Date	Approved by	Brief description of change and consultation
1	10/12/2021	Norbert Schaeper	New document

Appendix A: Creating Standards Procedure



Appendix B: Review of standards

Standards Review	
Standard Name	<i>Eg. Water Hammer Specification</i>
Doc Number	<i>Eg. Doc xxx000xxx</i>
Standard Description	
<i>The standard provides guidance to the industry on building a water hammer model for Sydney Water. In addition, it provides basic theory of transient analysis, Sydney Water's preferences to analyse and mitigate transient events, and reporting requirements.</i>	
Stakeholders	<i>Sydney Water Engineering Team – Civil Sydney Water Operations Team Concept design team</i>
Author	<i>A. Nother</i>
Reviewer	<i>A.N. Other</i>
Reviewer classification (Engineering Competence Std)	<i>C4</i>
Review Aspects	
<i>CPQQRT</i>	<i>In accordance with approved CPQQRT</i>
<i>Stakeholder/SW Register input</i>	<i>Stakeholder and Feedback register issues addressed in Standard</i>
<i>Content</i>	<i>Content reviewed</i>
Approval and Distribution	
Reviewer	Date:
L4 Manager	Date: