SA Water

Engineering

Technical Standard

TS 0104: Design quality management

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Government of South Australia

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Documents superseded by this standard

SAWS-ENG-0104 (version 1.0)

Significant/major changes incorporated in this edition

- Requirements of Approved Superintendents reinserted, and implementation noted below.
- Major revision of section 3.1
- Inclusion of Tables 3 and 4
- Update of section 4.1
- Design Acceptance Certificate renamed Design Milestone Acceptance Certificate
- Figures 2, 3 and 4 updated
- Minor corrections throughout
- Appendix F updated

Text changes within the body of the document are highlighted in yellow for clarity.

Implementation of this standard

All sections of this Technical Standard are considered operational as of the publication of version 1.0 in August 2024, with the exception of section 5.4, which will be implemented as follows:

1) Timeframe for implementation to the performance metrics for Approved Superintendents shall be as follows:
    i. 'Soft launch' period until the 30th of June 2026
    ii. Full implementation of Approved Superintendent performance metrics from the **1st of July 2026**

'Soft launch' entails the partial implementation of the performance metrics where:

- Indicative performance feedback is provided to the Approved Superintendent
- Performance ratings are not formally applied
- Ratings normalised at Rating 2 at full implementation date

Document controls

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1 Introduction

SA Water is responsible for an extensive amount of engineering infrastructure and relies on professional engineering services to support the maintenance, upgrade and replacement of this infrastructure.

This Technical Standard has been developed to establish SA Water's requirements with respect to the quality of design activities, to ensure designs for infrastructure projects:

a. Are delivered by competent and experienced personnel,

b. Use suitably thorough and rigorous quality assurance, both in the development of design and during construction,

c. Achieve outcomes which are effective, functional, safe and in accordance with SA Water's Project Requirements.

1.1 Purpose

The purpose of this standard is to establish the requirements and expectations of design activities undertaken for all SA Water infrastructure (inclusive of infrastructure whose ownership is to be transferred to SA Water by agreement), and the role and accountabilities of those involved.

This document is structured as follows, to reflect the different mechanisms by which infrastructure is designed and delivered for SA Water:

- Section 4: Design requirements – General
- Section 5: Design requirements – Land development
- Section 6: Design requirements – SA Water capital projects

The requirements of section 4 apply across all designs for SA Water infrastructure, while sections 5 and 6 provide specific requirements tailored to specific types of infrastructure projects.

1.2 Glossary

Terms and Abbreviations utilised in this Standard are included in the following sections. The definitions presented below are to be used when interpreting this Standard and actions undertaken in relation to this Standard. Where a conflict exists, clarification is to be sought from SA Water.

1.2.1 Terms and Definitions

The following is a list of Terms applicable to this document:

Term	Description
Accepted	Determined to be satisfactory by SA Water's Representative.
Approved Consultant	Consultants whose design activities are typically undertaken for works delivered under a DAFI
Approved Superintendent	Authorised under a DAFI agreement to support an effective quality assurance process during construction of infrastructure to be transferred to SA Water by proactively managing risk and working with Constructors to ensure delivery of infrastructure that satisfies SA Water's requirements.
Allow	Means that the cost of the item referred to is the responsibility of the Constructor
Provide	Means "supply and install".
Agent	Person or organisation that engages a Designer.

Term	Description
Authoriser	Ensures that the relevant review and verification activities/process of a given output have been completed.
Constructor	The organisation responsible for constructing and installing infrastructure for SA Water whether it be a third party under contract to SA Water or an in-house entity.
Contract	A set of documents supplied to the Constructor as the basis for construction; these documents contain contract forms, contract conditions, specifications, drawings, addenda, and contract changes.
Design Consultant	An organisation who employs Designers, Reviewers and Verifiers, and is responsible for producing Design Deliverables for SA Water. This may be as a third party under contract (for example, to SA Water or a Constructor), or internal to SA Water. Design Consultants are a subset of Suppliers who are engaged to produce Design Deliverables for SA Water.
Design Deliverables	Documents or artefacts that provides technical information to support the design, construction, commissioning, operation or management of SA Water infrastructure. This may include, but is not limited to: • Formal designs (e.g., design drawings, specifications, hazard registers etc.) for use in capital or maintenance works • Modelling outputs • Investigations or assessments, and corresponding technical reports
Design Manager (Agent)	The person/s, nominated by the Constructor, who is responsible for co-ordinating site investigations, meetings, project interfaces/stakeholders (inclusive of the Designer) and commissioning activities.
Design Manager (Design Consultant)	The person, employed by the Design Consultant, who is responsible for oversight and coordination of design effort (inclusive of managing any sub-consultants directly engaged by the Design Consultant) to deliver a design which complies with SA Water's Project Requirements.
Designer	The organisation responsible for producing Design Deliverables for SA Water whether it be a third party under contract to SA Water or a Constructor, or an in-house entity. A Designer is a person who effects design, produces designs or undertakes design activities as defined in the *Work Health and Safety Act 2012 (SA)*.
Drawing	A document intended to provide sufficient technical information in detail about the work to be constructed, and to provide a record of works undertaken.
Inspection	Measuring, testing or examining of Works, materials or goods or services (includes raw materials, components and intermediate assemblies) for determining conformity with the Requirements.
Inspection and Test Plans	The planned inspections and tests for individual work processes or activities.
Manufacturer	A person, group, or company that owns and operates a manufacturing facility that provides materials for use in SA Water infrastructure.
Non-Conformance Report	Report provided to SA Water by the Constructor on non-conforming products indicating the proposed rectification method and supporting information.
Owner's Engineer	Engaged by SA Water to protect the SA Water's interests by ensuring the works progress project progresses in accordance with SA Water's Project Requirements.
Principal	As defined in SA Water's Developer Agreement Formal Instrument

Term	Description
Project Sponsor	Asset planner accountable for ensuring a project is governed effectively and delivers outcomes that achieve the required level of service.
Requirement	Need or expectation that is stated within the Contract.
Reviewer	A suitably qualified and experienced person, who: • Carries out design review activities to ensure technical requirements are satisfied. • Possesses water industry experience specifically related to the subject area for which the review is being undertaken.
Responsible Discipline Lead	The engineering discipline expert identified in the 'Approvers' table (via SA Water's Representative).
Representative	The Representative shall be either one of the following: • For Works delivered under a Developer Agreement Formal Instrument (DAFI), this shall be the Approved Superintendent. • For works delivered directly for SA Water under a contract or other engagement, this shall be the SA Water Representative.
SA Water Project Requirements	Documentation (for example, Request for Quotation, Functional Specification, Contract etc.) specifying SA Water's requirements for a given project, and inclusive of SA Water's Technical Governance.
SA Water Engineering Panel Manager	The SA Water representative with delegated authority to manage SA Water's Engineering Panel.
SA Water Representative	The SA Water representative with delegated authority under a Contract or engagement, including (as applicable): • Superintendent's Representative (for example, AS 4300 and AS 2124 etc.). • SA Water Project Manager. • SA Water nominated contact person.
Must	See 'Shall'
Shall	Indicates a requirement that is to be adopted in order to comply with the Standard.
Should	Indicates practices which are advised or recommended, but is not required
Supplier	A person, group or company that provides goods or services for use in SA Water infrastructure. This includes organisations engaged under SA Water's Engineering or Automation Panels.
Technical Dispensation Request Form	This form is part of SA Water's Technical Dispensation Request Procedure which details the process by which those required to comply, or ensure compliance, with SA Water's technical requirements may seek dispensation from those requirements.
Technical Governance	SA Water's primary method for articulating required technical outcomes to stakeholders, usually via Technical Standards, Standard Drawings etc.
Verifier	A suitably qualified and experienced person, who: • Carries out design verification to ensure technical requirements are satisfied. • Possesses water industry experience specifically related to the subject area for which the verification is being undertaken.
Work	Elements of a project which require design and/or construction.

1.2.2 Abbreviations

The following is a list of Abbreviations, Acronyms and Initialisms used in this document:

Term	Description
ACR	Asset Criticality Rating (refer TS 0109)
AS	Australian Standard
BAL	Bushfire Attack Level
CAR	Corrective Action Report
CDR	Concept Design Report
CFD	Computational Fluid Dynamics
CHAZOP	Control System Hazard and Operability
CLoS	Customer Level of Service
CV	Curriculum Vitae
D&C	Design and Construct
DA	Development Application
DMAC	Design Milestone Acceptance Certificate
DAFI	Developer Agreement Formal Instrument
DBR	Design Basis Report
DDR	Detailed Design Report
DMP	Design Management Plan
ECI	Early Contractor Involvement
EPA	Environment Protection Authority
ESCOSA	Essential Services Commission of South Australia
FEA	Finite Element Analysis
HAZOP	Hazard and Operability
IFC	Issued for Construction
ITP	Inspection and Test Plan
NCR	Non-conformance Report *(also known as a corrective action report)*
OE	Owner's Engineer
QA	Quality Assurance
QMP	Quality Management Plan
QMS	Quality Management System
RFI	Request for Information
SA Water	South Australian Water Corporation
SiD	Safety in Design
TDRF	Technical Dispensation Request Form
TG	SA Water Technical Guideline
TLoS	Technical Level of Service
TS	SA Water Technical Standard
WHS	Work Health and Safety
WSAA	Water Services Association of Australia

1.3 References

1.3.1 Australian and International

The following table identifies Australian and International standards and other similar documents referenced in this document:

Reference	Title
	Work Health and Safety Act 2012 (SA)
	Work Health and Safety Regulations 2012 (SA)
AS/NZS ISO 19011	Guidelines for Auditing Management Systems
AS/NZS ISO 9001	Quality Management Systems

1.3.2 SA Water Documents

The following table identifies the SA Water standards and other similar documents referenced in this document:

Reference	Title
-	SA Water technical dispensation request procedure
SAWG-ENG-0521	Major land developments safety in design management plan
SAW-PR-0006	Procurement and contract management procedure *(internal SA Water use only)*
SCM	Sewer construction manual
TG 0103	Approach to technical governance
TS 0100	Requirements for technical drawings
TS 0101	Safety in design
TS 0106	Temporary works (when published)
TS 0109	Infrastructure design
TS 0110	Durability design
TS 0130	As constructed data requirements for linear assets
TS 0132	Operation and maintenance manuals
TS 0134	Requirements for automated assessment
TS 0136	Pipework access and protection
TS 0245	Design requirements for ventilation and cooling systems
TS 0523	Requirements for drawings in land development projects (when published)
TS 0720	Access infrastructure for water tanks
WSCM	Water services construction manual

2 Scope

The scope of this Technical Standard is to establish SA Water's minimum requirements for how design activities are to be managed, to ensure that SA Water infrastructure is designed such that it:

a. Is safe, and satisfies SA Water's obligations under the *Work Health and Safety Act* 2012 (SA)

b. Complies with applicable legislation, regulations, standards and state government policy

c. Satisfies the performance requirements and outcomes stipulated in SA Water's Project Requirements and

d. Achieves the outcomes (for example, CLoS, TLoS etc.) expected by SA Water's customers, regulators and key stakeholders.

This Technical Standard defines:

- Design management requirements.
- The roles, responsibilities and accountabilities of Designers, Reviewers, Verifiers and Agents.
- Competencies of personnel engaged for design, review and verification activities.
- The design process to be followed
- An escalation process for disputes and review comment resolution.
- How non-conformances are raised and managed.

Unless noted otherwise (or approved via a TDRF), this Technical Standard is applicable for all design activities undertaken for SA Water infrastructure.

2.1 Exclusions

The following are excluded from the scope of this Technical Standard:

a. Designs undertaken by SA Water employees for network alterations delivered **strictly** in accordance with SA Water's WSCM and SCM drawing sets (namely minor third party works or extension and connection designs)

b. Legislative/Statutory/Planning approvals

c. Cultural/Environmental assessments or investigations

d. Project risk assessments (aside from project risks pertinent to design activities)

e. Evaluation of sustainability, environmental and circular economy parameters.

f. Commissioning requirements or procedures (excepting the role of the Designer).

g. Systems engineering deliverables

h. Design of temporary works (refer TS 0106)

i. Levels of detail for the technical content of design deliverables.

2.2 Technical dispensation

Departure from any requirement of this Technical Standard requires the submission of a Technical Dispensation Request Form (TDRF) for review and approval/rejection, in accordance with SA Water's Technical Dispensation Procedure. These are submitted and evaluated on a case-by-case basis, noting that:

a. The Agent shall not proceed to engage a Design Consultant who is not an SA Water panel member (Engineering or Automation) until the respective Panel Manager has provided approval via the Technical Dispensation Request Form (TDRF).

b. The Designer shall not proceed to document/incorporate any non-conforming work before an approved TDRF has been issued.

c. The use of companies other than SA Water's Approved Consultants or Approved Superintendents for works delivered via a DAFI is not permitted

    i. Dispensation requests to use companies not listed as an SA Water Approved Consultant or Approved Superintendent will not be accepted.

SA Water requires sufficient information to assess dispensation requests and their potential impact. The onus is therefore on the proponent to justify dispensation request submissions and provide suitable evidence to support them.

Design works that are carried out without being appropriately sanctioned by SA Water shall be liable to rejection by SA Water and retrospective rectification by the Design Consultant/Constructor.

3 SA Water's Design Consultants

Design Consultants play an essential role in the development of engineering designs and provision of technical services in support of delivering works on SA Water infrastructure.

Such works are broadly grouped into three project types, with design capability which shall be as described in Table 1.

The design of any non-standard infrastructure shall follow the process described in section 6.

Table 1: Engineering design matrix

Project type	Engineering design by
SA Water capital	SA Water panel/s
SA Water operational	SA Water panel/s
Land development	Refer Table 2

Table 2: Land development design matrix

Infrastructure Type[1]	Approved Consultant[2]	SA Water Panel Suppliers[3]
Standard infrastructure[4]	Permitted	Not permitted[5,6]
Non-standard infrastructure[7]	Not permitted	Permitted
Non-standard connection/augmentation[8]	Not permitted	Permitted

Notes:

1) Including single or multi-stage developments
2) Refer section 5.2.
3) SA Water's Engineering or Automation Panel (as appropriate), refer section 3.1
4) Standard infrastructure includes:
   a. Drinking and non-drinking water networks to ≤ DN375 (inc. highway, creek, and rail crossings)
   b. Gravity sewer networks to ≤ DN300 (inc. highway, creek, and rail crossings)
   c. Sewer rising mains to ≤ DN200 (inc. highway, creek, and rail crossings)
   d. Wastewater pumping stations with a design flow rate of ≤ 30L/s which includes:
      i. Siting of the wastewater pumping station and
      ii. Determination of design flows originating within a development
   e. Connections to gravity sewer pipelines mains ≤ DN300 (unless excluded by note 6)
   f. Connections to drinking and non-drinking water mains ≤ DN375 (unless excluded by note 6)
   g. Tankering sites
5) Suppliers listed on SA Water's Engineering Panel, who are also Approved Consultants, may design standard infrastructure in land development projects.
6) Excepting third party review of designs per section 4.2.5.1.
7) Non-standard infrastructure includes:
   a. Pressure reducing valve stations.
   b. Booster pump stations
   c. Pipe diameters or flow rates greater than those prescribed in note four.
   d. Vacuum or Pressure sewer systems.
8) Non-standard connection/augmentation includes:
   a. Connection to facilities with an ACR ≥ 3 or trunk mains (refer TS 0136)
   b. Augmentation or modification of infrastructure with an ACR ≥ 3

3.1 SA Water panels

SA Water engages Design Consultants and other technical service providers through structured panel arrangements to ensure quality, consistency, and alignment with infrastructure standards and technical requirements.

SA Water maintains two panels to provide technical services — an **Engineering Panel** and an **Automation Panel** — in which companies have been evaluated via a formal procurement process to confirm their capability to deliver designs and services of a high standard to SA Water.

Suppliers on these panels may only be engaged to provide services that fall within both the scope and capability area for which the panel was established. Engagement of panel members to work outside these boundaries requires submission and approval of a TDRF prior to their being engaged (refer section 3.1.4).

Compliance with the requirements of this Technical Standard is a crucial element of becoming (and remaining) a member of SA Water's panels. SA Water reserves the right to conduct audits of a Design Consultant at any time to monitor performance against the requirements of this Technical Standard.

3.1.1 Engineering panel

To support consistent alignment between technical complexity and consultant capability, SA Water has established a structured Engineering Panel with defined capability areas. These provide a risk-based approach to engaging technical capability while supporting SA Water's diverse infrastructure programs.

Engagement of these Suppliers shall be in accordance with Table 3, based on the capability area appropriate to the infrastructure type or subject matter expertise required. These capability areas reflect varying levels of technical complexity, risk, and specialisation.

Capability area definitions, as outlined in Table 4, shall be:

- Used in conjunction with infrastructure types as a practical guide for determining the appropriate capability area—noting that these examples are indicative, not exhaustive; and
- Read **alongside** the accompanying explanatory notes.

Table 3: Engineering Panel Capability Service Areas

Supplier	Capability Areas[1]						
	General		Specialist				
	Major	Minor	Dams	Process	Cathodic Protection	Systems Planning	Environment
AECOM							X
Aurecon[3]	X		X	X	X		X
Corrosion Control Engineering					X		
Fyfe[2]		X			X		
GHD+[2]	X		X	X		X	
GPA[2]		X					
Jacobs	X			X		X	X
KBR[3]				X			
Mott Macdonald	X		X				X
SMEC	X		X				
Tonkin & Stantec[2]		X				X	
WSP	X			X		X	

Notes:

1) Capability areas as defined in Table 4
2) Suppliers formed through commercial partnerships between two or more Design Consultants, delivering services within their approved capability area.
3) Due to current contracts with SA Water for project management and Owner's Engineer services, these consultants cannot be engaged for capital projects unless a TDRF is approved. The TDRF must address how conflicts of interest will be identified, assessed, and managed throughout the engagement, including the likelihood of such conflicts arising. Where risks are deemed unacceptable or unresolvable, SA Water may reject the submission at its sole discretion, with no obligation to justify the decision or permit appeal.

Table 4: Capability Area Definitions

Capability Area	Overview	Scope[1]	
		Included	Excluded[2]
MAJOR[3]	Broad, multidisciplinary engineering capability and integration for technically complex or bespoke water and wastewater infrastructure. Core engineering disciplines: • Structural • Civil • Materials Science • Process • Hydraulics • Electrical • Mechanical • Geotechnical	Design of infrastructure requiring multidisciplinary capability due to technical complexity, integration needs, or design risks. Included infrastructure: • Treatment plants, including process upgrades[4] • Major/trunk pipelines[5], including appurtenant infrastructure (surge vessels, valves etc.) • Pump stations • Tanks[6] • Earth bank storages[7] • Dam infrastructure[7] • Coating system renewals/replacements • Project-specific hydraulic modelling • High voltage infrastructure (i.e. ≥ 11kV)	Services involving: • Systems integration

MINOR	Multidisciplinary capability for lower complexity infrastructure requiring limited design integration.
	Core engineering disciplines:
	• Structural
	• Civil
	• Mechanical
	• Electrical
	• Geotechnical
	• Building Services
		Design of infrastructure requiring reduced multidisciplinary capability for low to moderate complexity works.
		Included infrastructure types:
		• Standard Infrastructure defined in Table 2
		• Buildings, including:
		  ○ Upgrades/Renovations
		  ○ Building services
		  ○ Ventilation/cooling systems[9]
		• Roads/Hardstands
		• Switchboards[10]
		• Stormwater systems
		• Access infrastructure[11]
		• Levees
		• Retaining walls
		• Plinths/Slabs supporting electrical infrastructure
			Services involving:
			• High voltage infrastructure[8]
			• Systems integration[7]

DAMS	Specialised multidisciplinary capability for dam infrastructure and dam safety. Core engineering disciplines: • Dams • Structural • Civil • Mechanical • Geotechnical	Design of dam infrastructure requiring specialised multidisciplinary input due to technical complexity, integration needs, and design risk. Provides specialised capability in: • Dam inspections • Dam safety (including risk assessments) • Hydrology • Seismology Included infrastructure: • Dams/earth bank storages with ANCOLD consequence category of Significant–Extreme • Appurtenant dam infrastructure with dam safety implications	
CATHODIC PROTECTION	Specialised capability in cathodic protection systems.	Provides specialised capability in design, testing, commissioning, and reporting for cathodic protection in water/wastewater infrastructure.	

Capability Area	Overview	Scope[1]	
		Included	Excluded[2]
PROCESS	Specialised capability for process and treatment infrastructure design.	Design of process and odour infrastructure requiring specialised capability in: • Membrane treatment • Ozonation • H2S modelling and mitigation infrastructure design • Recycled water process/treatment design • Computational fluid dynamics • Chemical Dosing • UV treatment • Disinfection • Sludge management processes	
SYSTEMS PLANNING[12]	Specialised capability in strategic hydraulic system modelling for water, recycled water and wastewater Core technical capability: • Hydraulic Engineering • Network Modelling • System Planning	Specialised capability in: • Corporate model maintenance, including model enhancements and calibration expertise • Systems performance analysis • Growth/augmentation planning	
ENVIRONMENT[13]	Specialised capability in land use planning, environmental assessment and approvals	Specialised capability in: • Land use planning • Environmental impact assessments • Native vegetation assessments • Water sensitive urban design • Site contamination assessments • Spoil and soil investigation / classification • Environmental auditing • Environmental approval support.	Services involving: • Cultural Heritage

Notes:

1) Design for infrastructure rehabilitations are to be delivered by the capability area within which the infrastructure is nominated.
2) Scope of work in other capability areas excluded by default unless noted otherwise
3) Providers may deliver scope of work in Minor capability area
4) Excluding scope of Process capability area, unless listed in both.
5) As defined in TS 0136
6) Design of access infrastructure may be undertaken by suppliers in the Minor capability area
7) Excluding scope which satisfies criteria of the Dams capability area
8) Such works are to be delivered by the Automation Panel or suppliers in the Major capability area
9) Per TS 0245
10) Within the scope of SA Water typical switchboard designs, and may also be delivered by the Automation Panel
11) Per TS 0720
12) Providers may also be engaged to deliver hydraulic modelling services for individual projects, in addition to their broader corporate modelling capabilities
13) Use of the Environment capability area by third parties to deliver development applications on behalf of SA Water is not permitted without an approved TDRF

3.1.2 Automation panel

To support consistency and functionality across SA Water's electrical and control infrastructure, SA Water has established an Automation Panel. The scope of works for these Suppliers is to provide systems integration capability and the design of electrical infrastructure (as defined in SA Water Technical Standard TS 0109) and the relevant capability nominated in Table 4 of this Standard.

This includes (but is not limited to) SCADA, telemetry, and other control systems critical to SA Water's operational technology environment.

The companies that constitute SA Water's automation panel are as follows:

a. Alliance Automation

b. ATSYS

c. GPA Engineering

d. Verbrec

e. SAGE Automation

3.1.3 Sub-consulting requirements

Suppliers may enter in to sub-consulting arrangements with other Design Consultants to support delivery across capability areas, provided those engagements are consistent with the capability areas defined in this Technical Standard.

Panel membership alone does not permit delivery of services outside a supplier's capability area, and any sub-consulting arrangements (including specialist Suppliers sub-consulting to a lead Design Consultant) must only be for services within their nominated capability area (refer Table 4).

Where multiple consultants or sub-consultants are engaged on a single project, the Agent's responsibilities shall be as described in section 4.2.1.

Sub-consulting arrangements may proceed without SA Water approval only where:

- The sub-consultant is a current Supplier on SA Water's Engineering or Automation Panels and is being engaged **within their nominated capability area**; or
- The sub-consultant is not a Supplier on SA Water's Engineering or Automation Panels but is being engaged to provide additional capacity in a capability area already held by the Agent.

Where these conditions are not met (including where it is proposed for a Supplier to deliver services outside their nominated capability area) **SA Water approval via a TDRF is required**. The TDRF must detail:

- The rationale for engaging the sub-consultant;
- How the sub-consultant's capability has been assessed in accordance with this Technical Standard;
- How design quality, review, and verification requirements will be met;
- Any corrective actions to be implemented if issues arise.

A Supplier's use of sub-consultants **does not** absolve the Design Consultant of their design accountabilities under this Technical Standard. They remain fully responsible for ensuring the quality management requirements of section 4.3 are satisfied.

3.1.4 Use of SA Water panels

Excluding designs delivered by SA Water personnel, the use of design capabilities that are not from a Supplier on SA Water's Engineering or Automation Panels requires an approved TDRF **before** any engagement is entered into. Approval of any such TDRF does not override any of SA Water's commercial requirements with respect to the engagement of design services, and these shall be followed by the Agent as applicable.

TDRF submissions requesting the use of non-panel design services must contain **all** of the following:[1]

a. Details of why design capability outside SA Water's panels is required

b. The quality systems the proposed design consultant currently maintains (ISO 9001 etc.)

c. The systems/procedures for design, review and verification (refer section 4.3.2)

d. Details of how technical capability is being matched to the requirements of section 4

e. A Curriculum Vitae of personnel to be used (demonstrating suitability and experience) **and** nominating their role in the design engagement (Reviewer, Verifier etc.)

   i. Where multiple non-panel Design Consultants are to be used, detail on how section 4.2.1 is to be addressed shall be provided

f. Potential risks foreseen in engaging a non-panel Design Consultant.[2]

g. Cost implications, which **must be quantified** against a comparable scope of work.

h. How any design non-conformances shall be managed

   i. Where SA Water is the Agent engaging non-panel design services, documentation in section 7.2 may be utilised in support of non-conformances, noting that support of their resolution is provided by SA Water's Supply Chain team under the purchasing terms and conditions.

[1] The TDRF shall be submitted by the Agent for the engagement, who is accountable for ensuring compliance with the requirements of this Technical Standard, and any other conditions listed in the TDRF.

[2] Management of these risks shall be nominated in a corresponding mitigation plan

4 Design requirements - general

This section outlines SA Water's general design requirements, which are applicable to all designs undertaken for SA Water infrastructure (unless noted otherwise) and describe:

- The outcomes expected of a Design Consultant's internal quality assurance process when delivering SA Water infrastructure designs.
- Key roles in the infrastructure design, along with their responsibilities and accountabilities

Design Consultants are afforded discretion regarding how the activities nominated in this section are undertaken but **must** achieve the required quality and process outcomes. Noting that the requirements of this section are fundamental to the requirements provided in ISO 9001, dispensations from the entirety of this section will not be considered.

4.1 Design development principles

In the development and delivery of designs for SA Water infrastructure, Designers must apply appropriate quality assurance and technical peer review to ensure:

- Each design stage logically builds on the preceding version(s)
- Deliverables demonstrate increasing technical robustness, maturity, and quality
- Hazards are addressed (so far as reasonably practicable), and deliverables are free from errors, oversights, and non-conformances

SA Water reserves the right to return documentation to the Design Consultant if submitted designs do not meet these requirements.

Additionally, SA Water requires that designs:

a. Comply with SA Water's Project Requirements, with deviations authorised per section 2.2.

b. Consider temporary or enabling works needed to support installation, construction, commissioning or maintenance.

c. Demonstrate qualitative cost-effectiveness over the full design life (including CAPEX, OPEX, and major maintenance), unless detailed analysis is specifically requested in SA Water's Project Requirements.

d. Maintain clear version control and document identification in accordance with TS 0100, TS 0101 and TS 0132.

e. Apply appropriate design conservatism to optimize material and resource efficiency

f. Use equipment, materials, coatings and detailing suited to the operating environment.

g. Consider equipment and material availability, to avoid unnecessary spare parts procurement for SA Water.

h. Undergo thorough and rigorous quality assurance.

i. Deliver outcomes that uphold safety, sustainability, performance, resilience and health

4.2 Design responsibilities and accountabilities

4.2.1 Agent

The Agent is the organisation or individual who engages a Designer to deliver a design in accordance with the project requirements.

The Agent is expected to work collaboratively with the Designer to co-create a suitable design engagement scope, noting that where an Agent makes decisions pertaining to technical deliverables to be produced by the Designer (and in particular, their omission), that the Agent assumes responsibility and liability of a Designer with respect to those matters, under the definition provided in this Technical Standard (which is also aligned with the *Work Health and Safety Act* 2012 (SA)).

Where the Agent engages multiple Designers, the Agent assumes accountability for items a) to c) of section 4.2.2 and must ensure that each consultant operates strictly within their nominated capability area;

Failure of the Agent to comply with these requirements to deliver satisfactory outcomes constitutes a non-conformance under this Technical Standard.

a. For land development works, this will be addressed as provided in section 5.

b. For SA Water capital works, this will be actioned as provided in section 7.

4.2.2 Design consultant

The Design Consultant is an organisation who employs Designers, Reviewers and Verifiers, and is responsible for designing infrastructure for SA Water. This may be as a third party under contract (for example, to SA Water or a Constructor), or internal to SA Water.

The Design Consultant is wholly and fully accountable for design and design management activities necessary to satisfy project requirements. Where the Design Consultant engages sub-consultants or sub-contractors to undertake design and investigation activities, the Design Consultant is accountable for:

a. Managing the design interfaces across the Design Consultants engaged

b. Co-ordinating the outputs across the sub-consultants, to ensure the outputs from each are compatible

c. Confirming that the final design satisfies both the SA Water Project Requirements, and design quality expectations as articulated in this Standard.

Activities pursuant to SA Water acceptance/sign-off of infrastructure upon completion of a project remains the responsibility of the SA Water Representative. However, this shall be supported by the activities of the Design Consultant, as described in this Standard.

4.2.3 Designer

4.2.3.1 General

The Designer is employed by a Design Consultant and is the individual responsible for designing infrastructure for SA Water.

A Designer undertakes design activities to create deliverables for a given design output, as defined in the *Work Health and Safety Act* 2012 (SA), and shall be appropriately qualified, experienced and competent in the area for which they are undertaking design activities.

SA Water supports and encourages the development of junior and/or inexperienced personnel. However, where such personnel are used for SA Water projects, they are to be supervised and supported by a Senior Engineer who is appropriately qualified, competent and experienced in the area for which design activities are being undertaken. This shall be noted in both the DMP, and the review/verification outputs for a given design.

4.2.3.2 Construction phase support

At the conclusion of formal design activities, the Agent shall work collaboratively with the Design Consultant to identify and implement appropriate technical support for construction and commissioning phases. The specific scope and extent of this support is left to the discretion of both the Agent and Design Consultant, noting that:

a. The quality assurance and design validation outcomes of this Technical Standard must be achieved.

b. The Agent directs all clarifications or enquires regarding the design to the Design Consultant.

c. Where the Agent does not engage the Design Consultant to provide technical support, **the Agent assumes responsibility for these activities at their own risk.**

d. The Owner's Engineer (and other SA Water employees) **shall not** be used to supplement any omission on the part of the Agent in engaging appropriate and sufficient technical support.

4.2.3.2.1 During construction

To ensure the construction of infrastructure designed for SA Water satisfies the original design intent, the Design Consultant is expected to have an active role supporting the Constructor during the construction phase of a project.

This may include one or more of the following (noting this list is not exhaustive), as agreed between the Design Consultant and the Agent:

a. Supporting quality assurance activities by undertaking inspections and validating constructed works against the design to facilitate confirmation of as constructed drawings etc. (refer section 4.3.4).

b. Reviewing vendor drawings/datasheets etc. to verify compliance with SA Water's Project Requirements, SA Water Technical Governance and the design intent.

c. Checking shop drawings created for fabrication activities, to ensure these are consistent with the design, and comply with SA Water technical standards.

d. Supporting the Constructor through the provision of technical advice and direction, to ensure works are constructed in accordance with the design, and relevant standards.

e. Reviewing, documenting and authorising any design changes made during construction, while ensuring SA Water requirements are satisfied.

4.2.3.2.2 During commissioning

To ensure new SA Water infrastructure is commissioned appropriately and shown to satisfy the original design intent, the Design Consultant is expected to have an active role during commissioning, including but not limited to:

a. Ensuring the design makes suitable provision for commissioning to be conducted

b. Contributing to preparation of the commissioning plan though:

   i. Inputs to the test procedure

   ii. Confirming required tests and defining pass/fail criteria.

   iii. Defining interfaces to be managed and/or checked.

c. Reviewing and approving the final commissioning plan

The Design Consultant's presence on site during commissioning to troubleshoot/support commissioning activities is also strongly recommended.

4.2.4 Reviewer

The Reviewer is employed by a Design Consultant and is the individual responsible for the review of designs for SA Water infrastructure.

SA Water requires that all designs developed for its infrastructure shall be subject to a design review, which is to be undertaken by a Reviewer. The Reviewer shall:

- Have qualifications appropriate to the subject area for which the review is being undertaken
- Have at least seven years of relevant industry experience specifically related to the subject area for which the review is being undertaken
- Not be the Designer of documentation to be reviewed
- Satisfy the registration requirements of section 4.3.2.1.

In undertaking a design review, the Reviewer shall ensure design outputs (as a minimum):

a. Contain no computational errors
    i. This is not expected to be a reproduction of all calculations, but should consist of either alternative calculations or a detailed check of a representative sample to ensure no errors are present
b. Use modelling inputs which have been selected and applied correctly
    i. This review includes checking modelling parameters to ensure they are realistic and represent an appropriate level of design conservatism
c. Contain no significant drafting errors
d. Satisfy the SA Water Project Requirements (including SA Water Technical Governance, national and international standards (as applicable))
e. Meet all statutory requirements
f. Are consistent with industry recognised best practice
g. Can be readily understood and utilised by third parties

The design and associated documentation shall be revised to resolve issues raised by the Reviewer. It is the responsibility of the Designer to liaise with the Reviewer to confirm all issues are closed out and actions documented.

4.2.5 Verifier

The Verifier is employed by a Design Consultant and is the individual responsible for design verification for the design of SA Water infrastructure.

SA Water requires that all designs developed for its infrastructure shall be subject to a design verification, which is to be undertaken by a Verifier. The Verifier shall:

a. Have qualifications appropriate to the subject area for which the review is being undertaken

b. Have at least ten years of relevant industry experience specifically related to the subject area for which the review is being undertaken and

c. Satisfy the registration requirements of section 4.3.2.1.

The Verifier shall verify that, as a minimum:

a. The Reviewer has fulfilled the requirements of section 4.3.2.2

b. Design outputs are developed and documented to an appropriate level

c. The design satisfies SA Water Project Requirements and all statutory requirements

d. Are appropriate and adequate in meeting the functional, contractual, and life cycle requirements (such as construction, operation, and decommissioning).

e. The design suitably incorporates any previous lessons learned.

f. Complete (inclusive of comments being closed/resolved) and suitable for the next stage of the project for which the design output/s are being issued

g. Design outputs are accurate and complete

The design and associated documentation shall be revised to resolve all issues raised by the Verifier. It is the responsibility of the Designer to liaise with the Verifier to confirm all issues are closed out and actions documented.[3]

Once all review comments and queries have been resolved, the Designer is to liaise with the Reviewer for final confirmation, certification and progression of the design to the Authoriser.

4.2.5.1 Verifier independence

SA Water does not require Verifiers to be independent of the Design Consultant, nor be completely independent of the Designer, who may engage with Verifiers at a high level throughout the development of a design. This engagement is intended to be for support and/or guidance, to ensure delivery of design outputs that satisfy SA Water's Project Requirements, as well as those of this Technical Standard.

This engagement with the Verifier is subject to the following conditions:

a. The Verifier is not to be directly involved in the creation of design deliverables, including, but not limited to, modelling, calculations, reports and drawings.

b. The Verifier is not to act as Reviewer on the same Design Deliverable for infrastructure with an ACR ≥ 3.

Third-party independent verification of designs in accordance with AS/NZS ISO 9001 shall be undertaken only where specified in SA Water's Project Requirements. Where applicable, the capability of the Verifier shall be provided as part of the DMP (refer section 6.1).

[3] For land development projects, this is managed via the audit process defined in section 5.5.1.3.

4.2.6 Authoriser

The Authoriser ensures that the relevant review and verification activities/process of a given output have been carried out as per the requirements of this Technical Standard.

In authorising finalised documents, the Authoriser confirms that:

a. The appropriate checks, design reviews and verifications have been undertaken, documented, actioned and closed.

b. Design deliverables prepared by sub-consultants has been suitably integrated by the Designer

c. Statutory requirements (for example, Safety in Design) have been documented, and actions closed.

d. All design deliverables have been completed, and that the design output is suitable for use by outside parties

SA Water permits the Reviewer or Verifier to perform the role of the Authoriser, subject to their satisfying all requirements of this Technical Standard in doing so.

4.2.7 Owner's Engineer

The Owner's Engineer is a role undertaken by SA Water Engineering (or a Design Consultant engaged by SA Water Engineering, to act on their behalf) to protect SA Water's interests, by ensuring works are delivered in accordance with SA Water' Project Requirements. In support of this objective, the Owner's Engineer may undertake monitoring and/or reviews of design/construction/commissioning activities and raise issues for the Designer and/or Constructor to address.[4]

The presence of an Owner's Engineer's role in a given project is determined by SA Water and will be communicated to the Agent and/or Designer developing the DMP by the SA Water Representative.

Issue of documents for Owner's Engineer review shall occur in accordance with section 6.2, noting that the Owner's Engineer:

a. Is **not** accountable for delivering activities nominated in sections 4.3 and 4.4.

b. Shall not be considered by the Design Consultant or Constructor as being part of their quality management processes.

c. Shall be considered as part of the engagement process required during design development, which is to be guided by project requirements[5]

d. **Does not** relieve the Designer or Constructor of their responsibilities and obligations under the Contract for the suitability and performance of their design against project requirements (including SA Water's Technical Governance).

e. Is **not** liable or responsible, **even after completing reviews**, for errors, deficiencies, defects or omissions in the Designer or Constructor's documentation.

f. Is **not** obliged to accommodate accelerated review times to relieve schedule pressures attributable to variables within either the Designer or Constructor's control (for example, late submissions of design deliverables, quality management issues, scheduling etc.).

    i. Acceptance of any accelerated review shall **only** be with agreement of the Owner's Engineer, per section 6.2.2.

[4] In land development projects, this role is undertaken by the Approved Superintendent.

[5] Failure of the Designer or Agent to engage with the Owner's Engineer (where this role is present on a given project) prior to the 30% design review gate without an approved TDRF (subject to the provisions of section 6.2.3) will be considered a non-conformance with this Technical Standard.

4.3 Quality management requirements

4.3.1 General

Management of design quality is essential to achieving safe, functional and value for money outcomes in the design of SA Water infrastructure. To ensure this, Design Consultants designing SA Water infrastructure shall:

a. Maintain a Quality Management System (QMS), which:
    i. For SA Water capital projects, is third party certified to ISO 9001
    ii. For Land Development projects,
        i. is third party certified to ISO 9001(preferred)
        ii. demonstrates compliance with AS/NZS ISO 9001 as determined by a second party audit in accordance with AS/NZS ISO 19011 (not preferred)[6]

b. Ensure the capability and experience of Designers assigned to design engagements is proportional to the technical risk and complexity of the design being undertaken.
    i. Design Consultants shall utilise a technical risk classification system (specific to their organisation), to manage the experience, capability and competence of design personnel.
    ii. SA Water requires that projects which are of a high technical risk or complexity to have more experienced people deployed for design, review and verification activities, compared to projects with lower technical risk or complexity.

c. Have a design and verification procedure which achieves the purpose and outcomes described in this section.

d. Implement system/s (for example, training and development, skills matrices, succession planning etc.) to ensure the capability and experience of staff used for SA Water projects continues to be maintained in accordance with this Technical Standard

e. Have a procedure to ensure that all comments/actions from design reviews (including design verification) and SiD workshops (including other safety in design activities such as HAZOPs, CHAZOPs etc.) are closed appropriately.

f. Provide appropriate and traceable document version control (refer section 4.4)

SA Water reserves the right to audit and/or request evidence of the application of a Design Consultant's quality systems (including an Agent who is acting as a Designer) at any time, to ensure that all requirements of this Technical Standard are being satisfied.

[6] This is a grandfathered provision for existing Approved Consultants and will not be accepted for new applicants.

4.3.2 Design review and verification

Design review and verification is a critical activity that provides safeguards against technical errors, omissions or inconsistencies that may result in design/project/safety/performance outcomes not being achieved.

4.3.2.1 General

SA Water considers a robust design review and verification process to be the cornerstone of a Design Consultant's QMS, to ensure appropriate quality assurance and technical peer review is undertaken and can be demonstrated in the design of SA Water infrastructure.

Documented evidence of design review and verification having been completed shall accompany all design deliverables issued by the Design Consultant. As a minimum, this shall consist of:

1) Document version control which nominates who has undertaken the individual roles within the design and verification process.
2) Submission of documentation demonstrating compliance with the Design Consultant's QMS (for example, checklists, reports, forms, registers etc.)

This evidence constitutes a **WITNESS POINT** under this Technical Standard, and is to be provided as follows:

a. For Land Development projects, evidence to be provided at each instance of submitting a design for audit
b. For SA Water capital projects, evidence to be provided at each design review gate and when designs are issued for acceptance.

Where it is evident that the quality of the review and verification process for submitted deliverables does not satisfy this Technical Standard (or is absent), a non-conformance may be raised.

Reviewers and Verifiers shall also:

a. Only undertake review/verification activities in their area/s of competence, in accordance with their professional engineering body's code of ethics. For example, an electrical engineer shall not review or verify structural drawings.
b. Provide their name (not initials), post nominals (for example, CPEng, RPEng, etc.) and membership/registration number on all deliverables submitted to SA Water (per SA Water's Project Requirements) that they have reviewed/verified.

As of the **1st of July 2026**, Reviewers and Verifiers of SA Water infrastructure designs shall be Chartered Professional Engineers (CPEng), or equivalent (for example, RPEng) who are registered with a recognised professional engineering body in Australia.

4.3.2.2 Internal design review

The internal design review is a quality process to be used by the Design Consultant to confirm that specified requirements, standards and criteria of the reviewed design element, product or associated output have been met.

An internal design review of all design deliverables (including drafting) is to be undertaken by the Reviewer to ensure the suitability and completeness of the output. Internal design reviews shall include, as a minimum, confirmation that the design:

a. Represents a robust, safe, functional and durable infrastructure which achieves the objectives of SA Water's Project Requirements.
    i. This requirement applies to the design as a whole, as well as for each contributing engineering discipline
b. Is technically sound, constructable, commissionable and operable.
c. Demonstrates that appropriate coordination of design interfaces (particularly for multidisciplinary projects) has occurred
d. Has used appropriate/current design methods, references, systems, and equipment
e. Is based on appropriate and acceptable design inputs. That is, the output complies with, and is traceable to, the inputs.
    i. For example, modelling parameters/boundary conditions, geotechnical investigations, site surveys, product datasheets, environmental/cultural heritage assessments, land use planning etc.
f. Is consistent with other design and construction activities on the project.
g. Is free of errors (whether computational, drafting or otherwise), omissions, conflicting/contradictory information and non-conformances
h. Contains correct and current references to other documentation (internal and external to the design output)
i. Satisfies the requirements of SA Water's Technical Governance, Australian and International Standards (as appropriate to the project) or has been granted formal approval to deviate from these requirements in accordance with section 2.2.
j. Complies with all legal and statutory requirements
k. Conveys information such that the intent of the Designer is understood by the Constructor and
l. Complies with SA Water's standard formatting requirements/style guide.

Internal design reviews may be undertaken at any time during the development of a design. However, prior to issuance of any design deliverables to SA Water for review/audit, evidence of the design review having been undertaken shall be provided in accordance with section 4.3.2.1.

4.3.2.3 Design verification

Design Verification is a risk mitigation process used to confirm that the reviewed design outputs satisfy SA Water's Project Requirements and shall be conducted by the Verifier.

The scope of the verification is to perform a wholistic assessment of the design against the project design criteria, with activities as described in section 4.2.5. Design Consultants are expected to implement systems to ensure design outputs consistently satisfy SA Water's Project Requirements.

Projects with low technical complexity may seek approval to reduce or omit design verification via a TDRF. Such submissions, along with requiring endorsement of the Project Sponsor, shall reference how technical risk is to be managed if verification is not to occur.

4.3.3 Design authorisation

Authorisation of a design output represents the final stage before issuing design deliverables for acceptance to the SA Water Representative[7]. Prior to transmitting any issued for acceptance drawings and other finalised design outputs (for example, calculations, documents, reports and other design related documentation), documents must be signed by the Authoriser to warrant that necessary checks have been undertaken.

Intermediate documents moving through design development and design review gates, are not required to be formally authorised, although version control shall be provided.

4.3.4 Design validation

The purpose of design validation is to confirm that SA Water's Project Requirements will be satisfied by the design. This process differs from design verification in that it occurs over multiple phases of an infrastructure project, starting with design and ending with the completion of commissioning. The ultimate aim is to:

a. Ensure that what is being built during the construction phase matches the design intent through the provision of construction phase support (refer section 4.2.3.2)

b. Validate (via commissioning and as constructed drawings) that infrastructure satisfies SA Water's Project Requirements in:

   i. Having been built in accordance with the design.[8]

   ii. Functioning in accordance with the design intent[9]

The Agent may assume the responsibilities of part a) above, subject to the conditions of section 4.2.3.2. However, responsibility for part b) is vested with the Design Consultant and shall only be carried out by competent personnel operating within their area/s of expertise.

4.4 Document management

SA Water requires all design documents prepared for its infrastructure to incorporate document control principles across their development, publication and subsequent revision. This section provides minimum requirements for document control across design report outputs (including design reports, calculations etc.) and design drawings.

4.4.1 Document revision

The revisions of design deliverables shall follow the following convention:

a. Minor revisions are to be used during the review/verification process or at design review gates etc., and shall increase in 0.1 increments

b. Major revisions are to be used at design milestones (for example, issued for acceptance) and shall increase in 1.0 increments.

For example, a drawing at the 30% design review gate that has been revised twice to that point (during the review and verification process) would be revision 0.3.

[7] For land development projects, this is managed via the audit process defined in section 5.5.1.3.

[8] This is intended to function as a Designer's review of as constructed drawings, to provide written confirmation that they represent construction of infrastructure as designed. The Designer is not responsible for the accuracy of the as constructed drawings, unless engaged accordingly. Any lack of detail in as constructed drawings that impacts the provision of this confirmation shall be raised by the Designer with the Constructor for resolution. Where a non-conformance with the original design is identified (whether by construction defect or design changes not authorised by the Designer), the Constructor shall raise a non-conformance, which shall be addressed in accordance with TS 0105.

[9] Where commissioning plans are used to bring infrastructure into service, the Designer is to provide written confirmation that the results of the commissioning plan represent operation of infrastructure as designed. Designer presence on site shall satisfy the requirements of section 4.2.3.2.2.

4.4.2 Design reports

All design reports shall be provided with document control as shown in Table 5 (details of inputs required are provided in italics). For large, multi-discipline engagements, there may be multiple lines within one revision to reflect the various engineering disciplines involved. However, only one individual may act as the document authoriser.

Definitions of the roles and responsibilities of those contributing to the document are defined in section 4.2.

Table 5: Document Control (Reports)

Revision	Date	Designer	Reviewer	Verifier	Status
0.1	*dd/mm/yy*	*Given Name, Surname* *Title* *Organisation*	*Given Name, Surname, Post nominals* *Title* *Registration no.*(1) *Organisation*	*Given Name, Surname, Post nominals* *Title* *Registration no.* (1) *Organisation*	*Draft*
0.2	*dd/mm/yy*	*Given Name, Surname* *Title* *Organisation*	*Given Name, Surname, Post nominals* *Title* *Registration no.* (1) *Organisation*	*Given Name, Surname, Post nominals* *Title* *Registration no.* (1) *Organisation*	*Issued for 30% review*
Authorised by(2,3):					

Notes:

1) Engineers Australia membership number or equivalent.
2) This is the Authoriser as defined in section 4.2.6
3) Design acceptance is sought per section 6.2.6.

4.4.3 Design drawings

Design drawings shall comply with the requirements below and for the design panel, adopt the naming convention of 'first name initial', 'full stop', 'full surname'. For example, 'John Drafter' would be written as 'J. DRAFTER'.

In design drawings, document revision information shall be recorded in the revision panel as the design progresses, in accordance with TS 0100.

SA Water uses an automated drawing management system (Meridian/Lunr) to ensure consistency and traceability of design drawings delivered as part of SA Water infrastructure projects. The specific requirements of drawings being entered into Meridian/Lunr is defined in TS 0100, with definitions of roles and accountabilities to be as defined in this Technical Standard.

4.4.3.1 Land development projects

Design drawings for land development projects shall be prepared and submitted in accordance with TS 0523.

4.4.4 As constructed drawings

Creation and submission of as-constructed drawings serves an essential quality assurance activity that validates that the design has been constructed in accordance with the IFC documentation. In addition, it provides SA Water with crucial information to identify the location and orientation of constructed infrastructure for future reference.

Preparation of as constructed drawings by the Designer is not a mandatory requirement. However, as constructed drawings shall be:

a. Developed in accordance with the quality requirements of this Technical Standard

b. Developed and submitted in accordance with TS 0100, TS 0130, TS 0134 and TS 0523 (as applicable)

c. Checked by the Designer and provided with written confirmation that infrastructure has been constructed in accordance with the issued for construction drawings[10]

4.4.5 Changes to final/IFC documentation

After being Issued For Construction, design deliverables may not be altered or deviated from without a written **HOLD POINT** release from both the Representative and the Designer. This approval shall be sought using a change management process, which includes (as a minimum):

a. Documented engagement with impacted project stakeholders

b. Confirmation from the Designer of the suitability of the change, relative to satisfying SA Water's Project Requirements

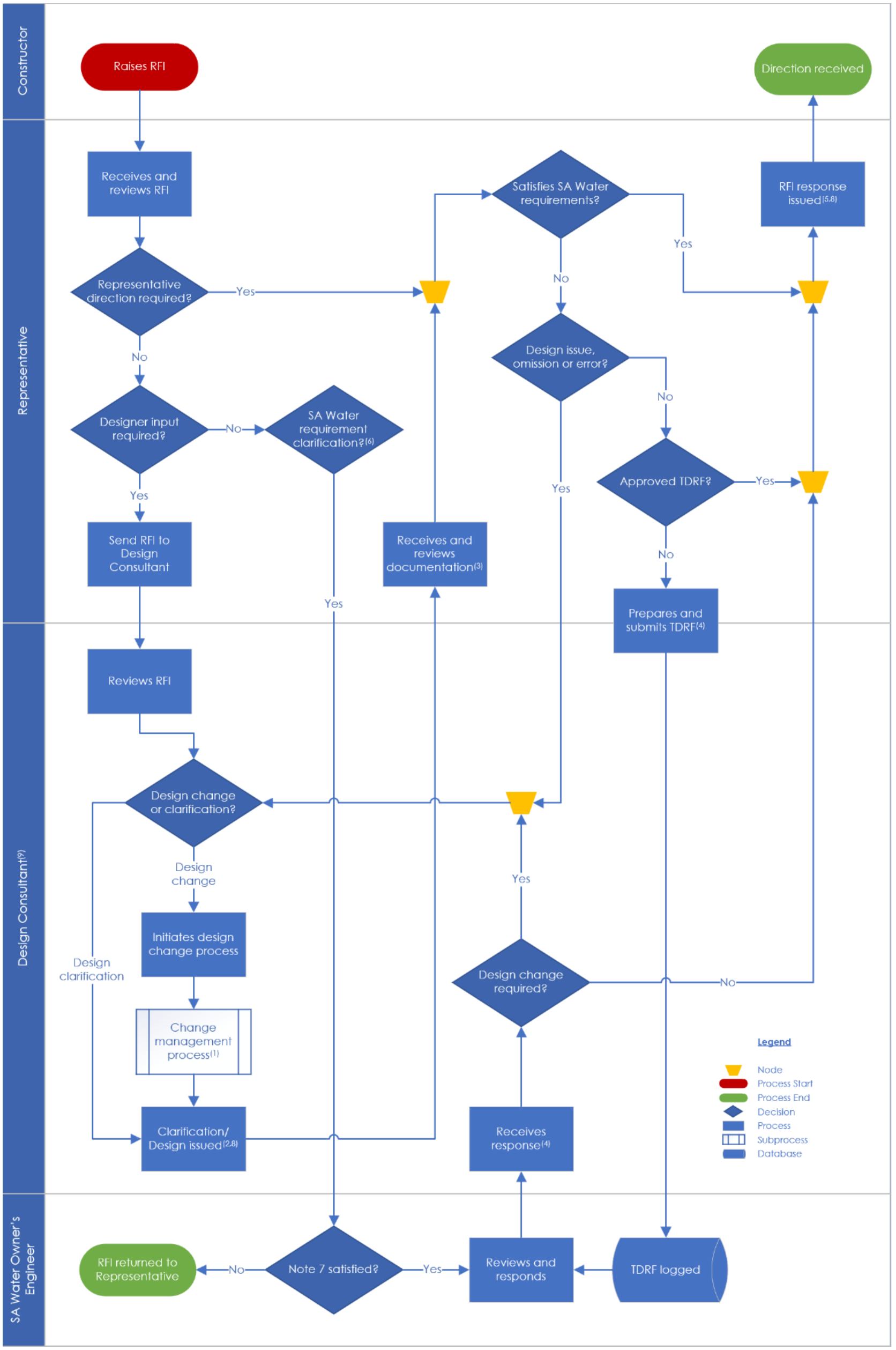
c. Systematic identification and documentation of the impact of the change, per TS 0101

d. Version control of impacted documents which complies with this Technical Standard.

A flow chart highlighting the steps in this process stemming from an RFI is shown in Figure 1.

[10] This is intended to function as a Designer's review of as constructed drawings, to provide written confirmation that they represent construction of infrastructure as designed. The Designer is not responsible for the accuracy of the as constructed drawings, unless engaged accordingly. Any lack of detail in as constructed drawings that impacts the provision of this confirmation shall be raised by the Designer with the Constructor for resolution. Where a non-conformance with the original design is identified (whether by construction defect or design changes not authorised by the Designer), the Constructor shall raise a non-conformance, which shall be addressed in accordance with TS 0105.

Figure 1: RFI initiated change management process



Notes:

1) Refer section 4.4.5
2) Updates may be provided as red line markups. However, these must be captured in as constructed drawings as being authorised changes, per section 4.4.5
3) This represents a check of deliverables from the Design Consultant, noting this does not relieve the Design Consultant of their responsibilities or obligations to ensure SA Water requirements are satisfied.
4) During the construction phase of Land Development projects, TDRF's are managed by the Representative.
5) For Land Development projects, formal instruction to the Constructor shall be provided via the Developer
6) Requirement may be SA Water Project Requirements or Technical Governance
7) If clarification of a requirement is to be sought from SA Water's Owner's Engineer/Responsible Discipline Lead, this must be presented as options based on the different interpretations available. Submissions seeking a solution from the SA Water will not be accepted.
8) For Land Development Projects, the Construction Services Technical Officer, Account Manager and Reticulation Networks are to be copied in on correspondence
9) For SA Water capital works, interface with the Design Consultant is via the Agent.

4.4.6 Digital signatures

Digital signatures shall be used for all design deliverables where signatures are required. As a minimum, the details within the digital signature shall be presented in the following order:

a. Full Name
b. Signature
c. Title
d. Organization[11]
e. Date

An important distinction between digital signatures and electronic signatures is that the latter are not validated for authenticity. An electronic signature is simply an electronic representation of a person's signature, whereas a digital signature contains a unique digital identifier to verify its authenticity.

4.5 Environmental and sustainability considerations

Along with complying with all relevant legislative and regulatory requirements, the Designer shall consider the following (where applicable) during the development of a design:

a. Accounting for impacts of climate change and flooding, per TS 0109.
b. Minimising noise and vibration impacts, particularly during operation and construction
c. Minimising impact to native vegetation.[12]
d. Prioritising the preservation of cultural heritage and areas of cultural significance
e. The South Australian Planning and Design Code (refer https://code.plan.sa.gov.au)
f. Adopting principles of sustainable design provided in TS 0109
g. Reducing waste by using/reusing/incorporating existing infrastructure into the new design, where technically and economically appropriate.
h. Utilising design features (where technically appropriate) that can be constructed using less invasive construction techniques (for example, hydro excavation or trenchless techniques) to minimise disturbance of nearby trees and sensitive buried assets.
i. Adopting water sensitive urban design principles to manage site stormwater runoff.

[11] Typically, the Designer's direct employer, unless otherwise agreed in a secondment arrangement

[12] Any removal of native vegetation may require a native vegetation impact assessment.

5 Design requirements – land development

This section outlines SA Water's specific requirements for designs prepared for land development projects, which are delivered via a DAFI.

5.1 Review and issue of designs

For Land Development infrastructure delivered via a DAFI, in addition to the requirements of TS 0101 and TS 0523, interface and engagement with key project stakeholders shall be undertaken in accordance with SA Water's "*Major Land Developments Safety in Design Management Plan*", which is available on the SA Water website.

5.2 Use of consultants

Land developers shall only engage:

a. SA Water Approved Consultants to prepare designs for new water/sewer infrastructure (in accordance with Table 6) and

b. SA Water Approved Superintendents to oversee construction activities.

The requirements and application process for these consultants is presented in sections 5.3 and 5.4 respectively, along with the criteria against which their performance is evaluated and managed.

Land developers engaging these companies are advised that SA Water makes no guarantees or warranties regarding the performance, commercial practices or financial status of these companies, and expects appropriate due diligence be undertaken prior to engaging their services.

5.2.1 Sub-consulting requirements

An Approved Consultant may only engage sub-consultants for land development projects where these are:

a. Another Approved Consultant, with a performance rating level of 1 or 2 at the time of engagement or

b. A member of SA Water's panels (refer section 3.1)

The use of sub-consultants does not absolve the Approved Consultant of their design accountabilities under this Technical Standard, and they remain accountable for ensuring the quality management requirements of section 4.3 are satisfied.

5.3 Approved Consultants for land development

Approved Consultants for land development are consultants who are approved to undertake design of SA Water infrastructure for works delivered under a DAFI.

SA Water maintains an Approved Consultants rating list, which can be found on the SA Water website.

For continued inclusion on the list of Approved Consultants, a consultant is required to:

a. Consistently perform at a rating level of 1 or 2

b. Be actively participating in design for water and sewer infrastructure, over a 24-month period **and**

c. Satisfy Quality Management System certification and insurance requirements

SA Water Approved Consultants are only authorised to prepare and submit designs as permitted in Table 2. The design of this infrastructure must comply with the requirements of SA Water's Technical Governance, relevant national standards and WSAA codes (including SA Water supplements to these).

5.3.1 Application process

Applications to become an Approved Consultant will only be accepted when applications are listed as being open on the SA Water website. Applicants shall be familiar with SA Water's technical requirements **prior** to making an application.

To be considered for accreditation, applicants must:

a. Provide details and evidence of appropriate qualifications and experience for all key personnel undertaking the applicable functions nominated in section 4.

b. Provide a copy of the company's Quality Management System certification (refer section 4.3.1)

c. Provide Public Liability and Professional Indemnity insurance certificates of currency

d. Demonstrate experience in design projects of various levels of complexity

e. Provide copies of designs **and** safety in design hazard registers for three projects of similar complexity to the design of SA Water infrastructure

f. Not have been removed from SA Water's Approved Consultant's rating list within the last 18 months.

SA Water will interview the applicant and may request further information to determine capability to perform at the required standard.

5.3.2 Application outcomes

SA Water will provide a written response regarding the outcome of an application to become an Approved Consultant based on the evaluation criteria in Table 6.

Table 6: Approved Consultant Evaluation Criteria

Criteria	Requirement
Personnel	Suitably qualified and experienced key personnel, per section 4.2 inclusive
Quality Systems	Satisfies the requirements of section 4.3.1
Insurance	Sums insured consistent with the requirements of Annexure A of SA Water's Land Development Agreement
Experience	Proof of extensive involvement in at least 3 relevant design projects, with all supporting documentation provided
Quality of design documents	**No** Major non-conformances and **two or less** minor non-conformances in submitted design deliverables (refer Table 9).
Client References	Positive notes about the applicant/applicant's agency and the work carried out

Where applications are successful:

a. SA Water will update the Approved Consultant Rating List to include the successful company.

b. A newly listed Approved Consultant will initially be rated at level 2.

Where information submitted in the application does not satisfy SA Water's requirements, applications will be rejected, and applicants will be ineligible to make another application for a period of not less than 12 months. This decision is final and is not subject to appeal.

5.4 Approved Superintendents for land development

Approved Superintendents for Land Development are consultants who support works in accordance with Annexure D of SA Water's DAFI and this Technical Standard.

The Superintendent must be:

- Qualified, competent and experienced in undertaking the role in water and sewer infrastructure
- Not be the same as the Approved Consultant used for design.

Only SA Water Approved Superintendents may undertake this role and must be listed as an Approved Superintendent on the date on which the Developer signs the DAFI.

The role of the Approved Superintendent is to:

a. assess and approve the construction programme proposed by the Constructor(s)

b. assess the Constructor's quality assurance processes and quality assurance documentation records, to ensure compliance with project and SA Water requirements.

c. report at least monthly to the Principal, and SA Water, of:

    i. progress against the contract programme(s), and

    ii. quality performance against SA Water's requirements

d. conduct surveillance activities in the field (in addition to site meetings) to verify SA Water requirements are being satisfied

e. ensure proposed and actual construction practices/procedures are consistent with SA Water requirements

f. assess the quality of materials and workmanship in accordance with the contract documents and SA Water requirements

g. provide technical direction to the constructor relating to design, standards and construction methodology

h. assess progress claims and issue progress certificates

i. direct variations to the work under the contract

j. assess claims for extra payments for variations to the contract

k. assess claims for extra payment such as claims relating to latent conditions

l. assess claims for extension of time

m. foster sufficient and appropriate interface between the Designer and Constructor, to ensure accountabilities and responsibilities in designing and constructing infrastructure are correctly managed

n. support the successful delivery of infrastructure to SA Water by **proactively**:

    i. managing risk

    ii. addressing issues (whether quality, safety or otherwise) before and as they arise

    iii. supporting an effective quality assurance process (inclusive of raising/closing non-conformances identified during construction)

    iv. reviewing the practices used by Constructors to identify and address any shortcomings before infrastructure is built and

    v. supporting any defect rectification works that may be required.

5.4.1 Application process

Applications to become an Approved Superintendent will only be accepted when applications are listed as being open on the SA Water website. Applicants shall be familiar with SA Water's technical requirements **prior** to making an application.

To be considered for accreditation, applicants must:

a. Provide details and evidence of appropriate qualifications (for example, degrees/certificates in civil engineering and/or construction etc.) and experience for all key personnel.

b. Provide details of Public Liability and Professional Indemnity insurances held

c. Demonstrate experience in water/sewer infrastructure projects of various levels of complexity

d. Provide client references for previous Superintendent engagements

e. Not have been removed from SA Water's Approved Superintendent's rating list within the last 18 months.

SA Water will interview the applicant and may request further information to ascertain the applicant's capabilities to perform at the required standard.

5.4.2 Application outcomes

SA Water will provide a written response regarding the outcome of an application to become an Approved Superintended based on the following evaluation criteria shown in Table 7:

Table 7: Approved Superintendent Evaluation Criteria

Criteria	Requirement
Personnel	Suitably qualified and experienced key personnel
Insurance	Sums insured consistent with the requirements of Annexure A of SA Water's Land Development Agreement
Experience	Proof of extensive involvement in at least 3 relevant infrastructure projects
Client References	Positive notes about the applicant/applicant's agency and the work carried out

Where applications are successful:

a. SA Water will update the Approved Superintendent rating list to include the successful company.

b. A newly listed Approved Superintendent will initially be rated at level 2.

Where information submitted in the application does not satisfy SA Water's requirements, applications will be rejected, and applicants will be ineligible to make another application for a period of not less than 12 months. This decision is final and is not subject to appeal.

5.5 Performance management

5.5.1 Approved Consultants and Approved Superintendents

SA Water manages the performance of Approved Consultants and Approved Superintendents for land development via classification ratings, which are released quarterly. Details of how this process functions for each are described below and **apply only for these consultants**.

5.5.1.1 Classification structure

SA Water has a three-level structure for rating its Approved Consultants and Approved Superintendents, which is based on audits and performance criteria shown in Table 9 and Table 11. Based on performance, a rating level of 1, 2 or 3 will be allocated, which will last for the following three months.

The rating levels are as follows, with the performance thresholds required to achieve each rating provided in Table 10.

Level 1 - Outstanding

- Approved Consultant/Superintendent has performed at a high standard against the requirements of this Technical Standard.

Level 2 - Acceptable

- Approved Consultant/Superintendent has not achieved the standard to be rated Level 1 but have still performed at a level which justifies their continued accreditation.

Level 3 - Unacceptable

- Approved Consultant/Superintendent has not fulfilled the requirements of this Technical Standard. The consultant will be permitted to complete development works for which they have already been formally engaged as a final opportunity to demonstrate improved performance, before being removed.

Asterisk (*)

- Where an Approved Consultant/Superintendent has not been active in land development infrastructure projects during the previous 12-month period, they will be assigned an asterisk in place of a level rating.

Hash (#)

- Where an Approved Consultant/Superintendent has not been active in land development infrastructure projects during the previous 18-month period, they will be assigned a hash in place of a level rating.

5.5.1.2 Movement between rating levels

Movement between levels will be based on the outcome of the quarterly performance reviews as follows:

a. Where a consultancy has achieved the standard to be rated level 1:
   i. A level 1 consultant will remain at level 1
   ii. A level 2 consultant will be elevated to level 1

b. Where a consultancy has not achieved the standard to be rated level 1, but satisfied the requirements of level 2:
   i. A level 1 consultant will be adjusted to level 2
   ii. A level 2 consultant will remain at level 2

c. Where a consultancy has performed below an acceptable level:

i. A level 1 **or** level 2 consultant[13] will be adjusted to level 3.

ii. SA Water will contact the consultant to provide an opportunity to discuss improvement plans.

Where poor performance continues, the consultant will be removed from SA Water's rating lists[14]. From this point the consultant is only permitted to complete development works for which they have already been formally engaged.

5.5.1.3 Audits

SA Water collects performance data on its Approved Consultants and Approved Superintendents via audits on designs and site performance respectively.

5.5.1.3.1 Approved Consultants

Approved Consultants are required to submit designs for technical audit by SA Water for performance to be evaluated.

Upon submission for audit, designs and supporting information will be assessed for conformance with SA Water's Technical Governance, and against the performance criteria shown in Table 9. The resulting scoring will then be used to inform consultant ratings at the end of the performance review period. An example of how this scoring is applied provided in Table 8.

Table 8: Audit outcome - example

Audit Number	First submission	Second submission	Level Rating Calculation(2)
Description of Audit Outcome	No major technical non-conformances. One minor technical non-conformance and minor deficiencies in SiD documentation noted. Design will require resubmission.	Submission complete, with no technical non-conformances. SiD documentation satisfies requirements. Design accepted.	A = 1.80 (Lvl 2) B = 1.88 (Lvl 2) C = 2.50 (Lvl 1) D = 1.90 (Lvl 1) **Rating: Level 2**
Scoring(1)	A = 1.80 B = 1.25 C = 2.50 D = 1.80	A = 1.80 B = 2.50 C = 2.50 D = 2.00	
Scoring Notes	Scoring for metric A reduced as design will be returned.	Scoring for metric A retained previous audit, as submission now satisfies SA Water requirements without further returns being necessary.	

Notes:

1) Scoring per Table 9
2) Rating per Table 10

SA Water's audit is **not** a design review (accountability for which remains with the Design Consultant) [15], and SA Water's expectation is that Approved Consultants ensure their technical capability is managed in order to achieve the required quality of design output.

[13] Unacceptable levels of performance will result in a level 3 classification, regardless of original classification.

[14] Performance considered by SA Water to be egregious will result in removal after one written warning.

[15] As such, once the lowest score for a given performance metric is reached, SA Water's auditors will no longer examine the drawings against that metric (for example, when one major non-conformance is found during an audit, the SA Water auditor will not identify any further major technical non-conformances that may be present).

5.5.1.3.2 Approved Superintendents

SA Water will conduct audits of project quality documentation at the commencement and conclusion of projects, to evaluate Approved Superintendent performance coupled with other performance metrics as shown in Table 11. The resulting scoring will then be used to inform consultant ratings at the end of the performance review period.

5.5.2 Performance management

SA Water's performance review process for Approved Consultants and Approved Superintendents is undertaken quarterly, to promptly identify and reflect changes in performance[16] and/or activity levels in SA Water's published documents.

In the event of decreased performance or activity, this process aims to provide an opportunity to improve performance and/or activity levels over the following performance cycle, and for ratings to be updated promptly based on the outcome of these efforts.

5.5.2.1 Performance review criteria – Approved Consultants

Performance reviews described above will use the metrics shown in Table 9 below.

Table 9: Performance metrics (Approved Consultants)

Metric	Description	Weighting	Scoring key	Score
A	Audit Cycles *(no. returns before a satisfactory result, per design)*	30%	10: Design accepted on first submission	3.0
			6: Design returned once	1.8
			3: Design returned twice	0.9
			0: More than twice(2)	0
B	Quality of SiD documents	25%	10: SiD Process has been applied and is supported by detailed and accurate information	2.5
			5: SiD Process has been applied, however there are minor deficiencies in the supporting information	1.25
			0: SID process has been superficially applied or there is incomplete or undeveloped information submitted	0
C	Major technical non-conformances(1) *(per design)*	25%	10: No major non-conformances	2.5
			0: One or more major non-conformances	0
D	Minor technical non-conformances(1) *(per design)*	20%	10: No minor non-conformances	2.0
			9: One minor non-conformance	1.8
			8: Two minor non-conformances	1.6
			0: More than two minor non-conformances	0

Notes:

1) Refer Appendix B for details of major and minor technical non-conformances.
2) Where designs have not achieved SA Water acceptance within two audit cycles (due to the presence of non-conformances etc.), designs shall be certified as complying with SA Water requirements by a member of SA Water's Engineering Panel prior to resubmission to SA Water for audit.

[16] It shall be noted that the complexity of jobs is not considered as a factor during the performance review process, as SA Water's expectation is that consultants will allocate the appropriate resources and expertise required.

5.5.2.2 Rating level calculation – Approved Consultants

Consultant ratings for the period under review are calculated as an average score per performance metric, which is compared to the thresholds in Table 10 to determine rating level. The rating level will be assigned based on the metric for which the lowest score is achieved (that is, to achieve a level 1 rating, **all** metrics must achieve a score at that level).

Table 10: Rating score thresholds (Approved Consultants)

Metric	Description	Required Score		
		Level 1	Level 2	Level 3
A	Audit Cycles	A ≥ 2.40	1.80 ≥ A < 2.40	A < 1.80
B	Quality of SiD documents	B ≥ 2.20	1.25 ≥ B < 2.20	B < 1.25
C	Major technical non-conformances	C ≥ 2.20	1.60 ≥ C < 2.20	C < 1.60
D	Minor technical non-conformances	D ≥ 1.80	1.60 ≥ D < 1.90	D < 1.60

5.5.2.3 Performance review criteria – Approved Superintendents

Performance reviews described above will use the metrics shown in Table 11.

Table 11: Performance metrics (Approved Superintendents)

Metric	Description	Weighting	Scoring key	Score
A	Quality Assurance – Inception[1]	20%	10: QA documentation reviewed & free of errors/omissions.	2.0
			5: QA documentation reviewed & up to three errors/omissions still present.	1.0
			0: QA documentation not reviewed or more than three errors/omissions still present.	0
B	Quality Assurance – Completion[2]	25%	10: QA documentation collated and supplied to SA Water. Documentation is fully and correctly completed, inclusive of evidence that the Superintendent has released appropriate hold points.	2.5
			5: QA documentation collated and supplied to SA Water. Documentation contains up to five errors/omission[3]	1.25
			0: QA documentation is not collated and supplied to SA Water and/or documentation contains more than five errors/omissions[3]	0
C	Undetected non-conformances[4] *(per project)*	25%	10: All non-conformances raised and actioned by Superintendent	2.5
			0: One or more non-conformances not detected which are raised by SA Water	0
D	Technical Capability and Efficacy[5,6] *(per project)*	30%	10: All measures adequately satisfied	3.0
			5: Up to two instances of measures not being adequately satisfied	1.5
			0: More than two instances of measures not being adequately satisfied	0

Notes:

1) Superintendent has a key role in ensuring a Constructor's QA documentation (QMP, ITP's etc.) is adequate and correct at project outset. This metric reflects a review being undertaken by the Superintendent, ensuring corrections are made to any errors/omissions found, and final endorsement of the documentation for use in the project.
2) The Superintendent's role during construction is reflected in section 5.4, and at the conclusion of construction, evidence of the Superintendent's release of appropriate hold points shall be provided in the form of collated and finalised QA documentation.
3) Including any lack of evidence that the Superintendent has released appropriate hold points.
4) A measure of Superintendent efficacy on site during construction as evidenced by the proactive raising and resolution of non-conformances across their entire involvement with the project under the DAFI.
5) Factors contributing to the measurement of Superintendent Technical Capability and Efficacy include:
   a) Timely and appropriate response to RFI's
   b) Aptitude to provide technical input to the constructor to resolve construction defects/issues in accordance with SA Water requirements
   c) Demonstrated ability to proactively identify unsuitable construction techniques and ensure appropriate methods are adopted **before** infrastructure is constructed.
6) Performance criteria measured by substantiated instances of Constructors, SA Water or Developer indicating that their needs against the criteria in Note 5) not being adequately satisfied, per the requirements of section 5.4.

5.5.2.4 Rating Level Calculation – Approved Superintendents

Superintendent ratings for the period under review are calculated as an average score per performance metric, which is compared to the thresholds in

Table 12 to rating level. The rating level will be assigned based on the metric for which the lowest score is achieved (that is, to achieve a level 1 rating, all metrics must achieve a score at that level).

Table 12: Rating Score Thresholds (Approved Superintendents)

Metric	Description	Required Score		
		Level 1	Level 2	Level 3
A	Quality Assurance – Inception	A ≥ 1.7	0.80 ≥ A < 1.7	A < 0.80
B	Quality Assurance – Completion	B ≥ 2.1	0.80 ≥ B < 2.1	B < 0.80
C	Undetected non-conformances	C ≥ 1.6	0.80 ≥ C < 1.6	C < 0.80
D	Technical Capability and Efficacy	D ≥ 2.5	0.75 ≥ D < 2.5	D < 0.75

5.5.3 Activity Requirements

To maintain experience and knowledge of SA Water's requirements, SA Water expects its Approved Consultants and Approved Superintendents to be active in land development infrastructure projects, as described below.

Prior to any revocation due to inactivity, SA Water will engage with the Approved Consultant/Superintendent (usually after an 18-month period of inactivity), to provide an opportunity to increase activity levels.

5.5.3.1 Approved Consultants

Approved Consultants who submit less than three designs (inclusive of SiD requirements) during the previous 12-month period will be considered inactive. If this inactivity continues for a 24-month period, an Approved Consultant's listing will be revoked.

5.5.3.2 Approved Superintendents

Approved Superintendents who act in that role for less than three land development projects during the previous 12-month period will be considered inactive. If this inactivity continues for a 24-month period, an Approved Superintendent's listing will be revoked.

5.5.4 Ongoing Requirements

In addition to satisfying the requirements above, Approved Consultants/Superintendents shall supply the following information upon request from SA Water:

a) Documentation demonstrating continued Quality Management System certification

   i. For consultants using non-certified systems per section 4.3.1, this becomes second party audit results indicating a compliant system.

b) Certificates of Currency for Insurance

Failure to supply this information may serve as grounds for revoking approved status.

5.5.5 Appeals Process

SA Water is committed to engagement with its partners, to provide ongoing dialogue/feedback, and will work with Approved Consultants/Superintendents to provide opportunities to improve performance, per section 5.5.1.2.

However, where affording these opportunities has not resulted in the necessary improvements, SA Water reserves the right to rate or remove an Approved Consultant/Superintendent at its sole discretion.

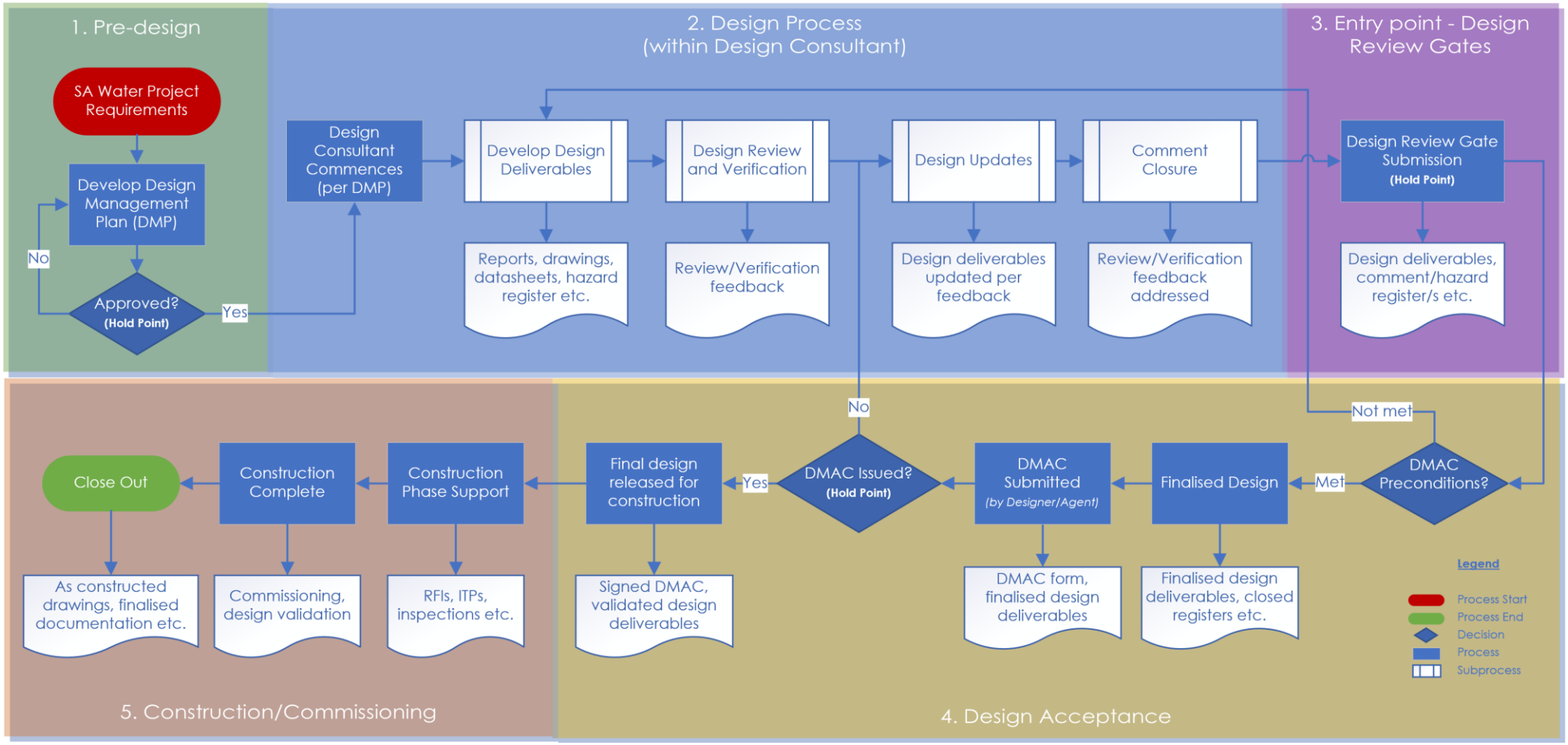
Such decisions are final and are not subject to appeal.

6 Design requirements – SA Water capital projects

This section outlines SA Water's specific requirements for designs prepared for SA Water capital works, regardless of the commercial mechanism by which they are delivered (D&C, ECI etc.).

A summary of the design process for SA Water capital works is shown in Figure 2.

Figure 2: Design process summary (SA Water capital works)



6.1 Design Management

The Design Management Plan (DMP) is a key document of a design engagement that:

- Identifies the Agent who is responsible for the design engagement
- Establishes the required design scope and deliverables (including design sequence)
- Identifies key stakeholders whose inputs are required
- Establishes the design schedule
- Enables monitoring of scope, cost and schedule of a design engagement.

The Design Consultant shall develop a DMP and submit it to the SA Water Representative at least 10 business days before design activities are due to commence. This constitutes a **HOLD POINT** under this Technical Standard.

- The SA Water Representative will engage with the Owner's Engineer for review and feedback on the DMP before releasing the hold point.

Where the Agent is a Constructor (for example, in an SA Water D&C contract), the Agent is to have been involved in developing and reviewing the DMP **before** submission to SA Water.

- Where the Agent has engaged multiple Design Consultants to undertake a design, the DMP shall be a single, combined document with input from all consultants, as well as the Agent.

The Design Management Plan is to contain the items shown in Table 13 as a minimum.

Table 13: Design Management Plan Requirements

Item	Description	Notes
1.0	Design Scope	Scope of design engagement, including reference to SA Water's Project Requirements, and any exclusions, limitations, pre-requisites etc. as required.
2.0	Investigations Required	Investigations and analysis required to complete design activities • For example, geotechnical investigation, topographical survey, dilapidation and condition assessments, materials testing, any modelling (CFD, FEA, slope stability) etc.
3.0	Roles and Responsibilities	Establishes roles and responsibilities of the design team. This shall also include detail of who is responsible for: • Design coordination between different Design Consultants and equipment vendors • Interface management activities • Review and verification activities • Undertaking design validation across the project lifecycle • Providing technical support during construction and commissioning
4.0	Resourcing	This section of the DMP is to include the following: • Details of any subcontractors or subconsultants to be used (inclusive of prior approval from SA Water in accordance with this Standard) • Composition of the design team demonstrating how capability and experience aligns with the requirements of this Technical Standard and other relevant SA Water Technical Governance[1] • An organisation chart, identifying roles and responsibilities
5.0	Design Deliverables	List of design deliverables to be produced. • Items are to be separated into elements as required by the Project/Program
6.0	Design Costs[2]	Design costs associated with design deliverables and other design activities • Items are to be separated into elements as required by the Project/Program
7.0	Additional Information to be Supplied	Additional information to be provided by the Agent (for example, hydraulic models, development approvals, environmental approvals etc.)

Item	Description	Notes
8.0	Work breakdown structure	This shall be sufficiently detailed to allow monitoring of progress against deliverables, and is to include a resource plan showing hours to be worked per individual • Appropriate allowance is to be made for review and SiD actions to be addressed and closed after designs have progressed through design review gates
9.0	Design Schedule	Including identification of meetings, design activities, review stages, production of draft and final deliverables. • Minimum review timeframes of design review gates shall also be included in the schedule.
10.0	Risks and Opportunities	Identification of project risks/opportunities and how these will be mitigated/realised • This shall also include risks and mitigations associated legislative/external approvals per section 4.5.
11.0	Key Stakeholders(3)	Key stakeholders for the development of the design • May be for input into design requirements, undertaking design reviews, temporary works/bypassing inputs, constructability/commissioning assessments etc.
12.0	Interface Management	Description of who, how and when interfaces between the Designer, Agent, key stakeholders and SA Water will be engaged, and what outcomes are required from each (for example, Constructor via a workshop at 30% design for constructability input, product vendor at 60% design for commissioning input etc.)
13.0	Quality Assurance	Design Quality Management and Quality Assurance activities being undertaken in accordance with this Technical Standard. • This should also incorporate the change management process to be adopted during the design engagement
14.0	Project Controls	Project controls to be implemented (for example, checklists, transmittals, document collation etc.) and who is accountable for these activities.

Notes:

1) Demonstration of this requirement shall also include submission of focussed CV's, showing information on comparable designs undertaken and resulting project outcomes (client feedback/referees are encouraged)
2) Design costs are not required in DMPs for works delivered via a Design and Construct or ECI contract, as these will be contained in other contract documentation.
3) Not applicable for D&C or ECI contracts (where stakeholders are nominated in SA Water's Project Requirements)

Reduction in the scope of a DMP as shown in Table 13 without an approved TDRF is only permitted when:

- SA Water is engaging the Design Consultant directly (i.e. an SA Water employee is the Agent) **and**
- The market approach does not require supply chain support, per the SA Water Market Approach Matrix in SAW-PR-0006 (internal SA Water use only).

6.1.1 Program level design management plans

Recognising that SA Water delivers programs of works across certain infrastructure types, DMP's may be generated at a program level (as opposed to individual projects), subject to the following conditions being satisfied:

- The program is for a single infrastructure type (for example, water main relays)
- SA Water's Project Requirements have been prepared on the basis of delivering a program of works and nominate the infrastructure scope accordingly
- The approach is endorsed by both the SA Water Representative and the Owner's Engineer **and**
- For all infrastructure within the program, the ACR ≤ 3.

6.1.2 Changes to design management plans

Changes to a DMP after the initial hold point is released are to be classified and actioned as shown in Table 14.

Table 14: DMP change categories

Change category	Descriptor	Approval Requirements
Major	A fundamental change to original DMP resulting in: • ≥30% of the document content being altered (as judged by the SA Water Representative), OR • Changes to Reviewer or Verifier personnel (including addition of new engineering disciplines); OR • Reduction in design deliverables, interface management or quality assurance; OR • Increased design costs	Per section 6.1
Minor	Updates to the DMP made to reflect the evolution of design requirements, which are not considered to be major changes.	Change management process to be applied. SA Water Representative to be provided with 5 business days' notice before changes are implemented. This requirement is a **WITNESS POINT** under this Technical Standard.

Where any changes to a DMP are made after the initial hold point is released, the Design Consultant shall clearly identify in their revised DMP submission:

- What changes have been made?
- Why were changes required?
- How is technical risk managed to ensure design outputs satisfy SA Water's requirements?
- Which version of the document is current?[17]

[17] Previous versions shall be superseded.

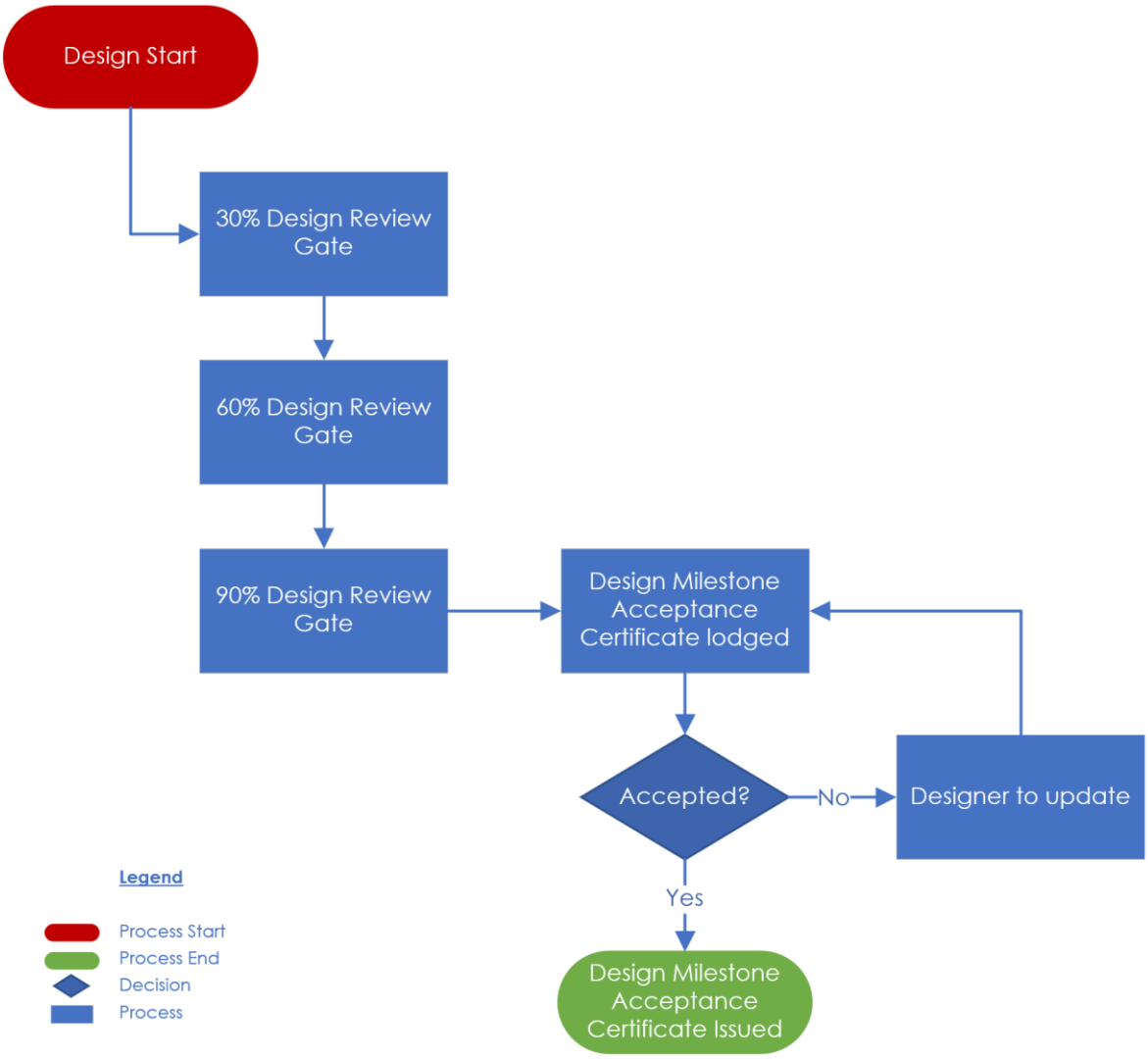
6.2 Design review and acceptance

6.2.1 Overview

Design review and acceptance is a structured process, shown in Figure 3, which is used to ensure that design deliverables are robust, coordinated, and satisfy project requirements. It provides SA Water with the opportunity to formally assess design completeness, integration, safety, and management of technical risk prior to release for construction.

This section sets out design review gates, acceptance requirements, and escalation pathways for design of SA Water infrastructure, while incorporating flexibility to scale the process in recognition of the diverse range of project scales with which SA Water delivers infrastructure.

Figure 3: Complete design review process



6.2.2 Design review gates

The design review gates provided in Table 15 each represent a **HOLD POINT** at key stages of the design lifecycle. At each gate, the Designer shall submit design deliverables (as defined in SA Water's Project Requirements) to the SA Water Representative for review and feedback, which will be returned as described in section 6.2.4.

These gates provide a structured opportunity to:

- Confirm alignment with technical, operational, and project objectives.
- Assess design completeness and integration.
- Identify and manage risk.
- Initiate value engineering and Safety in Design activities.

Where the Agent is a Constructor (for example, in a D&C contract), the design must be reviewed by the Agent prior to submission to SA Water. This may occur in parallel to the Design Consultant's internal review processes.

Table 15: Design review gates

Design review gate[1]	Description	Objectives[2]
30% Design	General arrangement and configuration of key design elements determined, to establish a realistic baseline for cost and schedule.	• Major design elements and layout established • Operational and performance requirements incorporated • Key design decisions taken • Baseline cost and schedule established • Confirmation that project objectives can be delivered within time, cost, and space constraints • Identification of all major risks, with ownership assigned and plans in place to address these.
60% Design	Technical aspects of design materially complete, to enable design refinements through review, constructability and SiD activities.	• Detailed integration of major design elements and key design decisions with supporting technical components • Demonstrated maturation of operational/control requirements and interfaces to integrate design with existing/connected infrastructure • Design computations/modelling materially complete • Pre-requisites to undertaking SiD hazard review 2 (for example, finalised equipment selections, structure dimensions etc.) satisfied. Refer TS 0101.
90% Design	Design essentially complete, excepting final refinements.	• Comments and actions from previous review gates largely (if not completely) addressed. • Design refinements from SiD activities, constructability reviews etc. implemented • Major risks demonstrably addressed • Fully resolved design incorporating finalised operational/control requirements and interfaces.

Notes:

1) These gates correspond to the level of design maturity and not necessarily linear percentage completion. Deliverables, expectations, and timing shall be proportionate to the project complexity and defined in the DMP.
2) The objectives provided represent the net outcome of the design deliverables, SiD and value management activities undertaken for a given stage of design.

A **minimum of 10 business days** shall be allowed for SA Water's review from the date a complete submission is received. This reflects the internal coordination and resource planning required across SA Water's functional areas.

Requests to vary this timeframe—while not requiring a TDRF—will be considered at SA Water's discretion, and only where all of the following conditions are met:

- The revised timeframe is formally recorded in the Design Management Plan (DMP); and
- The SA Water Representative has obtained agreement from the Owner's Engineer confirming that the proposed timeframe is achievable; and
- The review timeframe is **not less than five business days**, except where the design forms part of a formal SA Water Incident Management Team response.

Delays attributable to the Designer or Constructor **will not** be accepted as justification for requesting or imposing accelerated review timeframes on SA Water unless otherwise agreed (refer to section 4.2.7).

6.2.3 Application of design review gates

To accommodate the varying scale and risk profile of SA Water infrastructure projects, the design review gates outlined in Table 15 may be adjusted under the scenarios described below. If scenario conditions are not satisfied, design review gates shall apply per Table 15.

The following apply in all design review gate scenarios:

- The requirements of TS 0101 remain in effect and are not modified;
- The approved DMP must document which design review gate scenario has been adopted **and** provide justification for its use;
- All other relevant provisions of this Technical Standard continue to apply.

Non-conformances will be raised against both Agents and Designers who misuse these scenarios or fail to comply with the conditions of their use.

6.2.3.1 Scenario 1: Projects using SA Water Standard Drawings

The 30% and 90% design review gates may be removed without requiring a TDRF where all Works are being delivered within the scope of existing SA Water Standard Drawings.

6.2.3.2 Scenario 2: Projects using SA Water Typical Drawings

The 30% design review gate may be removed without requiring a TDRF where all Works are being delivered within the scope of existing SA Water Typical Drawings.

6.2.3.3 Scenario 3: Streamlined design review gates (TDRF not required)

The 90% design review gate may be merged with the application for design acceptance without a TDRF where **all** of the following are met:

- The project has an Asset Criticality Rating (ACR) of less than 3;
- Written agreement to merge the 90% and design acceptance hold points is reached between the SA Water Representative and the Owner's Engineer, and is documented in the approved DMP;
- All preconditions for design milestone acceptance are satisfied (refer section 6.2.5)

6.2.3.4 Scenario 4: Reduced design review gates via TDRF

Where a project does not meet the above criteria but seeks to remove one or more review gates, a TDRF shall be submitted, which **must include**:

- A clear explanation of how design risks will be managed with fewer review cycles;
- Where applicable, a sensitivity analysis showing that procurement decisions based on less mature designs will not compromise delivery of SA Water's Project Requirements;
- Where the Agent is a Constructor, acknowledgement from the Agent that SA Water will not be liable for delays or rework arising from issues that would reasonably have been identified in the removed design review gate(s).

6.2.4 Design review gate outcomes

Artefacts typically generated at each design review gate include, but are not limited to:

- Design comment registers;
- Updated Safety in Design (SiD) hazard registers (including HAZOPs, CHAZOPs etc.);
- Drawing and report markups.

Return of these artefacts by the SA Water Representative upon successful completion of the review constitutes the formal release of the corresponding hold point.

Recognising SA Water's role in supporting an efficient design gate review process, the SA Water Representative (or their delegate, such as the Owner's Engineer) will check design review gate artefacts before issue to ensure that:

- Comments are presented in a clear and concise manner;
- Items raised align with SA Water's Project Requirements and contract scope;
- Duplications, contradictions, or erroneous entries are resolved.

Comments provided as part of the design review gate process are categorised based on the severity and impact of an identified issue, as shown in Table 16.

Table 16: Review comment categories

Comment category	Issue identified[1]
1 – Major	• Non-conformance to project requirements, SA Water Technical Governance, legislation etc. • Evidence of poor design quality management (including document version control) by the Design Consultant. • Design maturity not at required level or is not supported by computational data. • Designer/Reviewer/Verifier sign-off not provided or performed by personnel who do not meet the requirements of TS 0104.
2 – Medium	• Design information incomplete/not provided • Contradictory information present • Additional detail/data/clarity required
3 – Minor	• Minor technical issues that do not materially impact SA Water Project Requirements • Suggestions for consideration/ to achieve value management outcome/s • Grammatical errors

Notes:
1) This is not to be considered an exhaustive list of design issues that may be raised.

A high incidence of category one or two comments being raised during a design gate review indicates significant deficiencies within the Design Consultant's review and verification process, which may result in SA Water:

a. Immediately rejecting the submission (with documentation returned to the Agent/Design Consultant for correction), citing poor performance

b. Raising a non-conformance where:

   i. The response from the Agent/Design Consultant is insufficient/inadequate in addressing the matters raised or

   ii. Deficiencies in the Design Consultant's review and verification process are occurring repeatedly (as established by SA Water's Engineering Panel Manager).

6.2.5 Design progression

Designs shall not progress to the next design review gate unless **all** category one and two comments have been closed. Where this is not possible due to further design development being required, comments may be left open only where:

a. They are provided with clear actions demonstrating how they are to be closed during the next design review gate, and:

b. The SA Water Representative has provided written approval (which shall be endorsed by those who have raised comments to be left open).

Closure of all applicable design gate review artefacts is a precondition for requesting design acceptance and shall consist of:

- The Designer updating design deliverables or providing other evidence to address each comment; and
- Acceptance of each resolution by the individual (or delegate) who raised the original comment.

Submissions lacking full closure of these artefacts shall be returned without review and may be raised as a non-conformance.

6.2.6 Design milestone acceptance certificate

SA Water's acceptance of final design deliverables is recorded via the Design Milestone Acceptance Certificate (DMAC), which represents the final **HOLD POINT** prior to construction. Given the criticality of its function, dispensation requests to remove this hold point will not be accepted.

Application for design acceptance must be lodged by the Agent or Design Consultant (using the form provided in Appendix F) only **after** satisfying the preconditions listed in section 6.2.5. The design milestone acceptance process functions as outlined in Figure 4.

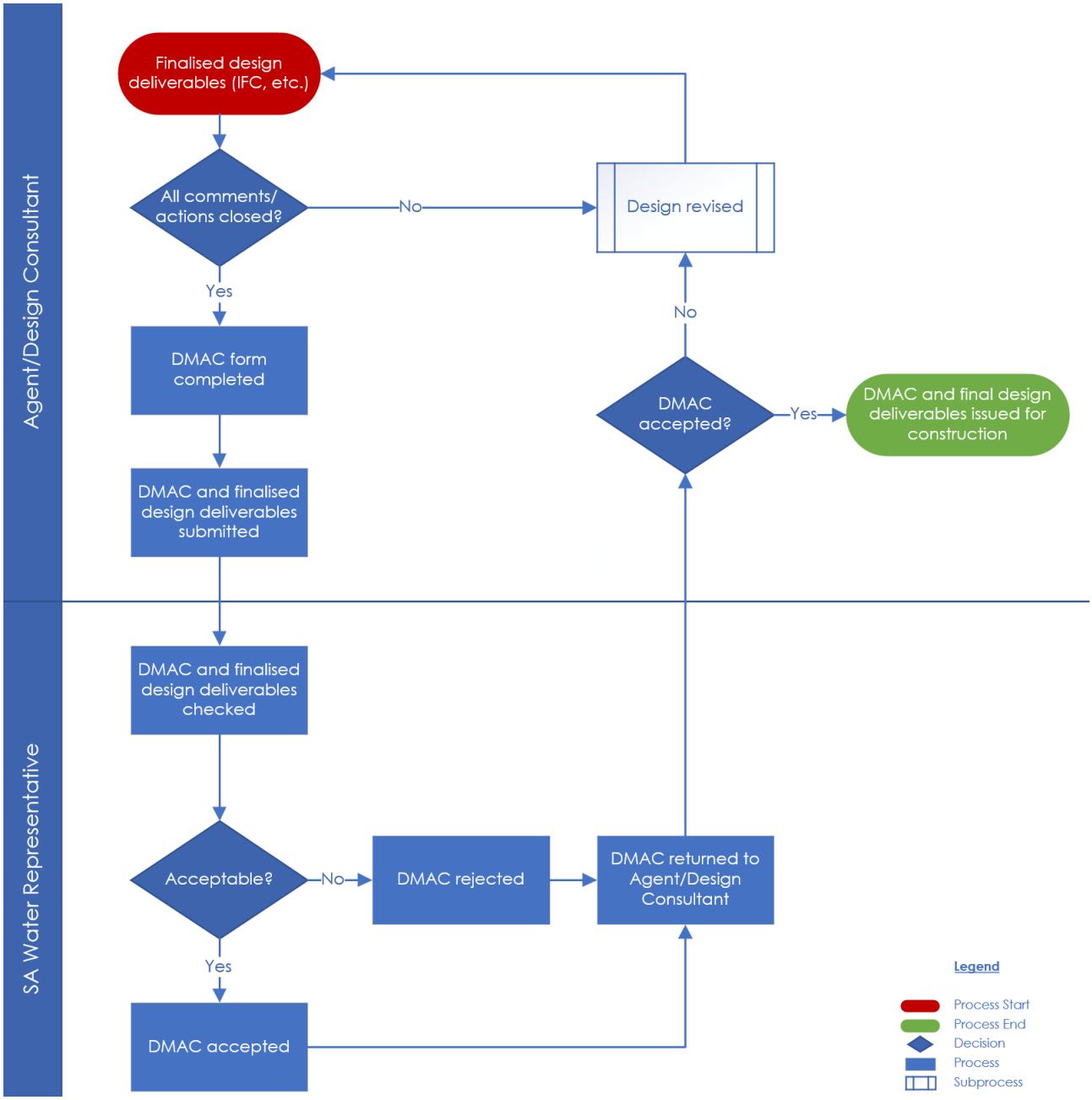
It shall be noted that design acceptance is **not an additional design review gate.** Rather, it allows SA Water to confirm that:

- All review comments, actions, and SiD activities have been closed/completed;
- Final design deliverables are fully coordinated and ready to be used for construction.

Final design deliverables (for example, design reports, IFC drawings etc.) are **invalid unless** accompanied by a DMAC which has been endorsed by the Owner's Engineer[18] and is signed by the SA Water Representative.

[18] Where an SA Water Owner's Engineer role is present on a project, per section 4.2.7

Figure 4: Design Milestone Acceptance Certificate (DMAC) Submission Process



6.2.7 Escalation of unresolved issues

Where technical or scope-related misalignments cannot be resolved through the design review or clarification process, they shall be escalated using the pathways described in

Table 17, noting that:

a. The issue shall be summarised using the template in Appendix D (noting that this is to be lodged by SA Water employees only).

b. Design liability shall remain vested with the Design Consultant.

   i. **No design liability shall transfer to SA Water as a result of an escalation unless accompanied by an approved TDRF.**

c. Where decision-makers cannot reach agreement, the SA Water Representative shall escalate the matter to the next level in SA Water's management structure.

Table 17: Escalation pathways

Issue type	Escalation	Notes
Project scope	To Project Sponsor	Further escalation may be required, subject to the impact of project scope changes relative to the delegation of the Project Sponsor (for example, on budget, level of service etc.).
Technical	To SA Water Representative, then Project Sponsor	Pathway applicable where: • There is a misalignment in technical opinion/interpretation between a stakeholder and the Designer • The technical matter is not impacted by a specific exclusion in the scope of SA Water's Project Requirements* In these situations, the Designer must provide appropriate and evidence based technical justification for their position before the matter is escalated.

*Where a misalignment arises from an exclusion or limitation in SA Water's Project Requirements, the Designer must provide contextual documentation to support resolution.

6.3 Performance management

Performance management of SA Water's Engineering and Automation Panels will be undertaken by SA Water through a combination of:

- Informal and bi-annual formal review meetings
- Ad hoc audit of quality systems and/or design outputs
- Direct feedback from projects
- Outputs from SA Water's supplier performance management tool and project closeout reports
- Non-conformances raised under section 7 of this Technical Standard.
- Audits (per section 4.3.1)

In the case of any quality issues in the delivery of a design output, the Design Consultant concerned is to be contacted directly by the project team in the first instance to provide resolution. A non-conformance shall only be raised where:

a. An issue raised is substantiated and remains unresolved/requires escalation

b. Quality concerns arise more than once on design work of the same type/scope within a 12 month period

7 Management of non-conformances

The identification of non-conformances represents a continuous improvement opportunity to address shortcoming in systems/processes/training (or a combination of all three) that have contributed to a failure in satisfying given requirements. The requirements of this section apply to all consultants undertaking designs for SA Water capital projects.

7.1 Application

The non-conformance process described below only applicable to issues arising from the work of Designers in SA Water capital works projects. Some typical examples are provided in Table 18 for guidance in the application of the non-conformance process of this Technical Standard.

Table 18: Application of TS 0104 NCR Process*

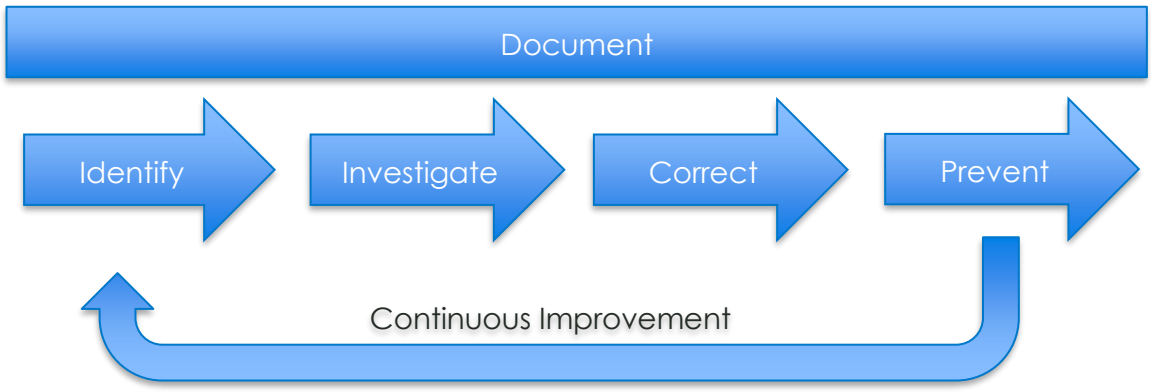
Scenario	Applicable NCR Process	Relevant TS 0104 Section	Notes
Design deliverables not in accordance with SA Water technical requirements	TS 0104	4.2 (Design responsibilities and accountabilities) 4.3 (Quality management requirements)	Refers to designs submitted to SA Water after having been reviewed and/or verified which are found to contain errors etc.
Designer seeks technical direction from SA Water	TS 0104	4.2.3 (Designer) 4.2.7 (Owner's Engineer)	Excludes clarifications sought from SA Water regarding scope, policy or application/interpretation of Technical Governance
Construction defect identified on site	Constructor QMS	N/A	
Design defect identified on site	TS 0104	4.2 (Design responsibilities and accountabilities) 4.3 (Quality management requirements)	
Construction and/or commissioning support not provided	TS 0104	4.2.1 (Agent) 4.2.3.2 (Construction phase support)	Excludes SA Water hold point releases etc. Examples may include SA Water being requested to prepare commissioning documentation or review of vendor datasheets to determine suitability.
Safety Incident	Constructor and SA Water WHS	To be confirmed at time of incident (as applicable)	TS 0104 applicability only where safety incident is the result of a failure of the design to address requirements of TS 0101

*Table is not intended to provide an exhaustive listing of non-conformance scenarios. Rather, it aims to provide a suite of examples to assist the application of the TS 0104 NCR process.

7.2 Non-conformance process

This Technical Standard adopts a structured non-conformance process as shown in Figure 5, to document activities which identify, investigate, correct and prevent non-conformances.

Figure 5: Non-conformance overview



7.2.1 Non-conformance form

Where instances of non-conformance to this Technical Standard occur (noting the exclusion provided in 3.1.4), the online form available on the SA Water Engineering AquaNet site may be utilised by the SA Water Representative (or their delegate).

Submission of a non-conformance form will trigger the workflow shown in Figure 6, the NCR will be issued to the Agent who has engaged the Design Consultant, who shall use this form (along with the corresponding reference number) to work through the non-conformance process of the Design Consultant's QMS and engage with the SA Water Representative (or their delegate) to reach agreement on its resolution.[19]

- In the event agreement on closure of a non-conformance cannot be reached, the issue may be escalated to the SA Water Engineering Panel Manager

7.2.2 Non-conformance report

The non-conformance report is a tool used to identify a non-conformance and document all investigations and actions taken with respect to that non-conformance, culminating in acceptance of the resolution by the originator (and other relevant parties).

The outcome of this process shall be a finalised non-conformance report issued to SA Water within 10 business days of the non-conformance form being issued which, as a minimum:

a. Identifies and confirms the non-conformance

b. Establishes the root cause of the non-conformance

c. Details actions taken to correct/resolve the identified non-conformance

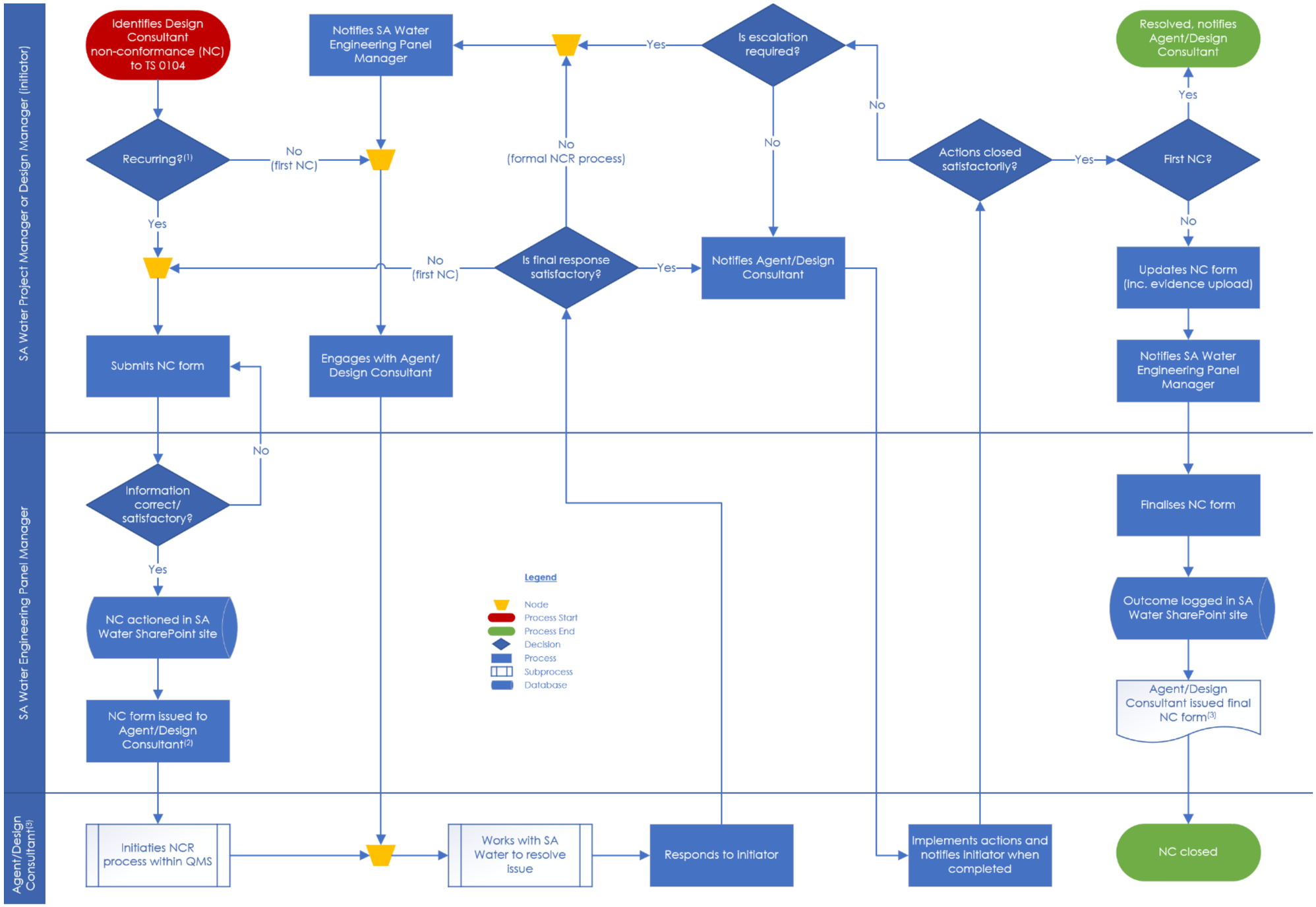
   i. Acceptance of these actions represents a **HOLD POINT,** which must be accepted and released before implementation and continuation of design development.

d. Identifies actions to prevent a recurrence, along with assigning responsibility and a timeframe for their enactment.

Once the NCR is completed, actions agreed and fully implemented, the SA Water Representative is to upload the finalised NCR to SA Water's non-conformance SharePoint site and mark it as being closed.

[19] The SA Water NCR form is intended to give SA Water visibility of TS 0104 non-conformances and is not a replacement for a Design Consultant's non-conformance process.

Figure 6: Non-conformance process



Notes:

1) Recurring non-conformance defined as one which has occurred more than once in a single 12 month period.
2) NCR documentation from SA Water will be issued to the Agent. Where the Agent is SA Water, documentation will be issued directly to the Design Consultant.
3) Only NC form will be returned to the Agent/Design Consultant.

Appendix A - Schedule of hold and witness points

Section	Type	Description
6.1	Hold	Approval of Design Management Plan
6.1.2	Hold	Approval of Design Management Plan changes
4.3.2.1	Witness	Review and verification documentation to accompany design deliverables
6.1.2	Witness	Changes to design management plans (minor)
6.2.2	Hold	Design review gates
6.2.6	Hold	Design milestone acceptance certificate
7.2.2	Hold	Approval of corrective actions (where an NCR is raised)

Appendix B - Land development design non-conformances

Guidance as to what are considered major and minor technical non-conformances for Land Development projects (across both water and wastewater design) is provided below to inform the quality assurance processes (such as design checklists) of Design Consultants, noting that:

a. This list is **not** to be considered exhaustive

b. Due to specific site circumstances, non-conformances beyond those described below may be identified during audits which will be classified as either:

   i. A major technical non-conformance, where the design:
      - Does not satisfy network design or SA Water requirements
      - Has critical design values or data which is missing, unsupported or incorrect
      - Poses a risk to public health, safety (including both SA Water personnel and the general public), environment and/or cultural heritage

   ii. A minor technical non-conformance, where the design contains errors or omissions of details which are critical to the construction, operation and/or maintenance of infrastructure

Description of non-conformance	Type
Drawing is not digitally signed by a CPEng.	Major
Design is not supported by appropriate and correct calculations (for example, hydraulic design)	Major
Drawings – Provided with incorrect title block information – Do not comply with TS 0523 – Contain leaders (for notes, details etc.) that are split across multiple sheets – Do not provide order of construction details – Contain connection notes, lines, symbols and labels do not match – Lack required symbols/Provide incorrect symbols – Do not nominate a compliant co-ordinate system and at least two survey marks – Do not provide tie points (or co-ordinates) for bends and appurtenances	Minor
Total length, diameter, material and pipe class in design: – Is not provided – Is represented incorrectly in longitudinal sections (grade, size etc.) – Is sized incorrectly – Specifies the use of products not approved by SA Water	Major
Drawing notes do not cover charge up, pressure testing or disinfection requirements	Major
Pressure zone/s: – Are not labelled – Are not isolated (where there are two different pressure zones)	Major
Chainage: – Not provided for bends, appurtenances, end fittings of stage boundaries etc. – Descriptions do not match layout plans	Minor
Air release locations not provided and/or nominated as required	Major
SA Water Systems Planning requirements not fully implemented	Major

Description of non-conformance	Type
Fireplug spacing exceeds maximum allowable distances	Major
No provision made to: – Facilitate disinfection and testing per TS 0900 – Safely and effectively construct, commission, maintain, operate infrastructure	Major
Thrust blocks are not: – Specified as required – Detailed correctly – Shown with correct symbol, chainage and description on design	Major
Clearances to other services are: – Not specified – Not compliant with the requirements of TS 0136 – Pose a risk to safety and environment	Major
Mains not available for connection: – Labelled incorrectly – Are provided with customer connections	Major
Connection details: – Are not provided with a details box – Reference connection types incorrectly – Show connection types that do not match the totals – Have non-compliant IP inverts – Do not clearly identify or specific locations of meters	Minor
Longitudinal section: – Does not provide chainages for all structures and bends – Has chainages that do not match the layout plan – Does not provide invert levels for all structures, jump ups and bends – Has branching line inverts that do not match host main inverts – Has incorrect, non-compliant grades and/or incorrectly displayed grades – Is not provided with design elevation or depth to invert values	Minor
Layout plan: – Not provided – Does not show contract boundary – Does not delineate as constructed, design or survey elevations – Chainages and fittings do not match the longitudinal section	Minor
Design does not specify if network is chlorinated or chloraminated	Major
Provision for firefighting not accommodated in main sizing	Major
Link in/s do not minimise service outage duration, extent or the number of outages required	Major

Appendix C - Design deliverables list

The deliverables list below provides SA Water's general expectations with respect to design deliverables and does not override the deliverable requirements of any other Technical Standard. Given the breadth of infrastructure projects for which design is undertaken, design deliverables required are to be specified as part of SA Water's Project Requirements, with submission and approval of the DMP (refer section 6.1) to be used as the means by which these deliverables are formally established.

Requirements for operation and maintenance manuals and durability planning are provided in TS 0132 and TS 0110 respectively.

List of Deliverables

Refresh Table

Deliverables	Planning & Scoping	Concept Design 30%	Detailed Design 60%	Detailed Design 90%	IFC 100%	Comments
GENERAL						
Deliverables List	x					
Options Report (Engineering Template)	x					
Options Endorsement Part A - Project Options	x*					*This is an IP&S deliverable that SA Water Engineering has input into during the Prefeasibility Study. Only required for Tier 1 and 2 projects.
Options Endorsement Part B - Technical Options	x*					*Only required for Pathway 3 projects.
Scoping Report	x					
Functional Specification	x					
Design Basis Report		x	x	x	x	
Concept Design Report		x				
Detailed Design Report			x*	x	x	* draft accepted at this stage To summarise the detailed design activities, assumptions, clarifications and outcomes of the design to demonstrate compliance with relevant SA Water and Australian Standards. This document details the design changes and decisions between the CDR and the IFC design.
Design Management Plan		x*	x*			*Only applicable to FEED for large project and to be completed prior to design commencing. Applicable to the Design Panel members and MFP Contractors for all Projects as per TS0104.
Technical Specification (AS4300 - ECI Contract)	x*					*Only applicable for major projects where a contractor is not already engaged under an existing agreement or sending out to multiple contractors for tender.
Technical Specification (AS4300 - D&C Contract)		x				
Engineering Specification (Regional Delivery Only)		x1, 2	x2	x2	x2	This document has two purposes: 1. It is used to convey scope, requirements and expectations to a Design Partner to undertake concept and detailed design. 2. It is used by the FEED team to capture DBR, CDR and DDR requirements for low complexity outputs, which do not require stand alone documents to be developed.
Value Management Register	x	x				
Needs Register	x	x*				* If delivered by SA Water Engineering
Interface Register	x	x				
Assumptions & Constraints Register	x	x	x	x	x	To be updated throughout the project lifecycle
Key Decisions Register	x	x	x	x	x	To be updated throughout the project lifecycle
Interoperability Assessment	x					
Constructability Assessment	x					
Reliability Availability & Maintainability Analysis	x					
Project Architecture	x					
Concept of Operations	x	x				
Human Factors Assessment	x					
INVESTIGATIONS						
Site visits to inspect existing installation, gather required information etc.	x	x	x	x		Site visits as required to gather relevant information to enable the design to be developed and finalised. Sufficient site visit allowances shall be made, and RFI's requesting site based information that should have been gathered by the Contractor during site investigations may be rejected.
Topographical Survey			x	x	x	
Service location		x				
Site Bushfire Risk Assessment	x	x	x			To be conducted by qualified and experienced consultant to inform on the material selections for significant assets (plants, water storages etc) where disruption of services is not acceptable and / or sset loss is not acceptable due to high cost of reinstatement
Geotechnical Investigation - Desktop Study	x	x**				To be done at (or even before) 30%.
Geotechnical Investigation & Report		x**	x**	x	x	To be done at (or even before) 30% for complex structures. For ordinary structures at 60%
Environmental Investigations & Report		x**	x**	x	x	To be done at (or even before) 30% for complex structures. For ordinary structures at 60%
Condition Assessment Report			x	x	x	Defect maps to be developed showing deteriorated areas
Technical Memo - Existing Process (Site Investigation)	x					
Technical Memo - Process Technology Selection	x					
Technical Memo - Other Investigation	x					
Technical Memo - Pilot Plant Assessment	x					
Desktop site assessment from SAPPA maps	x					
Radio Path Survey (Physical)			x*	x*		*Timing of when this occurs will depend on the complexity of the project and the design impact it may have i.e. civil / structural impacts for tower / pole.
As-building of existing site drawings / documentation	x*	x*	x**			To enable detailed design activities to be undertaken, when existing site documentation is limited or cannot be relied upon and such information is need prior to the progression of detailed design. *Typically done for process/mechanical related works, to enable concept design. **Typically completed by the Designer for electrical related works, to enable detailed design.
Power Authority Investigations with SA Power Networks	x*	x*	x	x	x	*SAPN liaison is preliminary only at these stages i.e. to commence high level feasibility discussions only.

List of Deliverables

Refresh Table

Deliverables	Planning & Scoping	Concept Design 30%	Detailed Design 60%	Detailed Design 90%	IFC 100%	Comments
SAFETY & RISK						
SID Assessment Plan	x	x*				*To be completed by SA Water where appropriate to allow for budgeting for Workshops etc
SID Short Form		x*				*For single discipline, low cost and low complexity projects. Not typically used for most capital projects executed through FEED. SID Specalist to approve the use of this Form.
HAZID Workshop & Minutes	x	x				
SID 1 Workshop & Register		x*	x*			*Timing will be dependent on the scope and complexity of the project i.e. SiD 1 & 2 may be combined.
HAZOP Workshop, Register & Report		x	x	x		Workshop quantities and timing will be dependent on scope and complexity of the project i.e. Top Down vs Bottom Up
CHAZOP Workshop, Register & Report		x	x	x		Requirement for this process is driven by project complexity and risk. A CHAZOP should be carried out for chemical plants, critical systems and multi loop systems.
SID 2 Workshop & Register			x*	x*		*Timing will be dependent on the scope and complexity of the project i.e. SiD 1 & 2 may be combined.
SiD Report				x	x	
Lessons Learned		x*	x*			*Known hazards and incidents to be identified and integrated into the SiD process. Usually included in the Insight ribbon.
AS4024 Risk Assessment Workshop, Register & Report		x	x	x		Required for machine guarding and emergency stop requirements
Pressure equipment hazard level classification				x	x	Required for pressure equipment such as surge vessels, accumulators, air compressor receivers etc
Functional Safety Lifecycle Process & Documentation (i.e. QRA, SRS etc.)		x	x	x		Requirement for this process is driven from the HAZOP / CHAZOP
Lifting Studies		x	x			
Shoring / Excavation Studies			x	x		
Ergonomic Studies			x	x		
Other Studies & Reports	x*	x*	x*	x*	x*	*As required by the specific project requirements.
Risk Register	x	x	x	x	x	
Multi-criteria Analysis	x	x				
General Risk Assessment Workshop & Report	x	x	x	x		Required where the above workshops are not suitable.
Hazardous Area Classification Report			x	x	x	Multidiscipline - Lead by Process. This includes any required dispersion modelling, ventilation calculations etc.
Hazardous Area Classification Drawings			x	x	x	
Hazardous Area Design Report			x	x	x	To summarise the basis of the hazardous area design, assumptions, criteria, inputs etc. including specific requirements required by the standards i.e. glanding methodologies etc.
IS Loop / Entity Calculations			x	x	x	
Increased Safety Calculations (i.e. Te time, heat loading etc.)			x	x	x	
Hazardous Area Inspection Sheet Templates				x	x	Templates provided for review prior to construction phase services. Forms to be completed during the construction phase.
Hazardous Area Verification Dossier				x	x	Collation of all design information into the verification dossier. Dossier to be finalised during the construction phase.
MULTI-DISCIPLINARY DOCUMENTATION						
Control Philosophy		x	x	x	x	Developed in conjunction with the P&ID Multidiscipline activity: Process, Mech, EIC
Demolition Plan		x*	x	x	x	* Dependant of assessed risk
Red-line Markups of Existing Drawings	x*	x*				*Preliminary Only - Provided at early stages to show potential tie-ins to existing infrastructure.
Update of Existing Site Drawings			x	x	x	To be updated by the Designer, including superseding or making existing drawings obsolete.
Site plan	x	x	x	x	x	to include all disciplines, as required
General Arrangement/s	x	x	x	x	x	
P&ID (s)	x	x	x	x	x	Multidiscipline activity: Process, Mech, EIC
Demolition Drawings		x*	x	x	x	*If it needs to be provided, will be preliminary only
Security drawings		x	x	x	x	To be developed in consultation with the SA Water Security Team.
Fire systems drawings		x*	x	x	x	*If provided, is preliminary only
Cutover / Staging Plan		x*	x	x	x	*If provided, it will be preliminary only to highlight constraints / issues that need to be considered as a part of the design process.
Performance Testing Method / Criteria		x*	x	x	x	*If provided, it will be preliminary only to highlight constraints / issues that need to be considered as a part of the design process.
Construction Scope of Works				x	x	Typically for regional projects
Building Datasheet/s or Technical Specification	x*	x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. Multi-discipline Activity Includes new switchroom buildings

List of Deliverables

Refresh Table

Deliverables	Planning & Scoping	Concept Design 30%	Detailed Design 60%	Detailed Design 90%	IFC 100%	Comments
CIVIL & STRUCTURAL						
Civil Notes			x	x	x	
Site Plan		x	x	x	x	
Pavement Plan			x	x	x	
Pavement Details		x*	x	x	x	*Basic details, as required
Drainage Plan			x	x	x	
Drainage Details		x	x	x	x	
Bulk Earthworks Plan			x	x	x	
Long Sections - Roads and Pipe			x	x	x	
Cross Sections - Roads and Pipes			x	x	x	
Service Trench - Details			x	x	x	
Earth Retaining structure - Plan & Details			x	x	x	
Structural Notes			x	x	x	
Thrust Block			x	x	x	Only if not covered by WSCM
Trench Cross Sections Drawings				x	x	with input from relevant discipline - elec, eg
Concrete Plans with Members Schedule		x*	x	x	x	* Concept Design Plans can be provided without schedule
Reinforcement Plans with Reo Schedule			x	x	x	
Typical Footing Details		x*	x	x	x	*Basic details, as required
Ancillary Footing Sections and Details - for elec & mech equip.				x	x	which includes footing support and reinforcement support for other discipline related items such as switchboards, light poles, antenna, solar panel poles, pump,
Floor Plans with Members Schedule		x*	x	x	x	* Concept Design Plans can be provided without schedule
Reinforcement Plans with Reo Schedule			x	x	x	
Concrete Overall Elevations		x	x	x	x	
Concrete Overall Sections		x	x	x	x	
Typical Concrete Details		x*	x	x	x	*Basic details, as required
Project Specific Sections and Details				x	x	
Concrete Mix Design				x	x	
Defects Repair Methodology - Notes			x	x	x	
Defects Map		x	x	x	x	
Typical Concrete Repair Details			x	x	x	
Project Specific Repair Details				x	x	
Roof Framing Plans with Schedule		x*	x	x	x	* Concept Design Plans can be provided without schedule
Floor Framing Plans with Schedule		x*	x	x	x	* Concept Design Plans can be provided without schedule
Steel Framing Overall Elevations		x	x	x	x	
Steel Framing Overall Sections		x	x	x	x	
Typical Steelwork Details			x	x	x	
Project Specific Sections and Details				x	x	
Building Floor Plans		x	x	x	x	
Building Roof Plans		x	x	x	x	
Building Overall Elevations and Sections		x	x	x	x	
Building Typical details		x*	x	x	x	*Basic details, as required
Projects Specific Sections & Details		x*		x	x	*Basic details, as required
Demolition Methodology - Notes			x	x	x	
Demolition Plans			x	x	x	
Demolition Elevations and Sections			x	x	x	
Buried Pipe Structural Integrity Calcs			x*	x*	x	*Dependant on assessed level of risk and if not covered by SA Water Water Supply Construction Standards.
Pipe Penetration Details		x*	x	x	x	Detailed Designs must be fully dimensioned *Basic details, as required
Pipe Trench Details (if non-standard)		x*	x	x	x	* Dependant of assessed risk
MECHANICAL & HYDRAULICS						
Steady State Hydraulic Modelling Report	x	x	x	x	x	
Surge Modelling Report		x*	x	x	x	*Dependant on assessed level of risk. May be combined with steady state into overall hydraulics report
Water Balance		x*	x*	x*	x*	*Dependant on assessed level of risk and applicability.
Hydraulic calculations - Hydraulic Grade Lines		x	x	x	x	Input from Process team and Water Quality where required. May be included in hydraulic report.
Hydraulic calculations - System curves		x	x	x	x	Applicable to valves and pump selection. Pump/valve curves must be overlayed over System Curves. May be included in hydraulic report.
Hydraulic calculations - NPSHa		x*	x	x	x	Requirement at concept design stage dependent on assessment of risk.
Materials Selection Report			x	x	x	Can be part of DBR for simple projects
Pipe resonance calcs			x	x	x	
Plant/Machinery Vibration Calcs		x*	x	x	x	*Dependant on assessed level of risk
Hydraulic Residence Times Calcs (Sewer networks) Report		x	x	x	x	Can be part of CDR at Concept Stage
Air Conditioner Sizing Calculations		x	x	x	x	If required for a new buildings, switchrooms, control rooms or if typical ventilation fans cannot provide adequate cooling. Multidiscipline Activity.
Ventilation fan sizing calculations		x	x	x	x	Building ventilation
Piping stress analysis			x	x	x	
Anchor force calculations			x	x	x	To be used as an input to structural design of pipe anchors.
Flange gasket and bolt stress calculations				x	x	For bolted flange joints with flanges on pipes that are not standard sizes (ISO 559 for steel pipe) or for flange joints with flanges of differing dimensional standards.
Pipeline alignment plans		x	x	x	x	
Pipeline longitudinal sections		x	x	x	x	Long sections if the pipeline is >500m or if pipe profile is important in understanding hydraulics and/or pipeline operation
Hydraulic Grade Lines		x	x	x	x	
System curves		x	x	x	x	For network, distribution and transmission water pumping systems and for wastewater pumping systems.
Piping arrangement plan and sections		x	x	x	x	Piping arrangement drawings required if piping arrangement not covered adequately in the general arrangement drawings.
Piping details		x*	x	x	x	*Basic details
HVAC arrangement		x	x	x	x	Arrangement of key equipment (eg location of fans, air intakes, air exhausts, ducting, condenser units, fan coil units.
HVAC details				x	x	Refrigerant and condensate piping runs, ducting details, pipe/ducting supports, lagging, attennuation, insulation, louvres, motorised dampers, fans, filters, cowls, guards etc
Piping arrangement drawing		x	x	x	x	With input from Process if needed, with the ownership from the biggest input
Pump Datasheet/s		x	x	x	x	
Control Valve Datasheet/s		x	x	x	x	
Large/critical/non-standard isolating valve datasheet/s		x	x	x	x	As required by the specific project requirements.
Large/critical non-return valve datasheet/s		x	x	x	x	
Actuator datasheet		x	x	x	x	Incorporate with valve datasheet when specifying together with a valve.

Government of South Australia SA Water

List of Deliverables

Refresh Table

Deliverables	Planning & Scoping	Concept Design 30%	Detailed Design 60%	Detailed Design 90%	IFC 100%	Comments
ELECTRICAL & INSTRUMENT CONTROL						
Arc Flash Modelling and Report (as per TS0371)			x	x	x	For Switchboards with a rating > 250A. The native file of the model is to be provided as a deliverable. If this cannot be accommodated, subject to approval from the Principal Electrical Engineer, then all relevant raw data utilised in the development of the model shall be provided to SA Water in a suitable format (i.e. spreadsheet) for future model development.
Control Power Supply and Battery Sizing Calculations (12VDC)			x	x	x	For RTU Applications, where 24VDC is not being utilised.
Control Power Supply and Battery Sizing Calculations (24VDC)			x	x	x	
Earth Fault Loop Impedance Calculations			x	x	x	Can be provided as a part of the LV Power Systems Model analysis, but evidence and commentary needs to be provided within the Detailed Design Report to demonstrate compliance with the standards.
Fault Level Calculations			x	x	x	Can be provided as a part of the LV Power Systems Model analysis, but evidence and commentary needs to be provided within the Detailed Design Report to demonstrate compliance with the standards.
Heat Loading Calculations (Panel, Switchboard etc.)			x	x	x	Indoor and Outdoor Panel Calculations
Harmonic Analysis & Report			x	x	x	The Report can be combined as a part of the Detailed Design Report.
Lighting Study			x	x	x	
Lightning Protection Risk Assessment (AS1768)			x	x	x	
Lightning Protection Study & Report			x	x	x	The Report can be combined as a part of the Detailed Design Report.
LV Cable Sizing Calculations			x	x	x	Can be provided as a part of the LV Power Systems Model analysis, but evidence and commentary needs to be provided within the Detailed Design Report to demonstrate compliance with the standards.
LV Power Systems Model (PowerCAD)		x*	x	x	x	*Concept phase is Preliminary only Native File of the model to be provided as a deliverable.
Maximum Demand Calculation/s		x*	x	x	x	*Preliminary calculation only. This is generally developed to assist with early engagement with SAPN, determine the suitability of existing supply systems to support the proposed new load, determine preliminary tie-in locations and provide context of the size of the new switchboard/MCC/DB. The Designer shall take responsibility for this calculation.
Protection, Coordination and Grading Study/s			x	x	x	Can be provided as a part of the LV Power Systems Model analysis, but evidence and commentary needs to be provided within the Detailed Design Report to demonstrate compliance with the standards.
Solar Panel and Battery Sizing Calculations		x*	x	x	x	*Preliminary only, if provided. The Designer shall be responsible for this calculation. Typically provided for RTU applications.
Surge Divertor Sizing Calculation/s			x	x	x	
UPS and Battery Sizing Calculations		x*	x	x	x	*Preliminary only, if provided. The Designer shall be responsible for this calculation.
HV Power Systems Modelling and Report			x	x	x	Coordination with the relevant Supply Authority will be required to source relevant design inputs i.e. fault levels, impedance values etc. The native files of all model shall be provided as a deliverable. If this cannot be accommodated, subject to approval from the Principal Electrical Engineer, then all relevant raw data utilised in the development of the model shall be provided to SA Water in a suitable format (i.e. spreadsheet) for future model development. All reports shall summarise the scope, assumptions, options considered, issues encountered, findings, recommendations and confirmation that the design documented complies with relevant standard requirements.
HV Fault Analysis and Low Flow Study and Report			x	x	x	Refer comment above.
HV Protection Study and Report			x	x	x	Refer comment above.
HV Earthing Study and Report			x	x	x	Refer comment above.
Arc Flash Modelling and Report (as per TS0371)			x	x	x	Refer comment above.
HV Cable Sizing Calculations			x	x	x	Refer comment above.
LFI/ERP Investigation and Report			x	x	x	Multi-discipline Activity with inputs required from the Mechanical Designer
Single Line Diagram/s		x*	x	x	x	*Preliminary Only For HV, this includes protection single line diagrams as well.
Power Distribution Diagrams			x	x	x	
Electrical Schematic Diagrams			x	x	x	To include main incomer(s), generator incomer, motor, fan, heater, lighting, valving, etc.
Control Power Distribution Diagram/s			x	x	x	
Control Power Single Line Diagram/s			x	x	x	
Control Schematic Diagrams			x	x	x	To include power supply, battery, UPS etc.
Distribution Board Control Schematics			x	x	x	For external lighting control for instances.
PLC I/O Diagrams			x	x	x	To include AI, AO, DI, DO, Communications and any other required drawings
RTU I/O Diagrams			x	x	x	To include AI, AO, DI, DO, Communications and any other required drawings
RTU Power Distribution Diagram/s			x	x	x	
Network Architecture / Topology Diagram		x*	x	x	x	*Preliminary Only
Junction Box / Marshalling Panel / Remote Switching Panel Termination Diagrams				x	x	
Instrumentation Loop Diagram/s				x	x	
Instrumentation Mounting Diagram/s				x	x	
Equipment Layout Diagram/s		x	x	x	x	This is to include site layouts, switchroom and/or building layout drawings, lighting and power layouts etc. in order to highlight the location and size of new equipment items
Equipment Mounting Details		x		x	x	To provide context of where / how new equipment items are to be mounted.
General Arrangement Diagrams			x	x	x	This is to include Switchboard, MCC, DB, Control Panel, PLC Panel, Radio Panel, RTU Panel, Junction Box, Marshalling Panel etc. This includes Plan, Elevation, Section, Doors On / Off, Escutcheon View (Infront / Behind) etc.
Cable Routing Diagram/s			x	x	x	
Earthing Details				x	x	Typical earthing connection details
Earthing Layout Diagram/s			x	x	x	To define earth grid / stake details
Earthing Schematic/s, block diagram/s				x	x	To detail earthing field connections
Lightning Protection System Details				x	x	Typical earthing connection details
Lightning Protection System Layout Diagram/s			x	x	x	To define earth grid / stake details
Package Drawing List Coversheet			x	x	x	
Drawing Convention & Wiring Standards Sheet				x	x	
Bill of Materials List/s				x	x	
Cable Schedule/s			x	x	x	SA Water Cable Schedule Template to be utilised
Distribution Board Circuit Schedule/s			x	x	x	
Equipment Schedule/s				x	x	Summarises equipment supplier, make, model and key rating data for all equipment items
Instrumentation Schedule/s				x	x	Summarises equipment supplier, make, model and key rating data for all instrumentation

List of Deliverables

Refresh Table

Deliverables	Planning & Scoping	Concept Design 30%	Detailed Design 60%	Detailed Design 90%	IFC 100%	Comments
Label Schedule				x	x	
SCADA Impact Assessment	x	x*				*Typically to be completed by SA Water
Functional Design Specification				x	x	
PLC I/O Schedule		x*	x	x	x	*Preliminary Only
RTU I/O Schedule		x*	x	x	x	*Preliminary Only
SCADA Screens/Tags Markups				x	x	
HV Switchboard Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Ring Main Unit Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Kiosk Substation Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. This is a combined RMU, Transformer, LV Distribution and Enclosure Datasheet
Transformer Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Generator Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. Multi-discipline Activity
AS61439 LV Switchboard Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. User requirements datasheet. Datasheet to be completed by the Designer in consultation with the board manufacturer.
AS61439 MCC Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. User requirements datasheet. Datasheet to be completed by the Designer in consultation with the board manufacturer.
AS61439 DB Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. User requirements datasheet. Datasheet to be completed by the Designer in consultation with the board manufacturer.
AS61439 Control Panel Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. User requirements datasheet. Datasheet to be completed by the Designer in consultation with the board manufacturer.
UPS Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Variable Speed Drive Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Harmonic Mitigation Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Soft Starter Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Motor Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. Multi-discipline Activity
Solar Panel and Inverter Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Battery Charger and Battery Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Other Datasheet/s		x	x	x	x	As required by the specific project requirements.
PLC Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
HMI Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data. Includes eHMI
RTU Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Radio / 4G Modem Datasheet/s		x*	x	x	x	*If provided will be preliminary only and will not be populated with vendor data.
Other Datasheet/s		x	x	x	x	As required by the specific project requirements.
Analyser Datasheet/s		x	x	x	x	Multi-discipline Activity
Flowmeter / Flow Switch Datasheet/s		x	x	x	x	Multi-discipline Activity
Gas Detector Datasheet/s		x	x	x	x	Multi-discipline Activity
Level Transmitter / Level Switch Datasheet/s		x	x	x	x	Multi-discipline Activity
Pressure Transmitter / Pressure Switch Datasheet/s		x	x	x	x	Multi-discipline Activity
Limit Switch Datasheet/s		x	x	x	x	Multi-discipline Activity
Other Datasheet/s		x	x	x	x	As required by the specific project requirements.
PROCESS						
Process Calculations	x	x	x	x	x	
Process OPEX Estimation	x	x	x	x	x	
Mass Balance/Load	x	x	x	x	x	
Filter Bed Sizing Calculations	x*	x	x	x	x	*Preliminary Only
Filter Media Hydraulic Calculations	x*	x	x	x	x	*Preliminary Only
Sedimentation Sizing Calculations	x*	x	x	x	x	*Preliminary Only
Reverse Osmosis Projections	x*	x	x	x	x	*Preliminary Only
Contact Tank Sizing	x	x	x	x	x	
Chemical Dosing Calculations	x	x	x	x	x	
Chemical Dosing Sizing	x	x	x	x	x	
Chemical Storage Sizing	x	x	x	x	x	
Chlorine Gas System Calculations	x	x	x	x	x	
Hypochlorite Dosing Calculations	x	x	x	x	x	
OCU specification	x	x	x	x	x	
Extraction air volume required (extraction fan sizing)	x	x	x	x	x	
Media Volume and specification (organic v inorganic)	x	x	x	x	x	
Air Curtain v water seal requirement	x	x	x	x	x	
Water Modelling Calculations	x*	x	x	x	x	*Preliminary Only
Wastewater Treatment Modelling (BioWin etc)	x*	x	x	x	x	*Preliminary Only
Odour or Ventilation Modelling	x*	x	x	x	x	*Preliminary Only
Odour Control Units (ACF, BF, BTF) sizing	x*	x	x	x	x	Odour Tech Spec, *preliminary unit sizing only
Technical Data Sheets		x	x	x	x	
Process Flow Diagram	x	x	x	x	x	
Chemical Dosing Plant/Panel GA		x	x	x	x	

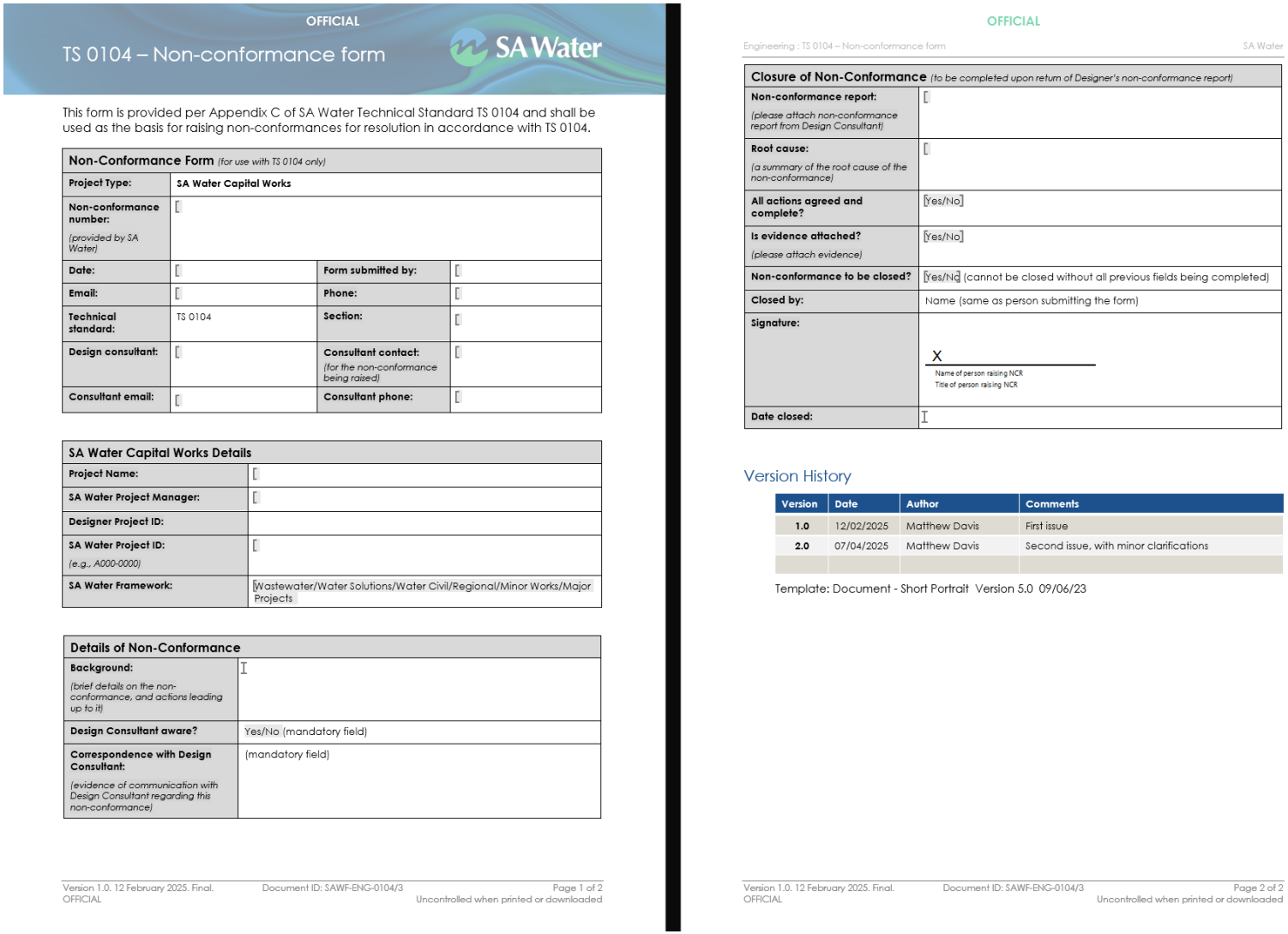
List of Deliverables

Refresh Table

Deliverables	Planning & Scoping	Concept Design 30%	Detailed Design 60%	Detailed Design 90%	IFC 100%	Comments
MATERIALS						
Welding requirements			x	x	x	Deliverable in construction Phase. Welding requirement needs to have at least 60% design to make sure about materials and construction process.
Cathodic protection, review of exisiting CP	x		x	x	x	
Cathodic protection design site investigations including soil resisitvity testing	x	x	x	x	x	Note that these investigations require time, and need to be followed by a desing process. Start as early as possible once it has been confirmed that MSCL pipe will be used and that CP will be provided.
Cathodic protection, design (new, retrofit)			x	x	x	
Cathodic protection, electrolysis and stray current mitigation considerations	x		x	x	x	Consider as early as possible. Can be delted from subsequent stages, once completed.
LFI/EPR studies on pipelines	x	x	x	x	x	Consider that these studies take several weeks to months to completed depending on how quickly inputs are obtained from relevant authorities/utilities.
Durability planning, report/assessment		x	x	x	x	Mandatory for more complex projects proposed is Risk levels 1 and 2
Corrosivity assessment, macro and micro environments		x	x	x	x	
For material selection refer to items below		x	x	x	x	
Corrosion condition Assessment of metallic structures - site visit and inspection	x*	x*				x*: This activity to be done (if required) in one of the stages, ideally during investigation stage, Planning & Scoping or 30% Concept.
Concrete deterioration/corrosion sssessment of concrete structures - site visit and inspection	x*	x*				x*: This activity to be done (if required) in one of the stages, ideally during investigation stage, Planning & Scoping or 30% Concept.
Materials sampling and testing - concrete, steel, polymers	x*	x*				x*: This activity to be done (if required) in one of the stages, ideally during investigation stage, Planning & Scoping or 30% Concept.
Condition Assessment - report	x*	x*				x*: This activity to be done (if required) in one of the stages, ideally during investigation stage, Planning & Scoping or 30% Concept.
Remaining life assessment, structural assets	x*	x*				x*: This activity to be done (if required) in one of the stages, ideally during investigation stage, Planning & Scoping or 30% Concept.
Remaining life modelling (Chloride, carbonation)	x*	x*				x*: This activity to be done (if required) in one of the stages, ideally during investigation stage, Planning & Scoping or 30% Concept.
Material selection - repair and rehabilitation (concrete, metallic, polymers and coating)	x*	x	x	x	x	x*: Should be included here if there are fixed predetermined requirements, which are impacting cost
Material selection - new construction (coatings)	x*	x	x	x	x	x*: Should be included here if there are fixed predetermined requirements, which are impacting cost
Concrete	x*	x	x	x	x	x*: Should be included here if there are fixed predetermined requirements, which are impacting cost
Metals and alloys	x*	x	x	x	x	x*: Should be included here if there are fixed predetermined requirements, which are impacting cost
Polymers	x*	x	x	x	x	x*: Should be included here if there are fixed predetermined requirements, which are impacting cost
Material Notes on drawings (material properties and durability notes)		x	x	x	x	
Coatings			x	x	x	
Linings			x	x	x	
Hot dip galvanised coatings			x	x	x	
Coating specification for organic coatings			x	x	x	
Coating specification for thermal spray coatings			x	x	x	
Materials for corrosion resistance			x	x	x	
Materials failure analysis	x*	x*				x*: This activity to be done (if required) in one of these stages, ideally during investigation stage

Appendix D - Non-conformance form

The non-conformance form below (provided for reference only) is to be completed by the SA Water Representative (or their delegate) using the online form provided on the SA Water Engineering Aquanet site.



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TS 0104 – Non-conformance form

SA Water

This form is provided per Appendix C of SA Water Technical Standard TS 0104 and shall be used as the basis for raising non-conformances for resolution in accordance with TS 0104.

Non-Conformance Form *(for use with TS 0104 only)*			
Project Type:	**SA Water Capital Works**		
Non-conformance number: *(provided by SA Water)*	[		
Date:	[	**Form submitted by:**	[
Email:	[	**Phone:**	[
Technical standard:	TS 0104	**Section:**	[
Design consultant:	[	**Consultant contact:** *(for the non-conformance being raised)*	[
Consultant email:	[	**Consultant phone:**	[

SA Water Capital Works Details	
Project Name:	[
SA Water Project Manager:	[
Designer Project ID:	
SA Water Project ID: *(e.g., A000-0000)*	[
SA Water Framework:	[Wastewater/Water Solutions/Water Civil/Regional/Minor Works/Major Projects

Details of Non-Conformance	
Background: *(brief details on the non-conformance, and actions leading up to it)*	I
Design Consultant aware?	Yes/No (mandatory field)
Correspondence with Design Consultant: *(evidence of communication with Design Consultant regarding this non-conformance)*	(mandatory field)

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Engineering : TS 0104 – Non-conformance form SA Water

Closure of Non-Conformance *(to be completed upon return of Designer's non-conformance report)*	
Non-conformance report: *(please attach non-conformance report from Design Consultant)*	[
Root cause: *(a summary of the root cause of the non-conformance)*	[
All actions agreed and complete?	[Yes/No]
Is evidence attached? *(please attach evidence)*	[Yes/No]
Non-conformance to be closed?	[Yes/No] (cannot be closed without all previous fields being completed)
Closed by:	Name (same as person submitting the form)
Signature:	X Name of person raising NCR Title of person raising NCR
Date closed:	I

Version History

Version	Date	Author	Comments
1.0	12/02/2025	Matthew Davis	First issue
2.0	07/04/2025	Matthew Davis	Second issue, with minor clarifications

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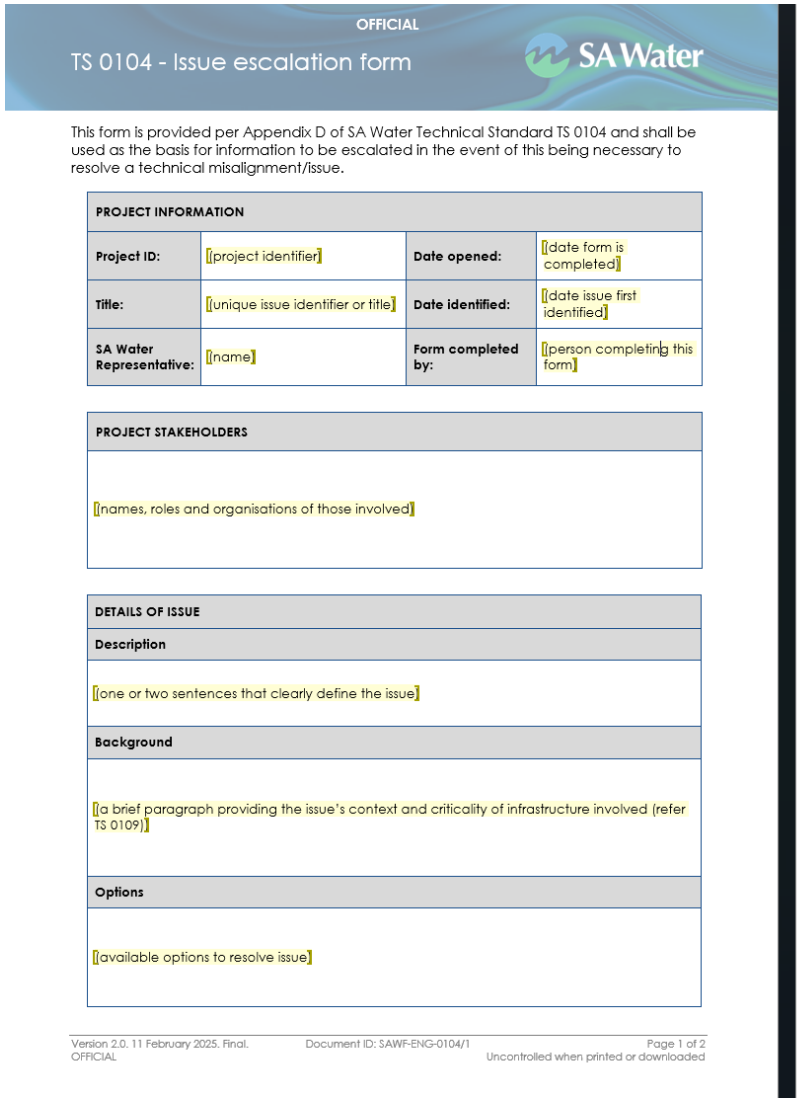
Appendix E - Issue escalation form

The form below shall be used as the basis for information to be escalated in the event of this being necessary to resolve a technical misalignment/issue (refer section 6.2.7).



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TS 0104 - Issue escalation form

SA Water

This form is provided per Appendix D of SA Water Technical Standard TS 0104 and shall be used as the basis for information to be escalated in the event of this being necessary to resolve a technical misalignment/issue.

PROJECT INFORMATION			
Project ID:	[project identifier]	**Date opened:**	[date form is completed]
Title:	[unique issue identifier or title]	**Date identified:**	[date issue first identified]
SA Water Representative:	[name]	**Form completed by:**	[person completing this form]

PROJECT STAKEHOLDERS
[names, roles and organisations of those involved]

DETAILS OF ISSUE
Description
[one or two sentences that clearly define the issue]
Background
[a brief paragraph providing the issue's context and criticality of infrastructure involved (refer TS 0109)]
Options
[available options to resolve issue]

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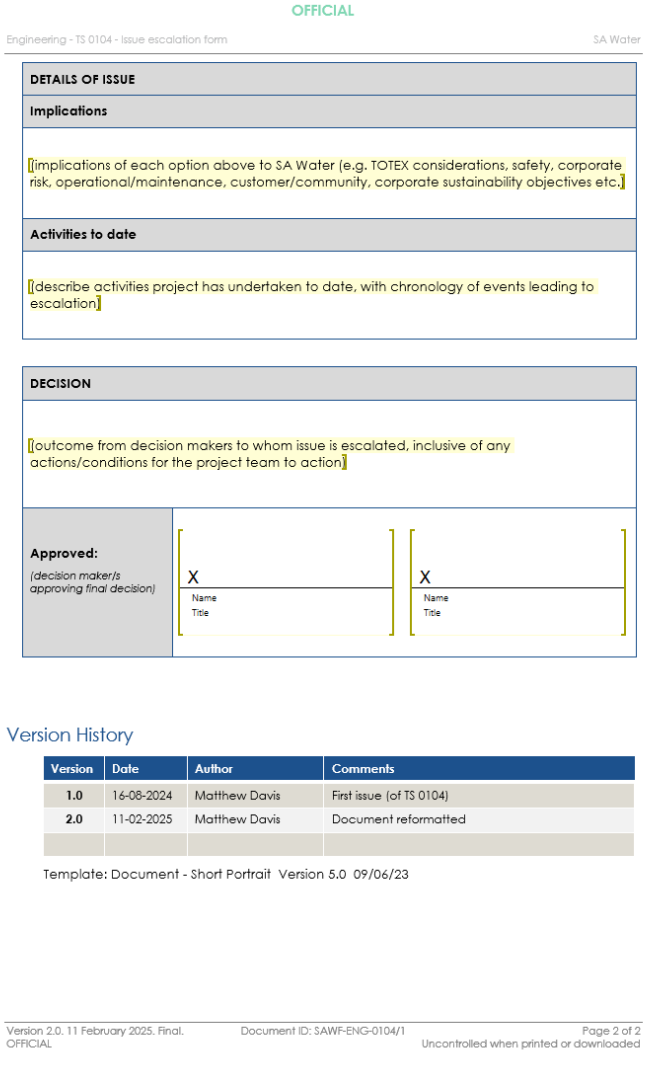

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Engineering - TS 0104 - Issue escalation form SA Water

DETAILS OF ISSUE
Implications
[implications of each option above to SA Water (e.g. TOTEX considerations, safety, corporate risk, operational/maintenance, customer/community, corporate sustainability objectives etc.]
Activities to date
[describe activities project has undertaken to date, with chronology of events leading to escalation]

DECISION		
	[outcome from decision makers to whom issue is escalated, inclusive of any actions/conditions for the project team to action]	
Approved: *(decision maker/s approving final decision)*	X Name Title	X Name Title

Version History

Version	Date	Author	Comments
1.0	16-08-2024	Matthew Davis	First issue (of TS 0104)
2.0	11-02-2025	Matthew Davis	Document reformatted

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Appendix F - Design milestone acceptance certificate

The form below shall accompany all design deliverables submitted to SA Water for acceptance in accordance with section 6.2.6.

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Design Milestone Acceptance Certificate

SA Water

This form is provided as part of SA Water Technical Standard TS 0104. Please complete all fields before submission and attach supporting documents as required.

Finalised design deliverables (for example, final report/s, registers, issued for construction drawings etc.) are **NOT VALID UNLESS** accompanied by an accepted and signed 'Design Milestone Acceptance Certificate'.

PROJECT INFORMATION			
SA Water Project ID:	[project identifier]	**Project Name:**	[name]
Designer Project ID:	[project identifier]	**Design Consultant:**	[name]

ISSUED FOR ACCEPTANCE REPRESENTATIVES			
SA Water Representative:(1)	[name]	**Owner's Engineer:**(2,3,7)	[name]
Design Consultant	[name]	**Authoriser:**(4)	[name]
Authoriser Phone:	[phone]	**Authoriser Email:**	[email]

DOCUMENTS ISSUED FOR DESIGN ACCEPTANCE(5)			
Document Title	**Document Number**	**Revision**	**Date**
[	[	[	[
[	[	[	[
[Add rows if needed	[	[	[

DRAWINGS ISSUED FOR DESIGN ACCEPTANCE			
Drawing Number	**Sheet No.**	**Revision**	**Drawing Title**
[	[	[	[
[	[	[	[
[	[	[	[
[	[	[	[
[Add rows if needed	[	[	[

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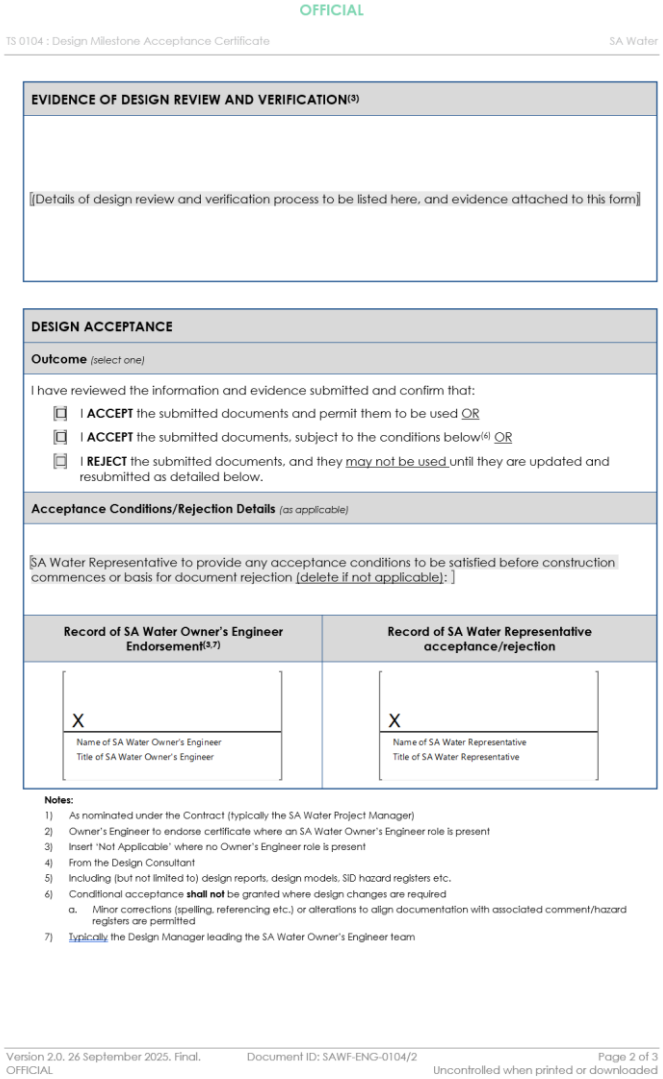

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TS 0104 : Design Milestone Acceptance Certificate SA Water

EVIDENCE OF DESIGN REVIEW AND VERIFICATION(3)
[Details of design review and verification process to be listed here, and evidence attached to this form]

DESIGN ACCEPTANCE
Outcome *(select one)*
I have reviewed the information and evidence submitted and confirm that: ☐ I **ACCEPT** the submitted documents and permit them to be used OR ☐ I **ACCEPT** the submitted documents, subject to the conditions below(6) OR ☐ I **REJECT** the submitted documents, and they may not be used until they are updated and resubmitted as detailed below.
Acceptance Conditions/Rejection Details *(as applicable)*
SA Water Representative to provide any acceptance conditions to be satisfied before construction commences or basis for document rejection (delete if not applicable):]

Record of SA Water Owner's Engineer Endorsement(3,7)	Record of SA Water Representative acceptance/rejection
X Name of SA Water Owner's Engineer Title of SA Water Owner's Engineer	X Name of SA Water Representative Title of SA Water Representative

Notes:

1) As nominated under the Contract (typically the SA Water Project Manager)
2) Owner's Engineer to endorse certificate where an SA Water Owner's Engineer role is present
3) Insert 'Not Applicable' where no Owner's Engineer role is present
4) From the Design Consultant
5) Including (but not limited to) design reports, design models, SID hazard registers etc.
6) Conditional acceptance **shall not** be granted where design changes are required
   a. Minor corrections (spelling, referencing etc.) or alterations to align documentation with associated comment/hazard registers are permitted
7) Typically the Design Manager leading the SA Water Owner's Engineer team

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