Handover and Commissioning Procedure

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Document control

Revision history

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Summary

This document details the commissioning and handover process for treatment plants, pump stations and other specialised assets, and describes the roles and responsibilities of all stakeholders involved.

Following the process outlined in this document will support clear communication, accountability, and adherence to best practices. This will ensure successful project outcomes in these areas:

- Cohesive alignment and collaboration across Wellington Water and design, construction, and operations teams from the activity brief through to operational handover
- Transparency and rigour in the testing of assets to ensure compliance with specifications
- A structured approach to training and comprehensive operational documentation, including operation and maintenance (O&M) manuals
- Improved communication about safety and risk management throughout the commissioning and handover phase

This process aligns with the commissioning requirements for project managers following PCMG_0002 Guidance for Capital Project Delivery.

Contents

1 Introduction

1.1 Purpose

The purpose of this document is to establish the minimum requirements and expectations for commissioning treatment plants, pump stations and other specialised assets throughout the entire project lifecycle. It aims to ensure consistency, quality, and efficiency in commissioning practices, from project initiation to completion.

1.2 Scope

This document was developed by Wellington Water for the Hutt, Porirua, Upper Hutt and Wellington City Councils, South Wairarapa District Council, and Greater Wellington Regional Council and the new water services entity currently referred to as Metro Water. It outlines the commissioning activities throughout the project lifecycle, including defining, planning, design, construction, renewal, and decommissioning. These activities are described in relation to contracts for new and upgraded water treatment plants, wastewater treatment plants, pump stations (except subdivisions) and reservoirs managed under NZS 3910 (Conditions of contract for building and civil engineering construction).

The document does not specifically address:

- design and construct contracts under NZS 3916
- maintenance activities or “like for like” replacements
- subdivisions (see ACM_0001 Commissioning Guideline for Pump Stations)
- decommissioning.

1.3 Departures

Departures from this document and the minimum requirements below require the written permission of the document owner, in consultation with the relevant head of operations.

1.4 Reference documents

When following the process below, refer to the documents in Table 1 for related templates, forms, procedures, processes, specifications and requirements.

Table 1 Other documents to use and consult while following this process

Controlled documents	Title
ACMT_0002A	Template – Commissioning specification
ACMT_0002B	Template – Commissioning plan
ACMT_0002C	Template – System-specific commissioning plan
ACMT_0002D	Template – Training manual
ACMT_0002E	Template – Operating and maintenance manual
ACMF_0002A	Form – Safety clearance certificate
ACMF_0002B	Form – Application for inspection
ACMF_0002C	Form – Acceptance to service certificate

Controlled documents	Title
QMF_0905	Template – Standard operating procedure
STD_0003	Asset Information Requirements
STD_0003a	Template – Preventative maintenance register
STD_0003b	Template – Asset data template
STD_0003c	Template - Information delivery plan
ACM_0001	Commissioning Guideline for Pump Stations [for subdivisions]
HESP_0015	Control of Work Procedure
HSEP_0032	Lock Out Tag Out Procedure
ONPP_0001	Wellington Water Shutdown Requests Process
PCMG_0002	Guidance for Capital Project Delivery
HSEP_0014	Safety in Design Process
STD_0001	Regional Standard for Water Services
STD_0002	Regional Specification for Water Services
	NZS 4404:2010 Land development and subdivision infrastructure.

2 Definitions

2.1 Key terms

These terms are listed in alphabetical order in Table 2, rather than in the order in which they occur in the process. See the flow chart in Section 4.

Table 2 Definition of key terms

Term	Definition
Acceptance to service	An inspection of physical works and a review of documentation to confirm the system is ready to be introduced into the operational network or plant. This inspection is an acknowledgement of the transition of the system into operation. However, it isn't fully handed over to operations at this stage as it is yet to be fully tested.
Cold commissioning	The process where systems and equipment are tested without impacting the operation process. The main goal is to verify that all components function according to specifications. This phase is critical for identifying and resolving issues early, and for ensuring the system is safe and ready to bring into operation. The use of reticulated water is encouraged. Also known as 'dry commissioning' in other industries. *No connection into the operational network or plant until this stage is completed.*

Term	Definition
Hot commissioning	The process where systems and equipment are tested using live operational assets, such as wastewater or water to the network. The primary goal is to verify that the systems operate correctly and safely under real conditions. Key activities include: live testing, safety, environmental and regulatory compliance checks, and system integration. This phase ensures the system is fully functional and ready for continuous operation without ongoing support.
Construction quality records	Installation completion involves visual field inspections, verification, and completing documentation – such as inspection and test plans – throughout the build process to ensure the system is correctly and completely installed.
Livening	The process of safely energising a piece of equipment or a system for the first time. This is predominantly for power. It can also include networks for gas, nitrogen, compressed air, etc.
Long-term performance testing	The process where systems and equipment are tested to provide confidence over a longer period such as seasonal or complex process performance tests.
Pre-commissioning	These are the checks and tests performed on individual pieces of equipment or systems to ensure readiness for handing over to the commissioning phase. Also known as 'offline commissioning' or 'mechanical and electrical completion'.
Safety clearance certificate	A certificate is issued once the successful completion inspection of both physical works and a review of documentation is completed. This confirms the installation is safe to be commissioned. This certificate allows the system to proceed into cold commissioning. *No permanent power or energy sources can be applied before this certificate is issued.*
Trial period	The process where systems and equipment are tested to provide confidence that they can operate without intervention under normal operating conditions. The trial period is used to confirm reliability and process performance.

2.2 Acronyms

The acronyms in Table 3 are used in this document.

Table 3 Acronyms used in this document

Acronym	Definition
AFI	Application for Inspection
DB	Distribution board (electrical)
COC	Certificate of compliance
CHAZOP	Control hazard and operability study
DCS cabinet	Distributed control system cabinet
ESD	Electrostatic discharge
FAT	Factory acceptance test
FD	Functional description
H1, H2, H3	Phases of handover of construction records
HAZOP	Hazard and operability study
I/O	Input/output, specifically for control signals

Acronym	Definition
ITP	Inspection and Test Plan
ITR	Inspection and Test Records
LOTO	The lockout/tagout safety procedure
MCC	Motor control cubicle, also known as the cabinet or switchgear
NOE	Notice of energisation
O&M	Operation and maintenance
P&ID	Piping and instrumentation diagram
PLC	Programmable logic controller
PS1, PS2 etc	Producer statements: statements issued by the qualified person carrying out the work to confirm compliance with the relevant standards
PTW	Permit to work
SAT	Site acceptance test
SCADA	Supervisory control and data acquisition
SOP	Standard operating procedure
SFAT	Software factory acceptance test
WBS	Work breakdown structure

3 Roles and responsibilities

The process for commissioning and handover requires multiple roles to work collaboratively within a working group. Their roles and responsibilities are defined in this section and in Appendix A. In addition, Appendix C provides a useful checklist of documentation that should be assigned to each role on a project. This checklist can also be found in STD_0003c Information delivery template. That template also contains a comprehensive responsibility matrix, which is generally consistent with this document.

For each project, the Project Manager should clearly identify the persons in each role, noting that some individuals may have multiple roles. Each project should also define project-specific responsibilities, especially where they may be different from those in this document or in STD_0003c. It may be useful to clarify these roles and responsibilities within a Terms of Reference for each project.

3.1 The Commissioning Working Group

The Commissioning Working Group is responsible for transitioning the constructed asset into an operational asset. Individual roles are clearly defined, and a collaborative environment is key to ensuring success. Accountability is distributed among individuals for different activities throughout the process. The Project Manager is responsible for establishing the working group during the construction phase, as early as is practical, to integrate commissioning activities into the project from the outset.

The group includes the following roles shown in Table 4.

Table 4 Roles and their responsibilities. For a detailed task-based list of responsibilities for each role, see Appendix A. Note: for smaller projects, individuals may be accountable for more than one role.

Role name	Responsibilities
Project Manager	The Project Manager is accountable for ensuring that the requirements before commissioning planning are completed and that the Commissioning Working Group has visibility of external influences that may impact the commissioning activities.
Designer or project design team	The Designer is accountable for producing the commissioning specification, inspecting the works, accepting the hold points of the inspection and test plans and issuing producer statements, if required.
Commissioning Representative	The Commissioning Representative is an internal role in Wellington Water that has responsibility to approve or to recommend approval of several key commissioning activities. The Commissioning Representative must liaise closely with the Project Manager, Commissioning Manager and Operations Liaison.
Project Engineer (construction)	The Project Engineer is accountable for planning, coordinating, executing, and verifying that the on-site physical installations are complete prior to handover to the Commissioning Working Group at safety clearance. The Project Engineer will liaise closely with the Commissioning Engineer.
Commissioning Manager	The Commissioning Manager is responsible for the management and overall coordination of the commissioning activities and the Commissioning Working Group.
Commissioning Engineer	The Commissioning Engineer is accountable for managing the hands-on commissioning of all elements of the commissioning process for the area for which they are responsible, from safety clearance to final handover. The role will also involve a considerable amount of coordination and commissioning documentation.
Process Engineer	The Process Engineer is accountable for ensuring that the system commissioning plans when tested, achieve the expected design outcomes. They represent the

Role name	Responsibilities
	design and set the expectations for the system to achieve its intended parameters and ensure a smooth integration into the existing plant or network.
Control Systems engineer	The Control Systems Engineer is accountable for ensuring that the control system is rigorously tested and reliable for operational handover. They work under the direction of the Commissioning Engineer and Process Engineer.
Operations Liaison	The Operations Liaison represents Operations and is accountable for managing and coordinating the interactions between the Commissioning Working Group and Operations. This role is responsible for coordinating technical queries, aligning commissioning activities with operational requirements, raising concerns that impact operations and planning operational resources to support the commissioning process.
Equipment vendors	The equipment vendor will be identified in each package's specific system commissioning plan and is accountable for verifying that the equipment is installed and commissioned according to the manufacturer's recommendations to maintain the warranties, taking direction from the commissioning engineer.
Operator	The plant Operator is accountable for supporting the Commissioning Engineer in physical activities that may need to take place, such as lockout/tagout (LOTO) procedures and operating the plant outside of the system, taking direction from the commissioning engineers. Depending on the project size, an operator(s) may need to be assigned to the project, as mutually agreed by the project manager and operations team.
Technical authorities	The Technical Authorities are authorised personnel who have been identified as qualified and experienced individuals in their respective disciplines. These individuals are accountable for ensuring that their discipline is safe during the commissioning phases and for providing final sign-off on the LOTO procedures and energisation.

4 Process overview

The flow chart in Figure 1 outlines the major process steps of commissioning. Appendix B provides more detail about how the activities in this process relate to the framework used within Wellington Water for delivering capital projects. Appendix C contains detail on specific activities within each process step.

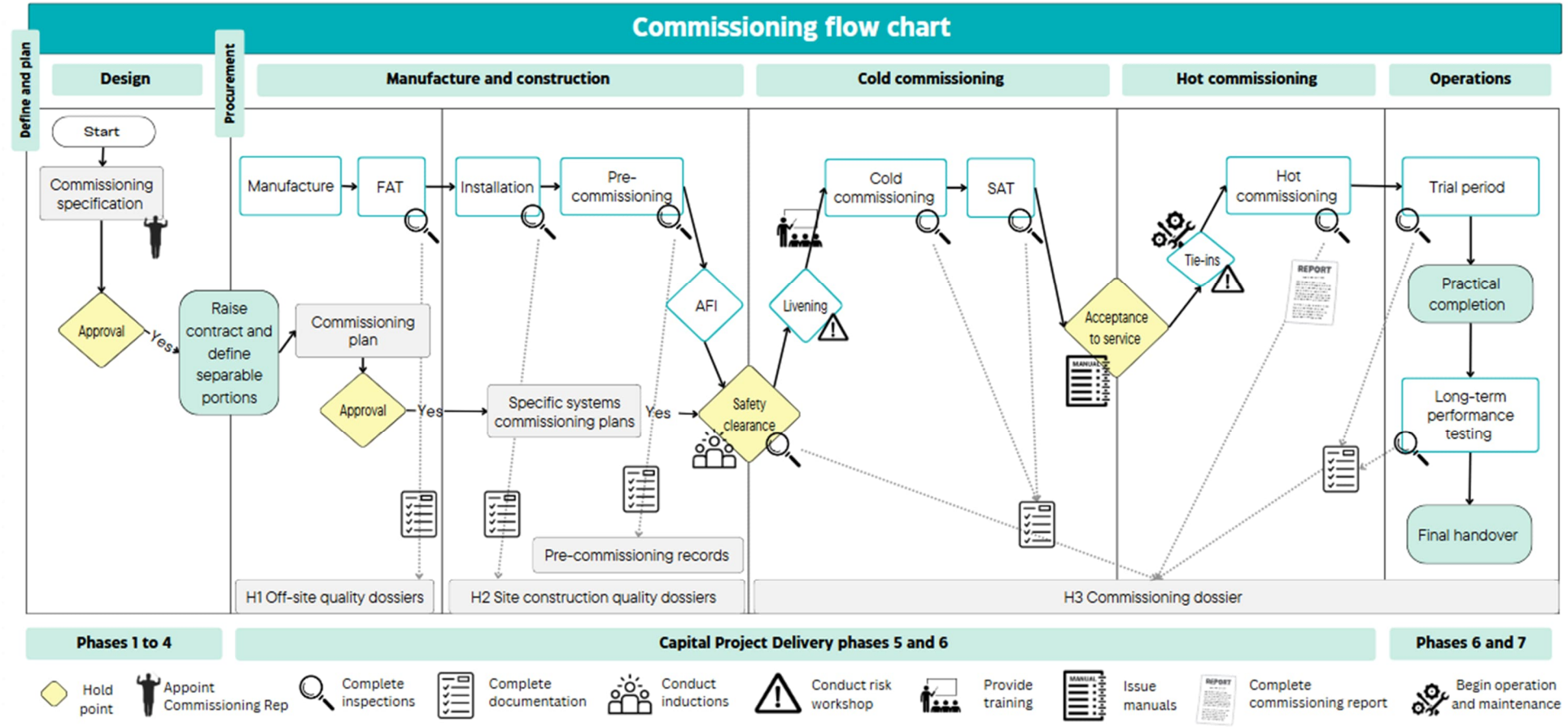

Figure 1 Flow chart outlining the end-to-end process through the commissioning stages in relation to the phases describing capital project delivery.

5 Define and Plan Stage

The 'Define and Plan' stage in Figure 1 includes the transition of work from being prioritised by Wellington Water into becoming a defined project and set up for delivery, and the planning stage to identify and prioritise key activities and deliverables that will set the project up for success.

This stage is equivalent to Phases 1 and 2: 'Define' and 'Plan', in the Capital Project Delivery project management framework (see more details in Appendix B).

6 Design stage

The 'Design' stage illustrated in Figure 1 ensures that commissioning-related input is addressed during the design of the project. This stage is equivalent to Phases 3 through 4: 'Concept design' and 'Detailed design' in the Capital Project Delivery project management framework (see more detail in Appendix B). Key responsibilities of preparation, consultation and approval related to commissioning for each role during the Design Stage are shown in Table 5 and the sub-sections below.

Table 5 Key responsibilities related to commissioning for each role in the Design Stage. Responsible (R): performs the task; Accountable (A): Approves the deliverable; Consulted (C): consulted before the task is completed.

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Design	Commissioning Specification	A					R						
Design	Tie-in concept methodology	A					R						C
Design	Tie-in list	A					R						

6.1 Produce commissioning specification

The Designer or project design team must produce a commissioning specification in consultation with the operators who will maintain the system.

The commissioning specification outlines the requirements and expected performance of the new asset(s). The specification must also include any required decommissioning and any temporary works for commissioning, such as the recirculation of water (when practical) to support cold commissioning. The approval of this specification is the responsibility of the Project Manager.

Key matters required for the commissioning specification are outlined in the sub-sections below. For detailed requirements on what to include in this specification, see the Commissioning Specification Template ACMT_0002A.

6.1.1 Collect project information for commissioning specification

Information on work breakdown structure (WBS)

During the design stage, the Designer should provide the commissioning specification with a work breakdown structure (WBS). The WBS breaks the project down into a hierarchy of smaller, manageable systems and subsystems that support individual system commissioning allowing the process to be tested safely.

This approach streamlines commissioning activities and ensures that individual systems are tested and verified without impacting other processes or operations. During the development of the WBS, the Designer should consider resource consent requirements, planned construction programme sequence, and the existing infrastructure.

For example, determining whether to use process water or potable water to test the system may be a key aspect of each sub-system. This approach supports safer cold commissioning and might include additional temporary pipework or connections. These provisional allowances must be included during the design phase.

The project's tie-ins and any temporary works

The WBS needs to describe the complexity of the project's tie-ins, including physical and software-related tie-ins.

'Acceptance to Service' must be completed before tie-ins can be carried out as shown in Figure 1. At the Design Stage a preliminary methodology for all tie-ins needs to be developed with input from operations.

The tie-in list must be reviewed during the detailed design phase to verify its completeness as part the signoff for the Detailed Design Report.

Commissioning-related key risks and safety considerations

The Commissioning Specification needs to collate the risks and safety considerations that the yet-to-be-established Commissioning Working Group should be aware of and manage during commissioning. These must also be documented in the project's safety in design (SID) risk assessment register, which will include risks and controls identified in HAZOP and CHAZOP assessments where these were undertaken. For more detail, see HSEP_0014 Safety in Design Process.

Consent requirements for impact on commissioning approach

The Commissioning Specification must include a review of the relevant resource consents or permitted activity obligations in the district and regional plan and their impact on commissioning. While commissioning requirements should have been considered as part of the project's wider consenting strategy, scope changes or more detailed development of requirements may result in the need for additional mitigation to ensure consent/permitted activity compliance. Mitigation may involve changes to the commissioning approach and/or additional consents.

Considerations need to include activities needed for initial startup, testing and the current vs long-term expected performance parameters.

A list of documentation to hand over

The Commissioning Specification also needs to include a list of the project-specific documentation to provide during handover. Please see Appendix C and STD_0003c for further detail.

6.2 Hold point: review and approve commissioning specification

The commissioning specification must be approved by the Project Manager before the Procure Stage (see Section 7), as it will form the basis of contract expectations.

7 Procure Stage

The 'Procure Stage' is at the end of the Phase 4 'Detailed Design' in the Capital Project Delivery project management framework (see more details in Appendix B).

These tasks are not depicted in detail in the flow chart in Figure 1. Key responsibilities related to tendering for commissioning during the Procure Stage are shown in Table 6 and the sub-sections below.

Table 6 Key responsibilities related to commissioning for each role in the Procure Stage. Responsible (R): performs the task; Accountable (A): Approves the deliverable; Consulted (C): consulted before the task is completed.

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Procure	Contract details	A		R									
Procure	FATs	A		Rr									

7.1 Factory acceptance testing expectations

Regardless of when the equipment is manufactured (before the project or during the early phases), certain projects may require factory acceptance tests (FATs) to be carried out before the equipment is released from the factory. These should be reviewed based on:

- Management of risk to the project or long-term operation
- Complexity of equipment

Make sure the following are covered in the contract agreements, where applicable.

- The list of equipment in the commissioning specification requiring FAT and the required testing and relevant quality assurance documentation
- Investigate and decide if any special interventions are needed to ensure that a relevant, independent third party is engaged to support the sign-off at the factory, or use of video technology to witness remotely.

7.2 Specify who is responsible for what in the contract

The Project Manager must review the best-practice separable portions based on the commissioning specification. This should help identify who will perform the cold and hot commissioning so that they can be included in their contractual responsibilities.

Examples to consider:

- review the number of separable portions complete versus the system completion, if any
- Include an additional separable portion for long-term testing if this will extend beyond the defects period

- define the responsibilities for the Commissioning Working Group (see Sections 3 and 8.1 and Appendix A))
- define the accountability for the parties performing the cold and hot commissioning (refer to Section 3)
- define the accountability of who performs the operational maintenance of assets during hot commissioning (refer to Section 3).

8 Manufacturing and construction stage

The 'Manufacturing and Construction' stage defined in Figure 1 is associated with the Phase 6 'Construct' in the Capital Project Delivery project management framework (see more detail in Appendix B).

Key responsibilities related to commissioning for each role during the Manufacturing and Construction Stage are shown in Table 7 and the sub-sections below.

Table 7 Key responsibilities related to commissioning for each role in the Manufacturing and Construction (M&C) Stage. Responsible (R): performs the task; Accountable (A): Approves the deliverable; Consulted (C): consulted before the task is completed.

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Manufacturing & Construction	Establish working group	A											C
Manufacturing & Construction	Commissioning Plan(s)		A		R	R		C	C			C	C
Manufacturing & Construction	Develop Tie-in Methodology		A			R	R	C	C			C	C
Manufacturing & Construction	Training plan and manual		C		R	R		C	C			A	C
Manufacturing & Construction	H&S					R							
Manufacturing & Construction	Communication Protocol		A		R								
Manufacturing & Construction	Handover H1			R		C	A						
Manufacturing & Construction	Installation and Construction records					R	A				C		
Manufacturing & Construction	Pre-commissioning		A			R				C			

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Manufacturing & Construction	Application for Inspection (AFI)		A			R		C					
Manufacturing & Construction	Handover H2		R	R			A						
Manufacturing & Construction	Safety Clearance	A	R	C		R				C		C	

8.1 Establishment of the Commissioning Working Group

The Project Manager must establish the Commissioning Working Group early in the project. The identification of the appropriate people to be the Operations Liaison and Operators must be done with the agreement of their supervisors. The purpose of the working group is to:

- Provide clear expectations for commissioning at the onset of the project
- Form a collaborative working environment
- Reduce risks associated with handover to operations.

The roles and responsibilities are set out in more detail in Appendix A and should have been addressed as needed in the contracts during the Procure Stage (see Section 7.2).

8.2 Produce commissioning plans

The Commissioning Engineer is responsible for developing:

- a commissioning plan for the project
- commissioning plans for specific systems, with inspection and test plans and inspection test records.

Note that the vendor's equipment may require its own commissioning plans, depending on the complexity of the system, which will be incorporated into the specific system commissioning plan(s).

Use these plans to manage and verify compliance with the commissioning specification (see Section 6.1 above).

Commissioning plans consolidate all aspects of commissioning, including roles and responsibilities, commissioning lots, programme, risk management, and communication protocols. The intention is to expand on the details in the commissioning specification and to provide specific project details. The plan must be scaled to meet the project complexity. It will highlight any differences from the requirements in this document and add more detail specific to the project.

Note that the commissioning plan needs to identify plans, drawings, registers, documents and certificates that need to be presented in the application for inspection (see Section 8.6), prior to issuance of the safety clearance before the start of cold commissioning.

The Commissioning Manager is responsible for submitting the commissioning plan at least 12 weeks before the start of any commissioning activities to the Commissioning Representative for approval.

Key matters required for the commissioning plan are outlined in the sub-sections below. Use the ACMT_0002B Commissioning Plan Template.

Depending on the complexity, the project may require multiple specific-system commissioning plans. These provide detailed, hands-on information on how each system will be commissioned, including:

- battery limits and tie-ins
- testing methods
- parameters expected to be verified
- all required compliance certificates
- inspection test plans (ITPs), and
- inspection test records (ITRs)
- Vendor Commissioning Plan(s).

The Commissioning Manager is responsible for submitting the system-specific commissioning plan for approval by the Commissioning Representative at least eight weeks before the start of any commissioning activities.

Use the ACMT_0002C Specific-system Commissioning Plan Template.

8.2.1 Develop the tie-in methodology

The tie-in of newly constructed elements is a key step in enabling hot commissioning and must be completed before hot commissioning can begin. In some cases, it can't be reversed. To provide clarity of the scope and risk of proceeding with hot commissioning, the Commissioning Engineer must develop a tie-in methodology for approval by the Commissioning Representative. This methodology needs to be included in each specific plan.

A review of each tie-in is required to assess the impact of risks on commissioning and operations. High-risk tie-ins require a joint workshop between all parties to understand and manage 'go' and 'no-go' interventions. An appropriate level of input, agreement and acceptance of the methodology to be used is required from operations. This should be specified in the commissioning plan under the section on roles and responsibilities.

In addition, the details of cut-in procedures into the live water network including liaison with Wellington Water and production of shut-down plans and any associated control measures, must be in accordance with ONP_0001 (see Section 1.4).

Key matters to include in the tie-in methodology include:

- 'Go' and 'no-go' interventions.
- Risk assessment.
- Roles and responsibilities of anyone involved.
- Sequence of tasks, duration of each task, whose is responsible etc.
- Emergency contact details, if necessary.
- Disinfection (for potable water connections).
- Sign-off details.

8.2.2 Identify required operating and maintenance manuals

The commissioning plan needs to identify each operating and maintenance (O&M) manual that will be required. The O&M manuals must be submitted with the application for inspection (see Section 8.6). Use the ACMT_0002E Operating and Maintenance Manual Template

8.2.3 Complete training plan and training manual

The commissioning plan needs to describe the training plan and any training manuals needed. The Commissioning Manager must develop and complete a training plan and manual in preparation for cold commissioning (see Section 9).

Training is a fundamental duty within the commissioning process. It supports operational personnel becoming familiar with the plant's new equipment and systems. This ensures effective operation and maintenance after handover.

The training plan

The Commissioning Engineer must complete and submit a training plan for approval by the Commissioning Representative. The training plan sets out the dates and type of training session for the following training activities:

- Induction
- Support and transition for the operations staff from cold commissioning through to final handover.

Training may involve a combination of on-site and classroom sessions. The Commissioning Manager will decide on the type of session and who will perform and be present during the training sessions. They will also decide which sessions are video recorded for future training.

The Commissioning Engineer will lead the training. The Process Engineer and Controls Engineer will support the training, if required, on the overall function and control systems. For special equipment, vendors may be asked to facilitate training sessions.

The training plan must include:

- the type of session (classroom or hands-on/on-site)
- the location, date, time and duration
- the list of expected attendees
- the overview and outline of each session
- a copy of the training manual(s).

The training manual

The training manual(s) must detail the following topics:

- site orientation
- overall function
- overview of system
- explanation of maintenance schedules
- explanation of critical control points
- control logic
- safety interlocks
- automatic versus manual operations
- level of automation and set points, including identification of black-box settings provided by vendors
- compliance requirements and how data is captured, for example, hold functions during calibrations
- critical spares
- troubleshooting.

Use the ACMT_0002D Training Manual Template.

8.2.4 Hold point: review and approve all commissioning plans

The commissioning plan, system-specific commissioning plans, and associated O&M and training manuals must be approved by the Commissioning Representative with consultation and agreement from operations (via the Commissioning Liaison) before any commissioning can commence.

8.3 Health and safety considerations

Health and safety is a fundamental aspect of commissioning activities and is the responsibility of the entire commissioning team. Key health and safety requirements associated with commissioning must be included in the commissioning plan, which is the responsibility of the Commissioning Engineer (see Section 8.2). All risks associated with commissioning must be assessed and either eliminated or mitigated to an acceptable level.

It is crucial to recognise that safety hazards may evolve during the commissioning phases, and it is important that they are identified and do not become obscured.

8.3.1 Complete a risk assessment

A risk assessment register must be completed before the beginning of any pre-commissioning activity. The risk assessment register must be completed by:

- all Commissioning Work Group members
- the personnel who may be used from time to time during pre-commissioning and commissioning.

8.3.2 Agree on the permit to work system

The Permit to Work (PTW) system (refer to HSEP_0015 or the 0045) that includes a LOTO (Lock Out Tag Out) regime is a mandatory requirement for commissioning. All works performed beyond safety clearance will require a permit to work. The commissioning plan should list all risks that need to be included in the PTW in addition to a LOTO, such as confined space, hot work, etc. This permit must be signed off by nominated technical authorities and issued by the Commissioning Engineer or Wellington Water authorised representative for the entity's asset before any commissioning activity post safety clearance, including any energisation. Please note the appropriate permit and authority to issue is dependent on asset control.

8.3.3 Define a restricted area

A good commissioning plan should identify the physical area being commissioned and prepare a site and hazardous area plan. This should include a restricted area zone that only inducted commissioning personnel can access. This can rely on physical barriers and warning signs or designated commissioning tape, such as. blue cones or blue and white candy tape.

8.3.4 Prepare emergency response plan

The emergency response plan must be in accordance with legislation. It needs to describe the actions to be taken for each reasonably foreseeable emergency that may arise from a breach or failure of the controls on any hazardous substance present or likely to be present. At the time of publication of this document a template for emergency response plans was not available, so please check if one has been developed.

8.3.5 Organise a commissioning induction

The Commissioning Engineer must organise a comprehensive induction for all people who will be on-site during commissioning activities from the safety clearance hold point (see Section 8.8) and onwards (Figure 1). This must happen before the start of any commissioning activities.

The Commissioning Engineer will lead the induction. Identification in the form of badges or stickers to be worn on hard hats must be provided to all people.

Induction topics should include, but are not restricted to:

- Overall commissioning process and project objectives
- The Permit to Work and isolation procedures

- Specific hazards and risks associated with testing and commissioning.
- The commissioning programme
- Identification of hazardous areas
- Define the restricted areas
- Roles and responsibilities of each commissioning team member
- Communications and escalations
- Required PPE
- Restricted areas, escape routes, alarm musters.

8.3.6 Identify hazardous areas

If the project has areas of the plant that are designated as hazardous, all personnel who need to work in or access these areas during commissioning must complete training to understand the area classifications and the associated entry and work requirements. As shown in Table 7 above, the Commissioning Engineer is responsible for leading this training.

8.3.7 Conduct daily meetings as per communication protocol

As noted in Section 8.2, the commissioning plan needs to include a communication protocol. Within each system, a daily pre-start meeting will be held at the beginning of each shift change to jointly discuss the planned commissioning activities. This meeting will be led by the Commissioning Engineer. Discussion points include:

- Results of systems tested the previous day, including challenges.
- Lesson learnt from the previous day.
- The system planned to be tested that day and the associated risk and expectation.
- The open permits and modifications.
- Any new NOEs (Notice of Energisation) and who are the technical authorities.

8.4 Manufacture and factory acceptance tests (FATs)

Before receiving a delivery of the equipment manufactured offsite, the Project Engineer needs to ensure that the required FAT is completed and signed off appropriately, in line with the commissioning specification and the contract documentation. This should also include software factory acceptance tests (SFATs).

8.4.1 Hand over H1 ‘offsite quality’ dossier

The Project Engineer needs to collate all offsite fabrication records into a dossier. Please see Appendix C and STD_0003c for further detail.). These must be approved by the Designer before installation of any equipment manufactured offsite (Figure 1).

8.5 Complete pre-commissioning

Once the system is installed (see Figure 1), begin pre-commissioning testing, also known as ‘offline commissioning’ or ‘mechanical and electrical completion’ testing. The purpose of pre-commissioning testing is to verify that:

- the plant was installed in line with the construction drawings and specifications, and
- all non-operating adjustments were completed.

At the end of pre-commissioning, a system will be ready for cold commissioning. Record the result of these tests with the ITPs and ITRs associated with the commissioning plans. These must be submitted to the Commissioning Representative for approval.

8.5.1 Examples of the pre-commissioning tests and checks to be undertaken

Check the drawings

- Review the installation against piping and instrumentation diagrams (P&IDs), construction drawings, vendor drawings, and specifications.
- Check the P&IDs as-built drawings (redline mark-ups on P&IDs are acceptable at this stage).

Site Readiness

- Commissioning area identified and confirm all construction debris is removed, and the work area is clean and tidy.
- Flush, clean, and inspect pipelines.
- Disinfect equipment and pipework (for potable water systems).
- Purge with nitrogen if flammable fluid is the normal operating fluid.

Equipment checks

- Inspect motor control cubicle (MCC), distribution board (DB) and DCS cabinets (including seismic design compliance where required)
- Pressure-test the pipelines and appropriate pressure vessels as per the specifications.
- Check equipment is lubricated correctly (i.e., in line with the manufacturer's recommendations).
- Alignment of motors and drive equipment and the associated documentation.
- Check insulation and earthing.
- Confirm that all pipe markers, including fluid codes and direction of flow, equipment labels and safety signs are in place (temporary acceptable).
- For specialised equipment that has been identified with the commissioning specification, the vendor will be required to sign off and accept the installation before any commissioning or livening to ensure the retention of their warranties. This should be detailed in the vendor commissioning plan (see Section 8.2).

Complete and collate the documentation

- Prioritise the defect list using A, B and C categories (see Section 8.8).
- Ensure the following are completed and available:
    - compliance certificates (e.g. location compliance certificate, stationary container certificate)
    - Electrical Code of Compliance Certificate (COC) – temporary is acceptable.

8.6 Prepare and submit application for inspection (AFI)

The purpose of the application for inspection (AFI) is to notify that a system or sub-system is ready for inspection to proceed into cold commissioning. A formal request from the Commissioning Engineer must be submitted to the Commissioning Representative at least three days in advance of the planned inspection.

The request for inspection needs to include a relatively large suite of documents listed below, as well as a date, time and location for a walkdown inspection.

Use the form ACMF_0002B Application for Inspection to prepare the AFI.

8.6.1 Information to include in the AFI

The completed AFI form must be accompanied by project-specific plans, drawings, registers, documentation and certificates. This information should be clearly identified in the commissioning plan (see Section 8.2).

Plans

- The approved commissioning plan including any system-specific and vendor commissioning plans

- Site and hazardous area plan
- Consent details monitoring plan, if applicable
- Load certificates (gantry cranes) and lifting plans
- Site acceptance testing (SAT) plans
- Emergency response management plan
- Incident and response management plans
- Odour management plan

Operating and maintenance documentation

- Agreed lockout/tagout (LOTO) safety procedure in place
- Operating and maintenance manual (a draft manual is acceptable if Wellington Water has reviewed and provided feedback)
- Shutdown and outage procedures
- Planned preventative maintenance schedules (see STD_0003a)
- Decommissioning procedures
- A list of the critical and recommended spares
- A list of required lubricants

Certification and compliance

- Compliance certificates and reports (e.g. location compliance certificate, stationary container certificate.)
- Calibration certificates
- Electrical COC Certificate – Temporary certificate accepted for Safety Clearance
- Completed factory acceptance tests (FATs) and software factory acceptance tests (SFATs)
- Record of instrument calibration

Producer statements Health and safety

- Material safety data sheets
- Site hazard register and residual hazard log
- Evidence that a commissioning induction was completed for the personnel involved
- Training register

Drawings

- Electrical drawings (redline acceptable)
- Piping and instrumentation diagrams (P&IDs), redline mark-ups on P&IDs are acceptable.

8.7 Hand over H2 construction quality records

The Project Engineer collates all construction records for the Designer to approve, who then hands them over the Commissioning Representative. These records must be available for consideration during the safety clearance hold point discussed in Section 8.8. Please see Appendix C and STD_0003c for further detail.

8.8 Hold point: Safety clearance

The safety clearance process (and certification) is a critical point of change in the project. It marks the transition from the construction phase to the commissioning phase. This process and its hold point give assurance that all components are verified and meet the necessary safety and operational requirements. It includes a review of the completeness of the documentation collected for the AFI, the H2 Handover dossier, and a physical inspection of the installation.

The safety inspection is led by the Commissioning Engineer. They coordinate the inspection with input and verification from the Project Engineer, technical authorities and Operations Liaison.

An outcome from the joint inspection is collated as a punch-list of items that need to be addressed and categorised as follows.

- Category A – major defects or outstanding works that need to be corrected before safety clearance can be issued (a rejected inspection).
- Category B – defects or outstanding works that can be corrected during the Commissioning stage until 'acceptance to service' under a Permit to Work (PTW) set up.
- Category C – defects or outstanding works can be corrected up until practical completion under a PTW set up.

Once the safety inspection confirms that the project can progress, a safety clearance certificate and supporting punch-list is issued by the Project Manager. Issuing this certificate allows the commissioning phases to commence, including the livening and energisation of equipment.

Use the form ACMF_0002A Safety Clearance Certificate to complete this certificate.

9 Cold commissioning stage

The activities in the 'Cold commissioning' stage, shown in Figure 1, are undertaken during Phase 6 'Construct' in the Capital Project Delivery project management framework (see more detail in Appendix B).

Key responsibilities related to commissioning for each role during the Cold Commissioning Stage are shown in Table 8 and the sub-sections below.

Table 8 Key responsibilities related to commissioning for each role in the Cold Commissioning Stage. Responsible (R): performs the task; Accountable (A): Approves the deliverable; Consulted (C): consulted before the task is completed.

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Cold Commissioning	Cold Livening and Energisation					A				A			
Cold Commissioning	Training					R		C	C		C		
Cold Commissioning	Testing					A		Ct	C	A			R
Cold Commissioning	Site Acceptance Testing (SAT)		A		C	R	C					C	
Cold Commissioning	Acceptance to service	A	R			R		C				C	

9.1 Livening and energisation

Livening and energisation, whether for electrical or mechanical purposes, can only be executed after the safety clearance certificate is issued and the PTW, which includes LOTO, is in place. The Commissioning Engineer must include the PTW as an agenda item for daily meetings

A complete set of notice of energisation (NOE) documentation must also be in place., and this will require signed approval from both the designated technical authorities and the commissioning engineer.

9.2 Training during cold commissioning

Training requirements including the training plan and training manual are discussed in Section 8.2.3

9.3 Complete cold commissioning testing

The purpose of cold commissioning is to verify that the equipment, system or sub-system has been tested and to verify that all functions meet the specifications and manufacturer's instructions.

This phase is critical for identifying and resolving issues early, ensuring the system is safe and ready to bring into operation. The use of recirculating water with temporary works is encouraged. Cold commissioning involves working closely with vendors, the electrical team and the software engineer to ensure all equipment is tested thoroughly and safely. All tests will be recorded and included in supporting ITPs and ITRs.

Before beginning, note the health and safety considerations in Section 8.3.

9.3.1 What to check and test during cold commissioning

The following list provides examples of what to check and test during cold commissioning.

General

- Project, system specific and vendor commissioning plans.
- Draft O&M manuals, including equipment manuals and standard operating procedures (SOPs) (see QMF_0905)
- Confirm that the equipment is safe to operate.
- Test lighting and power points.

Control functions

- Equipment start-up and parameter setting.
- Test switchboards, MCCs, DBs and DCS cabinets.
- Instrument calibrations, parameters, setpoints and scaling.
- Variable frequency drive (VFD) and variable speed drive (VSD) parameter setting.
- Input/output (I/O) signal tests for signalling system inputs and outputs at programmable logic controllers (PLCs) then up to supervisory control and data acquisition (SCADA), and alarm databases.

Performance

- Bump testing for the directional rotation of all rotating equipment, initially uncoupled where practical, and then recoupled.
- Check actuated valves for clean travel and sealing when closed.
- Test all electric motors for insulation resistance before starting.
- Confirmation that equipment operates with minimum vibration and within the noise limits as specified by the manufacturer.
- Dry systems such as instrument air or nitrogen systems are air-blown to both clean and dry out the distribution piping to the coded dew point.

9.3.2 Considerations and expectations during cold commissioning

The following considerations and expectations need to be addressed during cold commissioning:

- The software will need to be uploaded for cold commissioning activities to take place. This needs to be reviewed to ensure the upload doesn't impact current operations or other systems being commissioned.

- Instruments to be used for monitoring and testing must be suitable for the purpose and calibrated by an IANZ-accredited laboratory (or equivalent approved by the manufacturer) within the last 12 months.
- Operations personnel should be included during cold commissioning for their experience and to gain of knowledge and familiarity with the plant.
- Operator system training and demonstration of operator competencies is required to ensure readiness for acceptance to service and hot commissioning.
- Instrumentation devices must be set up and calibrated by qualified technicians to provide verification of instrumentation functionality, measurement attenuation, signal range, and signal accuracy. Calibration record sheets (ITRs) will be used to record and verify each instrument's set-up parameters.

9.4 Site acceptance testing

The purpose of site acceptance tests (SATs) is to verify the control system for each system of sub-system sequence where possible without impacting operations.

Each SAT is designed to prove all aspects of control, item by item, and plant-wide communication and logic control between the entire plant process. Some testing of abnormal conditions and responses is required, so it will require the plant to be deliberately put into abnormal operating modes and conditions.

SCADA must be used extensively. Alarm registers and deliberately activated alarms must be raised, logged, accepted, and reset each day. With several system using the same SCADA files and PLCs concurrently, this can add complication to the software management, so the commissioning engineer will need to manage these interfaces and determine priorities where necessary.

The approval of SAT is the responsibility of the Commissioning Representative.

Before beginning, note the health and safety considerations in Section 8.3 above.

9.4.1 What to check and test during site acceptance testing

Examples of what to check and test during SAT include:

- Testing safety systems including interlocks, air relief valves, safety relief valves (including certifications), overload protection devices, emergency stops, field push buttons etc.
- Check and confirm pump output performance using water, including duty point verification.
- SCADA and control operation of equipment i.e., driving valves etc.
- Control system SAT checks that do not require a continuous process fluid.
- Line-by-line function testing with the functional description. Items that can't be tested must be included in hot commissioning testing.
- Testing cause and effect.
- Plant must be fully operated in automatic mode on SCADA.
- Compliance deliverables to be proven (i.e., demonstrating critical control points, emergency shutdown and recovery of process, pump system tests, hydraulic capacity testing to design limit etc).

9.4.2 Considerations and expectations during site acceptance testing

The following considerations and expectations need to be addressed during SAT:

- Protection settings will need to be refined as the electrical infrastructure is loaded.
- Some control design features should be re-evaluated, amended and even redesigned during these tests. Acceptance from the Process Engineer prior to approval for this is required and must be recorded as a change (signed and dated).

- Software security will be important if ongoing software work will necessitate multiple users of the same control platforms and equipment, and the software file structure. All software changes will require acceptance from the Process Engineer prior to approval from the Commissioning Representative. This also requires discussion with Operations staff, and trackability records kept up to date.
- If SCADA setpoints are to be bypassed, or ESD signals to be temporarily bypassed, a structured and documented record (log) of this bypass within the PTW must be kept and signed off. The downstream operations will be required to review this log to ensure all bypasses are removed before normal operations.

9.5 Hold point: Acceptance to service

The purpose of the 'acceptance to service' step (Figure 1) is the formal transition and acceptance that the system was successfully connected to the plant or network. At this point, the asset or system is live and intended to operate without manual intervention from operations.

The system, however, still needs to go through Hot Commissioning (full system testing and have a commissioning report approved) before being handed over to operations for performance testing and practical completion.

Acceptance to service requires a formal inspection led by the Commissioning Engineer. They coordinate the inspection with input and acceptance provided by the Operations Liaison, supported by the Process Engineer, technical authorities, and the operators.

An outcome from the joint inspection will be an updated punch-list (same as the Safety Clearance) of items that need to be addressed, categorised as follows.

- Category A – Not used for acceptance for service as all category "A" should have been closed as part of the Safety Clearance Certificate (see Section 8.8)
- Category B – defects or outstanding works that can be corrected during the Commissioning stage until 'acceptance to service' under a Permit to Work (PTW) is set up.
- Category C – defects or outstanding works can be corrected up until practical completion under a PTW.

Once the acceptance to service inspection has been accepted commissioning can progress, an Acceptance to Service Certificate with supporting punch-list is issued by the Project Manager. Issuing this certificate allows the next commissioning phases to commence, including the tie ins and hot commissioning

Use the form ACMF_0002C Acceptance to Service Certificate.

10 Hot commissioning stage

The activities in 'Hot commissioning' stage, shown in Figure 1, are undertaken during Phase 'Construct' in the Capital Project Delivery project management framework (see more detail in Appendix B).

Key responsibilities related to commissioning for each role during the Hot Commissioning Stage (HC) are shown in Table 9 and the sub-sections below.

Table 9 Key responsibilities related to commissioning for each role in the Hot Commissioning Stage. Responsible (R): performs the task; Accountable (A): Approves the deliverable; Consulted (C): consulted before the task is completed.

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Hot Commissioning	Full system test		A		R	R	R			R			
Hot Commissioning	Commissioning Report		A		R	R							

10.1 Complete hot commissioning testing

The purpose of hot commissioning is to complete any tests that remain from the cold commissioning phase including a full-system test under normal process conditions, e.g. with effluent. This phase is critical to ensure that the individual systems, and ultimately the complete system, operate as designed and intended. The Commissioning Engineer is responsible for conducting the tests during hot commissioning. The test results need to be validated by the Designer and technical authorities and approved by the Commissioning Representative.

Before beginning, note the health and safety considerations in Section 8.3 above.

10.1.1 What to check and test during hot commissioning

Examples of what to check during hot commissioning include:

- Tests that could not be completed during the site acceptance testing.
- Re-confirmation of flow parameters.
- Confirmation of all setpoint achievements.
- Optimisation of the asset.
- Duty performance must be measured, recorded and compared to the design parameters, and then adjusted and re-evaluated as the equipment operates in range of operating condition settings.
- Protection settings and setpoints refined.
- Systems will be "operated-checked" within the parameters of the process design, ensuring both manual and automatic operations as per the design are met.
- Safety interlocks verified.
- Confirmation of the basis of design (process performance) parameters.

10.2 Complete commissioning report

The Commissioning Engineer must prepare a commissioning report. The commissioning report summarises both the cold and hot commissioning tests completed for each system. It should include any deviations throughout the process and a record of who attended the training.

The commissioning report marks the end of cold and hot commissioning and the must be approved by the Commissioning Representative before the trial period (performance testing) begins.

11 Operations stage

The testing during the 'Operations' stage, illustrated in Figure 1, includes performance testing and coincides with the Phase 6 'Construct' and Phase 7 'Complete' in the Capital Project Delivery project management framework (see more detail in Appendix B).

Key responsibilities related to commissioning for each role during the Operations Stage are shown in Table 10 and the sub-sections below.

Table 10 Key responsibilities related to commissioning for each role in the Operations Stage. Responsible (R): performs the task; Accountable (A): Approves the deliverable; Consulted (C): consulted before the task is completed.

Stage	Task	Project Manager	Commissioning Rep	Project Engineer (Construction)	Commissioning Manager	Commissioning Engineer	Designer	Process Engineer	Control systems engineer	Technical Authorities	Vendor	Operations liaison	Operator
Operations	Trial period (Performance testing)		A		R	R	C			C			C
Operations	Practical Completion	A	C									C	
Operations	Long-term performance testing (Defects period)	A	C										R
Operations	Final Handover H3		A			R							

11.1 Trial period

The trial period occurs before practical completion of the project (Figure 1). During the trial period, Operations take over the daily running of the system while they still have the support of the project team to correct any defects.

The purpose of the trial period is to test and confirm that the new asset can operate as a system without intervention under normal operating conditions. There are two objectives: reliability and process performance. The duration of the testing is specified in the commissioning specification, or within a minimum of 14 days.

If a significant fault occurs, the trial period shall restart. 'Significant' refers to a fault impacting resource consents or design specifications.

The trial period ends when the specified duration of the testing has expired without significant defects.

11.2 Practical completion

Once the trial period is completed, the Operations Liaison can recommend that the project is approved for practical completion. For details, see PCMG_0002 Guidance for Capital Project Delivery.

11.3 Long-term performance testing

The long-term performance testing period runs concurrently with the defects period in Phase 7 'Complete' of the Capital Project Delivery project management framework (Appendix B).

The purpose of the long-term performance testing is to verify tests that require an extended period of testing. These tests are described in the commissioning specification, and can include:

- Process testing that is impacted by seasonal change i.e. flows, composition or other characteristics
- Complex vendor equipment that requires long-term operability support.

11.4 Final handover

The final H3 Handover dossier is compiled by the Commissioning Engineer and must be approved by the Commissioning Representative. Please see Appendix C and STD_0003c for further detail.

12 Decommissioning

Decommissioning is not within the scope of this process document. However, it is important to recognise that the commissioning of a new or upgraded system is often associated with the decommissioning of another system.

A decommissioning procedure is currently being completed but was not available at the time of the publication of this commissioning document.

Appendix A Detailed responsibilities per role

Note: for smaller projects, individuals may be accountable for more than one role. Table 11 lists the responsibilities for each role in the Commissioning Working Group.

Table 11 Responsibilities for each role in the Commissioning Working Group.

Role	Responsibilities
Project manager	• Manage of resources to fulfil commissioning planning requirements. • Establish the Commissioning Working Group and ensure project-specific roles and responsibilities are documented and understood. • Issuing the Safety Clearance Certificate and Acceptance to Service Certificate. • Ensure contract documents are aligned with the commissioning requirements for the consultants and contractors. • Manage any contractual conflicts and changes to support commissioning.
Designer	• Prepare commissioning specification for tender documentation. • Prepare a work breakdown structure (WBS). • Prepare preliminary tie-in methodology. • Approve collated documentation for H1 and H2 handover dossier. • Approve installation and construction quality records. • Provide design acceptance prior to approval of SAT. • Provide design acceptance prior to approval of the full system test. • Provide design acceptance prior to approval of performance testing (trial period).
Commissioning representative	• Ensures all consultations and approvals occur as agreed between the project manager, commissioning manager, and operations liaison • Approve the commissioning plan, specific commissioning plans tie-in methodology and communication protocol. • Approve the pre-commissioning and AFI • Recommend approval of the Safety Clearance Certificate • Approve the SAT, full system test and commissioning report • Recommend approval of the Acceptance to Service Certificate • Approve the trial period (performance testing) • Recommend approval of practical completion and the defect period (long-term performance testing • Approve final handover of the H3 handover dossier.
Project engineer (construction)	• Tenders contract details for construction including FATs • Collate the handover dossiers • Verify readiness for issuance of Safety Clearance Certificate • Developing work plans, tie-in plans, inspection and test plans (ITPs) and inspection and test records (ITRs) to validate installations. • Verify, sign off and compile ITPs and ITRs ready for application for inspection (AFI) and safety clearance. • Ensuring the as-built drawings, operation and maintenance (O&M) manual and documentation, including the functional descriptions, are updated to reflect changes through the installation. • Participation in risk workshops. • Prioritisation of defect lists (categories A, B and C) and ensuring the necessary items are completed before commissioning. • Coordination and implementation of physical tie-in activities as required during commissioning.

Role	Responsibilities
	• Ensuring the required factory acceptance tests (FATs) are completed. •
Commissioning manager	• Submit the commissioning plans to the commissioning representative for approval, based on this document and the specific project commissioning specifications. • Develop an organisational chart and update the roles and responsibilities. • Coordinate and plan training activities. • Rationalise the system and sub-system work breakdown structure to ensure priority systems are identified early on within the project programme. • Appoint commissioning engineers who plan and coordinate their respective systems, including all safety clearance inspections and commissioning activities. • Appointment of commissioning technical authorities. • Ensure that safety clearance certificates are completed and signed. • Ensure that tests are carried out in accordance with the contractual documents and commissioning plan, with clear timeframe requirements, and that plant performance complies with the acceptance criteria. • Oversee the permit-to-work (PTW) system and ensure that the required permits are issued to all personnel who need to perform work. • Chair the start-up meeting and monthly meetings. • Facilitate solutions to the escalated commissioning roadblocks. • Review commissioning-specific system commission plans. • Facilitate risk assessments for tie-ins, energisation, and software implementations. • Review site acceptance testing and performance testing methodologies. • Coordinate and direct discipline leads and technical authorities to witness testing and document reviews. • Define the project data base any how information is stored and managed.
Commissioning engineer	• Develop the Commissioning Plan, including any required specific commissioning plans. • Review H1 Handover dossier. • Submit installation and construction quality records. • Develop and integrate the tie-in methodology, ITPs and ITRs for commissioning. • Lead all H&S inductions • Ensure that during testing, all ITR check sheets and testing information are recorded and signed prior to the completion of each test with the supporting defect lists. • Participate in risk workshops. • Interface with subcontractors and vendors to understand their expectations and ensure they are documented within the System Specific Commissioning Plan. • Develop a defect list and record changes and issues during commissioning. • Produce site acceptance testing and performance testing methodologies. • Participate in FATs, particularly for the control system. • Ensure the as-built drawings, O&Ms and documentation including the functional descriptions, are updated to reflect changes resulting from commissioning. • Complete the training plan, submit it for approval to the Operations Liaison and lead the training. • Ensure that training and training documentation are provided in advance of acceptance to service. • Request the application for inspection (AFI) and prepare safety clearance documentation. Ensure all electrical, mechanical, instrumentation, and control equipment and systems provided within the work package scope are set up, tested, calibrated, and verified during cold commissioning.

Role	Responsibilities
	• Approve all permits jointly with the technical authorities for cold livening and energisation, including LOTO as required for each work front. • Direct the installation and removal of LOTOs. • Coordinate and implement software tie-in activities as required during cold commissioning. • Run the commissioning morning pre-start briefing. • Issue daily diary progress reports to the commissioning manager. • Facilitate the training and familiarization of operations teams to prepare them for continued operations. • Manage and coordinate alarms during the commissioning phase until practical completion, with the support of the operator. • Ensure the required maintenance of physical assets is maintained during the commissioning phases until practical completion, with the support of the operator.
Process engineer	• Review and provide acceptance prior to approval of the system commissioning plans. • Review and provide acceptance prior to approval of methodologies, ITPs and ITRs for commissioning. • Sign off at hold points during the commissioning stages, particularly for acceptance to service supported by raising defects. • Participate in risk workshops and identify risks to the existing plant during commissioning and tie-ins. • Ensure specific plant requirements are in place for the commissioning and trial periods. • Review and assist in the development of any changes that impact the original design process. • Ensure that any plant compliance requirements have controls in place and are communicated to the commissioning working group during daily meetings. • Manage all process testing and sampling activities for the works and for process proving trials. • Manage interfaces with external laboratories. • Run, optimise, and fine-tune the plant control logic to meet operational needs and ensure optimum performance during hot commissioning. • Ensure the team understands and manages the process critical control points to ensure compliance with specifications and regulations. • Review and assist in the development of any standard operating procedures and identify and communicate the specific requirements from the operators. • Support the commissioning engineers in prioritizing critical alarms that impact operations.
Control systems engineer	• Set up and test the signalling and instrumentation devices. • Verify the control logic needed for the overall process control system. • Escalate logic issue to the commissioning engineer. • Document and record testing line by line. • Document any deviations or changes from the process engineer. • Train operators on supervisory control and data acquisition (SCADA).
Operations liaison	• Represent all operations staff involved in the commissioning project. • Coordinate the interactions between the Commissioning Working Group and Operations. • Raise technical queries • Align commissioning activities with operational requirements. • Raise concerns that impact operations and planning operational resources.

Role	Responsibilities
	• Review and provide operational acceptance prior to issuance of Safety Clearance, SAT, Acceptance to Service, and practical completion.
Equipment vendors	• Provide specific commissioning plans and ITPs for review and integration into the system commissioning plan. • Perform vendor sign-off of installation and confirmation of start-up procedures. • Provide a commissioning report outlining all parameters and setpoint adjustments made during the commissioning process. • Demonstrate performance criteria to the process engineer. • Facilitate operator training and issue records. • Issue confirmation of any warranties. • Provide information for any asset data capture requirements. • Provide O&M manuals. • Participate in commissioning-related risk workshops.
Operator	• Remove or install LOTO for isolations of the system under the direction of the commissioning engineer. • Attend training sessions and demonstrate competencies. • Review and provide operational acceptance of the O&M manual. • Notify the operations liaison of any plant issues that may affect commissioning. • Receive alarms and respond to on-call support for the newly operational plant. • Operate and maintain equipment during the trial period (performance testing). • Record results and defects during the long-term performance testing (defects period).
Technical authorities	• Approve all permits jointly with the Commissioning Engineer for critical procedures, such as LOTO, cold livening and energisation, ensuring that all safety measures are in place before operations begin. • Released of hold permits for system being commissioned. • Attend, raise and define defect categories during the safety clearance inspection. • Provide technical acceptance prior to issuance of Safety Clearance Certificate. • Ensure that all commissioning activities adhere to safety standards and regulations, minimising risks to personnel and equipment. • Offer expert advice on technical issues related to their discipline, helping to resolve any challenges that arise during commissioning. • Review and provide technical acceptance prior to issuance of all relevant documentation, including specific commissioning plans, test protocols, and operational manuals, to ensure they meet required standards. • Validate that systems are tested and performed according to design specifications during cold commissioning testing, full system test and performance testing (trial period). • Assist in the training of operators, ensuring they understand the systems and can operate them safely and effectively. • Participate in risk workshops to identify potential issues. • Provide feedback and recommendations for improvements during commissioning to the commissioning engineer.

Appendix B Capital project delivery framework and commissioning activities

At Wellington Water, we use a seven-phase gateway approach to managing capital project delivery. This provides for consistent fit-for-purpose approaches to track progress through the project lifecycle. Each gateway represents a decision point that requires the completion of key activities and governance approval before moving to the next phase.

The commissioning and handover process described in this document aligns with this framework. Table 12 shows how the commissioning and handover activities described above are integrated within these phases and gateways. Any changes to the staging of these activities must be fully described in the approved project management plan.

See PCMG_0002 Guidance for Capital Project Delivery for more information about the framework of phases and gateways.

Table 12 Key commissioning activities and deliverables within each phase of the Capital Project Delivery framework.

Project phase	Key deliverables within Commissioning
Phase 1: Define 	• Prepare the activity brief (see template: PCMT_0009). • Consider operational requirements. To progress through Gateway 1 to Phase 2, provide evidence of acceptance of operational requirements by the Asset Operator in the Gateway checklist.
Phase 2: Plan 	• Consider the need for commissioning and handover requirements including, how operations team representatives need to be involved t to ensure a seamless commissioning and handover process To progress through Gateway 2 to Phase 3, , provide evidence of acceptance of operational requirements by the Asset Operator in the Gateway checklist.
Phase 3: Concept Design 	• Develop the commissioning specification. • Engage a commissioning representative. To progress through Gateway 3 to Phase 4, confirm acceptance of operational requirements in the Gateway checklist.
Phase 4: Detailed Design 	• Engage a commissioning representative (if not done during Phase 3). • Complete pre-construction safety in design risk assessment, including HAZOP and CHAZOP if required. • Complete commissioning specification. • Prepare draft equipment list. • Prepare shutdown plans. • Prepare structure of O&M manuals (including as-built information). • Define contractual roles and responsibilities. • Define clear separable portions to support handover of systems • Establish FAT Requirements. • Define and allocation of operations resources. To progress through Gateway 4 to Phase 5, provide evidence of acceptance of operational requirements by the Asset Operator in the Gateway checklist.

Project phase	Key deliverables within Commissioning
Phase 5: Procure 	• If required, assist in responses to the RFT questions. • If required, provide input to tender evaluation process.
Phase 6: Construct 	• Establish a Commissioning Working Group • Develop detailed commissioning plan(s). • Develop specific commissioning plan for each system. • Complete action plans for Production Control team approval if water-treatment plant shutdowns or process interruptions are expected. • Perform commissioning activities. • Perform operator training. • Hand over commissioning records from cold commissioning, site acceptance test (SAT) and hot commissioning. • Hand over asset register O&M manual. • Ensure there are spares. To progress through Gateway 6 to Phase 7: • provide evidence of acceptance of operational requirements by the Asset Operator in the Gateway checklist
Phase 7: Complete 	• Long-term performance testing • Defects period • Final handover of H3 dossier.

Appendix C Asset handover documentation

A successful commissioning requires the collection and handover of all project documents and information that provides evidence of the project's completeness. The commissioning process, as illustrated in Figure 1 in Section 4 of this document, identifies process points for the following three handovers:

- H1 Off-site dossier: collation of off-site fabrication records. This is collated and handed over before installation begins.
- H2 On-site quality dossier: collation of construction records. This is collated and available for consideration during the Safety Clearance hold point.
- H3 Commissioning dossier: collation of all commissioning records and reports.

Detail on what information must be provided within each handover is shown in Table 13.

Table 13 Handover index associated with major commissioning steps. Please refer to STD_0003c.

Description	1 - Define	2 - Plan	3 - Concept Design	4 - Detailed Design	5 - Procure	With Safety Clearance	Acceptance to Service	6. Construction
Cable Loop Diagrams						REDLINE		X
Control Schematics								X
Drawings (Civil, Structural, Mechanical, Electrical)								X
Electrical Cable Block Diagrams								X
Electrical Single Line Diagrams						REDLINE		X
General Arrangement Drawings								X
GIS Geodatabase								X
Hazardous Area Plan						X		
Site Buried Services Plan								X
Site Plan						X		
Asset Data							X	
Critical & Recommended Spares						X		
Compliance Certificates & Reports						X		
Compliance Certificates (LCC, SCC)						X		
Compliance Certificates LLS						X		
Compliance Report for Infrastructure Data (ID) (Lutra)							X	
Disinfection Certificate							X	
Electrical Code of Compliance Certificate (COC)						X		
Water Safety Plan							X	
AFI Application for Inspection						X		
Asset Acceptance to Service						X		
Calibration certificates						X		
Commissioning Plan						X		
Commissioning Procedures/Method						X		
Commissioning Report							X	
Commissioning Spares and Lubricants						X		
Commissioning Specification				X				
Component and Material Test Certificates								X
Consent details						X		

Description	1 - Define	2 - Plan	3 - Concept Design	4 - Detailed Design	5 - Procure	With Safety Clearance	Acceptance to Service	6. Construction
Construction Monitoring						X		
Factory Acceptance Testing (FAT) Plans & SFAT						X		
Inspection and Test Plans and ITRS (Commissioning)						X		
Inspection Record						X		
Instrument Calibration						X		
Load Certificates (Gantry Cranes)						X		
Method Statements/Work Instructions/CEPS						X		
Producer statements (PS1 and PS2)						X		
Producer statements (PS3)						X		
Producer statements (PS4)						X		
Safety Clearance Certificate						X		
Site Acceptance Testing (SAT) Plans						X		
Snags & Defects							X	
Testing Report							X	
PLC Software								X
SCADA Mimic Screens								X
2D CAD Drawings				X				X
3D Model				X				X
Basis of Design				X				
Design Calculations				X				
Design Departures				X				
Design Reports				X				
Design Specifications				X				
Equipment Data Sheets				X				
Functional Design Specification (FDS)				X				
Piping & Instrumentation Diagrams (P&IDs)				X		REDLINE	X	
Process Flow Diagrams				X				
Asset Risk Management Plans								X
Emergency Response Management Plan						X		
Environmental Aspects and Impacts Register								X
Failure Mode, Effects and Criticality Analysis (FMECA)								X
Hazardous Area Assessment and Dossier							X	
HAZOP Documentation						X		
Incident and Response Management Plans						X		
Lifting Plans						X		
Material Safety Data Sheets (MSDS)						X		
Odour Management Plan						X		
Residual Hazard Log						X		
Safety Assurance Reports				X				X
Safety in Design Reports				X				
Site Hazard Register				X		X		
Decommissioning Procedures						X		
Job Plans								X
Operations & Maintenance Manuals							DRAFT	X

Description	1 - Define	2 - Plan	3 - Concept Design	4 - Detailed Design	5 - Procure	With Safety Clearance	Acceptance to Service	6. Construction
Original Equipment Manufacturer (OEM) Manuals								X
Planned Preventative Maintenance Schedule						X		
Recorded Training Sessions								X
Shutdown and Outage Procedures						X		
Site Operating Manual								X
Standard Operating Procedures (SOPs)							DRAFT	X
Tools and Equipment								X
Training Manuals and Materials							DRAFT	X
Training Register						X		
Warranties								X

The handover dossier must be provided in both physical and digital formats.

Each physical dossier should be bound neatly in loose-leaf, hardback binders in ISO A4 size, and labelled, indexed, and divided appropriately. The physical dossier must be provided to Operations Liaison who is responsible for making it accessible to the site operations team.

Digital dossiers must be provided in accordance with asset information requirements in STD_0003.