

Asset Lifecycle – Guidance Note

Decommissioning of non-linear assets (facilities)



Purpose

Assets that reach the end of their service life or become redundant generally require some form of decommissioning to remove them from operation or are left in place for future use, should it be required. The purpose of this decommissioning guideline is to establish a consistent, safe, and efficient process for decommissioning of Watercare’s facilities.

Objective

A well-defined process helps ensure that decommissioned assets do not become a liability. The objectives of this guideline include:

- Establishing a clear and consistent strategy for decommissioning which helps to identify the most efficient approach, whilst mitigating potential risks associated when assets are decommissioned
- Safeguarding the public and protecting surrounding infrastructure.
- Ensuring compliance with regulatory standards.
- Optimising resources used and avoid unnecessary costs.

Scope

The Scope of this document covers the decommissioning of the following assets:

- Water and wastewater treatment plants
- Water and wastewater pumping stations including booster pump stations
- Storage reservoirs
- Dam structure including any storage classified as a “dam”

Refer to Guidance Note *ESF-500-GDN-303* for decommissioning guidance of linear assets.



Decommissioning Approach

The key stages involved with implementing a decommissioning activity are as follows:

- I. **Decommissioning optioneering:** A structured approach such as comparative risk assessment or MCA should be carried out to assess viable options and determine an appropriate decommissioning pathway e.g. putting it out of service (mothballing), abandonment in place or/and abandonment by removal. The criteria should include weighted risks, benefits, environmental impacts, technical risk, effect on other utilities and TOTEX.

Understanding the structural condition (estimated remaining life) of the asset will also help inform the preferred approach especially if the option requires an asset to be shutdown/deactivated or continue to remain deactivated for a period (months, years).

- II. **Engineering and planning:** To help ensure the efficient delivery of the decommissioning plan, the project team should:
 - Identify and engage with the relevant stakeholders
 - Gather the necessary information (e.g. condition assessment, sampling, monitoring, data analysis, gathering documentation including drawings etc), pipeline segment analysis.
 - Carry out a risk assessment
 - Develop a sound methodology
 - Obtain the necessary consents and maintain regulatory compliance

As part of the planning process, the project team should consult with parties that have a vested interest in the proposed methodology e.g. operators, maintenance and life cycle teams.

- III. **Decommissioning delivery:** Carry out decommissioning and handover activities. Ensure all decommissioning activities comply with relevant regulatory standards and guidelines (this should be identified during the planning stage). Task shall include a final inspection of the decommissioned site and asset information update. To facilitate continuous improvement, a lesson learnt session should be conducted to gather feedback from the team and stakeholders involved, documenting both positive learnings and challenges endured during the decommissioning process.
- IV. **Post decommissioning:** Decommissioned assets are handed over to the identified responsible team for ongoing periodic monitoring, inspection and maintenance as required.



Decommissioning Options

When decommissioning an asset, there are two primary classifications and two sub-categories for abandonment which are:

1. Out of service state
2. Abandonment
 - a. In-place
 - b. Removal

Depending on the complexity of the facility, a combination of these classifications can be assigned to different areas or equipment.

Out of service state

An asset classified as out of service (mothballed) is left in place without significant alternations and can be reinstated or repurposed if required. This option is generally suitable for assets that may have future value. The ownership and responsibility of periodic maintenance remain with Watercare to ensure identified risks are managed and these assets can be reinstated or repurposed for future use (should it be required).

Abandonment

Where assets are to be abandoned, it is expected that they will not be put back into service or repurposed because it has been confirmed Watercare Planning and/or Operations team that there is no foreseeable use of the asset moving forward. This is generally the case with asset that are irreparable or where it's been demonstrated that there is sufficient provision for elsewhere and the asset is not required (i.e. asset doesn't provide benefit, and the ongoing operational cost doesn't justify operating it). Within the abandonment option, the asset can be abandoned in-place or removed.

Asset identified for abandonment require a specific risk assessment to consider the likelihood and consequence of failure, and what the implications of failure may include. This should inform a decision on the most appropriate abandonment technique to mitigate risk and liability in the event of failure. Refer to Risk Evaluation for Abandonment Option section for further information regarding the risk assessment exercise.

Abandonment in Place

Assets that are abandoned in place are usually civil structures such as buildings, tanks, dam or reservoir. Mechanical and electrical assets within the facilities are typically removed and/or reused. The decision to carry out abandonment in place shall be determine through the failure risk assessment exercise.

Abandonment by Removal

Assets are completely removed and/or demolished. This includes, but not limited to, all above and underground components, plinths, structures, mechanical and electrical equipment and pipe works.

This option is typically selected when leaving the asset in place poses significant risks or when the asset owner chooses to eliminate future liability. The benefit of removal is that it makes the site



available for other future works, in a world of congested services where infrastructure “real estate” is becoming increasingly challenging.

Risk Evaluation for Abandonment Option

Risk is determined by evaluating the likelihood of failure and the consequences in the event of that failure. To assess the magnitude of the risk, a risk class is assigned by plotting the likelihood and consequences scores on a risk matrix (see Figure 1). This classification ranges from very low to very high.

Table 1: Example of risk assessment matrix

Consequence of failure (Significance of failure)		1	2	3	4	5
		Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood of failure (Asset condition)	Very Poor	Note 1	Note 1	Note 1	Note 1	Note 1
	Poor	Note 1	Note 1	Note 1	Note 1	Note 1
	Average	Note 1	Note 1	Note 1	Note 1	Note 1
	Good	Note 1	Note 1	Note 1	Note 1	Note 1
	Very Good	Note 1	Note 1	Note 1	Note 1	Note 1

Note: Abandonment option/technique based on risk profile.

For the risk assessment, the likelihood of failure and the consequence in the event of failure must be evaluated. When assessing the consequence of an abandoned asset's failure, the following key factors should be considered:

- Health and safety
- Operations
- Environment
- Finance
- Reputation

These aspects are scored based on the risk management framework to assess the overall consequence. The severity can vary from insignificant (e.g. no significant impacts) to catastrophic (e.g. loss of life or high value financial implications due to damage to surrounding infrastructure), based on the potential consequences and outcomes.

Assessing the asset’s condition of an asset is a key step when determining the likelihood of failure. Risks may arise due to material deterioration, lack of maintenance and equipment at its end of life.

Implementing a risk-based approach allows Watercare to take appropriate mitigation measures on abandoning asset. The strategy would enable:

- Prioritisation based on a high likelihood of failure and the criticality of consequences.
- Mitigation of risks to surrounding infrastructure, particularly in sensitive areas, such as those near schools and residential properties.
- Minimisation of environmental and economic impacts through cost-effective abandonment methods.



Asset Information Update

Where applicable, the following information source shall be updated to reflect changes resulting from the decommissioning activity:

- Site/asset management plans such as operation management plan, emergency response plan and water safety plan.
- Operation and maintenance documentation such as operations and maintenance manual, functional description, standard operating procedure, maintenance procedure and maintenance schedule.
- As-built drawings (pdf, AutoCAD, BIM)
- HMI pages and control system software
- Asset register (via Asset Creation Sheet). This shall include assets which has been identified for reuse or as spares
- Hazardous area verification dossier (if applicable)
- Facilities risk register
- Spares inventory/list

Requirements Guideline

While this guideline provides general principles and strategies for decommissioning, it is essential to recognise that each project must develop its own site-specific decommissioning specification. The appropriate methodology can vary significantly depending on site conditions, asset type, and the surrounding environment. Each asset should be assessed individually to determine the most suitable, safe, and environmentally responsible decommissioning method.

The guidance provided in this document is intended to serve as a starting point, offering information to support project planning. However, these recommendations may not apply in all situations. Project teams are encouraged to deviate from these guidelines when necessary to account for specific site constraints, risks, or operational requirements.

Decommissioning Planning Guidance

The following factors should be considered during decommissioning planning stage:

- Identify success criteria such as decommissioning is successful when all buildings, equipment, materials, wastes or any other material that could result in environmental pollution are removed from site and/or recycled, recovered or disposed of in accordance with all regulations.
- Consult with Watercare Strategy and Planning team regarding land usage where the planned decommissioned facility is located. If land is to be disposed, Watercare Property team can provide support in the land disposal process and easement removal/de-registration.
- Discussion with electrical lines company if there are any equipment belonging to them within the site boundaries. E.g. transformers and Ring Main Units (RMU)s.
- Requirements of stake holders regarding retention of infrastructure if applicable.
- Site history, heritage consideration (buildings or sites for special consideration).
- Strategy, timing and techniques to remove and dispose of equipment and structures including shut down procedures.



- Identification of assets that can potentially be reuse or stored as spares. Condition and age of these identified assets should be confirmed.
- For wastewater treatment plants, a transition plan maybe required to detail a structured approach in treatment processing ramp down whilst ensuring plant is still able to meet resource consent conditions. If there is an identified risk of non-compliant scenario with no practical mitigation action, consult with Watercare Resource Consent team.
- Development of a flow diversion plan as required.
- Management of water quality, air quality and noise during decommissioning.
- Waste management practices to ensure proper handling, treatment and disposal of hazardous materials and waste. This also includes opportunities for recycling, reusing or safely disposing of materials to reduce the overall impact on landfills.
- Special procedures or precautions to be used to ensure safety during decommissioning. For example, removal and treatment of contaminated materials, removal of asbestos, procedures for making safe and sealing openings to underground workings.
- Site remediation requirements such as landscaping and revegetation and slope stabilisation especially for dam removal scenario.
- Post decommissioning monitoring requirements.
- Training requirements to support familiarisation with operation and maintenance of the changed asset.

General Decommissioning Requirements

For any facilities, equipment or structure that requires decommissioning (out of service state or abandonment), the following minimum requirements shall apply:

- a) All work must be done in accordance with standards and meet applicable legislation as listed in Regulatory Requirements and Reference Documents section.
- b) Where demolition works need to be done in protected, environmentally sensitive areas, discussion with Auckland Council’s monitoring agent is required. Consent needs to be obtained from Auckland Council.
- c) Perform health and safety risk assessments which contain aspects of:
 - Engineering: Assess structural integrity of the facilities and to understand the key design characteristics of the structure.
 - Electrical: Identify and mark out the power supply to and the distribution of power in the work area, in order to assess the isolation requirements and to plan for relocation or protection of the supply to other areas of facilities or equipment
 - Fire: To gain understanding of fire prevention and control measures required in the structure of building to be removed. Temporary changes to fire protection might be required.
 - Asbestos: To establish the type (fibre, sheet, gasket, etc) and distribution of asbestos containing materials. The assessment shall be completed with reference to Watercare’s asbestos register. Asbestos assessments for demolition must be adequate to determine which asbestos material can be removed before demolition commences as far as reasonably practicable.
 - General H&S: Address the impact of the work on surrounding work areas and activities.



- d) Prior to commencing work, approvals shall be obtained in relation to activities including scheduled/uncontrolled waste removal and disposal. Typical bodies to be consulted or advised could include:
- Local council i.e Auckland Council
 - Worksafe New Zealand
 - Telecommunications providers
 - Electrical lines provider. Note that electrical supplier will still need to be advised.
 - Water provider
 - Sewer/trade waste provider
 - Gas provider
 - Storm water provider
 - Traffic authorities (unusual traffic movements)
- e) A transfer of premises control (internal Watercare procedure) should be completed.
- f) Update and revision of site labelling including:
- Labelling of spare conduits to identify location and status.
 - Abandoned in place above ground pipeline should be clearly labelled to provide clear visual cue that it's no longer in use. "Abandoned" wording against background colour of green colour (for water), black (for wastewater) or yellow (gases) may be used. Refer to AS 1345-1995 for requirements.
- g) Decommissioning report submission which includes details of work that were completed, any support reports and details of any ongoing management strategies such as monitoring.
- h) No residual liquid wastes including chemicals, residual sludge and contaminated soil are allowed to be drained to the environment.
- i) All material and other rubbish generated by demolition activities shall be removed to an appropriate tip site as stated in Watercare General Civil Construction Standard.
- j) Re-useable materials need to be neatly stored at a location as indicated and approved by Watercare (such as fencing wire shall be neatly wound into rolls and, together with the fence posts neatly stacked).
- k) Check if any trees are protected. If work is to be done on trees (chop, prune, trim and removal) or around it, relevant resource consent needs to be obtained.
- l) Trees (if allowed) and other material from structures shall be removed from the site unless specifically stated otherwise.

Out of Service State Guidance

The following measures should be considered for this decommissioning option to ensure health and safety are protected during the out of service duration and asset can be effectively brought back into service:

- Develop plan for out of service state outlining actions, resources, legislation requirements, transitioning out procedure and reactivation options.
- If it's a whole facility, the plan needs to cover shutdown procedure and site safety protocols.
- Confirm site fire protection and security system still meet the needs. Additional site security measures maybe required.
- Conduct assessment on proposed asset to be out of service (structural integrity, mechanical system and equipment).



- Identify maintenance or/and operation requirements to preserve the asset so it's ready to resume operations efficiently (such as protection against corrosion, moisture, routine inspection, preventative maintenance scheduling).
- Documentation of preservation maintenance activities performed.
- If asset/equipment is to be stored, ensure its stored in an approval environment.
- Identify potential risk or hazard that may occur during mothballing duration to identify mitigation actions such as disconnecting all electrical power to the facility or equipment and switchboards to eliminate electrical hazards.
- Inspect all facilities and equipment for visible danger points and secure if needed.
- Provision of all equipment and materials required to make the unused facilities and equipment safe
- Remove any wastewater, sludge and/or other liquids from all pipework and flush clean.
- Clean all structures with high pressure water. Disinfection with appropriate product maybe required (e.g. one tank filled with clean water disinfected to at least 5 mg/L free residual chlorine, with 30 minutes contact time or disinfected by spreading hydrated lime).

On-going electrical assessment

An assessment on ongoing electrical supply needs should be carried out to advise if any changes are required for the connection settings and type. This will optimise the facility's ongoing every cost.

If there is no ongoing electrical supply requirement then a decision should be made if the ICP is to be decommissioned or not. Note that retaining an ICP will incur ongoing electrical supply costs, but this should be considered against other factors related to the Out of Service intent. If an ICP is to be decommissioned, a formal ICP decommission application is required via the electrical lines company.

Abandonment by Removal Requirements

The requirements for removal of unused assets are described in the sub-headings below.

Civil Works and Structure Removal/Demolition

- a) Structures shall be demolished in accordance with Watercare's General Civil Construction Standard and other relevant guidelines and standards listed in the Regulatory Requirements and Reference Document Section.
- b) Refer to Watercare's General Civil Construction Standard if explosives and blasting for clearance of structures are required.
- c) Dispose of demolition debris including hazardous materials such as Asbestos materials in pipes and waste sludge at suitable disposal sites.
- d) Existing road pavements or hard standings that are no longer required, shall be scarified and windrowed free of soils, clay or other contaminating material. The aggregates shall then be recovered and carted to stockpile for subsequent reuse.
- e) Provide suitable filling material and fill all open tanks and channels where required.

Landscaping and Revegetation

The following should apply to areas where facility or asset has been removed:

- a) Topsoiling and planting of site with approved plant type. Consultation with Auckland Council Arborist maybe required.



- b) Grading, levelling and re-contouring to ensure no voids or uneven surfaces and that no ponding occurs. Grading should allow flows to existing stormwater assets.
- c) Rendering the site safe for future land use
- d) Arrangements should be put in place to maintain the land such as mowing and weeding.

Mechanical Related Work

- a) Remove the equipment and completely and cut down mounting bolts flush with concrete plinth or other supports.
- b) Remove interconnecting pipework and pipe supports. Where pipes penetrate into pre-existing structures, demolish and remove pipework to the interface point and make good interface with blind flange.
- c) For any other mechanical equipment fixed or mounted on a permanent or temporary structure, remove equipment along with mounting bolts or other supports and fill gap or void to match surrounding.
- d) Valves, fittings, and fire hydrants connected to decommissioned pipes must be fully removed and not left in the ground. Leaving these components buried can lead to future confusion, mismanagement of the network, or increased liability. Care should be taken to disconnect and safely remove these assets, ensuring the surrounding area is restored to prevent hazards or misidentification during future work.
- e) Consult with Watercare's Operations and Maintenance Delivery teams to confirm items that may be maintained for spares or reuse. Ensure that asset register is updated to reflect relocation of these assets.

Electrical and Instrumentation Related Work

- a) Disconnect the electricity meter and return to the Metering Equipment Provider (MEP) for final readings.
- b) Any rented Current Transformer (CT) and/or Voltage Transformer (VT) should also be returned to the MEP. If they are owned by Watercare, these should be stored appropriately. Note that there will be cost for the last downloading of metering data. Final invoice will be issued by the retailer.
- c) Inform electrical lines provider for power supply termination and to remove any assets which is under their ownership such as transformer.
- d) Once the motor control centre (MCC)'s, local panels or instruments have been made safe and de-energised, un-terminate cables, remove panels or instruments for disposal.
- e) Any penetrations or culverts left open shall be covered and make good to match surrounding finishes.
- f) Redundant cabling removed back to the switchboard.
- g) Reclaim (pull out) or earth any cables left in the field.
- h) Remove unused cable containment and associated mounting brackets and hardware.
- i) Cut earth grid cables back to finished surface level where needed.
- j) Consult with Watercare's Operations and Maintenance Delivery team to confirm items that may be maintained for spares or reuse. Ensure that asset register is updated to reflect relocation of these assets.

Control System Related Work

- a) Control cabinets associated with the decommissioned asset should be removed. Any components within the cabinet including wiring or operational equipment shall be



disconnected and safely removed. If removal is impractical, this must be assessed and addressed through consultation with Watercare.

- b) Consult with Watercare's Control System team to confirm items that may be maintained for spares or reuse. Ensure that asset register is updated to reflect relocation of these assets.
- c) Re-program control system as required to show the revised or new arrangement.
- d) Control logic removal. Complete removal of all control logic associated with the decommissioned equipment. This includes logic elements directly responsible for the monitoring and/or control of the equipment, as well as any indirect or external logic references, interlocks, or dependencies that interface with or reference the decommissioned system.
- e) Software Licensing Management. Verify that all software licenses associated with the decommissioned system are released and made available for reallocation or reuse within the control network.
- f) I/O Hardware and Addressing Reset. Following the removal of power and signal cabling for the decommissioned system, ensure that all associated Input/Output hardware and software addressing are reset, cleared, and made available for future use.
- g) Historical Data – Local Storage. Review locally stored historical data associated with the decommissioned equipment. Either delete the data or archive it securely off the host control system, in accordance with Watercare's data retention, cybersecurity, and operational continuity requirements.
- h) Historical Data – Remote Storage (Corporate AVEVA PI System). Review remotely stored historical data related to the decommissioned system. Either delete or archive the data off the host control system, and disable or remove the corresponding tag points entirely to free up history point licensing capacity.
- i) Automated Reports and Analytics. Identify and modify all automated reports, dashboards, and analytics applications (including AVEVA PI Vision, Seeq, and SQL-based reporting) that reference the decommissioned equipment or system, to prevent invalid data queries and maintain reporting accuracy.

Facility Type Specific Requirements

The following sections provide further information on various Watercare facility types. These are supplementary to the other requirements stated in the previous sections.

Pump Station

Pump stations, whether above or below ground, are usually decommissioned via the abandonment by removal option (complete removal and demolished) due to high risk of vandalism and poses safety concerns. Moreover, if these structures remain, the liability for any incidents falls under Watercare's responsibility.

Decommissioning Procedures

The following procedure outlines the essential steps for decommissioning pump stations and transitioning operations to new infrastructure. While specific project requirements may vary, these steps should guide the planning and execution of decommissioning works:

1. Preparatory works



- Documentation and permits: Prepare and implement a Traffic Management Plan (TMP) and obtain all necessary permits, approvals, and consents, including Corridor Access Requests (CARs) and Works Access Permits (WAPs).
- Service Identification: Identify all underground and above-ground services within 10 meters of the works, physically exposing services within 3 meters as required.
- Quality Plan: Develop a site-specific quality plan addressing health and safety, environmental management, and quality assurance and control.
- Asbestos survey: Conduct asbestos surveys and testing for all structures to be demolished, including equipment chambers, control buildings, and flowmeter chambers.
- Shutdown coordination: Collaborate with Watercare's Operations team to create a shutdown plan for decommissioning works.

2. Electrical, instrumentation and controls

- Coordinate with Watercare for decommissioning of redundant electrical bulk supply assets, including transformer units.
- Remove all electrical and control equipment from the control building and equipment chamber.

4. Mechanical equipment and piping

- Execute the shutdown plan for associated pipelines, removing pumps, valves, and pipework within the equipment chamber. Replace these components with a straight section of pipe, ensuring the new section complies with Watercare standards.
- Remove any downstream flowmeters and replace them with straight sections of pipe.

Storage Reservoirs

Reservoirs, whether above or below ground, should be carefully assessed and fully decommissioned to prevent long-term safety, environmental, and liability risks. Abandoned reservoirs can become hazards, attract vandalism or pose structural threats over time. Additionally, residual water can cause internal corrosion, leach contaminants, or create breeding grounds for harmful bacteria, contributing to broader public health concerns.

The decommissioning process should begin with a thorough site assessment, including structural inspections, water quality testing, and asbestos surveys, if applicable. Documentation, permits, and coordination with Watercare's Operations team are essential to ensure the safe isolation and removal of associated infrastructure. All mechanical and electrical components, such as pumps, valves, flowmeters, and control cabinets, must be removed and properly disposed of or recycled.

Structural demolition should follow industry best practices to avoid impacting adjacent utilities or structures. If complete removal is not feasible, reservoirs may be backfilled and sealed to prevent future collapse or unauthorized access. In such cases, backfilling materials must meet the relevant engineering standards to maintain ground stability and minimise environmental impact.

In instances where reservoirs hold historical or cultural significance, consultation with local heritage organisations and iwi may be required. Preservation efforts or partial decommissioning options should be considered to balance safety with cultural considerations.

Dam Structures

To decommission a dam and reservoir (water body behind dam) it is important to ensure that the dam is not left in a condition that will still allow water to be impounded behind it during a flood event. It is



therefore not sufficient to drain the reservoir and remove the valves and draw-off tower so that the stream flows through the existing culvert. In the event of a flood there is a high risk of this becoming blocked and permitting the reservoir to fill again. It is therefore necessary to remove a significant portion of the dam so that floods can safely pass through the empty reservoir basin and across the dam site without any restrictions that could allow water to be impounded. It is also necessary to ensure that any structures left in place are not likely to be a risk to future users of the site. A third important criterion is that any remaining portion of the dam does not still constitute a dam by retaining water behind it.

Building consent is required for decommissioning of classifiable dams under the Building Act (2004). If a dam has height of 4 metres or more and it stores 20,000 cubic metres or more of water or other fluids it will meet the definition of a classifiable dam.

During detailed design it is recommended that the NZSOLD Guidelines 2024 (Module 7 Section 9) and International Commissioning of Large Dam (ICOLD) guidelines for dam decommissioning are consulted.

Below is a typical process of dam decommissioning (as per Fig 9.1 in NZSOLD Guidelines 2024 Module 7) and brief description what each stage might entail:

- Details of dam decommissioning decision including:
 - Case for decommissioning
 - Major issues (likely to be dam safety deficiencies) and options
 - Investigation and assessments to assist final decision making - this will also provide supporting information to confirm viability and provide basis for design of decommissioning
- Detailed design of decommissioning methodology
 - Extent of dam removal - complete or partial
 - Temporary work site isolation (i.e. Cofferdam)
 - Flood management during construction including reservoir drawdown, managing storm during construction and construction EAP etc.
 - Erosion and sediment control
- Restoration/rehabilitation work (mainly stream and/or reservoir)
- Other requirements
 - Ecological
 - Historical/heritage (to do with dam systems (structure, reservoir etc) themselves)/archaeological
 - Consenting requirements (both resource and building consents)



Regulatory Requirements and Reference Documents

All work, materials and practices shall comply with requirements described in current Watercare, New Zealand and Australian legislation, standards and guidelines below. Where conflict or ambiguity exists, this guideline shall take precedence. Where there is conflict between referenced documents, the higher level of standard shall take precedence.

Watercare Services Limited

- No. CG Ver 1.1.: General Civil Construction Standard

National and international

- Health and Safety at Work Act 2015 (New Zealand)
- Health and Safety at Work (Hazardous Substances) Regulations 2017
- Building Act 2004 (New Zealand)
- Resource Management Act 1991 (New Zealand)

- AS 2601 – Australian standard for demolition of structures
- AS 1345:1995 – Identification of the Contents of Pipes, Conduits and Ducts
- WorkSafe NZ – Asbestos Management and Removal Guidelines
- New Zealand Dam Safety (NZSOLD) Guidelines 2024
- International Commission on Large Dams (ICOLD) Dam Decommissioning Guidelines (Bulletin 16, 2018)