
ASSET MANAGEMENT FOR WATER SERVICES

Effective Date: May 24, 2019

Approved By: GVWD Board

Policy No. FN-028

PURPOSE

To establish asset management principles and framework to balance asset performance, risk, and cost to deliver water services.

POLICY

Water Services delivers water storage, treatment and transmission services through an extensive and complex portfolio of natural and built assets.

This Policy outlines Metro Vancouver's commitment and methodology to manage these assets in a manner that minimizes asset failure risks and impact to customers and optimizes the lifecycle value of assets to consistently meet asset performance targets and enable evidence-based decision making to continuously provide quality services.

NATURAL ASSETS

The Water utility's natural assets, comprised of the forests, streams, rivers, and lakes that make up the protected water supply lands, provide ecosystem services which are essential to the region's water supply and the environmental sustainability of the area. Whether naturally occurring, or constructed and enhanced to improve function, these assets must be operated and maintained. If managed appropriately, natural assets do not require replacement.

As the tools and methodologies for quantitatively assessing natural assets evolve, Water Services will determine how best to inventory and assess natural assets in order to ensure they can be managed in accordance with the principles set out in this Policy.

BUILT ASSETS

Built assets such as dams, treatment plants, water mains, pump stations, and reservoirs have been engineered/constructed to store, treat, and deliver water services to our customers.

ASSET MANAGEMENT PRINCIPLES

The methodology for managing Water Services assets is guided by the following principles:

- a) **Integrated:** a comprehensive approach that examines the combined implications of managing all aspects of the asset life cycle. This includes interdependencies of assets or asset systems
- b) **Risk-based:** manage asset risk relative to defined performance targets and asset criticality and focus expenditures and priorities based on risk and associated cost and benefit

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- c) Sustainable: a long-term approach to estimating asset investment and activities, which will better enable assets to meet future challenges, including changing demographics, legislative requirements and technological, financial, climatic and environmental factors
- d) Fiscally Responsible: ensure activities and decisions aim at reducing the life cycle cost of asset ownership, while achieving defined asset performance targets
- e) Systematic: a formal, consistent, repeatable and methodical approach to the management of assets
- f) Innovative: continuous improvement in Asset Management by examining new tools, technologies, practices and solutions

ASSET CLASSES

This Policy is applicable to the management of each Water Services asset in the following nine asset classes:

- Watersheds
- Dams
- Water Treatment Plants
- Water Mains
- Pump Stations
- Reservoirs
- Rechlorination Stations
- Communications Systems
- Works Yards

ASSET DATA AND INFORMATION

To measure performance of Water Services assets, Water Services will develop and maintain an Asset Registry with comprehensive and accurate asset data and information. Data will be organized in a structured manner so that it can be stored, analyzed and reported at an adequate level for different business needs. Integrity of the data shall be constantly monitored, updated and maintained to provide accurate asset information.

The Water Services Asset Registry will include at a minimum, the following:

- Asset grouping (e.g. utility, asset class)
- Asset location (e.g. facility, sub-facility/process)
- Asset details (e.g. make, model, material, size, install date, expected service life)
- Asset identification (e.g. type, number, description)
- Asset criticality and risk information
- Financial information (e.g. acquisition and disposal costs, estimated replacement cost, Operations & Maintenance costs)
- Asset condition and/or estimated remaining service life

ASSET PERFORMANCE AND LIKELIHOOD OF FAILURE

Water Services will manage and renew each asset in accordance with clearly defined asset performance metrics and targets. Asset performance information is used as an indicator of an assets' likelihood of failure. Water Services asset performance categories, key performance indicators and targets are provided in the table below.

Performance Category	Performance Category Description	Key Performance Indicator (KPI)	Minimum Standard
Condition	Asset physical condition	Condition Score (see table below)	<p><i>All assets:</i> Condition Score is Grade 3 (Fair) to Grade 4 (Poor) or better</p> <p><i>High criticality assets:</i> Condition Score is Grade 2 (Good) to Grade 3 (Fair) or better</p>
Maintenance Costs	Cost to maintain the asset (e.g. labour, parts)	Annual asset maintenance costs	Annual asset maintenance cost is less than 20% of replacement cost
Obsolescence	Asset is obsolete; technology is no longer supported and cannot be maintained or replaced	Assets with obsolete technology	No assets with obsolete technology
Functionality	Current functionality of the asset (e.g. capacity, velocity, safety)	Asset functionality vs as-designed functionality	Asset functioning as-designed

Water Services will use a 1 to 5 condition scoring system in accordance with the table below. When condition information is not available, an age based remaining service life will be used as a proxy for asset condition. Condition information will be stored in the asset register at a level most practical to capture and maintain the condition data. Water Services will develop asset specific descriptions based on the table below to enable assignment of Grade 1-5 condition score for all assets.

Condition Score		Description
Grade 1	Very Good	New or Excellent condition, no apparent defects.
Grade 2	Good	In good state of repair, some minor defects (e.g. finishes) that do not detract from functionality.
Grade 3	Fair	Some non-critical defects are apparent.
Grade 4	Poor	Failure possible, some critical defects are apparent and functionality is affected.

Condition Score		Description
Grade 5	Very Poor	Failure imminent (within 12 months).

Water Services will consider asset vulnerability in assessing likelihood of failure. Vulnerability is the extent to which the asset or grouping of assets can withstand a potential failure and includes factors such as asset redundancy, asset material, soil type and cathodic protection.

ASSET CRITICALITY AND CONSEQUENCE OF FAILURE

Asset criticality is a measure of the asset’s relative consequence of failure. It is considered in planning asset replacement, rehabilitation, operations and maintenance strategies as well as alternative risk mitigation strategies (e.g. emergency preparedness and response planning). High criticality assets (e.g. marine crossings) have the potential for significant impact on services if they fail. Failure of low criticality assets (e.g. portable sump pump) will have low or no impact on services. As there is less tolerance to asset failure for high criticality assets, they will be monitored more frequently and have higher priority for asset inspection and improvement work than medium or low criticality assets. The information outlined in the table below will be considered to determine asset criticality (consequence of failure).

Consequence of Failure Category	Consequence of Failure Criteria
Worker and Public Safety	Injuries from physical infrastructure failure
Ecological & Public Health	Negative environmental impact, not meeting GVWD Operating Permit requirements, poor drinking water quality, unacceptable pressure deviation, loss of water service
Social	Water use restrictions, loss of use of facility / property
	Disruption to land / marine transportation services
Economic	Asset restoration and supplemental O&M costs
	Economic impact to third parties
	Economic impact from penalties

The following criteria are taken into consideration in assessing the relative consequence of failure:

- Population/number of people affected
- Type of infrastructure/services affected (e.g. hospital, school, park, highway, rail)
- Location of potential failures (e.g. waterways, land use)

ASSET RISK AND LIFECYCLE MANAGEMENT STRATEGIES

Managing risks to assets is essential to maintaining expected Water Services service levels and the core focus of Asset Management. Risk is the combination of likelihood and consequence of a failure event occurring:

Risk = Likelihood x Consequence

Key performance indicators and asset performance targets will be monitored to identify the likelihood of failure of an asset. When asset data and information indicates that an asset is failing to meet performance target(s), Water Services staff will identify the relative consequence if the asset fails (asset criticality), assess the risk and identify options to address the risk. Risk mitigation options could include asset replacement, rehabilitation, modified operations and maintenance strategies as well as modified emergency preparedness and response planning.

In evaluating different options, economic, social and environmental benefits will be considered for each option. Total asset life cycle costs including capital investment, expenditures related to operations and maintenance of the asset and decommissioning costs will be considered.

Where infrastructure investment is required, Water Services will consider opportunities to address other needs or future requirements (e.g. capacity increase, seismic resiliency improvement, etc.) consistent with integrated infrastructure investment planning and the following service level objectives:

- Maintain Quality of the Drinking Water Delivered
- Maintain Capacity and Reliability of the Water Supply System
- Improve Environmental Stewardship
- Minimize Timeline to recover from a Major Event (including Seismic, Power Interruption and Climate Change)

ASSET MANAGEMENT PLANS

Water Services will have Asset Management Plans to summarize asset performance data and information, including a summary of performance risks. Asset Management Plans will also outline the risk mitigation strategies (including capital investments, operating and maintenance strategies and emergency response strategies) and short and long term projected costs.

Water Services will have 10 facility-level Asset Management Plans as follows:

- Watersheds
- Dams
- Seymour Capilano Filtration Plant (SCFP)
- Coquitlam Water Treatment Plant (CWTP)
- Water Mains
- Pump Stations
- Reservoirs
- Rechlorination Stations
- Communications Systems
- Works Yards

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Asset Management Plans will be updated on a regular schedule (minimum every 5 years). Information from the facility-level Asset Management Plans will be aggregated and summarized to prepare a departmental *Water Services Asset Management Plan*.

CONTINUOUS IMPROVEMENT

Water Services will examine, monitor, identify and address asset management improvement opportunities to enhance asset management tools, technologies and business practices.

Staff will be trained to support asset management activities from assessing asset condition to renewing assets to improve asset performance. Water Services will report on improvement activities related to the Water Services Asset Management Program.