

Title	Manage water resources for on site hydro-electricity generation		
Level	4	Credits	8

Purpose	People credited with this unit standard are able to: demonstrate knowledge of water resources for hydro-electricity generation; identify and communicate current hydrological status; maintain dispatched generation, water flows, and water storage within hydrological parameters; respond to and manage abnormal conditions; and document water use for hydro-electricity generation.
----------------	--

Classification	Electricity Supply > Electricity Supply - Power System Management
-----------------------	---

Available grade	Achieved
------------------------	----------

Guidance Information

- 1 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable legislative and industry requirements.
- 2 Legislation, regulations and/or industry standards relevant to this unit standard include but are not limited to
 - Health and Safety at Work Act 2015;
 - Electricity Act 1992;
 - Electricity (Safety) Regulations 2010;
 - Electricity supply industry codes of practice and documented enterprise procedures, including *Safety Manual – Electricity Industry (SM-EI)* and relevant EEA guides available from www.eea.co.nz; and any subsequent amendments and replacements.
- 3 Definitions

Asset owner refers to a participant who owns or operates assets used for generating or conveying electricity.

Industry requirements include all asset owner requirements and standards; manufacturers' specifications; and enterprise requirements which cover the documented workplace policies, procedures, specifications, business, and quality management requirements relevant to the workplace in which assessment is carried out.

SCADA an abbreviation of Supervisory Control and Data Acquisition system, refers to a computer system that is used to operate equipment and monitor the performance of the electrical power system and/or network, gather data for analytical purposes, and generally assist the operation and delivery of electrical network functions concerning the supply of electricity to customers.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of water resources for hydro-electricity generation.

Range includes but is not limited to – lakes, reservoirs, rivers, hydraulic structures and equipment, canal systems, tunnels, water storage and management.

Performance criteria

1.1 Principles of water management and utilisation are described.

Range includes but is not limited to – hydraulic measurements, hydraulic storage, hydraulic control levels, flood control, Resource Management Act 1991, resource consents, hydraulic dispatch, turbine efficiency curves, operating policies, rules, and regulations, inflows, river and tributary flows, weather.

1.2 Hydraulic structures and equipment relating to the use of water for hydro-electricity generation are identified and their purpose explained.

Range includes but is not limited to – types of dams, dam safety, intake works and equipment, spillways and capacity, grills and cleaning, pipelines, headgates, penstocks, surge chambers, types of turbine, bypass valves, protection.

1.3 Canals are identified and their purpose explained.

Range includes but is not limited to – flows, flow velocities, gates, canal management.

1.4 Tunnels are identified and their purpose explained.

Range includes but is not limited to – flows and flow velocities, pressures, monitoring.

Outcome 2

Identify and communicate current hydrological status.

Range includes but is not limited to – hydraulic storage, inflows, outflows, dispatch, plant status, generation flows, spillways, monitoring equipment problems and faults.

Performance criteria

- 2.1 Hydro system and plant status is determined.
- Range includes but is not limited to – lakes, canals, lake levels, volumes, outflows, inflows, river flows, canal flows, spill flows, generation flows, weather, plant status.
- 2.2 Planned events which impact upon equipment status are identified and impact determined.
- Range includes but is not limited to – plant availability, contingencies, constraints.
- 2.3 At shift change, handover procedures are completed and all relevant information is transferred to successive operator or maintainer.
- Range includes but is not limited to – formal handover procedures, log books, shift change reports, abnormal situations.

Outcome 3

Maintain dispatched generation, water flows, and water storage within hydrological parameters.

Range includes but is not limited to – generation dispatch, resource consents, operating rules and regulations, operating policies, plant operating parameters, capability diagrams, station manuals, alarms, events, plant status, outage planning, plant availability.

Performance criteria

- 3.1 Dispatched generation, water flows, and water storage are monitored and maintained in accordance with legislative requirements and optimal water usage.
- Range includes but is not limited to – resource consents, operating rules and regulations, turbine efficiency curves, plant status, indications, alarms, events, faults, defects.
- 3.2 Operating decisions are determined in accordance with operating requirements, plant status, local knowledge, and resource consents.
- Range includes but is not limited to – plant availability and service condition, loading limits, impact, options.
- 3.3 Plans are developed to maintain generation, water flows, and water storage ensuring optimal equipment performance.
- Range includes but is not limited to – outage planning, generator availability.

- 3.4 The plant and equipment required to maintain generation, water flows, and water storage is operated to maximum efficiency of water use in accordance with dispatch requirements.

Range includes but is not limited to – plant operating schedules, capability diagrams, station manuals.

Outcome 4

Respond to and manage abnormal conditions.

Range includes but is not limited to – emergency, unscheduled event, abnormal conditions, alarms, forced outage, power system faults.

Performance criteria

- 4.1 System is stabilised.

Range includes but is not limited to – indications, alarms, levels, flows, flow diversions, flood control measures, spilling, maximum generation, bypass operation.

- 4.2 The event or cause of the event and the impact on hydrology, flows and generating assets are determined and acknowledged.

Range includes but is not limited to – alarms identified, events lists, event recording, SCADA displays, contingency plans, emergency operating plans, hydraulic gate tripping, flood events.

- 4.3 The event is responded to in accordance with resource consents.

Range includes but is not limited to – flow diversion, spillway gate operation, sluicing, flood control, warnings.

- 4.4 The event is analysed to identify options to remedy or mitigate undesired conditions, and future actions are identified.

Range includes but is not limited to – log entries, event lists, event reporting procedures, SCADA, resource consent compliance.

- 4.5 The event reporting is conducted.

Range includes but is not limited to – identification of future actions, local instructions, event reporting standards, logging, reporting.

Outcome 5

Document water use for hydro-electricity generation.

Range includes but is not limited to – operating orders, electronic log, generation management system, generation availability data system, reports.

Performance criteria

5.1 Incident and event reports are prepared.

Range includes but is not limited to – resource consents and conditions, operating rules and regulations, collection and analysis of data, log entries.

5.2 Computer logs, reports, documentation and data are recorded concisely in the required format and filed within scheduled timeframe.

Range includes but is not limited to – hydrological history records, automated collection of data.

Planned review date	31 December 2026
----------------------------	------------------

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 April 2001	31 December 2018
Revision	2	11 February 2004	31 December 2018
Rollover and Revision	3	26 November 2007	31 December 2018
Review	4	16 April 2010	31 December 2019
Review	5	16 March 2017	31 December 2023
Review	6	30 September 2021	N/A

Consent and Moderation Requirements (CMR) reference	0120
--	------

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Connexis - Infrastructure Industry Training Organisation qualifications@infrastructureito.org.nz if you wish to suggest changes to the content of this unit standard.