Title	**Demonstrate knowledge of surface water and groundwater sources**		
Level	**4**	**Credits**	**7**

Purpose	People credited with this unit standard are able to: demonstrate knowledge of the environmental factors affecting surface water sources; and abstraction processes for surface water sources; and describe groundwater flow principles, bore hydraulics, and bore construction; and water quality parameters of groundwater.

Classification	Water Industry > Water Treatment

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 and references relevant to this unit standard include:
Health and Safety at Work Act 2015, Water Services Act 2021, Resource Management Act 1991, and subsequent amendments;
Ministry of Health, *Drinking-water Standards for New Zealand*, Ministry of Health, Wellington, 2005 (Revised 2018), and subsequent replacements, available at www.taumataarowai.govt.nz.

3 Definitions
Industry requirements include manufacturers' specifications; and enterprise requirements which may include documented workplace policies, procedures, specifications, business, and quality management requirements relevant to the workplace in which assessment is carried out.
Water quality – the suitability of water for use as potable water, with or without water treatment.

4 Learning and assessment activities for this unit standard must be informed by Te Mana o te Wai (refer to Taumata Arowai) and the *National Policy Statement for Freshwater Management 2020* available from https://environment.govt.nz/.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of the environmental factors affecting surface water sources.

Performance criteria

1.1 Surface water environments are described in terms of their suitability as sources for water supply.

Range lakes, dams, stratification, eutrophication, upland rivers and streams, lowland rivers and streams, off-river storage.

1.2 Surface water abstractions are identified and described in terms of the constraints.

Range river/stream topography and hydrology, water quality, stream bed movement, resource consents, catchment land use, recreational use, intake security, water level hydraulics, aquatic life.

Outcome 2

Demonstrate knowledge of abstraction processes for surface water sources.

Performance criteria

2.1 Design features of hardware for surface water abstractions are identified in terms of their function.

Range river intake types, weirs, pumps and wet wells, mechanical and fixed screens, infiltration galleries, rough filtration, intake towers, sedimentation, spillways, aerators;
evidence is required of at least six water abstractions.

2.2 Variations in water quality from surface water sources are outlined in terms of operational factors which can be implemented to mitigate their effects.

Range operational factors – flow control, water quality monitoring, consent limits, retention time, depth selection, destratification, chemical dosing and mixing, circulation.

Outcome 3

Describe groundwater flow principles, bore hydraulics, and bore construction.

Performance criteria

3.1 Groundwater flow principles are described in terms of the permeability of aquifers, and aquicludes.

Range infiltration zones, recharge areas, springs, piezometric head, artesian systems, confined and unconfined aquifers, secure groundwater.

3.2 Bore hydraulics are described in terms of drawdown, cone of depression, and different flow rates.

3.3 Bore construction is described in terms of physical structures and processes.

Range physical structures – screen types, pump placing and cooling, power cables, pipework, check valves, bore head; processes – developing, surging, drawdown measurement.

3.4 Bore head security is described in terms of public health risks and the requirements of the *Drinking-water Standards for New Zealand.*

Outcome 4

Describe water quality parameters of groundwater.

Performance criteria

4.1 Factors that affect the quality of groundwater are described in terms of public health.

4.2 Factors that affect the quality of groundwater are described in terms of aesthetics.

Planned review date	31 December 2027

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	1 February 2001	31 December 2018
Review	2	19 September 2008	31 December 2018
Review	3	16 March 2017	31 December 2024
Review	4	26 May 2022	N/A

Consent and Moderation Requirements (CMR) reference	0101

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

Comments on this unit standard

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council at qualifications@WaihangaAraRau.nz if you wish to suggest changes to the content of this unit standard.