41028 Design irrigation pipe systems

Kaupae | Level	5
Whiwhinga | Credit	15
Whāinga | Purpose	This skill standard is for people working in, or intending to gain skills in, designing and evaluating irrigation pipelines to ensure efficient flow, operational reliability, and compliance with system requirements. People credited with this skill standard will be able to apply hydraulic calculations and mitigate performance risks when designing pipelines. This standard provides a foundation for further training in advanced irrigation system design, pipeline optimisation, and irrigation network performance management. This skill standard has been developed to align with the New Zealand Certificate in Irrigation System Design (Level 4) [Ref: 2557].

Hua o te ako me Paearu aromatawai | Learning outcomes and assessment criteria

Hua o te ako | Learning outcomes	**Paearu aromatawai |** Assessment criteria
1. Perform hydraulic calculations	a. Conduct hydraulic calculations including pressure head, flow rate, velocity, and friction loss.
	b. Apply appropriate methodologies and tools to determine accurate pipe sizing based on system requirements.
2. Design pipeline and system layouts that meet delivery and efficiency targets while minimising energy loss.	a. Design detailed pipeline and system component layout plans, ensuring optimal pipe sizing and pressure zoning to meet delivery and efficiency targets.
	b. Incorporate design elements that minimise energy loss, adhering to best practice standards.
3. Identify and mitigate risks to the performance of the pipeline.	a. Identify risks to the pipeline performance related to hydraulic factors and site conditions.
	b. Develop and document mitigations addressing identified risks to ensure system reliability and continuity.
	c. Confirm and document that all design choices comply with the New Zealand Piped Irrigation Systems Design Code of Practice and other relevant standards.

Pārongo aromatawai me te taumata paearu | Assessment information and grade criteria

Assessment specifications:

Akōnga/learners must be assessed in a commercial irrigation system context, using naturally occurring evidence.

Activities can be assessed against existing, new or modified irrigation systems.

The irrigation system is for an agricultural or horticultural property, sports turf surface, landscape, golf course, amenities and wastewater.

All assessment activities and evidence must meet the requirements of worksite procedures, accepted industry practice and any subsequent amendments to legislation.

Evidence for all outcomes must be presented in accordance with: New Zealand Piped Irrigation Systems Design Code of Practice; and Irrigation; available from the Irrigation New Zealand website, http://irrigationnz.co.nz/ and any subsequent amendments.

Providers must give due consideration to embedding ngā kaupapa (principles) o Te Tiriti o Waitangi when designing delivery activities relevant to this standard. These principles are outlined in Guidelines for Providers: Embedding Tirohanga Māori.

Providers must give due consideration to the needs and values of Pacific peoples and other cultural groups when designing delivery activities relevant to this standard, ensuring practices are inclusive and equitable.

Definitions*:*

Accepted industry practice refers to approved codes of practice and standardised procedures accepted by the wider tree felling industries as examples of best practice.

Worksite procedures refer to documented procedures used by the organisation carrying out the work and applicable to the tasks being carried out. They may include but are not limited to standard operating procedures, site safety procedures, equipment operating procedures, quality assurance procedures, housekeeping standards, procedures to comply with legislative and local body requirements.

Ngā momo whiwhinga | *Grades available*

Achieved.

Ihirangi waitohu | Indicative content

Hydraulic Calculations for Irrigation Systems

- Pressure Loss in Pipeline: Frictional losses
- Factors affecting pressure loss
- Common calculation methods (e.g., Darcy-Weisbach)
- Flow Rate Requirements:
- Crop water needs
- System specifications
- Methods for determining flow rates
- Pipe Sizing:
- Criteria for selecting pipe diameters
- Impact on energy efficiency
- Design considerations

- Pump Performance and System Matching:
- Pump curves
- Efficiency factors
- Pump capabilities with system requirements.

Efficient Pipeline Layouts

- Delivery Targets
- Uniform Water Distribution
- Water application
- Factors influencing distribution
- Design considerations
- Energy Efficiency
- Strategies for minimising friction losses
- Reduction in energy consumption
- Hydraulic performance optimisation
- System Zoning: Purpose of zoning
- Methods for managing pressure variations
- Impact on system reliability and efficiency.

Risks to the pipeline and Mitigations and Compliance

- Risk Assessment
- Mitigations
- Code of Practice
- Regulatory Requirements.

Rauemi | Resources

Legislation relevant to this skill standard includes but is not limited to:

- Irrigation New Zealand website (codes of practice), http://irrigationnz.co.nz/;
- Health and Safety at Work Act 2015 Health and Safety at Work Act 2015 No 70 (as at 05 April 2025), Public Act Contents – New Zealand Legislation;
- Resource Management Act 1991 Resource Management Act 1991 No 69 (as at 05 April 2025), Public Act Contents – New Zealand Legislation;
- National Policy Statement for Freshwater Management 2014 National Policy Statement for Freshwater Management | Ministry for the Environment;
- Public Works Act 1981 Public Works Act 1981 No 35 (as at 05 April 2025), Public Act Contents – New Zealand Legislation;
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020 Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (LI 2020/174) (as at 01 January 2025) Contents – New Zealand Legislation;
- National Environmental Monitoring Standards (NEMS) National Environmental Monitoring Standards » National Environmental Monitoring Standards (NEMS);
- Site specific water resource consent or water supply agreement, weather data Home | NIWA;

- Descriptions and soil profile data sheets S-Map Online | Manaaki Whenua - Landcare Research; and any subsequent amendments or replacements.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa | Standard Setting Body	Muka Tangata – People Food and Fibre Workforce Development Council
Whakaritenga Rārangi Paetae Aromatawai | DASS classification	Engineering and Technology > Water Industry > Irrigation
Ko te tohutoro ki ngā Whakaritenga i te Whakamanatanga me te Whakaōritenga | CMR	0052

Hātepe | Process	**Putanga |** Version	**Rā whakaputa |** Review Date	**Rā whakamutunga mō te aromatawai |** Last date for assessment
Rēhitatanga | Registration	1	18 December 2025	N/A
Kōrero whakakapinga | Replacement information	N/A		
Rā arotake | Planned review date	31 December 2030		

Please contact Muka Tangata – People Food and Fibre Workforce Development Council at qualifications@mukatangata.nz to suggest changes to the content of this skill standard.