1XXXXX 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, specify appropriate materials and components, 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 5).

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 for pressure loss, flow rate and pipe sizing	a. Conduct precise hydraulic calculations, including pressure head, flow rate, velocity, and friction loss.
	b. Utilise appropriate methodologies and tools for accurate pipe sizing based on system requirements.
2. Design pipeline layouts that meet delivery and efficiency targets while minimising energy loss.	a. Develop 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.
	a. Identify risks to the pipeline related to hydraulic performance and site conditions

Hua o te ako | Learning outcomes	**Paearu aromatawai |** Assessment criteria
3. Identify risks to the performance of the pipeline, develop and validate mitigations.	b. Develop and document mitigations addressing identified risks to ensure system reliability and continuity.
	c. Validate 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 collected from commercial irrigation systems, using naturally occurring evidence.

Activities can be assessed against existing, new or modified irrigation system – applicability.

The irrigation system is for an agricultural or horticultural property, sports turf surface, landscape, golf course, amenities and irrigated wastewater but are not limited to.

All 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

Perform Hydraulic Calculations for Irrigation Systems

- Pressure Loss: Utilize formulas like the Darcy-Weisbach equation to calculate frictional losses in pipes.
- Flow Rate: Determine required flow rates based on crop water needs and system specifications.
- Pipe Sizing: Select appropriate pipe diameters to minimize energy loss and ensure efficient water delivery.
- Pump Performance: Assess pump curves to match system requirements with pump capabilities.

Design Efficient Pipeline Layouts

- Delivery Targets: Ensure uniform water distribution across the irrigation area.
- Energy Minimization: Design layouts that reduce friction losses and energy consumption.
- System Zoning: Implement zoning strategies to manage pressure variations and optimize performance.

Identify Risks to the pipeline and Develop Mitigations and compliance

- Risk Assessment: Identify potential system failures and their impacts on operations (water hammer and site conditions).
- Mitigations: Develop plans to mitigate identified risks and ensure system reliability.
- Code of Practice: Adhere to the NZ Piped Irrigation System Design Code of Practice for system design and performance.
- Regulatory Requirements: Comply with local regulations and consent conditions related to water use and system operation.

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	Agriculture, Forestry and Fisheries > 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	<type here>	[dd mm yyyy]	[dd mm yyyy]
Kōrero whakakapinga | Replacement information	This skill standard replaced Unit standard 28932.		
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.