



Australian Government

NWPHYD001 Apply principles of open channel hydraulics

Release: 1

NWPHYD001 Apply principles of open channel hydraulics

Modification History

Release	Comments
1	This unit was released in NWP Water Training Package release 1.0 and meets the Standards for Training Packages. This unit supersedes and is not equivalent to NWP508A Apply principle of hydraulics to pipe and channel flow. • Unit code updated • Content and formatting updated to comply with the new standards • All PC transitioned from passive to active voice • Unit title changed to better reflect unit outcomes • All Elements and PC revised

Application

This unit describes the skills required to use hydraulic principles and calculations of theoretical flows. An understanding of the processes required to collect data accurately, interpret data, verify data and apply theoretical techniques to produce flow data is essential to performance.

This unit applies to hydrographers employed by the water industry and water operators involved in the monitoring of all the elements of the water cycle and their impact on the related environment.

The skills and knowledge described in this unit must be applied within the legislative, regulatory and policy environment in which they are carried out. Organisational policies and procedures must be consulted and adhered to, particularly those relating to WHS, Bureau of Meteorology, World Meteorological Organisation and Australian Standards.

Those undertaking this unit would work in small teams, autonomously or under supervision, while performing complex tasks in a broad range of contexts that could be unpredictable, including remote, confined spaces, near water and/or at heights.

No licensing, legislative or certification requirements apply to unit at the time of publication.

Competency Field

Hydrography

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the range of conditions section.
1. Select open channel hydraulic methodology	1.1 Identify monitoring objectives of the site and hydraulic calculation requirements. 1.2 Select methodology for open channel hydraulic calculations. 1.3 Identify hydraulic principles used for verification of calculations. 1.4 Select other methodologies to review initial calculations.
2. Collect and review data for flow calculations	2.1 Measure and collect appropriate data to calculate theoretical flows based on methodology selected. 2.2 Determine the hydraulic characteristics of a monitoring site. 2.3 Measure and collect appropriate data to calculate flows theoretically. 2.4 Estimate hydraulic coefficients based on observations. 2.5 Prepare records in a format suitable for dissemination. 2.6 Review data collected and subsequent calculations for inconsistencies against measured flows.
3. Select the appropriate control structure	3.1 Select the appropriate control structures based on the characteristics of the open channel and its catchment. 3.2 Identify and determine the method to calculate flow by using the appropriate formulae for the control structure.
4. Calculate flow in open channels	4.1 Select and use the appropriate formulae for calculating flows in open channels based on the characteristics of the open channel and its catchment. 4.2 Identify the limitations of the formulae. 4.3 Identify factors that would cause variations in the results. 4.4 Verify results by applying hydraulic principles and other methodologies. 4.5 Determine the characteristics of open channel pipe flow.
5. Calculate flow from pressure measurements	5.1 Determine flow-based calculations by using pressure instruments. 5.2 Make adjustments for absolute pressure instruments to measure head in open channels. 5.3 Make corrections in pressure measurements to allow for head measurement of salt water.

Foundation Skills

The foundation skills demands of this unit have been mapped for alignment with the Australian Core Skills Framework (ACSF). The following tables outline the performance levels indicated for successful attainment of the unit.

ACSF levels indicative of performance:

1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Learning					Reading					Writing					Oral communication					Numeracy				

Performance variables:

1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Support					Context					Text complexity					Task complexity				

Further information on ACSF and the foundation skills underpinning this unit can be found in the Foundation Skills Guide on the GSA website.

Unit Mapping Information

No equivalent unit

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=26336bc0-04e5-49d9-8c31-46c49b6a0037>

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Assessment Requirements for NWPHYD001 Apply principles of open channel hydraulics

Modification History

Release	Comments
1	These Assessment Requirements were released in NWP Water Training Package release 1.0 and meet the Standards for Training Packages. • Assessment Requirements created drawing upon specified assessment information from superseded unit

Performance Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. If not otherwise specified the candidate must demonstrate evidence of performance of the following on at least two occasions.

- drawing velocity distribution curves for fluids in pipes or channels with both laminar flow and turbulent flow
- using data to determine the value of roughness
- using simple equations for determining channel friction with their appropriate application
- calculating minor energy losses associated with enlargements, contractions and bends
- calculating the gradual varied flow profiles in uniform channels when the discharge is known
- interpreting and applying technical documentation to the collection, analysis and reporting of hydrographic data
- using computer systems
- using recording and reporting systems
- calculating hydraulic energy gradients
- distinguishing the applications and characteristics of notches and weirs, including type of the crest, shape of the notch, crest and conditions
- distinguishing the characteristics of open channels including:
 - types of open channel
 - steadiness
 - uniformity
 - state of open channel flow
 - laminar
 - transitional and turbulent flow
 - critical

- subcritical and supercritical flow
- types of data (photographic, surveying, long-section and cross-section, topographic maps, historical)
- using surveying techniques
- identifying types of flows
- verifying results by applying hydraulic principles and other methodologies such as using the continuity equation

Knowledge Evidence

Evidence required to demonstrate competence must satisfy all of the requirements of the elements and performance criteria. If not otherwise specified the depth of knowledge demonstrated must be appropriate to the job context of the candidate.

- application of matrix algebra to systems of linear equations
- graphical and algebraic methods for solving systems of linear, quadratic, exponential, logarithmic and trigonometric equations
- principles of fluid statics, fluid dynamics and hydraulic mechanics
- Pascal's law and hydrostatic effect on submerged surfaces
- distinction between laminar and turbulent flow
- Hagen–Poiseuille equation
- Darcy–Weisbach equation
- Bernoulli's equation
- the effect of velocity variation on velocity head
- equations for calculating the approximate value of the friction factor, the characteristics of flow through notches/weirs, including the use of these in channel flow measurement
- flow conditions including:
 - laminar flow
 - turbulent flow
 - smooth, rough pipe and channel surfaces
 - full pipe flow
 - submerged flow conditions
 - backwater
 - critical flow
 - subcritical and supercritical flow
 - uniform flow
 - rapidly changing flow
 - weir and flumes behaviour under various flow conditions

Assessment Conditions

Competency should be assessed in an actual workplace or in a simulated environment, with access to equipment and infrastructure appropriate to the outcome. Competency should be demonstrated over time to ensure the candidate is assessed across a variety of situations.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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