

Water resources (F/506/1609)

Level	4	CABWI Unit Ref	WOM407
Credit Value	14	Guided learning hours	42

Unit purpose and aim

This unit is designed to provide learners with an understanding of the principal factors involved in the management of water resources.

On completion of the unit the learner will be able to:

- explain the concepts of hydrology.
- explain and calculate flow measurement.
- explain key design features of water abstraction methods and how legislation impacts on them.
- explain the factors affecting yield of water resources and factors involved in demand forecasting.
- explain the practical management of water resources.

Learning Outcome 1: Understand the concept of hydrology

Assessment criteria – the learner can:

- 1.1 describe the pathways of precipitation.
- 1.2 explain the relationship between rainfall, infiltration and run-off.
- 1.3 describe methods of measuring losses, inputs and movement of water in the hydrological cycle through evaporation, transportation and rainfall.
- 1.4 describe methods of measuring **surface and groundwater storage and flow**.
- 1.5 interpret **hydrographical representations** of rainfall and flow.
- 1.6 explain how different **methods of estimating floods and droughts** are used.

Learning Outcome 2: Understand and calculate flow measurement

Assessment criteria – the learner can:

- 2.1 explain **classifications** for different types of flow.

Water resources (F/506/1609)

Learning Outcome 2: Understand and calculate flow measurement

- 2.2 describe the features and operation of **open channel flow measuring devices**.
- 2.3 calculate the flow for different **open channel flow measuring devices** using apt calculation.
- 2.4 describe the features and operation of **closed pipe flow measuring devices**.
- 2.5 calculate flow in a closed pipe from given data using different **formulae**.

Learning Outcome 3: Understand the key design features of water abstraction methods and how legislation impacts on them

Assessment criteria – the learner can:

- 3.1 describe **types of dam** including design features.
- 3.2 describe **river abstraction intakes** including their key design features, construction and their appropriateness to setting.
- 3.3 describe **methods of drilling and constructing boreholes** used for groundwater abstraction.
- 3.4 describe features of at least one spring box, including collection, abstraction, protection and screening.
- 3.5 identify legislation that is relevant to water abstraction
- 3.6 explain how legislation impacts upon the design of different **water abstraction methods**.

Learning Outcome 4: Understand the factors affecting yield of water resources and factors involved in demand forecasting

Assessment criteria – the learner can:

- 4.1 explain the **factors that affect yield** from groundwater and surface water sources.
- 4.2 describe the main **methods** of increasing and maintaining yield from groundwater and surface water sources.
- 4.3 describe the factors that contribute to current industrial, domestic and agricultural water demand and how consumption is measured.
- 4.4 describe the factors that contribute to future industrial, domestic and agricultural water demand and the importance of demand forecasting.
- 4.5 explain how abstraction licences and statutory compensation flows are set, monitored and revised.
- 4.6 describe the purpose and use of **conjunctive use schemes**.

Water resources (F/506/1609)

Learning Outcome 5: Understand the practical management of water resources

Assessment criteria – *the learner can:*

- 5.1 explain **potential threats** to raw water quality and quantity and possible mitigation.
- 5.2 identify **management guidelines** and how they would be applied to the practical management of a water resource and its catchment area.
- 5.3 explain how current legislation drives management practices in the protection of water resources.

Assessment requirements and guidance

In the assessment of this unit, the learner must ensure that the evidence that they produce covers the following:

1. The description of methods of measuring **surface and groundwater storage and flow** must cover at least one of each.
2. The learner must produce at least three interpretations of **hydrographical representations** of rainfall and flow.
3. The explanation of **methods of estimating floods and droughts** must include:
 - (a) at least two methods for each, and
 - (b) two probability calculations for each.
4. The explanation of flow type **classifications** must cover four classifications, including criteria.
5. The learner must provide descriptions of the features, operation and apt calculations for four **open channel flow measuring devices**.
6. The learner must provide descriptions of the features and operation of three **closed pipe flow measuring devices**.
7. The learner must carry out closed pipe flow calculations using two different **formulae**.
8. The description of **types of dam** must cover:
 - (a) a description of three different types of dam.
 - (b) a more detailed description of the design features of one type of dam, to include

Water resources (F/506/1609)

Assessment requirements and guidance

construction and benefits.

9. The learner must describe at least two types of **river abstraction intakes**.
10. The learner must describe two **methods of drilling and constructing boreholes**.
11. **Water abstraction methods** must include all four of the following:
 - (a) dams
 - (b) river abstraction intakes
 - (c) boreholes
 - (d) spring box.
12. The explanation of **factors that affect yield** from groundwater and surface water sources must cover five factors that affect yield and include the reasons why yield is affected.
13. The description of **methods** of increasing and maintaining ground and surface water yield must cover at least one method for ground water and one method for surface water, including infrastructure and conservation.
14. The description of the purpose and use of **conjunctive use schemes** must include:
 - (a) source
 - (b) operation for compliance.
15. The explanation of **potential threats** to raw water quality and quantity must cover:
 - (a) natural issues
 - (b) man-made issues
 - (c) mitigation and control measures used to remove the threats.
16. The application of **management guidelines** to the practical management of a water resource and its catchment area must include improvements in application.

The assessment of this unit will be via a combination of a centre-devised assignments and tests, and will be conducted in supervised conditions. The assessment strategy for the unit has been agreed with industry stakeholders.