



Unit Title	Water resources (F/506/1609)	
Level	4	
Credit Value	12	
Learning Outcomes – the learner will be able to:	Assessment Criteria – the learner can:	
1. Understand the concepts of hydrology	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.
2. Understand and calculate flow measurement	2.1	explain classifications for different types of flow.
	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 .
3. Understand key design features of water abstraction methods and how legislation impacts on them	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 .
4. Understand the factors affecting yield of water resources and factors involved in demand forecasting	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 .



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

Additional information about the unit	
Unit purpose and aims	<p>This unit is designed to provide learners with an understanding of the principal factors involved in the management of water resources.</p> <p>On completion of the unit the learner will be able to:</p> <ul style="list-style-type: none">• 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.
Unit expiry date	31/03/2019
Assessment requirements or guidance specified by a sector or regulatory body (if appropriate)	<p>In the assessment of this unit, the learner must ensure that the evidence that they produce covers the following:</p> <ol style="list-style-type: none">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:<ol style="list-style-type: none">(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 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.
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



	<p>must include improvements in application.</p> <p>The assessment of this unit will be via a combination of centre-devised assignments and tests, and will be conducted in supervised conditions. The assessment strategy for the unit has been agreed with industry stakeholders.</p>
Location of the unit within the subject/sector classification system	4.1 Engineering
Name of the organisation submitting the unit	CABWI Awarding Body
Availability for use	Shared
Unit guided learning hours	48