Level 4 Water

Unit Title	Operation and maintenance of the waste water network (F/506/1612)
Level	4
Credit Value	12

Learning Outcomes – *the learner will be able to:*	**Assessment Criteria** – *the learner can:*
1. Understand the origins of sewage, its characteristics and risks	1.1 identify the **key components** of sewage. 1.2 describe the range of **chemical and physical characteristics** of sewage. 1.3 explain the **health and safety risks** associated with waste water in the network and associated assets. 1.4 describe **key hazards** and relevant safe operation procedures for working on and in waste water systems.
2. Understand the impact and control of trade effluent	2.1 describe types of trade effluent and their possible **environmental impact**. 2.2 discuss the **controls** in place for trade effluent discharges. 2.3 evaluate, from an environmental and economic point of view, the **treatment and disposal of trade effluents**.
3. Understand the operation and maintenance of waste water systems and related installations	3.1 identify **types of sewer** and key components of a waste water system. 3.2 describe the **key provisions of legislation and regulations** affecting operation and maintenance of the waste water network. 3.3 describe the **methods** used in the operation and maintenance of waste water networks. 3.4 evaluate **condition monitoring processes** employed in the water industry. 3.5 identify **common failure modes** of the waste water network. 3.6 explain **remedial measures** related to the common failures. 3.7 explain the impact on the customer of common failures and remedial measures, and the water undertaker's **customer service** obligations and responsibilities.
4. Understand the design and construction of waste water systems	4.1 describe **flow measurement and modelling techniques**. 4.2 apply **analytical methods and techniques** in the hydraulic design of waste water systems. 4.3 produce **drawings** for sewer components demonstrating various construction techniques. 4.4 describe the **design, planning and construction processes** for the waste water network. 4.5 explain the **sewer adoption process** and procedures. 4.6 describe and compare **pump performance measurement methods** using appropriate analytical methods.
5. Understand the contractual framework used by the water industry for the operation and maintenance of waste water systems	5.1 evaluate the **types of contracts** used by water undertakers and the industry supply chain, with reference to: (a) regulatory compliance requirements (b) customer service requirements and responsibility to customers.

	5.2 explain the major categories of the Royal Institute of British Architects' (RIBA's) Plan of Work with regard to planning for operation and maintenance of waste water network construction. 5.3 discuss **performance measures** employed by waste water undertakers to monitor contracts with its supply chain. 5.4 explain the **importance** of the standard method of measurement for building works.

Additional information about the unit	
Unit purpose and aims	This unit is designed provide the learner with an understanding of the principles and practices involved in the operation and maintenance of the waste water network. On successful completion of this unit, the learner will be able to: • explain the operation and maintenance of waste water systems and related installations. • explain the design and construction of waste water systems. • evaluate the contractual framework used by the water industry for the operation and maintenance of waste water systems. • discuss the impact and control of trade effluent.
Unit expiry date	31/03/2019
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 learner must identify four **key components** of sewage. 2. The learner must describe three examples of the **chemical and physical characteristics** and their potential impact on: (a) the waste water network (b) waste water treatment processes (c) receiving watercourse. 3. The learner must explain four **health and safety risks** associated with waste water in the network and associated assets, and the typical risk reduction and control measures associated with them. 4. The learner must describe four **key hazards** and the relevant safe operation procedures to control risk. 5. The learner must describe different types of trade effluent and their possible **environmental impact** on: (a) personnel (b) the waste water network (WWN) (c) waste water treatment works (WwTWs) assets (d) waste water treatment processes

(e) receiving watercourses.

6. The **controls** in place for trade effluent discharges must include:
   (a) discharge consent compared with limit of volume and characteristics
   (b) trade effluent monitoring and self monitoring
   (c) charging
   (d) legislation and criminal prosecution.

7. The learner's evaluation of the **treatment and disposal of trade effluents** must include two key explanations covering the environmental viewpoint and two covering the economic viewpoint.

8. The learner must describe three examples of different **types of sewer** and key components of a waste water system.

9. The learner must describe three examples of **key provisions of legislation and regulations** that affect the operation and maintenance of the waste water network including discharge permits, their respective reporting, maintenance and self monitoring requirements (e.g. Water Resources Act; Urban Waste Water Treatment Directive; Shellfish Directive).

10. The learner's description of the **methods** used to operate and maintain waste water networks must include:
    (a) waste water network pumping station inspection and planned preventative maintenance strategy
    (b) partial restriction and complete blockage removal
    (c) sewer de-silting.

11. The learner's evaluation of **condition monitoring processes** must cover four examples of condition monitoring techniques.

12. **Common failure modes** of the waste water network must include two examples covering each of the following:
    (a) gravity network
    (b) rising mains
    (c) pumping stations
    (d) combined sewer overflows
    (e) storm attenuation facilities.

13. The learner must explain five examples of **remedial measures** relating to common failures.

14. The waste water undertaker's responsibility for **customer**

service relates to:
(a) incident response
(b) customer appointments
(c) regulatory reporting
(d) impact on regulatory review
(e) company profitability.

15. The learner must describe two examples of **flow measurement and modeling techniques**.

16. The learner must show the application of two different examples of **analytical methods and techniques** in the hydraulic design of waste water systems.

17. The learner must produce three **drawings** for sewer components, demonstrating different construction techniques.

18. The learner's description of the waste water network **design, planning and construction process** must cover:
(a) economic and planning aspects
(b) construction aspects
(c) 18 key stages.

19. The learner's explanation of the **sewer adoption process** and procedures must include reference to *Sewers for Adoption 6th Edition, Sections 102 and 104*.

20. The learner must describe and compare three methods of **pump performance measurement** and their application.

21. The learner's evaluation of **types of contracts** must cover the fundamentals of:
(a) value for money
(b) fitness for purpose
(c) cost v benefit analysis
(d) whole life cost.

22. The learner must discuss three key **performance measures** used by waste water undertakers to monitor contracts with the supply chain.

23. The learner's explanation of the **importance** of the standard method of measurement for building works must cover four key benefits.

The assessment of this unit will be via a combination of centre-devised assignments and end tests, and will be conducted in

	supervised conditions. The assessment strategy for the unit has been agreed with industry stakeholders.
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