

Ofqual Ref

Level

603/1173/3

Diploma at Level 3

# Water Network – Leakage

Issue 2 – March 2020

## ABOUT THE QUALIFICATION SPECIFICATION

This specification for CABWI Awarding Body's **CABWI Level 3 Diploma in Water Network - Leakage (Ofqual Ref: 603/1173/3)** is designed to provide assessment centres with information on the qualification's content, structure and delivery.

This document provides both general assessment guidance and more detailed information, including general requirements for the qualification and specific requirements for each unit, where applicable. It also includes sections relating to personnel and facilities approval. If you or your centre has any queries relating to the qualification or its delivery, please contact either your allocated external quality assurer (EQA) or the CABWI office (Tel: 020 7469 2641; E-mail: [enquiries@cabwi.co.uk](mailto:enquiries@cabwi.co.uk)).

This guidance (and updated versions issued during the qualification's lifetime) will be produced electronically and can be accessed via the CABWI website ([www.cabwi.co.uk](http://www.cabwi.co.uk)) or by contacting the CABWI office ([enquiries@cabwi.co.uk](mailto:enquiries@cabwi.co.uk)). Additional materials available for this qualification include questions and answers which can be used to support assessment.

Further information relating to the delivery of CABWI qualifications, including copies of CABWI's current forms and centre administration manual, may be obtained direct from the CABWI office by contacting:

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# 1. QUALIFICATION OVERVIEW

## 1.1 Qualification objective

The CABWI Level 3 Diploma in Water Network - Leakage is designed to demonstrate the occupational competence of learners. This qualification can be used both for the upskilling of existing staff and for the on-programme learning element of related apprenticeships.

The content, structure and assessment requirements of the qualification were developed by CABWI Awarding Body, in consultation with representatives of the water industry and its training and assessment providers.

This Occupational Qualification sits in the Regulated Qualifications Framework (RQF) and is regulated by Ofqual and CCEA Regulation.

If the assessment team identifies any queries or issues with the content of the qualification units or the structure, the centre should contact its external quality assurer or the CABWI office in the first instance. The awarding body can then provide advice on the most suitable course of action and consult further with qualification users, employers and/or training providers as necessary.

## 1.2 Qualification structure

To achieve a full CABWI Level 3 Diploma in Water Network - Leakage, a learner must complete the 7 mandatory units from the table below. Where required the additional unit may be taken in addition to the mandatory units. This is not required for achievement of the qualification but may further support on-programme learning for apprentices.

### Mandatory Units – *all learners must complete the following seven mandatory units*

3101	Water Treatment and Networks – Regulation and Compliance (H/615/5329)
3102	Water Treatment and Networks – Science and Applied Mathematics (Y/615/5330)
3202	Water Networks – Customer Service (F/615/5354)
3205	Water Network – Materials and Components (R/615/5357)
3301	Water Network Leakage – Pressure Management (K/615/5364)
3302	Water Network Leakage – Leakage Targeting (M/615/5365)
3303	Water Network – Leakage Detection and Location (H/615/5363)

### Additional Unit – *learners may take the following unit in addition to the qualification if required*

3208	Water Network – Asset Management (R/615/5360)
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### 1.3 Total Qualification Time, Guided Learning Hours and Credit

To meet regulatory requirements, all RQF qualifications must be assigned a number of Guided Learning Hours (GLH) and a number of hours for Total Qualification Time (TQT). These figures are assigned to the qualification during the development process, through consultation with industry specialists and training and assessment providers.

**Guided Learning Hours** is an estimate of the number of hours a learner would be expected to spend working towards a qualification, under the immediate guidance or supervision of a provider of education or training (e.g. a tutor, lecturer, supervisor, etc.).

**Total Qualification Time** is an estimate of the total amount of time (in hours) that a learner could reasonably be expected to achieve the level of attainment required for the award of a qualification. The TQT for any qualification is calculated by adding the number of hours assigned for Guided Learning to the estimated number of hours that a learner could reasonably be expected to spend in preparation, study or any other education or training activity, including assessment, that may be directed by, but not under the immediate supervision of a tutor, lecturer, supervisor, etc.

Please note: The GLH and TQT figures assigned by CABWI to its qualifications are notional, and it is not mandatory for centres to provide a specific number of GLH in delivery a qualification. Learners and their employers should be aware that different individuals may take different amounts of time to complete their assessment successfully.

The Qualification GLH is: 266 hours

The Total Qualification Time is: 416 hours

The Credit Value of the qualification is: 42 Credits

### 1.4 Relationship to apprenticeships

This qualification can be used to support the on-programme learning for the Water Process Technician Apprenticeship Standard. Apprentices may find it useful to include the additional unit in their learning programme.

### 1.5 Grading

The CABWI Level 3 Diploma in Water Treatment is graded PASS\FAIL.

## 2. QUALIFICATION APPROVAL REQUIREMENTS

All centres seeking to deliver CABWI regulated qualifications must complete the application process using CABWI's current centre and personnel application forms, providing information about how the centre will meet CABWI's centre recognition criteria. Information relating to CABWI's centre recognition process can be found in CABWI's *Centre Administration Manual*, a copy of which is available on the CABWI website.

Any centre recognition application requires details of:

- the title of the qualification(s) for which approval is required, or a list of the unit(s) if seeking unit approval only;
- the assessment and quality assurance team members, and named centre co-ordinator (it is helpful to provide a chart or diagram showing the team structure);
- proposed facilities, locations for assessment and storage of records (including satellite sites). This includes any proposed arrangements for the use of simulated activities in a realistic working environment;
- how the centre will meet the CABWI centre recognition criteria and any additional requirements relating to the specific qualification(s) they wish to deliver;
- how assessment and quality assurance will be conducted *for the specific qualification(s) required*.

If the organisation is already a recognised assessment centre with CABWI or any other awarding body, qualifications delivery and quality assurance systems and processes will already be in place. CABWI recommends that centres align the delivery of this qualification with their current systems, providing this allows them to meet the specific scheme requirements and centre recognition criteria.

A centre seeking to deliver the CABWI Level 3 Diploma in Water Network - Leakage must also ensure that it has the resources, including facilities and personnel, to meet the qualification-specific requirements described in this section.

### 2.1 Centre facilities

#### Facilities and equipment requirements

As this is an occupational qualification practical activities are expected to be naturally occurring in the work environment. Where this is not possible use of a simulated or realistic working environment may be acceptable. Unit information defines where this is likely to be acceptable.

#### Use of realistic working environment and simulated activities

The unit information in section 4 identifies where the use of a Realistic Working Environment (RWE) or Simulation is acceptable. The RWE or simulated activities must be approved by the centre's EQA before assessments commence.

## Records storage

All qualification records must be stored securely, and centres must maintain records of:

- learners
- assessments and assessment decisions
- internal quality assurance.

The records must be:

- sufficient to provide an audit trail
- retained for at least three years, to allow for monitoring (by the awarding body or the regulatory authorities) to take place.

Some records will include learners' personal information (subject to the Data Protection Act) and others may include details of written or oral underpinning knowledge questions asked during assessment, which must not be freely available to learners. It is vital that these records are held securely by the centre. Secure storage facilities will be verified by the external quality assurer during centre approval and at subsequent monitoring visits.

## 2.2 Personnel resources for qualification delivery

A centre must have at least one fully-qualified and occupationally competent assessor, and one fully-qualified and occupationally competent internal quality assurer (IQA) in order to be recognised to deliver the CABWI Level 3 Diploma in Water Network - Leakage. Centres should also have a tutor/trainer as part of their personnel where they have less than two fully qualified and occupationally competent assessors in order to comply with the independent assessment requirements set out in section 2.3.

Each assessor, IQA, assessor-candidate or IQA-candidate must submit the appropriate personnel application, together with relevant supporting evidence of qualifications and occupational competence. The qualifications and occupational expertise requirements for assessors and IQAs delivering the CABWI Level 3 Diploma in Water Network - Leakage are set out below.

### Centre co-ordinator / centre manager

The centre must have a named central point of contact for the administration of CABWI qualifications. They are responsible for ensuring that the correct application forms are submitted to the awarding body and for providing (either in person or via other designated personnel) details of learners who require registration and certification for particular qualifications.

## Assessors

### Assessor qualifications

In order to assess learners for the CABWI Level 3 Diploma in Water Network - Leakage, an assessor must have relevant occupational expertise, and must hold one of the following qualifications:

- Level 3 Award in Assessing Competence in the Work Environment, or
- Level 3 Certificate in Assessing Vocational Achievement, or
- Assessing Candidates Using a Range of Methods (A1), or
- D32 – Assess Candidate Performance and D33 – Assess Candidate Performance Using Diverse Evidence.

CABWI does not require assessors who hold earlier versions of assessor qualifications to complete the current versions. However, assessors must ensure that they are aware of current assessment practice, and must ensure that they review their skills, knowledge and understanding of assessment processes and practice regularly, and undertake relevant CPD. This activity may be undertaken in conjunction with the assessment centre(s) where the assessor works.

### Assessor-candidates

Assessor-candidates are individuals who meet the occupational expertise requirements to assess the qualification, but who do not yet hold an assessor qualification.

They may apply to CABWI for an assessor-candidate licence, for a maximum period of 18 months, while they undertake their assessor qualification. All assessment decisions taken by assessor-candidates must be countersigned by a fully-qualified assessor who is also approved to assess the same unit(s).

Assessor-candidates working on the CABWI Level 3 Diploma in Water Network - Leakage must be undertaking one of the following assessor qualifications:

- Level 3 Award in Assessing Competence in the Work Environment, or
- Level 3 Certificate in Assessing Vocational Achievement.

These are the two current assessor qualifications, developed as part of the Training, Assessment and Quality Assurance (TAQA) suite of qualifications, which cover the assessment of workplace competence.<sup>1</sup>

When seeking approval from CABWI, assessor-candidates may be required to provide confirmation of the assessment centre where they are registered to take their assessor qualification, and when they expect to complete the qualification.

### Occupational expertise and assessor requirements

Any assessor or assessor-candidate who wishes to assess the CABWI Level 3 Diploma in Water Network - Leakage must also show that they can meet the criteria listed in the table below (the column on the right provides examples of evidence against the requirements: please note that these are suggestions, and the lists are not exhaustive).

Assessor criteria	Potential sources of evidence
<ul style="list-style-type: none"> <li>• In-depth technical and practical knowledge of the areas they are</li> </ul>	<ul style="list-style-type: none"> <li>• CV confirming occupational experience relating to those unit(s)/qualification(s) for</li> </ul>

<sup>1</sup> The required qualifications for assessors may be updated during the lifetime of this qualification. CABWI can provide confirmation of the current requirements on request.



Assessor criteria	Potential sources of evidence
<p>assessing.</p> <ul style="list-style-type: none"> <li>Up-to-date knowledge and relevant technical/industrial experience in the areas they are assessing. (The experience must be not more than 5 years old, and at a level relevant to their assessor role and the level of the award.) Specific occupational experience that is at least at the same level as the qualification and/or unit(s) that they are assessing.</li> </ul>	<p>which approval is required - through an industry operational role and/or delivering operational training and/or assessment in activities covered by the unit(s) required.</p> <ul style="list-style-type: none"> <li>Occupational information must confirm experience of network leakage activities according to the units required.</li> <li>Details of any vocational qualifications etc. relevant to the activities covered.</li> <li>Other supporting information: witness testimonies or other testimonials.</li> </ul>
<ul style="list-style-type: none"> <li>Experience &amp; working knowledge of the assessment and quality assurance processes.</li> </ul>	<ul style="list-style-type: none"> <li>Copy assessor qualification certificates.</li> <li>For assessor-candidates, details of the induction they have received for their assessor award.</li> <li>For experienced assessors, confirmation of assessor experience on previous related qualifications or units.</li> </ul>
<ul style="list-style-type: none"> <li>Thorough understanding of the content of the CABWI Level 3 Diploma in Water Network - Leakage, and the ability to interpret it and offer advice on assessment-related matters.</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of familiarity with the qualification content.</li> <li>For experienced assessors, confirmation of assessor experience on previous related qualifications or units.</li> <li>Confirmation of involvement in standardisation process, assessment team meetings etc within centre.</li> <li>If applicable, details of involvement with the qualification development process for CABWI Level 3 Diploma in Water Network - Leakage.</li> </ul>
<ul style="list-style-type: none"> <li>High level of interpersonal and communication skills.</li> </ul>	<ul style="list-style-type: none"> <li>CV details confirming use of interpersonal skills etc.</li> <li>For experienced trainers or assessors, confirmation of previous training or assessment activity.</li> <li>Details of any qualifications covering communications skills (e.g. Key Skills or Functional Skills qualifications; qualifications or units covering soft skills – e.g. units from Management or Customer Service qualifications etc.).</li> </ul>
<ul style="list-style-type: none"> <li>Commitment to CPD for the assessor role and to maintain currency of knowledge and experience in network leakage activities.</li> </ul>	<ul style="list-style-type: none"> <li>Assessor licence application – details of how currency will be maintained.</li> <li>Details (as part of CV or application information) of participation in industry groups, consultations, etc., relating to network leakage.</li> </ul>

Assessor criteria	Potential sources of evidence
	<ul style="list-style-type: none"> <li>• Details of involvement in centre staff development programmes, as per centre application.</li> </ul>

## Internal quality assurers (IQAs)

### Internal quality assurer qualifications

In order to quality assure the CABWI Level 3 Diploma in Water Network - Leakage, an IQA must have relevant occupational expertise, and must hold one of the following qualifications:

- Level 4 Award in the Internal Quality Assurance of Assessment Process and Practice, or
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice, or
- Conducting Internal Quality Assurance of the Assessment Process (V1), or
- D34 - Co-ordinate the Assessment Process.

CABWI does not require internal quality assurers who hold earlier versions of the IQA qualifications to undertake the current versions, based on later national occupational standards. However, IQAs must ensure that they are aware of current assessment and quality assurance practice, and must ensure that they review their skills, knowledge and understanding of assessment and quality assurance processes and practice regularly, and undertake relevant CPD. This activity may be undertaken in conjunction with the assessment centre(s) where the IQA works.

### IQA-candidates

IQA-candidates are individuals who meet the occupational expertise requirements to internally quality assure the qualification, but who do not yet hold an IQA qualification.

They may apply to CABWI for an IQA-candidate licence, for a maximum period of 18 months, while they undertake their internal quality assurer/IQA qualification. All quality assurance decisions taken by IQA-candidates must be countersigned by a fully qualified IQA who is also approved to quality assure the same unit(s).

IQA-candidates working on the CABWI Level 3 Diploma in Water Network - Leakage must be working towards one of the following IQA qualifications:

- Level 4 Award in the Internal Quality Assurance of Assessment Process and Practice, or
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice.

These are the two current quality assurance qualifications, developed as part of the Training, Assessment and Quality Assurance (TAQA) suite of qualifications.<sup>2</sup>

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<sup>2</sup> The required qualifications for internal quality assurers may be updated during the lifetime of this qualification. CABWI can provide confirmation of the current requirements on request.

When seeking approval from CABWI, IQA-candidates may be required to provide confirmation of the assessment centre where they are registered to take their IQA qualification, and when they expect to complete the qualification.

### Occupational expertise and IQA requirements

Any IQA or IQA-candidate who wishes to quality assure the CABWI Level 3 Diploma in Water Network - Leakage must also show that they can meet the criteria listed in the table below (the column on the right provides examples of evidence against the requirements: please note that these are suggestions, and the lists are not exhaustive).

Internal quality assurer criteria	Potential sources of evidence
<ul style="list-style-type: none"> <li>Comprehensive understanding of the areas they are internally quality assuring.</li> <li>Up-to-date knowledge and relevant technical/industrial experience in the areas they are quality assuring. (The experience must be not more than 5 years old, and at a level relevant to their IQA role and the level of the award.)</li> <li>Qualification-specific occupational knowledge and experience that is at least at the same level as the qualification and/or unit(s) that they are quality assuring.</li> </ul>	<ul style="list-style-type: none"> <li>CV confirming occupational experience relating to those unit(s)/qualification(s) for which approval is required - through an industry operational role and/or delivering operational training, assessment or quality assurance in activities covered by the unit(s) required.</li> <li>Details of any vocational qualifications etc relevant to the activities covered.</li> <li>Other supporting information: witness testimonies or other testimonials.</li> </ul>
<ul style="list-style-type: none"> <li>Experience &amp; working knowledge of the assessment and quality assurance processes. <i>(Please note: it is desirable, though not mandatory, for IQAs working on this qualification to hold an assessor qualification.)</i></li> </ul>	<ul style="list-style-type: none"> <li>Copy IQA qualification certificates.</li> <li>Copy assessor certificates, if qualified assessors.</li> <li>For IQA-candidates, details of the induction they have received for their IQA award.</li> <li>For experienced IQAs, confirmation of internal quality assurance experience on previous related qualifications or units.</li> </ul>
<ul style="list-style-type: none"> <li>Thorough understanding of the content of the CABWI Level 3 Diploma in Water Network - Leakage, and the ability to interpret it and offer advice on assessment-related matters.</li> </ul>	<ul style="list-style-type: none"> <li>For experienced IQAs, confirmation of experience on previous related qualifications or units.</li> <li>Confirmation of involvement in standardisation process, assessment team meetings etc within centre.</li> <li>If applicable, details of involvement with the qualification development process for CABWI Level 3 Diploma in Water Network - Leakage.</li> </ul>
<ul style="list-style-type: none"> <li>High level of interpersonal and communication skills.</li> </ul>	<ul style="list-style-type: none"> <li>CV details confirming use of interpersonal skills etc.</li> </ul>

Internal quality assurer criteria	Potential sources of evidence
	<ul style="list-style-type: none"> <li>• For experienced trainers, assessors or IQAs, confirmation of previous training, assessment or IQA activity.</li> <li>• Details of any qualifications covering communications skills (e.g. Key Skills or Functional Skills qualifications; qualifications or units covering soft skills – e.g. units from Management or Customer Service qualifications etc.).</li> </ul>
<ul style="list-style-type: none"> <li>• Commitment to CPD for the IQA role and to maintain currency of knowledge and experience in network leakage activities.</li> </ul>	<ul style="list-style-type: none"> <li>• IQA licence application – details of how currency will be maintained.</li> <li>• Details of involvement in centre staff development programmes, as per centre application.</li> </ul>
<ul style="list-style-type: none"> <li>• Sufficient authority to carry out the IQA role at any centre where they are working – irrespective of whether they are a direct or contracted employee of the assessment centre.</li> </ul>	<ul style="list-style-type: none"> <li>• Endorsement of the CABWI IQA application by a manager at the assessment centre where they are working.</li> <li>• Organisation and/or team charts showing roles, responsibilities and authority of assessment and quality assurance team members.</li> <li>• For experienced IQAs, evidence of managing assessors within the team, dissemination and completion of agreed actions, etc.</li> <li>• Evidence of involvement in and contribution to centre standardisation activity and meetings.</li> </ul>

### 2.3 Independent assessment

Independent assessment is a quality control measure that is used to minimise any potential vested interest that an assessor could have in the outcome of a learner’s assessments.

Centres seeking approval to deliver the CABWI Level 3 Diploma in Water Network - Leakage must ensure that:

- assessors do not assess any learner for whom they have line management responsibility, and
- assessors do not assess any learner for any unit on which they have been involved in training that learner.

In cases where the centre’s assessment team cannot meet the above criteria, an alternative method of independent assessment will be agreed with the centre.

CABWI’s assessor application form includes two questions that ask if they will be training learners and if they will be assessing people who report directly to them. If the assessor answers ‘YES’ to

the training-related question, CABWI reserves the right to contact the centre co-ordinator to obtain further information, as follows:

If training learners:

- *To what extent will the assessor be training learners?*
- *Are they the only assessor, or does the centre have other assessors?*
- *Which units will the assessor be assessing?*
- *When did the applicant train the learners and when will they be assessing them?*

On receipt of this information, CABWI will agree an alternative quality assurance procedure with the centre and their EQA, details of which will be kept on file. Each case is judged on an individual basis, according to: the detail provided; whether there are other significant risk factors at the centre that could affect the integrity of delivery; and whether there is any scope for the centre to work towards meeting the independent assessment requirements in the future.

Other independent assessment measures, as discussed and agreed with the external quality assurer, could include (but are not limited to):

- additional IQA sampling
- requiring additional EQA visits to monitor the situation
- requiring the centre to arrange for the separation of training and assessment wherever possible (e.g. through having dedicated assessors and trainers, resources permitting.)

CABWI's EQAs will monitor the implementation of independent assessment during quality assurance visits, and will highlight any areas for improvement through the action planning section of their EQA Visit Report by agreement with the centre.

*Please note: It is vital that the centre informs CABWI if it cannot meet the independent assessment requirement for the CABWI Level 3 Diploma in Water Network - Leakage, or if it becomes unable to meet these requirements after approval. If the requirements are found not to have been met during EQA monitoring, and the centre has not agreed an alternative quality assurance procedure with CABWI, this can impact upon learner certification, leading to a requirement for re-assessment of the learners affected or other remedial action.*

## 3. QUALIFICATION DELIVERY

### 3.1 Pre-registration learner requirements

There are no entry requirements for this qualification. However, as there is a requirement for learners to provide evidence from workplace activities, the learner must have access to the work environment and tasks that allow them to complete the qualification.

### 3.2 Assessment methodology

Assessment for the CABWI Level 3 Diploma in Water Network - Leakage will be conducted using a portfolio of evidence. CABWI has produced documentation to support the recording of evidence and questions and answers which can be used to support assessment. Knowledge can be assessed using an “open book” approach but assessors are expected to ensure that the learner understands their answers fully by exploring their depth of understanding using additional questions which can be devised by the assessor. This additional questioning should be recorded by the assessor and mapped to the assessment criteria covered.

### 3.3 Recording assessments

Assessment for this qualification is via a portfolio of evidence. As there is a large amount of knowledge which need to be evidenced CABWI will provide questions and an indication of the expected coverage of the answers.

### 3.4 Internal quality assurance

The CABWI Level 3 Diploma in Water Network - Leakage must be internally quality assured in line with CABWI's centre recognition criteria and the specific qualification requirements. If the centre has experience of delivering similar or related qualifications, through CABWI or another awarding body, it is likely that the current internal quality assurance systems can also be used for the CABWI Level 3 Diploma in Water Network - Leakage, although the external quality assurer will need to review the systems as part of the centre recognition process.

Internal quality assurers are expected to:

- manage the operation of assessment within their centres
- support assessors
- quality assure assessors' work (including observing assessments taking place), according to the centre's IQA sampling strategy and specific plans for the quality assurance of this qualification
- ensure that the qualification requirements are applied consistently by the assessment team and across all learners at the centre, including participation in standardisation activities
- manage the qualification delivery process.

The types of records that EQAs review to verify internal quality assurance activities include (but are not limited to):

- IQA sampling strategy (the document that the IQA uses to determine what s/he will sample over time: this must take a risk-based approach)
- more detailed IQA sampling plans (they will be informed by the IQA sampling strategy, but may be modified over time, and in line with identified risks, familiarity with the qualification, learner numbers etc.)
- evidence of interim and summative sampling of assessments (to cover the full delivery process across all units that the assessment team delivers)
- IQA reports on work sampled, which **must** include a proportion of IQA observation reports, confirming that they have watched assessments (observations and/or meetings) taking place over time. The IQA records must also include, over time, sampling of the work of all assessors working on the qualification and all units covered at the centre.
- evidence of team meetings and standardisation exercises (while not relating to the IQA role alone, it is usual for the IQA to lead meetings and standardisation exercises, etc.).

It is likely that one of the internal quality assurers at the centre will act as the main point of contact with the EQA and the awarding body for policy issues relating to delivery of this qualification, disseminate the detail of EQA reports, and ensure that actions are implemented.

### **3.5 External quality assurance and post-approval monitoring**

Once the centre has been approved, the external quality assurer will start to plan and discuss quality assurance and monitoring activity with the team. Typically, a centre will receive at least two external quality assurance visits per year, but CABWI reserves the right to recommend additional visits, depending upon the centre's circumstances. The most common reasons for additional visits include, but are not limited to:

- high learner numbers and activity levels (including where a centre offers a wide variety of CABWI qualifications)
- to monitor completion of action points that must be resolved within specific timescales
- if there is a risk to the centre's qualification delivery or quality assurance systems (e.g. insufficient assessors, a high proportion of newly-qualified assessors or IQAs, etc.)
- to approve the centre to deliver new qualifications.

The centre may also request additional visits or EQA activity such as remote sampling of assessment materials, either for a review of learners' evidence and assessment records (usually prior to self-certification – 'direct claims' – status being granted), to add further units or awards to the existing centre licence, to review completion of agreed actions, or to discuss any aspect of scheme delivery.

The EQA monitors all aspects of assessment and quality assurance activity. This will include observation of assessments taking place, on site or at the centre. Over time, the EQA will seek to monitor the work of all assessors and IQAs at the centre, review the systems against current qualifications requirements and CABWI's centre recognition criteria, and provide feedback on the centre's activities.

An EQA report is produced after each quality assurance visit or activity, and sent to CABWI. Over time, CABWI will monitor the centre's progress and completion of actions agreed with the

awarding body, to ensure that robust qualification delivery and quality assurance systems are in place.

In order for CABWI to ensure that quality assurance activity is conducted effectively and within appropriate timescales, it is important that centres provide the external quality assurer with as much information as possible about planned activity, and the location of cohorts of learners. This allows the EQA to schedule quality assurance with the centre so that relevant monitoring activity can be undertaken at a rate and within timescales that meet, as far as possible, the centre's activity levels and commitments to learners, clients and regulatory or funding bodies. If a centre does not advise the EQA of their forthcoming activity, and quality assurance activities cannot be planned in advance, there is a risk that EQA activities may be delayed, which can impact upon the timescales for issuing certificates.

External quality assurance activity may take place between visits to centres, either through remote sampling of learners' portfolios or other assessment records, and/or correspondence with centre personnel (e.g. to confirm completion of action points, circulate records of team meetings or standardisation activity, etc.). This type of activity will usually be agreed between the EQA and the centre, and/or the CABWI office.

Details of the fees that CABWI charges in relation to external quality assurance and qualifications activity are available via the CABWI office and on the CABWI website.

### **Certification**

The centre may apply for learner certification either on a unit-by-unit basis or when the learner has completed sufficient units for a full qualification. (Please ensure that certificates are claimed within 12 months of the final date of assessment for any unit, to confirm the learners' currency.)

### **Direct claims status**

Direct claims status (DCS) may be recommended by the EQA, when s/he is satisfied that the systems and processes for delivering the qualification are robust and are operating in accordance with the scheme requirements. Self-certification status can be recommended for full qualifications or individual units, according to the centre's circumstances, and it will be granted only when the EQA has had chance to review the centre's systems and qualification delivery in operation.

**Please be aware that, if a centre without direct claims status submits claims before the EQA has authorised them, the request will be referred to the EQA, which could delay certificate issue.**

Direct claims status is kept under review by the awarding body, and can be suspended or withdrawn for a particular qualification, or suite of qualifications, in the event that issues are identified that cause a risk to the centre's qualifications delivery.



### **3.6 Reasonable adjustments and special considerations**

CABWI is committed to complying with all current and relevant equalities legislation and the requirements of the Regulator(s), to ensure that all learners have an equal opportunity to demonstrate their knowledge, skills and understanding, to the level of attainment required for each of CABWI's qualifications.

The CABWI Policy for Reasonable adjustments and special considerations is available on the CABWI website [www.cabwi.co.uk](http://www.cabwi.co.uk).

## 4. CABWI LEVEL 3 DIPLOMA IN WATER NETWORK - LEAKAGE: UNIT REQUIREMENTS

This section outlines the requirements for each unit in the CABWI Level 3 Diploma in Water Network - Leakage. The assessment guidance and requirements covered in Section 3 above apply across the full qualification, and most of this information is not repeated in the unit-specific notes that follow. Assessors should be aware of the general requirements covered in Section 3, and also of any specific requirements relating to the delivery of individual units.

Each unit includes learning outcomes and assessment criteria. The 'Terms and definitions' sections provide detail of the scope of terms used in the assessment criteria, and additional notes may be provided, where applicable, on the assessment and/or evidence requirements for each unit.

*Where the qualification is completed in a jurisdiction other than England or Wales differing legislation, organisations, regulators and Government departments may be substituted for any identified within the assessment criteria or terms and definitions.*

Evidence produced by learners in the workplace may cover more than one Assessment Criterion or unit and it is therefore desirable for centres to use a holistic approach to assessment. Evidence should be mapped within the portfolio to the criteria and units to which it applies.

## Water Treatment and Networks – Regulation and Compliance (H/615/5329)

Level	3	CABWI Unit Ref	3101
Credit Value	2	Guided learning hours	14

### Unit purpose and aim

This unit is designed to allow the learner to develop and demonstrate their knowledge and understanding of the activities of the Water regulatory bodies. The learner will be able to identify and describe the core functions and duties laid down by regulatory frameworks. This unit is designed to allow the learner to develop awareness and understanding on how the key regulatory bodies discharge their duties and administer the water industry. This unit is designed to allow the learner to develop a basic awareness and understanding of the direct and indirect impact of the regulation on water companies, customers and other stakeholders.

References to **Water Supply** in this unit cover the operational activities associated with the collection, storage, treatment and distribution of water.

*Where the qualification is completed in a jurisdiction other than England or Wales differing legislation, organisations, regulators and Government departments may be substituted for any identified within the assessment criteria or terms and definitions.*

### Learning Outcome 1: Understand the UK water supply regulatory framework

#### Assessment criteria – the learner can:

- 1.1 explain why a regulatory environment is important in relation to the performance of the water industry
- 1.2 explain the functions of the key **water industry regulators**
- 1.3 explain the functions of the **key stakeholders with influence**
- 1.4 explain the purpose of the **main legislation** and the regulations which support legislation in relation to water supply
- 1.5 describe the main areas of operational activity which could directly impact on the **protection of the environment**

### Learning Outcome 2: Understand regulatory performance measures

#### Assessment criteria – the learner can:

- 2.1 outline the main provisions of the **regulatory framework** and reporting mechanisms
- 2.2 explain the purpose of the current performance monitoring mechanism (e.g. service

## Learning Outcome 2: Understand regulatory performance measures

- incentive mechanism)
- 2.3 explain why the current performance monitoring mechanism is important to regulation
  - 2.4 describe the importance of customer contact in regulation

## Learning Outcome 3: Understand how regulation impacts the operational activities within a water company

### Assessment criteria – *the learner can:*

- 3.1 outline the **main provisions** of the water quality regulations relating to quality standards for drinking water
- 3.2 explain the importance of compliance with **regulatory measures**
- 3.3 explain the consequences of non-compliance with regulatory measures for water companies

## Learning Outcome 4: Understand the hygiene regulations and requirements governing water operations

### Assessment criteria – *the learner can:*

- 4.1 outline the provisions of the main water **hygiene requirements** governing water operations
- 4.2 describe the hygienic **working practices** used in the water industry
- 4.3 explain how the requirements of the national water hygiene (blue) card scheme impact upon operational activity

## Learning Outcome 5: Understand the health and safety regulations

### Assessment criteria – *the learner can:*

- 5.1 outline the main provisions of the Health & Safety at Work Act
- 5.2 explain the purpose of **Health & Safety Regulations** and guidance that form part of the Health & Safety at Work Act

## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Water Industry Regulators** in 1.2 above includes all of the following:
  - (a) OFWAT –The Water Services Regulation Authority - Economic regulator of the Water Sector in England and Wales

## Terms and Definitions

- (b) Environmental protection agencies such as EA – Environment Agency and Natural Resources Wales
  - (c) DWI – Drinking Water Inspectorate
2. **Key Stakeholders with influence** in 1.3 includes all of the following
- (a) DEFRA – Department for Environment, Food and Rural Affairs
  - (b) CCW – Consumer Council for Water (sits under OFWAT)
  - (c) HSE – Health and Safety Executive
  - (d) Local Authority (Planning, Environmental Health)
  - (e) CPNI Centre for the Protection of National Infrastructure
3. **Main legislation** in 1.4 above includes both:
- (a) Water Industry Act
  - (b) Water Quality Regulations
4. Areas which impact on the **protection of the environment** in 1.5 above include all of the following:
- (a) **Prevention of pollution**
  - (b) **Use of approved materials**
  - (c) **Control and movement of waste**
  - (d) **Abstraction licences and compensation discharges**
5. **Regulatory framework** in 2.1 above includes all of the following:
- (a) Financial/Economic
  - (b) Customer Experience
  - (c) Environmental
  - (d) Water Quality
  - (e) Health & Safety
6. **Main provisions** of Water Quality Regulations in 3.1 includes all of the following:
- (a) Microbiological standards
  - (b) Health based chemical standards
  - (c) Additional monitoring parameters
  - (d) Other pathogenic organisms
7. **Regulatory measures** in 3.2 above includes all of the following:
- (a) **Key Performance Indicators**
  - (b) **Compliance standards**
  - (c) **Regulatory reporting**
8. **Hygiene requirements** in 4.1 above includes all of the following:
- (a) **Company hygiene policies**
  - (b) **National Water Hygiene scheme**

## Terms and Definitions

9. **Working practices** in 4.2 above includes all of the following:
  - (a) Approved hygiene scheme
  - (b) Restricted operations
  - (c) Personal hygiene and identification of potential sources of contamination
  - (d) Health screening
  - (e) Prevention of Contamination
  - (f) Disinfection
  
10. **Health & Safety Regulations and guidance** in 5.2 above includes at least 10 of the following:
  - (a) Management of Health and Safety at Work Regulations (MHSWR)
  - (b) DSEAR Regs
  - (c) Construction (Design and Management) Regs
  - (d) Confined Spaces Regs
  - (e) Work at Height Regs
  - (f) Control of Asbestos Regs
  - (g) COSHH Regs
  - (h) COMAH Regs
  - (i) Chlorine Handling (HSG 40)
  - (j) Chemicals - Transport of Chemicals (CDG) Regs, Information and Packaging, Classification and Labelling
  - (k) Fire Safety
  - (l) Noise at Work Regs
  - (m) Manual Handling Operations Regs
  - (n) Risk Assessment (Management of Health and Safety at Work Regulations (MHSWR))
  - (o) Regulations supporting the New Roads and Street Works Act (NRSWA)

## Assessment Requirements

This unit is knowledge only – all assessment tools used by centres must be approved by the EQA

## Water Treatment and Networks – Science and Applied Mathematics (Y/615/5330)

Level	3	CABWI Unit Ref	3102
Credit Value	5	Guided learning hours	28

### Unit purpose and aim

This unit is designed to allow the learner to develop and demonstrate their understanding and application of the maths used in the design and operation of water industry assets. This will include the application of: approximation methods, arithmetic, algebra, geometry. Also the analysis and presentation of data with graphs and statistics. This unit is designed to allow the learner to develop an understanding of chemical and biological characteristics of water. Learners will gain an understanding of how these characteristics affect operational processes and will develop an understanding of the parameters required to measure and evaluate the performance of water assets.

### Learning Outcome 1: Understand mathematical techniques commonly used in Water Supply and Treatment

#### Assessment criteria – the learner can:

- 1.1 explain how **common measurements** are used within the water industry
- 1.2 undertake a range of typical **water industry calculations** using appropriate methods
- 1.3 undertake a range of **methods** to interpret, analyse and present water industry data

### Learning Outcome 2: Understand the chemical and physical characteristics of water

#### Assessment criteria – the learner can:

- 2.1 describe the basic **chemical characteristics** of water
- 2.2 describe the basic **physical characteristics** of water
- 2.3 explain the measurement of the **variables** used to monitor the quality of water
- 2.4 explain the differences between **chemical compounds, mixtures, solutions, suspensions and colloids**
- 2.5 explain **hydraulic principles** used in the water industry

### Learning Outcome 3: Understand the microbiological characteristics of water

#### Assessment criteria – *the learner can:*

- 3.1 explain water quality issues relating to different types of **micro-organisms** found in the water environment
- 3.2 explain the health risks associated with common **waterborne pathogens**

### Learning Outcome 4: Understand the environmental impact of the water industry

#### Assessment criteria – *the learner can:*

- 4.1 describe the **sources of water contamination**
- 4.2 explain the implications of water contamination on the environment and to public health
- 4.3 explain how information from **indicators** is used to monitor environmental impact and provide protection in relation to water industry activity

### Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Common measurements** in 1.1 above includes all of the following:
  - (a) areas -  $m^2$
  - (b) volumes -  $m^3$
  - (c) flow rates - litres/second,  $m^3$ /hour, megalitres/day
  - (d) concentrations - mg/litre  $\mu$ g/litre
  - (e) dosing rates - mg/litre
  - (f) retention times - seconds, minutes, hours
2. **Water industry calculations** in 1.2 above includes all of the following:
  - (a) areas
  - (b) volumes
  - (c) flow rates
  - (d) concentrations
  - (e) dosing rates
  - (f) retention times
3. **Methods** in 1.3 and 1.4 above includes all of the following:
  - (a) statistics
    - i. range
    - ii. median
    - iii. mode
    - iv. mean
  - (b) graphs



## Terms and Definitions

- (c) charts
  - (d) spreadsheets
4. **Chemical characteristics** of water in 2.1 above includes all of the following:
- (a) elements
  - (b) atoms
  - (c) molecules
  - (d) chemical bonding
5. **Physical characteristics** of water in 2.2 above includes all of the following :
- (a) solids, liquids, gasses
  - (b) boiling point
  - (c) freezing point
  - (d) effect of temperature on density
  - (e) mass density
  - (f) solutions
  - (g) temperature and dissolved oxygen concentration
6. **Variables** in 2.3 above includes all of the following:
- (a) Ct value
  - (b) concentration
  - (c) pH
  - (d) temperature
  - (e) decay rate
7. **Chemical compounds, mixtures, solutions, suspensions and colloids** in 2.4 above includes all of the following:
- (a) water
  - (b) salts
  - (c) acids
  - (d) bases
  - (e) solubility
  - (f) oxidation & reduction
8. **Hydraulic principles** in 2.5 above includes all of the following:
- (a) pressure/head
  - (b) continuity equation
  - (c) flow in closed conduits
  - (d) flow in open channels
  - (e) frictional losses
9. Types of **micro-organisms** in 3.1 above includes all of the following:
- (a) indicator bacteria e.g. coliforms
  - (b) pathogens
  - (c) protozoa

## Terms and Definitions

10. **Waterborne pathogens** in 3.2 above includes all of the following:
  - (a) e. coli (escherichia coli)
  - (b) enterococci
  - (c) cryptosporidium
  - (d) giardia
  - (e) leptospira
  - (f) campylobacter
  
11. **Sources** of water contamination in 4.1 above includes all of the following:
  - (a) river water
  - (b) raw water
  - (c) treated water (flushing, discharges to the environment)
  - (d) sewage
  - (e) sewage effluents
  - (f) agricultural activity
  - (g) industrial activity
  
12. **Indicators** used to measure and monitor environmental impact and protection in 4.3 above includes all of the following:
  - (a) pH
  - (b) BOD
  - (c) COD
  - (d) chlorine residual
  - (e) suspended solids
  - (f) wildlife
  - (g) wildlife habitats

## Assessment Requirements

This unit is knowledge only – all assessment tools used by centres must be approved by the EQA

## Water Networks – Customer Service (F/615/5354)

Level	3	CABWI Unit Ref	3202
Credit Value	6	Guided learning hours	35

### Unit purpose and aim

This unit allows the learner to develop their knowledge and identify the skills required to deal with internal and external customers in the course of their work. It requires the learner to develop an understanding of effective customer communications and decision making skills in relation to the water network.

All practical activities should be carried out in line with safe working practices, fully compliant with company policy and relevant Health & Safety legislation.

### Learning Outcome 1: Understand customer enquiries

#### Assessment criteria – *the learner can:*

- 1.1 describe the organisational requirements for dealing with customer queries and complaints
- 1.2 describe six ways to engage with the different types of **customer** and provide them with a positive experience
- 1.3 explain what process to follow to ensure understanding of an enquiry from a customer's perspective
- 1.4 describe six factors that might contribute to the cause of an enquiry
- 1.5 explain the company's processes for transferring customer enquiries to others including keeping the customer informed

### Learning Outcome 2: Deal with customer enquiries

#### Assessment criteria – *the learner can:*

- 2.1 respond to different types of customer queries in accordance with company policy
- 2.2 respond to different types of customer complaints in accordance with company policy
- 2.3 gather information to establish why a customer has raised a concern
- 2.4 transfer customer enquiries to relevant others and keep the customer informed

### Learning Outcome 3: Understand how to resolve customer concerns and issues

**Assessment criteria – the learner can:**

- 3.1 describe the sources of information available relating to the water company's **legal obligations**
- 3.2 describe the process used to confirm the customer understands the information provided and actions that will be taken to resolve an enquiry
- 3.3 describe the factors which should be considered to ensure the information provided is seen to be supportive
- 3.4 describe the organisational process for recording relevant information regarding enquiries and resultant actions

### Learning Outcome 4: Resolve customer concerns and issues

**Assessment criteria – the learner can:**

- 4.1 find and pass on specific information to assist the customer with the enquiry
- 4.2 take action to avoid offense or escalation of a situation
- 4.3 record specific information provided to customers to assist with different types of customer enquiries

### Learning Outcome 5: Understand how to address and resolve customers' water distribution related enquiries

**Assessment criteria – the learner can:**

- 5.1 describe the sources of information available to help formulate responses to enquiries
- 5.2 explain the operational policies and procedures that are available to assist in resolving customer enquiries
- 5.3 describe the process which should be used to confirm the customer understands the information relating to operational procedures which have been provided and actions that will be taken to resolve the enquiry
- 5.4 describe the factors that might result in a need to transfer or escalate the enquiry to others
- 5.5 describe the **key information** required to escalate or transfer an activity for others to resolve an enquiry
- 5.6 explain the process to be followed when the original course of action does not resolve the problem

## Learning Outcome 6: Address and resolve customers' water distribution related enquiries

### Assessment criteria – the learner can:

- 6.1 locate **additional information** and pass it on to customers
- 6.2 locate specific company policies and procedures relating to a customer enquiry
- 6.3 track the resolution of a customer concern through to completion
- 6.4 pass on **key information** to customers to help resolve a problem

## Learning Outcome 7: Understand performance measures and targets relation to water supply

### Assessment criteria – the learner can:

- 7.1 describe how performance measures and targets applied within your own water company relate to standards of customer service
- 7.2 explain service failures which may lead to customer complaints to water companies
- 7.3 describe the types of wanted and unwanted contacts from customers

## Learning Outcome 8: Use performance measures and targets relation to water supply

### Assessment criteria – the learner can:

- 8.1 record how performance measures and targets have influenced operational activities
- 8.2 contribute to identifying the root cause of customer complaints

## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Customers** in 1.2 above includes all of the following:
  - (a) those with additional needs
  - (b) challenging customers
  - (c) customers with specific expectations (this could include restrictive entry procedures and availability for access.)
  - (d) commercial and industrial customers
2. **Enquiries** in 1.4 above includes at least six of the following:
  - (a) complaints
  - (b) general enquiries on services provided by the company
  - (c) advice on water regulations
  - (d) reports for insurance purposes (in case of water damage/seepage)
  - (e) network performance (including water quality, water flow rates, water supply, water

## Terms and Definitions

- pressure)
  - (f) service standards
  - (g) leakage on customer's premises (customer side leakage policy)
  - (h) seepage of water into customer premises
  - (i) costs
  - (j) supply location and ownership
  - (k) metering
  - (l) property damage
  - (m) employee behaviour
  - (n) new and replacement supplies
  - (o) lead replacement policy
3. **Legal Obligations** in 3.1 above includes all of the following:
- (a) service levels
  - (b) response times
  - (c) notices
  - (d) compensation payments
  - (e) Water Supply (Water Fittings) Regulations \ Scottish Water Bylaws
4. **Additional information** in 6.1 above includes at least 5 of the following:
- (a) colleagues and supervisors
  - (b) company IT system
  - (c) records and data
  - (d) previous reports
  - (e) external sources
  - (f) regulatory and legislative requirements
  - (g) company specific policies and procedures
  - (h) other utilities
5. **Key information** in 5.5 and 6.4 includes all of the following:
- (a) network performance
  - (b) leakage reporting
  - (c) water quality

## Assessment Requirements

For the knowledge elements of this unit all assessment tools used by centres must be approved by the EQA.

Simulation is acceptable for Learning outcomes 2,4, 6 and 8. This must be agreed in advance with the EQA.

## Water Network – Materials and Components (R/615/5357)

Level	3	CABWI Unit Ref	3205
Credit Value	9	Guided learning hours	63

### Unit purpose and aim

This unit will also provide a sound knowledge of the physical characteristics and working principles of a Water Distribution Network. The unit will cover the use of Water Quality & Pressure Zones, Service Reservoirs and Towers, Pumps & Boosters, Trunk Mains and District Metered Areas (DMA) assets and the factors that influence their use on the network. This unit will also describe the methods used in joining and repair of different pipe materials and their components.

This unit will provide an opportunity for the learner to develop their understanding and awareness of the personal skills required for successful water distribution management in water industry operations.

### Learning Outcome 1: Understand the Water Distribution Network

#### Assessment criteria – *the learner can:*

- 1.1 describe the principal components and purpose of the **physical characteristics** of a water distribution network
- 1.2 explain the configuration of water network assets with reference to zones and boundaries
- 1.3 explain the main considerations when defining zones and boundaries

### Learning Outcome 2: Understand Service Reservoirs and Water Towers

#### Assessment criteria – *the learner can:*

- 2.1 explain the functions of service reservoirs and water towers
- 2.2 describe the **materials** used in service reservoir and water tower construction
- 2.3 explain the purpose of the **component parts** of reservoirs, towers, pipes and ancillaries
- 2.4 explain the **factors** which affect the selection, design and installation of service reservoirs and water towers
- 2.5 explain the **terminology** used in service reservoir and water tower design and operation

### Learning Outcome 3: Understand Pumps and Boosters

**Assessment criteria** – *the learner can:*

- 3.1 explain the different **types of pumps** and their primary uses in water networks
- 3.2 explain the terminology used to describe **pump configuration and performance characteristics**
- 3.3 explain the purpose of the booster and pump station **ancillaries and equipment** used in water networks
- 3.4 explain the **factors** which affect the selection and installation of pumps and boosters

### Learning Outcome 4: Understand Trunk Mains

**Assessment criteria** – *the learner can:*

- 4.1 explain the purpose and characteristics of the **main components** of a trunk main network
- 4.2 explain the benefits and possible disadvantages of each component
- 4.3 describe the three types of **trunk main flow meters** and their function

### Learning Outcome 5: Understand District Metered Areas (DMAs)

**Assessment criteria** – *the learner can:*

- 5.1 explain the purpose the main **components of a DMA** water network
- 5.2 explain the use of pressure control in the DMA network
- 5.3 explain the benefits and possible disadvantages of using pressure control in DMAs

### Learning Outcome 6: Understand different pipe materials

**Assessment criteria** – *the learner can:*

- 6.1 explain the properties and functions of the different **types of water pipes** used in water networks
- 6.2 explain the benefits and possible disadvantages of using each pipe type
- 6.3 explain the **factors** which affect the selection and installation of pipes in the water network
- 6.4 describe the methods used in **joining and repairing** different pipe materials and their components



## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Physical characteristics** in 1.1 above includes all of the following:
  - (a) water quality zones
  - (b) pressure zones
  - (c) service reservoirs and towers
  - (d) pumps & boosters
  - (e) trunk mains (or transmission mains)
  - (f) district metered areas (DMAs)
  - (g) domestic customers
  - (h) commercial customers
  - (i) industrial customers
  
2. **Materials** used in 2.2 above includes all of the following:
  - (a) brick and stone
  - (b) reinforced concrete
  - (c) steel
  - (d) glass reinforced plastic (GRP)
  
3. **Component parts** in 2.3 above includes all of the following:
  - (a) telemetry outstation
  - (b) access lids
  - (c) security devices
  - (d) sample taps
  - (e) ball valves
  - (f) level transducers
  - (g) pressure sustaining valves
  - (h) actuated valves
  - (i) non-return valves
  - (j) flow meters
  - (k) gate valves
  - (l) inlet pipe
  - (m) outlet pipe
  - (n) overflow
  - (o) washout
  - (p) sump
  
4. **Factors** in 2.4 above includes all of the following:
  - (a) cost
  - (b) location of supply source
  - (c) location of demand requirement
  - (d) topography
  - (e) power requirement
  - (f) storage requirement
  - (g) demand requirement

## Terms and Definitions

- (h) turnover requirement
5. **Terminology** used in 2.5 above includes all of the following:
    - (a) top water level (TWL)
    - (b) bottom water level (BWL)
    - (c) capacity
    - (d) throughput
    - (e) drawdown
  6. **Different types of pumps** in 3.1 above includes all of the following:
    - (a) axial flow
    - (b) centrifugal
    - (c) positive displacement
  7. **Pump configuration and performance characteristics** in 3.2 above includes all of the following:
    - (a) pump curves
    - (b) fixed and variable speed
    - (c) series and parallel groupings
    - (d) pressure control
    - (e) start /stop surge
  8. **Ancillaries and equipment** in 3.3 above includes all of the following:
    - (a) power supply
    - (b) control panel
    - (c) telemetry outstation
    - (d) pressure transducers
    - (e) surge vessels
    - (f) non-return valves
    - (g) flow meters
    - (h) gate valves
  9. **Factors** that affect selection in 3.4 above includes all of the following:
    - (a) cost
    - (b) location
    - (c) power supply
    - (d) supply capability
    - (e) demand requirement
    - (f) suction pressure available
    - (g) delivery pressure requirement
  10. **Main components** in 4.1 above includes all of the following:
    - (a) large gate valves
    - (b) butterfly valves
    - (c) flow meters
    - (d) non-return valves

## Terms and Definitions

- (e) washouts
  - (f) air valves
  - (g) actuated valves
  - (h) pressure sustaining valves
  - (i) pressure reducing valves
  - (j) pipe bridges including (slam shut valves)
11. **Trunk main flow meters** in 4.3 above includes all of the following:
- (a) electromagnetic
  - (b) ultrasonic
  - (c) insertion
12. **Components of a DMA** in 5.1 above includes all of the following:
- (a) pressure reducing valves
  - (b) flow meters
  - (c) strainers
  - (d) sluice valves
  - (e) hydrants & washouts
  - (f) boundary boxes
  - (g) boundary stop taps
  - (h) customer meters
  - (i) critical monitoring points
  - (j) average zonal pressure points
13. **Types of water pipes** in 6.1 and 6.2 above includes all of the following:
- (a) cast iron
  - (b) spun iron
  - (c) ductile iron
  - (d) steel
  - (e) asbestos cement
  - (f) glass reinforced plastic (GRP)
  - (g) PVC
  - (h) polyethylene
  - (i) lead
  - (j) copper
  - (k) barrier pipe
  - (l) lined mains
14. **Factors** which affect the selection and installation of pipes in 6.3 above includes all of the following:
- (a) cost of pipe material
  - (b) installation costs
  - (c) pressure rating
  - (d) ground conditions
  - (e) traffic loadings
  - (f) contaminated ground

## Terms and Definitions

(g) aggressive ground

15. **Joining and Repairing** different pipe materials in 6.4 above includes all of the following:

**Joining:**

- (a) butt fusion
- (b) electro-fusion
- (c) spigot & socket
- (d) bolted flanges
- (e) clamps

**Repairing:**

- (f) under pressure
- (g) wraparound collars
- (h) encapsulating collars
- (i) valve repack
- (j) welded patches

## Assessment Requirements

This unit is knowledge only – all assessment tools used by centres must be approved by the EQA

## Water Network Leakage – Pressure Management (K/615/5364)

Level	3	CABWI Unit Ref	3301
Credit Value	7	Guided learning hours	42

### Unit purpose and aim

This unit is designed to allow the learner to develop and demonstrate their knowledge and understanding of pressure management and its importance in an overall leakage control strategy.

Furthermore, this unit will provide an opportunity for the learner to develop their understanding and awareness of the personal skills required for successful reduction of leakage and optimisation of resources in water industry operations. It includes the role of giving information and advice about the relevant legislation and its application. It includes dealings with the public, contractors, and colleagues. The learner should understand how to apply a wide range of communication and presentation skills in order to manage leakage reduction effectively.

All practical activities should be carried out in line with safe working practices, fully compliant with company policy and relevant Health & Safety legislation.

### Learning Outcome 1: Understand the recording and management of the low pressure register

#### Assessment criteria – the learner can:

- 1.1 describe the **statutory requirements** for minimum levels of service to customers.
- 1.2 outline company procedures relating to levels of service to customers.
- 1.3 explain the **data capture** requirements for pressure recording for levels of service.
- 1.4 describe the low pressure register and how it is used in the company
- 1.5 explain how the low pressure register can impact on company Outcome Delivery Incentives

### Learning Outcome 2: Undertake recording and management of the low pressure register

#### Assessment criteria – the learner can:

- 2.1 demonstrate the company's levels of service commitment to its customers
- 2.2 undertake pressure surveys of critical customers within DMAs and provide the logged data in a suitable format

### Learning Outcome 3: Understand pressure management techniques and their application

#### Assessment criteria – the learner can:

- 3.1 describe the **pressure management techniques** used in water networks
- 3.2 explain where pressure management **typically takes place** in water networks
- 3.3 explain the **benefits** of pressure management in water networks
- 3.4 explain the process for identifying areas for pressure reduction
- 3.5 describe the different types of **pressure reducing valves** including the benefits and maintenance requirements for each type
- 3.6 give two examples of problems that can arise from pressure management schemes
- 3.7 explain hydraulic gradients and their relationship with pipeline and service pipe leakage
- 3.8 explain how existing pressure managed areas may be optimised for leakage savings
- 3.9 explain how to generate a business case for a pressure reduction scheme
- 3.10 explain how to calculate payback of investment for a pressure reduction scheme

### Learning Outcome 4: Undertake pressure management techniques

#### Assessment criteria – the learner can:

- 4.1 carry out pressure management activity
- 4.2 identify new areas for pressure reduction
- 4.3 support business cases for three new pressure managed areas
- 4.4 deal with problems that have arisen from pressure management schemes

### Learning Outcome 5: Understand how to interpret data to provide solutions to typical operational problems

#### Assessment criteria – the learner can:

- 5.1 describe the information available from **internal and external data sources**
- 5.2 explain the use of topographical, asset and time based data in pressure management activities
- 5.3 explain the use of on- site data validation methods in relation to pressure and flow
- 5.4 describe the use of network models in assisting pressure management solutions

### Learning Outcome 6: Undertake data interpretation to provide solutions to typical operational problems

#### Assessment criteria – the learner can:

- 6.1 identify and solve pressure problems using different internal and external data sources.
- 6.2 conduct a site survey using ordnance survey data and on-site data validation techniques to determine the critical customers for three DMAs.
- 6.3 use network models to assist in pressure management solutions

## Learning Outcome 7: Understand how to undertake calculations of water network systems

### Assessment criteria – the learner can:

- 7.1 explain the key factors related to hydraulics
- 7.2 list the **hydraulic formula** used in water systems calculations
- 7.3 describe the relationship between flow and velocity in pipes using the Continuity Equation
- 7.4 describe the use of the Bernoulli Equation in conjunction with headloss when determining the hydraulic gradient.
- 7.5 explain how pipeline losses affect the hydraulic gradient
- 7.6 explain the relationship between leakage index and Average Zone Night Pressure

## Learning Outcome 8: Undertake calculations of water network systems

### Assessment criteria – the learner can:

- 8.1 determine where the hydraulic gradient has been adversely affected within the network
- 8.2 resolve poor pressure complaints

## Learning Outcome 9: Understand how to make changes to the water networks

### Assessment criteria – the learner can:

- 9.1 explain the importance of conducting a **risk assessment** prior to changes in pressure to the network
- 9.2 describe how to conduct a **risk assessment** for a proposed change to the pressure in the network
- 9.3 describe how to make a planned change to customers supply pressure
- 9.4 describe how to design a rezone between two DMAs of different pressures
- 9.5 explain how to reduce pressures within a DMA whilst minimising customer conflict
- 9.6 explain how to ensure changes to the network are within required levels of service parameters
- 9.7 describe the **considerations** when making any changes to the network
- 9.8 explain the processes of ensuring records are updated with permanent changes to the network

## Learning Outcome 10: Undertake changes to the water networks

### Assessment criteria – the learner can:

- 10.1 design rezones between two DMAs of different pressures.
- 10.2 undertake **risk assessments** for changes to the water network.
- 10.3 alter pressures within a DMA whilst minimising customer conflict.
- 10.4 update records after permanent changes to the network have been undertaken.

## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Statutory requirements** in 1.1 in above include both below:
  - (a) Water Industry Act 1991
  - (b) Guaranteed Services Standards Scheme
2. **Data capture** in 1.3 above includes all of the following:
  - (a) pressure management valve inlet & outlet pressures
  - (b) Average Zone Night Pressure (AZNP)
  - (c) critical customer monitoring points
  - (d) levels of service (DG2) register
3. **Pressure management techniques** in 3.1 above includes all of the following:
  - (a) rezones
  - (b) changes to pumping regimes
  - (c) use of pressure reduction valves
  - (d) use of pressure sustaining valves
  - (e) mains rehabilitation
  - (f) mains renewal
4. Pressure measurement **typically takes place** in 3.2 above includes all of the following:
  - (a) general monitoring of the distribution system
  - (b) specific monitoring at critical points (levels of service)
  - (c) consumer problems of inadequate pressure
  - (d) co-ordination with flow tests e.g. new housing estates, high rise flats, industrial consumers, fire-fighting installations
5. **Benefits** in 3.3 above includes all of the following:
  - (a) reduce leakage
  - (b) reduce pressure-related consumption
  - (c) reduce the frequency of bursts
  - (d) stabilise pressure,
  - (e) provide a more constant service to customers
  - (f) enable a company to standardise on pipes and fittings
  - (g) assist demand
6. **Pressure reducing valves** in 3.5 above includes all of the following:
  - (a) fixed outlet
  - (b) timed modulation
  - (c) flow modulation



## Terms and Definitions

7. **Internal and external data sources** in 5.1 above includes all of the following:
  - (a) Ordnance Survey
  - (b) GIS mapping systems
  - (c) network models
  - (d) pressure and flow data
  - (e) telemetry
  
8. **Key factors** related to hydraulics in 7.1 above includes all of the following:
  - (a) pressure
  - (b) flow
  - (c) velocity
  - (d) gradients
  - (e) headloss
  
9. **9. Hydraulic Formula** in 7.2 above includes all of the following:
  - (a) Continuity
  - (b) Bernoulli
  - (c) Darcy
  - (d) Hazen Williams
  
10. **Risk Assessment** in 9.1, 9.2 and 10.2 above should cover as a minimum all of the following:
  - (a) safety considerations
  - (b) low pressure
  - (c) timing
  - (d) water quality
  - (e) discolouration
  - (f) contamination
  
11. **Considerations** when making changes in 9.7 above includes all of the following:
  - (a) management of the change
  - (b) gathering of data
  - (c) flow of information
  - (d) impact on customer pressure and flow
  - (e) GSSS impact
  - (f) customer service metrics (SIM or current equivalent)
  - (g) updating of records

## Assessment Requirements

For the knowledge elements of this unit all assessment tools used by centres must be approved by the EQA.

Unless otherwise stated at least three examples should be provided for each Assessment Criterion in Learning Outcomes 2, 4, 6, 8, 10 and 12

Simulation or the use of a Realistic Working Environment (RWE) is acceptable for Learning outcomes 2, 4, 6, 8 and 10 by prior agreement of the EQA.

## Water Network Leakage – Leakage Targeting (M/615/5365)

Level	3	CABWI Unit Ref	3302
Credit Value	7	Guided learning hours	42

### Unit purpose and aim

This unit is designed to allow the learner to develop and demonstrate their knowledge and understanding of leakage control strategy, company objectives, processes, procedures and detection methods used.

Furthermore, this unit will provide an opportunity for the learner to develop their understanding and awareness of the personal skills required for successful reduction of leakage and optimisation of resources in water industry operations. It includes the role of giving information and advice about the relevant legislation and its application. It includes dealings with the public, contractors, and colleagues. The learner should understand how to apply a wide range of communication and presentation skills in order to manage leakage reduction effectively.

All practical activities should be carried out in line with safe working practices, fully compliant with company policy and relevant Health & Safety legislation.

### Learning Outcome 1: Understand the importance of leakage management

#### Assessment criteria – the learner can:

- 1.1 explain the key legislation that covers losses due to leakage
- 1.2 explain how Ofwat influences company leakage performance
- 1.3 explain how the environment agency influences company leakage policy
- 1.4 describe the **advantages** of a leakage control policy
- 1.5 describe the effects of leakage control on customer supply

### Learning Outcome 2: Understand the operational principles of leakage management and detection

#### Assessment criteria – the learner can:

- 2.1 explain the difference between leakage targeting, detection and location
- 2.2 describe the use of **active and passive leakage strategies** to manage leakage
- 2.3 explain the cornerstone of effective and efficient **leakage management** process
- 2.4 explain the “**top down**” leakage calculations
- 2.5 explain the “**bottom up**” leakage calculations
- 2.6 describe the principal components of the standard water balance

## Learning Outcome 2: Understand the operational principles of leakage management and detection

- 2.7 explain how boundary valves, pressure zero tests and metering can be used in leakage management
- 2.8 explain the role of DMAs in leakage detection
- 2.9 describe the components of good DMA design
- 2.10 describe the data captured within DMAs and how it is used to determine leakage levels
- 2.11 explain how **leakage data** is recorded
- 2.12 explain how to use the available data and information about the network configuration to calculate leakage
- 2.13 explain how Average Zonal Night Pressure affects the leakage calculation
- 2.14 explain the use of the Night Day Factor

## Learning Outcome 3: Understand the factors that cause leakage

### Assessment criteria – *the learner can:*

- 3.1 describe the **factors** that cause leakage
- 3.2 explain the difference between leakage, burst and background losses
- 3.3 describe the different **types of leaks** that occur in the water network
- 3.4 explain how pressure affects leakage levels
- 3.5 explain how a transient pressure surge can cause burst to occur

## Learning Outcome 4: Understand calculations related to leakage

### Assessment criteria – *the learner can:*

- 4.1 outline the principle considerations for **leakage calculations**
- 4.2 explain how to calculate service reservoir leakage levels
- 4.3 explain how to calculate leakage in pipes using continuity principles
- 4.4 describe how awareness, location and repair times affect leakage levels
- 4.5 explain how to adjust leakage levels due to the effect of pressure
- 4.6 explain how to calculate a DMA water balance

## Learning Outcome 5: Undertake leakage activities

### Assessment criteria – *the learner can:*

- 5.1 determine the factor which has caused leakage to occur
- 5.2 recommend pressure reduction to reduce leakage in an area
- 5.3 recommend mains renewal to reduce leakage in an area
- 5.4 undertake reservoir leakage assessments
- 5.5 undertake DMA water balances

## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Advantages** of leakage control policies in 1.4 above includes all of the following:
  - (a) leakage reduction
  - (b) control of financial cost
  - (c) control of social and environmental impact
  - (d) evaluation of wider network problems.
2. **Active and Passive** leakage strategies in 2.2 include all of the below:
3. **Passive:**
  - (a) leaks found by water company personnel during their day-to-day duties
  - (b) leaks reported by members of the public and other external agencies
4. **Active:**
  - (a) use of dedicated and specialist personnel and equipment
  - (b) establishment of discrete zones
  - (c) DMAs or leakage areas
  - (d) effective metering
  - (e) pressure management
  - (f) robust monitoring of consumption and leakage
  - (g) regular recording and collection of data
5. **Leakage management** in 2.3 above includes all of the following:
  - (a) mains renewal
  - (b) pressure management
  - (c) leakage detection & location activity
  - (d) repair process
6. **“Top down”** leakage in 2.5 calculated using:
  - (a) distribution input
  - (b) measured domestic customer consumption
  - (c) unmeasured domestic customer consumption
  - (d) industrial consumption
  - (e) operational use
  - (f) unauthorised use
  - (g) mass balance calculation.
7. **5. “Bottom up” leakage in 2.5 calculated using:**
  - (a) minimum net night flows in DMAs
  - (b) pressure corrected daily unaccounted for water
  - (c) trunk main leakage
  - (d) service reservoir leakage
8. **Leakage data** in 2.11 includes all of the following:
  - (a) minimum night flow
  - (b) average zonal night pressure

## Terms and Definitions

- (c) property counts
  - (d) large metered usage
9. **Factors** that cause leakage in 3.1 above includes all of the following:
- (a) high pressure
  - (b) transient pressure surge
  - (c) ground movement
  - (d) deterioration of pipes and fittings
  - (e) traffic loadings
  - (f) poor maintenance
  - (g) workmanship
  - (h) seasonal trends
  - (i) rates of rise
  - (j) boundary integrity
  - (k) flow reversals
  - (l) meter accuracy
  - (m) average zonal night pressure (AZNP).
10. **Types of leaks** in 3.3 above includes all of the following:
- (a) splits
  - (b) holes
  - (c) fractures
  - (d) leaking valves
  - (e) leaking joints
  - (f) leaking fittings
  - (g) leakage on pipes of different materials (MDPE, cast iron, duct tile, steel, UPVC).
11. **Leakage calculations** in 4.1 above includes all of the following:
- (a) the minimum net night flows
  - (b) the effects of daily pressure fluctuations
  - (c) the durations of bursts
  - (d) estimations of unmetered consumption
  - (e) data accuracy

## Assessment Requirements

For the knowledge elements of this unit all assessment tools used by centres must be approved by the EQA.

Unless otherwise stated at least three examples should be provided for each Assessment Criterion in Learning Outcome 5. These examples should cover different locations and scenarios. A maximum of two examples may be the result of evidence produced in a Realistic Working Environment (RWE).

## Water Network – Leakage Detection and Location (H/615/5363)

Level	3	CABWI Unit Ref	3303
Credit Value	3	Guided learning hours	14

### Unit purpose and aim

This unit is designed to allow the learner to develop and demonstrate their knowledge and understanding of leakage location methods, technique selection and asset tracing methods used. Furthermore, this unit will provide an opportunity for the learner to develop their understanding and awareness of the personal skills required for successful reduction of leakage and optimisation of resources in water industry operations. It includes the role of giving information and advice about the relevant legislation and its application. It includes dealings with the public, contractors, and colleagues. The learner should understand how to apply a wide range of communication and presentation skills in order to manage leakage reduction effectively.

All practical activities should be carried out in line with safe working practices, fully compliant with company policy and relevant Health & Safety legislation.

### Learning Outcome 1: Understand techniques used in leakage detection and network performance analysis

#### Assessment criteria – *the learner can:*

- 1.1 explain the selection and deployment of **acoustic and non-acoustic techniques** to detect leakage
- 1.2 describe how to identify water company leaks from ground / surface water and private supplies
- 1.3 describe the use of meters and sub metering in leakage detection
- 1.4 explain the use of step tests in leakage detection
- 1.5 explain the use of permanent and temporary acoustic loggers in leakage detection
- 1.6 describe the factors that affect leak sounds
- 1.7 describe the use of sounding surveys in leakage detection
- 1.8 explain the use of leak noise correlators in both leakage detection and leakage location
- 1.9 describe the use of equipment in leakage location (pinpointing)
- 1.10 describe the use of gas injection techniques
- 1.11 describe the techniques used in trunk main and reservoir leakage

## Learning Outcome 2: Undertake techniques used in leakage detection and network performance analysis

### Assessment criteria – *the learner can:*

- 2.1 select and use non-acoustic techniques to support leakage investigation
- 2.2 select and use acoustic techniques to investigate suspected leakage
- 2.3 find leaks using acoustic techniques
- 2.4 undertake step tests
- 2.5 undertake acoustic logger deployments
- 2.6 undertake sounding surveys
- 2.7 identify water showing as not being mains water

## Learning Outcome 3: Understand how to prepare and prioritise leak location activities

### Assessment criteria – *the learner can:*

- 3.1 explain the **factors** that determine the priority of leakage location activity
- 3.2 explain how to **target** potential leakage location activity

## Learning Outcome 4: Undertake the preparation and prioritisation of leak location activities

### Assessment criteria – *the learner can:*

- 4.1 gather DMA data prior to leakage detection activities
- 4.2 prioritise leakage detection activity
- 4.3 plan leakage detection and location activity to find leakage in a DMA
- 4.4 undertake physical checks in different DMAs prior to leakage detection activities

## Learning Outcome 5: Understand the location and avoidance of underground apparatus

### Assessment criteria – *the learner can:*

- 5.1 explain the need for tracing mains and services
- 5.2 describe the **techniques** and their limitations when used to trace metallic & non-metallic pipes and cables



## Learning Outcome 6: Undertake the location and avoidance of underground apparatus

### Assessment criteria – the learner can:

- 6.1 trace metallic pipes using tracing equipment
- 6.2 trace non-metallic pipes using tracing equipment
- 6.3 identify underground cables using third party records
- 6.4 trace underground cables using tracing equipment

## Learning Outcome 7: Understand the management of customer side leakage

### Assessment criteria – the learner can:

- 7.1 explain the relevance of the Water Supply (Water Fittings) Regulations with regards to customer consumption
- 7.2 describe the general responsibilities for each section of service pipes
- 7.3 explain the duties under Section 73 of the Water Industry Act 1991 for owners of premises
- 7.4 describe water company's powers under Section 75 of the Water Industry Act 1991
- 7.5 explain the **enforcement options** available to water companies

## Learning Outcome 8: Manage customer side leakage

### Assessment criteria – the learner can:

- 8.1 issue Section 75 Waste notices to customers

## Learning Outcome 9: Understand the management of customer side leakage

### Assessment criteria – the learner can:

- 9.1 describe where leaks occur on water pipes
- 9.2 describe where leaks occur on water fittings
- 9.3 explain the type of **repair methods** used when fixing leaks
- 9.4 explain the benefits of selecting certain **repair methods** for different types of pipe materials and fittings
- 9.5 explain the significance of supply interruptions targets
- 9.6 explain the importance of non-disruptive repairs

## Learning Outcome

## Recommend repair processes for leakage repair

10:

**Assessment criteria** – *the learner can:*

- 10.1 contribute to a positive Supply Interruptions outcome
- 10.2 make reasoned recommendations for a non-disruptive repair activity to a water main or service
- 10.3 make reasoned recommendations for a non-disruptive repair activity to a water fitting

## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Acoustic and non-acoustic location techniques** in 1.1 above includes all of the following:
  - (a) step tests
  - (b) acoustic loggers
  - (c) correlation
  - (d) listening sticks
  - (e) ground microphones
  - (f) drop tests
  - (g) gas detection
  - (h) ground radar
  - (i) thermal imaging
  - (j) in pipe acoustic technology
2. **Factors** that determine the priority of leakage location activity in 3.3 above includes all of the following:
  - (a) amount of leakage
  - (b) customer impact
  - (c) historical
  - (d) asset condition
  - (e) high pressure
  - (f) environmental
  - (g) ground conditions
  - (h) traffic loading
  - (i) third party activity
3. **Target** a leakage location campaign in 3.1 above includes all the following areas:
  - (a) reservoir leakage
  - (b) trunk main leakage
  - (c) DMA leakage
  - (d) private supply leakage

## Terms and Definitions

4. **Techniques** used to trace in 5.2, 5.3 and 5.4 include all of the following:
  - (a) sonde (non-metallic)
  - (b) vibration devices (non-metallic)
  - (c) ground penetrating radar (non-metallic, metallic)
  - (d) cat & genny (metallic)
  - (e) dowsing (everything)
  
5. **Enforcement options** in 7.5 in relation to all of the following:
  - (a) separate supply
  - (b) common supply
  - (c) supply pipe in highway
  - (d) enforced repair
  
6. **Repair methods** in 9.3 and 9.4 above includes three of the following:
  - (a) cut out and piece through
  - (b) split and encapsulating collars
  - (c) repack valve
  - (d) weld steel

## Assessment Requirements

For the knowledge elements of this unit all assessment tools used by centres must be approved by the EQA.

All practical activities should be demonstrated on a minimum of 3 occasions in different District Metered Areas (DMAs)

## Water Network – Asset Management (R/615/5360)

Level	3	CABWI Unit Ref	3208
Credit Value	4	Guided learning hours	21

### Unit purpose and aim

The water industry relies on a high proportion of physical infrastructure and non-infrastructure assets. This is a complex mix of assets of varying materials and asset lifespans. The key objective is maintaining service to customers. Assets are often remote or out-of-sight, underground, difficult to inspect, maintain or assess condition. Asset Management is the management of physical assets - their selection, operation, maintenance, inspection and renewal. Asset Management is key in determining the operational performance and profitability of industries that operate assets as part of their core business.

This unit will provide an opportunity for the learner to develop their understanding and awareness of the skills required for water treatment asset management relating to water industry operations.

### Learning Outcome 1: Understand the principles of Asset Lifecycles and Asset Management Systems

#### Assessment criteria – the learner can:

- 1.1 define the term “Asset Management” from a water industry focus
- 1.2 explain how Asset Management determines the operational performance and profitability of the water industry
- 1.3 explain the **lifecycle** of Asset Management Projects
- 1.4 describe the tangibles and intangibles that relate to **Asset Management decisions**
- 1.5 describe the key **Asset Management Systems** used in the water industry

### Learning Outcome 2: Understand how water industry assets are financed

#### Assessment criteria – the learner can:

- 2.1 explain the components of **Operating Expenditure** (Opex).
- 2.2 explain how this is used to finance operations and maintenance activities.
- 2.3 explain the components of **Capital Expenditure** (Capex).
- 2.4 explain how this is used to finance renewal and improvement activities.
- 2.5 explain how the principle of **TOTEX** impacts asset management planning decisions.
- 2.6 explain how infrastructure and non-infrastructure assets are **depreciated** in the water industry.

### Learning Outcome 3: Understand the factors associated with poor performing infrastructure and non-infrastructure assets

#### Assessment criteria – *the learner can:*

- 3.1 describe the **conditions** that can influence the performance of water assets
- 3.2 explain how the **performance of assets** are categorised for rehabilitation or replacement options
- 3.3 explain the importance of maintain good hydraulic capacity in water assets
- 3.4 explain how ground conditions can influence the performance of pipeline materials
- 3.5 explain how the performance of infrastructure assets are categorised for rehabilitation or replacement options
- 3.6 describe the processes for determining the structural integrity of **underground assets**

### Learning Outcome 4: Understand the principles and selection of new mains, mains renewal and rehabilitation techniques

#### Assessment criteria – *the learner can:*

- 4.1 describe the methods of water mains and services **cleaning**
- 4.2 explain how to select the appropriate mains and services cleaning technique
- 4.3 describe the methods of water mains and services **rehabilitation**
- 4.4 explain how to select the appropriate mains and services rehabilitation technique
- 4.5 describe the methods of water mains and services **new installations and renewals**
- 4.6 explain how to select the appropriate mains and service installation or renewal technique

## Terms and Definitions

Some terms, used in the assessment criteria, cover a range of situations, as follows:

1. **Lifecycle** of Asset Management Projects in 1.3 above includes all of the following:
  - (a) strategy & planning
  - (b) financing & procurement
  - (c) design & build
  - (d) commission & handover
  - (e) operate & maintain
  - (f) replace & decommission
2. **Asset Management decisions** in 1.4 above includes at least 7 of the following:
  - (a) asset performance
  - (b) asset condition
  - (c) asset serviceability
  - (d) asset life
  - (e) asset operating costs
  - (f) asset replacement/improvement costs
  - (g) asset disposal

## Terms and Definitions

- (h) investment strategy/long term asset management plan
  - (i) whole life costs
  - (j) return on investment
  - (k) legislation and regulation
  - (l) regulatory targets
  - (m) company reputation
  - (n) customer satisfaction
  - (o) Capex versus Opex expenditure and Totex considerations
3. **Asset Management Systems** in 1.5 above includes all of the following:
- (a) Publicly Available Specification (PAS) 55:2008
  - (b) ISO 55000:2014
  - (c) Failure Modes Effects and Criticality Analysis (FMECA)
4. **Operating Expenditure** in 2.1 above includes at least 5 of the following:
- (a) employment
  - (b) power/energy
  - (c) chemicals
  - (d) materials
  - (e) operating/maintenance contracts
  - (f) consumables
  - (g) rents/leases
  - (h) waste disposal
  - (i) licencing
  - (j) transport
5. **Capital Expenditure** in 2.3 above includes at least 2 of the following:
- (a) asset construction/maintenance/improvement
  - (b) asset commissioning
  - (c) asset disposal
  - (d) acquisition
6. **TOTEX** in 2.5 above includes at least 4 of the following:
- (a) whole life/lifetime cost
  - (b) Capex/Opex options for achievement of outputs
  - (c) Totex targets
  - (d) innovation
  - (e) productivity
  - (f) cost
  - (g) risk
  - (h) performance
  - (i) efficiency
7. **Depreciated** in 2.6 includes all of the following:
- (a) Infrastructure Renewals Charge (IRC)
  - (b) Infrastructure Renewals Expenditure (IRE)

## Terms and Definitions

8. **Conditions** that can influence asset performance in 3.1 above includes at least 5 of the following:
  - (a) hydraulic capacity
  - (b) internal and external pipe condition
  - (c) corrosion of metallic pipes
  - (d) ground conditions
  - (e) bursts and leakage
  - (f) discoloured water
  - (g) water quality
  - (h) structural integrity
  - (i) ingress
  
9. **Performance of assets** are categorised in 3.2 above includes all of the following:
  - (a) water quality
  - (b) burst frequency
  - (c) hydraulic capacity
  
10. **Underground assets** in 3.6 above includes all of the following:
  - (a) service reservoirs
  - (b) trunk mains
  - (c) distribution mains
  
11. **Cleaning** in 4.1 above includes all of the following:
  - (a) flushing
  - (b) air scouring
  - (c) swabbing
  - (d) ice pigging
  - (e) conventional pigging
  
12. **Rehabilitation** in 4.3 above includes all of the following:
  - (a) scraping and relining
  - (b) epoxy resins coatings
  - (c) P.E. lining (non-structural and semi-structural)
  
13. **New installations and renewals** in 4.5 above includes all of the following:
  - (a) insertion or slip lining
  - (b) moling
  - (c) pipe bursting
  - (d) open cut
  - (e) service pipe replacement

## Assessment Requirements

This unit is knowledge only - all assessment tools used by centres must be approved by the EQA