



Training
QualificationsUK

Qualification Specification

TQUK Level 3 International Certificate in Design, Engineering, and Construction in the Digital Built Environment (RQF)

Qualification Number: 610/3228/1

Version 2

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Summary of changes

The following table provides a summary of the changes that have been made to the qualification specification since the publication of the previous version.

Version number	Summary of changes
Version 2	Generic updates have been made following the rebranding of the specification.

Introduction

Welcome to TQUK

Training Qualifications UK (TQUK) is an Awarding Organisation recognised by the Office of Qualifications and Examinations Regulation (Ofqual) in England and CCEA Regulation in Northern Ireland.

TQUK offers qualifications which are regulated by Ofqual and, in some cases, by CCEA Regulation. All regulated TQUK qualifications sit on the Regulated Qualifications Framework (RQF) and are listed on the [Register of Regulated Qualifications](#).

Our qualifications are designed to support and encourage learners to develop their knowledge and skills. This development may result in progression into employment or career development in the workplace. Our qualifications also allow learners to progress onto further qualifications. Please visit our [website](#) for news of our new and coming soon developments.

Centre Recognition

To offer any TQUK qualification a centre must be recognised by TQUK.

The TQUK centre recognition process requires a centre to have in place a number of policies and procedures to protect the learners undertaking a TQUK qualification and the integrity of TQUK's qualifications. These policies and procedures will also support a recognised centre's quality systems and help support the centre to meet the qualification approval criteria.

Recognised centres must seek approval for each qualification they wish to offer.

The approval process requires centres to demonstrate that they have sufficient resources, including suitably qualified and occupationally competent staff to deliver, assess and quality assure the qualification and access to appropriate support in the form of specialist resources. Qualification approval must be confirmed prior to any assessment of learners taking place.

Qualification Specifications

Each qualification which TQUK offers is supported by a specification that includes all the information required by a centre to deliver a qualification. Information in the specification includes unit information, assessment and learning outcomes.

The aim of the qualification specification is to guide a centre through the process of delivering the qualification.

Please read it alongside the TQUK Centre Handbook. Details of TQUK's procedures and policies can be found on our [website](#).

Qualification specifications can also be found on our [website](#). If you have any further questions, please contact TQUK.

Centres must ensure they are using the most recent version of the qualification specification for planning and delivery purposes.

Reproduction of this document

Centres may reproduce the qualification specification for internal use only but are not permitted to make any changes or manipulate the content in any form.

Centres must ensure they use the most up-to-date pdf version of the specification.

Use of TQUK Logo, Name and Qualifications

TQUK is a professional organisation and the use of its name and logo is restricted. TQUK's name may only be used by recognised centres to promote TQUK qualifications. Recognised centres may use the logo for promotional materials such as on corporate/business letterheads, pages of a centre's website relating to TQUK qualifications, printed brochures, leaflets or exhibition stands.

When using TQUK's logo, there must be no changes or amendments made to it, in terms of colour, size, border or shading. The logo must only be used in a way that easily identifies it as TQUK's logo. Any representation of TQUK's logo must be done so as a representation of the true logo.

It is the responsibility of the centre to monitor the use and marketing of TQUK's logos and qualifications on their materials as well as on those of any re-sellers or third parties that they may use. TQUK must be made aware of relationships with re-sellers of TQUK Qualifications. TQUK must be made aware of any additional websites where the Centre intends to use TQUK's name and/or logo. If this information is changed, TQUK should be notified. TQUK is required to monitor a centre's websites and materials to ensure that learners are not being misled.

If a centre ceases to be / surrenders recognition as a TQUK centre, it must immediately discontinue the use of TQUK's logo, name and qualifications from all websites and documents where they appear.

The Qualification

The TQUK Level 3 International Certificate in Design, Engineering, and Construction in the Digital Built Environment is regulated by Ofqual.

The qualification was developed in association with Class Of Your Own Limited (COYO).

COYO has licensed the Intellectual Property Rights in the Design, Engineer, Construct! The Digital Built Environment Learning Programme to TQUK, on an exclusive basis, for incorporation into the TQUK DEC qualifications.

The DEC learning programme has been designed to be highly adaptable and can be localised to meet the building regulations and standards specific to each country where it is delivered. This adaptability ensures the curriculum remains relevant, practical and wholly inclusive.

Qualification Purpose

The Level 3 International Certificate in Design, Engineering, and Construction in the Digital Built Environment is for learners who are looking to increase their knowledge of professional practice in the built environment and provides an excellent opportunity to advance knowledge gained at level 2 and extend the knowledge and skills required to progress to the professional workplace and/or university.

The Design, Engineer, and Construct! programme (DEC) has gained a solid reputation as being “the most innovative, challenging and relevant curriculum development in recent years,” championed by respected leaders, and referenced in numerous national reports.

The qualification prepares learners for a meaningful career that can positively impact society given the focus on sustainability and innovation in the construction industry. Learners will gain holistic knowledge and skills in:

- STEM and digital engineering
- Project-based learning
- Sustainable development goals
- Net zero and modern construction methods
- Collaborative working
- Problem solving.

Learners will design, develop, and deliver a fit-for-purpose, functional building that can be based on their own interpretation of a ‘real’ project brief. Their building design should be highly sustainable and inclusive and enable learners to demonstrate advanced knowledge and use a range of industry processes and digital skills.

The qualification fosters the knowledge and skills required to define, develop, deliver, and evaluate a digital construction project from concept to handover. It encourages learners to focus on the impact on the end user, the wider community, and the environment, setting standards for resource efficiency,

and committing to sustainable procurement. Learners will understand the need for accurate technical information regarding the proposed site, and the constraints and challenges a site can present.

The building types they might consider include:

- Office block
- Housing project, for example, for the elderly
- Outdoor activity centre
- Mixed-use development, for example, apartments and an integrated café
- School for special educational needs
- Neo-natal unit.

Learners can use an existing site as the 'building site' location of their building and/or use web-based mapping programs and other technology platforms to access a range of industry-specific site information.

Visits to live construction sites in a **safe and secure environment** can be facilitated by a local company through Class of Your Own's "Adopt a School" programme. Alternatively, learners can use a local site they can **safely** visit or an area of their existing school grounds as the 'building site' location of their building, enabling ease of access to a safe, outdoor space in which they can explore key topics such as spatial requirements, orientation and access.

Learners are empowered to take ownership of their project, focusing on a justifiable need for the end users they have identified.

Where possible, we recommend learners are given access to professional volunteers, such as through the Class Of Your Own '[Adopt A School](#)' scheme. For further information, contact support@classofyourown.com.

Entry Requirements

The qualification is accessible to learners in secondary schools, university technical colleges, further education colleges, international schools and other educational institutions.

There are no specific entry requirements, however learners should have a minimum of level 2 qualification in literacy and numeracy or equivalent.

This qualification is suitable for learners aged 16 years and above.

Centres should ensure that any learner registered on a TQUK qualification undertakes an initial assessment to ensure they have the ability to complete the course in full. The outcomes of the process inform:

- Early judgements about the learner
- The focus and level of learning
- The skills and needs that will be developed and supported.

A review of a learner's prior achievements, well-managed interviews and diagnostic tests are all suitable forms of initial assessment.

Progression

Learners who successfully complete this level 3 certificate can progress to the level 3 diploma. The diploma comprises 6 units (the same 3 units as the certificate and a further 3 mandatory units).

Learners can also progress to other qualifications in the built environment subject area.

The qualification complements other subject areas at level 3, such as mathematics, physics, engineering, computer science, art, geography, business studies and design technologies to broaden the curriculum. Past students have also combined the qualification with art and humanities subjects. It is recommended that centres consult with employers and higher education institutions for their specific entry requirements.

This qualification will support opportunities to progress into higher education or employment in the built environment. It supports access to a wide range of career pathways, including Architecture and Architectural Technology, Geospatial and Property Surveying, Quantity Surveying and Cost Management, Information Management, Civil, Structural and Building Services Engineering, and Construction Project Management.

With a range of transferable knowledge and skills, successful learners can access wider industry opportunities, for example in town planning, creative and digital, financial, and legal sectors.

This level 3 qualification will attract UCAS tariff points, used for UK university entry admission purposes, and details of the points allocation will be included in the tariff table published by UCAS in May each year.

Structure

Learners must successfully complete all 3 mandatory units to achieve this qualification.

Mandatory units

Title	Unit ref.	Level	Guided learning hours	Credit value
Defining a sustainable construction project	R/650/8394	3	60	10
Developing a sustainable construction project	T/650/8395	3	60	10
Investigate the design, structural and service aspects of a sustainable construction project	Y/650/8396	3	60	10

Guided Learning Hours

These hours are made up of all contact time, guidance or supervision of a learner by a lecturer, supervisor, tutor, trainer or other appropriate provider of education or training.

GLH for this qualification is 180 hours.

Directed Study Requirements

Learners are expected to study and complete aspects of their assessment portfolio in their own time. This additional time is expected to be approximately 120 hours over the cycle of the programme.

Total Qualification Time

This is an estimate of the total length of time it is expected that a learner will typically take to achieve and demonstrate the level of attainment necessary for the award of the qualification i.e. to achieve all learning outcomes.

Total Qualification Time is comprised of GLH and an estimate of the number of hours a learner is likely to spend in preparation, study or any other learning including assessment which takes place as directed by, but not under the supervision of, a lecturer, supervisor or tutor. The credit value for a qualification, where given, is determined by TQT, as one credit corresponds to 10 hours of learning.

The total Qualification Time for this qualification is 300 hours.

Resources

The recognised centre is required to have one or more delivery sites which offer facilities to support the programme of learning and assessment. These must comply with health and safety regulations and have in place appropriate access arrangements. All training and/or assessment sites must include the following facilities:

- A practical space to be used for learning and assessment activities. This should offer multimedia facilities such as a data projector and laptop, flipchart and pens.
- Architectural model-making facilities (card, foam board).
- A high specification* IT suite and IT hardware
- Industry standard CAD and BIM software.

The use of industry-standard software is a critical element of the qualification and prepares learners for working life in a modern, digital industry. Hardware and software specifications and training are available through Class Of Your Own. For further information, contact support@classofyourown.com.

Assessment

It is essential that all learners are assessed in English unless the qualification specification specifically states that another language may be accepted. This ruling also applies to all learner evidence presented for external quality assurance purposes.

The qualification is graded and is assessed by internally set and marked assessments that are subject to external quality assurance.

All learning outcomes which assess knowledge and understanding (usually beginning with 'understand' or 'know how to') may be assessed through, for example, internally set and marked written assignments, tasks, records of oral or written questions, workbooks or other portfolio evidence.

Where learning outcomes require the demonstration of practical skills and confirmation of workplace competence (usually learning outcomes beginning with 'be able to'), the portfolio evidence must include observation of learner performance in real work situations.

Each unit within the qualification may have its own assessment requirements, assessment guidance and range.

- **Assessment requirements** are conditions of assessment that must be met by learners when undertaking their assessments to achieve the unit or meet particular assessment criteria.
- **Assessment guidance** are areas that could be covered by learners in their assessments to achieve the unit or particular assessment criteria but are not mandatory.
- **Useful Websites** are resources that could be used by centres for the delivery of the qualification and by learners to support them with the completion of the unit.

For a learner to achieve this qualification, they must achieve a minimum pass grade for each unit.

All portfolios should be submitted as a single PDF file. If learners have completed work in a visual format, teachers should keep a record and add this to the learner's portfolios once they have been submitted and before submitting them to TQUK. All physical work should be scanned and added to the portfolio before submission.

Internal assessment portfolio marking

Allocating marks

The internal assessor will mark the portfolio in accordance with the clear levels of attainment contained in the assessment matrix found at the end of this specification. Each learning outcome is allocated marks based on the average of marks achieved for the assessment criteria within that learning outcome. Each assessment criteria is eligible to achieve between 1 – 6 marks. A zero score will be allocated when evidence presented does not meet the minimum requirements.

The overall unit score is then aggregated by adding the total learning outcome score:

Unit marking scale							
Unit Points	Fail	E	D	C	B	A	A*
Unit 1 combined score (x 3 tasks)	0	3	6	9	12	15	17
Unit 2 combined score (x 3 tasks)	0	3	6	9	12	15	17

Unit 3 combined score (x 3 tasks)	0	3	6	9	12	15	16
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Portfolio mark and overall qualification grade

The unit scores are added together to create an overall grade for the portfolio.

Portfolio marking scale							
Combined unit score	0-10	9-17	18-26	27-35	36-44	45-49	50-54
Portfolio Grade	Fail	E	D	C	B	A	A*

The learner attainment record is designed in a way to lead the assessors through this process. The portfolio points are then submitted to TQUK.

Centre Devised Assessment (CDA) Guidance

Centre-devised assessments play a vital role in the evaluation of a learner's progress as they are based on the qualification's learning objectives. They provide learners with the opportunity to evidence the knowledge, understanding, and skills gained while studying the qualification and support teaching staff in monitoring the learner's progress.

As this qualification is internally assessed, TQUK allows centres to produce their own assessments. When designing them, assessors must give consideration to the depth and breadth of knowledge allowed by each task.

TQUK has produced centre guidance on our suggested approaches to designing appropriate assessment tasks, and these may be accessed from our website www.tquk.org. This includes templates to support the design of internal assessments and a checklist to ensure that the assessments are valid and fit for purpose.

To ensure the validity and fairness of our qualifications, centre-devised assessments form part of our quality assurance processes. More information about this and how to prepare for external quality assurance reviews can be found on our website.

Course Delivery

Pre-Course Information

All learners should be given appropriate pre-course information regarding any TQUK qualifications. The information should explain about the qualification, the fee, the form of the assessment and any entry requirements or resources needed to undertake the qualification.

Initial Assessment

Centres should ensure that any learner registered on a TQUK qualification undertakes some form of initial assessment. The initial assessment should be used to inform a teacher/trainer of the level of the learner's current knowledge and/or skills and any additional specific support requirement the learner may need.

The initial assessment can be undertaken by a teacher/trainer in any form suitable for the qualification to be undertaken by the learner/s. It is the centre's responsibility to make available forms of initial assessment that are valid, applicable and relevant to TQUK qualifications.

Teaching resources

All teaching materials and additional resources used to support the delivery of this qualification must be age-appropriate. Centres must ensure when developing or sourcing delivery materials that careful consideration is given to the safeguarding and wellbeing of their learners in line with the centre's policies and procedures.

Learner Registration

Once approved to offer a qualification, centres must follow TQUK's procedures for registering learners. Learner registration is at the discretion of the centre and in line with equality legislation and health and safety requirements.

Centres must register learners before any assessment can take place.

Tutor, Assessor and Internal Quality Assurer Requirements

All members of staff involved with the qualification (assessing or IQA) will need to be occupationally competent in the subject area being delivered. This could be evidenced by a combination of:

- a higher level qualification in the same subject area as the qualification approval request
- experience of the delivery/assessment/IQA of the qualification/s requested
- work experience in the subject area of the qualifications.

Staff members will also be expected to have a working knowledge of the requirements of the qualification and a thorough knowledge and understanding of the role of tutors/assessors and internal quality assurance. They are also expected to undertake continuous professional development (CPD) to ensure they remain up to date with work practices and developments associated with the qualifications they assess or quality assure.

Tutor

Tutors or trainers who deliver a TQUK qualification must possess a teaching qualification appropriate for the level of qualification they deliver. This can include:

- Further and Adult Education Teacher's Certificate

- Cert Ed/PGCE/Bed/MEd
- PTLLS/CTLLS/DTLLS
- Level 3 Award/Level 4 Certificate/Level 5 Diploma in Education and Training.

Assessor

Staff who assess a TQUK qualification must possess an assessing qualification appropriate for the level of qualification they are delivering or be working towards a relevant qualification and have their assessment decisions countersigned by a qualified assessor. This can include:

- Level 3 Award in Assessing Competence in the Work Environment
- Level 3 Award in Assessing Vocationally Related Achievement
- Level 3 Award in Understanding the Principles and Practices of Assessment
- Level 3 Certificate in Assessing Vocational Achievement
- A1 or D32/D33.

Specific requirements for assessors may be indicated in the assessment strategy/principles identified in individual unit specifications.

Internal Quality Assurer

Centre staff who undertake the role of an Internal Quality Assurer (IQA) for TQUK qualifications must possess or be working towards a relevant qualification and have their quality assurance decisions countersigned by a qualified internal quality assurer. This could include:

- Level 4 Award in the Internal Quality Assurance of Assessment Processes and Practice
- Level 4 Certificate in Leading the Internal Quality Assurance of Assessment Processes and Practice
- V1 Conduct internal quality assurance of the assessment process
- D34 Internally verify the assessment process.

It is best practice that those who quality assure qualifications also hold one of the assessing qualifications outlined above. IQAs must follow the principles set out in Learning and Development NOS 11 - Internally monitor and maintain the quality of assessment.

External Quality Assurance

External Quality Assurance will be undertaken by TQUK to ensure that centres are satisfying TQUK quality assurance compliance with the requirements associated with their TQUK recognised centre status and formal written agreement. This will consist of physical activities and remote reviews.

Useful Websites

- [Office of Qualifications and Examinations Regulation](#)
- [Register of Regulated Qualifications](#)

You may also find the following websites useful:

- Chartered Institute of Building: <https://www.ciob.org/>

- Construction Industry Council: <https://www.cic.org.uk/>
- Institution of Civil Engineers: <https://www.ice.org.uk/>
- Architects Registration Board: <https://arb.org.uk/>
- Royal Institute of British Architects: <https://www.architecture.com/>
- Chartered Institute of Architectural Technologists: <https://architecturaltechnology.com/>
- <https://upa-bua-arch.be/en/profession/international-organisations-of-architects>
- Architects Regional Council Asia: <https://www.arcasia.org/>
- USA: <https://www.ncarb.org/about/related-organizations>

A full list of useful links is available through Class Of Your Own's teaching resources and the 'DEC School eLearning platform. All Centres will be invited to use 'DEC School' as their central resource for learning and teaching support. For further information, please contact support@classofyourown.com.

Mandatory Units

Title:		Defining a sustainable construction project	
Unit reference number:		R/650/8394	
Level:		3	
Credit value:		10	
Guided learning hours:		60	
Learning outcomes The learner will:		Assessment criteria The learner can:	
1.	Be able to research and convey the project remit.	1.1	Identify a significant construction project for in-depth study.
		1.2	Communicate the vision for the project.
		1.3	Set the scene for the project in the context of the existing environment.
		1.4	Set the scene for the project in the context of the end user.
		1.5	Write a mission statement for the project.
2.	Be able to set standards for sustainability in a construction project.	2.1	Define commitments to positively impact the local community and the local environment.
		2.2	Define and explain commitments to energy and water efficiency, and carbon reduction.
		2.3	Define commitments to minimise construction waste.
		2.4	Define and explain commitments to ethical sourcing of materials and responsible procurement.
		2.5	Define and explain sustainability monitoring and reporting procedures for the lifecycle of the project.
3.		3.1	Identify the importance of site analysis and the roles of professional consultants at the pre-design phase.

Be able to define site information required at the pre-design phase.	3.2	Determine what topographical information is required and outline appropriate, effective ways to collect accurate data for a particular site.
	3.3	Identify information required to produce a geotechnical report and relate it to the specified project.
	3.4	Identify information required to produce an ecological study and relate it to the specified project.
	3.5	Identify information required to produce a hydrology study and relate it to the specified project.

Assessment Guidance:

All assessment criteria will be expected to be evidenced in the learner’s portfolio.

1.1: Learners will select an appropriate project either through an existing genuine architectural competition or by identifying a building which they believe is needed in their own town.

1.2: Learners should articulate their high-level, aspirational ambitions for their project; what it will achieve when it is completed in the context of the people who will use it, the environment in which it sits, and the sustainable objectives it will realise.

1.3: Learners should discuss the existing built environment and infrastructure, describe the current social, economic, and environmental situation, and the general aesthetics and ‘feel’ of the area, what it means to the people who live and work, and indeed what it means to them personally.

1.4: Learners will provide a profile of the end user of their building project, detailing anticipated wishes and demands. They may choose to research end users in similar facilities both physically and operationally.

1.5: Learners will determine clear values, objectives and outcomes for their project, ideally working as a team to identify key themes, for example, purpose, environmental impact, design excellence, sustainability, and economic contribution. Learners might gain inspiration by exploring the mission statements of leading architecture, engineering and construction companies.

2.1: Learners will produce a statement which outlines their commitment to positively impact the local community and the local environment not only in terms of the building itself and its entire lifecycle but also through the ethos, behaviour and passion of the entire project team in caring for the community and protecting the environment in the immediate vicinity of the project. This should be based on referenced research evidence.

2.2: Learners will produce a statement which outlines their commitment to energy and water efficiency, and to reduce carbon emissions throughout the entire lifecycle of the building, and also through the ethos, behaviour and passion of the entire project team. This should be based on referenced research evidence.

2.3: Learners will produce a statement that outlines their commitment to waste minimisation throughout the entire lifecycle of the building, and also through the ethos, behaviour and passion of the entire project team.

2.4: Learners will produce a statement that outlines their commitment to ethical sourcing and responsible procurement throughout the entire lifecycle of the building, and also through the ethos, behaviour, and passion of the entire project team.

2.5: Learners should explore existing industry procedures to produce a methodology. Valuable guidance can be found by registering with BREEAM, an internationally recognised measure and mark of a building's sustainable qualities, and certified buildings are immediately identifiable as having been planned, designed, constructed and operated in accordance with best practice sustainability principles.

3.1: Learners will understand the importance of an adequate site investigation and describe who and what is involved, and why it is carried out. They will outline the risks involved in gathering insufficient or inadequate data.

3.2: Learners will understand the role of the topographical surveyor in providing accurate survey data. They will explore the limitations of everyday mapping information in providing accurate geotechnical data and how technology has advanced the methods of surveying. Learners will compare methodologies and technologies and will determine appropriate above ground survey methods for their project including laser scanning, satellite-based positioning systems (GPS/GNSS), electronic distance measurement (total station), Geographical Information Systems (GIS) and Ground Penetrating Radar (GPR) for below ground utility mapping. Learners will define appropriate vertical/horizontal accuracy and understand the need for precision to establish boundaries, elevation for flood plain data, position of trees, water courses and other natural features, existing buildings and synthetic features, and also the need to discover existing utilities running through and adjacent to the site. They will explore the limitations of surveying tools, for example, GPS requires good satellite geometry and visibility. Tree canopies and dense, built-up areas can render GPS methods ineffective.

3.3: Learners will understand the role of the geotechnical surveyor in providing accurate ground condition information regarding soil and geologic conditions on and below the surface. They will understand the process of site analysis through desk study, survey and reporting.

3.4: Learners will understand the role of the ecology professional in providing accurate information regarding vegetation and wildlife and their habitats in the local area. They will understand the process of site analysis through desk study, survey and reporting.

3.5: Learners will understand the role of the hydrology professional in providing accurate information regarding the quality, position and flow of watercourses in the local area. They will understand the process of site analysis through desk study, survey and reporting.

Title:		Developing a sustainable construction project	
Unit reference number:		T/650/8395	
Level:		3	
Credit value:		10	
Guided learning hours:		60	
Learning outcomes The learner will:		Assessment criteria The learner can:	
1.	Be able to prepare a design brief and take steps to appoint an effective design team.	1.1	Explain the purpose of a design brief.
		1.2	Describe the role and responsibility of the client in a construction project.
		1.3	Prepare the design brief for a specific construction project and receive critical feedback for client sign-off.
		1.4	Formalise the appointment of an integrated project team.
		1.5	Produce an organogram outlining professionals and their roles at each phase of the project.
2.	Be able to use building information modelling techniques for concept design.	2.1	Create preliminary concept designs based on the design brief.
		2.2	Assess concept designs for space requirements, circulation and accessibility.
		2.3	Assess concept design to produce preliminary cost and lifecycle cost predictions.
		2.4	Perform energy analysis relative to form, orientation, weather, surfaces, and glazing.
		2.5	Present information for the whole project lifecycle and provide validation for the chosen model.
3.	Be able to prepare information and resources needed to support a planning application.	3.1	Explain the planning process for a specific construction project.
		3.2	Make use of current legislation and guidance.
		3.3	Prepare a planning feasibility study for a specific construction project.

		3.4	Describe what is meant by the term 'undesirable precedent' in planning decisions and provide an example.
		3.5	Formulate justification and present evidence for the approval of a specific project.

Assessment Guidance:

All assessment criteria will be expected to be evidenced in the learner's portfolio.

1.1: The learner will explain what a design brief is and what purpose a design brief serves within a construction project.

1.2: The client plays a major role in any construction project and has a wide range of responsibilities including ensuring that all appointees are competent and that suitable managers are appointed to oversee the project.

1.3: Learners will prepare an effective, jargon-free design brief which conveys a client's vision, goals and their priorities and provides an accurate account of the project's deliverables. The brief should refer to a budget estimate and realistic timeline and should confirm the main point of contact and decision maker(s). Operational management must be a key part of the brief.

Learners will present to an audience which will act as clients in the development. The learner must present with conviction and confidence and make appropriate adjustments upon receiving critical feedback.

1.4: Learners should describe the engagement of an efficient, multidisciplinary team focusing on their ability to work together in a collaborative digital environment driven by the benefits of Building Information Modelling (BIM).

1.5: Learners will outline key members of the project team with specific reference to the role of the Information Manager.

2.1: Learners will produce a number of concept design options extracting key information from the design brief. They will understand the benefits of conceptual modelling as a critical stage of building design such as enabling the communication of ideas and supporting early stage analysis for building life cycle sustainability and cost.

2.2: Learners will determine how their concept design maximises efficient and effective space use for those who will use it and how it facilitates the safe, convenient movement of people, both able-bodied and disabled. They should define spatial requirements for a range of occupant activities and equipment and consider how the positioning of elements such as corridors, lifts/elevators, escalators, and staircases contribute to the optimisation of the flow of people through a building. They should be encouraged to explore the size of rooms and areas with a specific purpose.

2.3: Learners will produce high-level estimates based on the number of occupants and area or volume on a standard £/m² and £/m³ (or use local currency) basis according to the type of project they have designed. Whilst this is a function that can be quickly carried out using industry software, learners should understand the methodology behind the calculation, the risks involved in estimation, and the impact of lifecycle costing on sustainability.

2.4: Learners will produce a high-level analysis of overall energy use. They will provide a solar study taking into account the shading effects of surrounding buildings where applicable and recommending ways to maximise solar gain. They will explore the effects of making changes to form and orientation to maximise energy efficiency and make comparisons. Whilst this is a function that can be quickly carried out using industry software, learners should understand the methodology behind the calculation, the risks involved in estimation, and the impact of analysis on sustainability.

2.5: Learners will present an effective, efficient concept model which is most aligned with the project design brief, life cycle objectives and vision.

Learning outcome 3

Learners can make links to legislation for their local area but should be aware of UK policies and legislation.

Learners should consider how their local communities have the opportunities to shape the development and land use in their respective areas. They might refer to a national planning policy or a neighbourhood development plan but should understand the mechanisms for empowering communities to have a say in the future of their local area.

3.1: The 'National Planning Policy Framework' sets out planning policies for England and how they are expected to be applied. It guides local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications. It is important that learners understand the need to involve the wider community in the process and the introduction of the 'Localism Act' and the new 'Neighbourhood Planning' framework empowers communities to have their say regarding development in their neighbourhoods. If a construction project is classed as a 'major development' it is crucial that the community is involved at an early stage. Relevant aspects of national, regional and neighbourhood planning should be identified and used to justify the need for the project.

3.2: Learners will align significant legislation to their specific project. They should be aware of a number of acts and codes of practice from level 2 including Tree Preservation Orders (TPOs) and the Wildlife and Countryside Act 1981. The Disabled Persons Act 1981 ensures that the needs of disabled persons are provided for in any development schemes. The Equality Act 2010 ensures that local planning policies need to take into account the particular needs of women, young people and children, older people, ethnic minorities, children and disabled people. The Party Wall Act 1996 prevents and resolves disputes in relation to party walls (walls of adjoining dwellings such as semi-detached houses and terraced houses), boundary walls and excavations near neighbouring buildings. Right to Light - a private, legally enforceable easement or right to a minimum level of natural illumination through a 'defined aperture', usually a window opening. Planning applications must also be decided by the Local Development Framework (LDF).

3.3: Learners will create a feasibility study outlining how their proposal will conform and respond to particular areas of policy and legislation.

3.4: Learners will explain the term 'undesirable precedent' in the context of building design and its impact on planning law/codes of practice. A large number of case studies can be found on the internet and learners should provide an appropriate example aligned to their project.

3.5: Learners will explain the planning process in their own region, and identify the documentation required for an application, including the following: - Ownership certificate, fees, drawings, and application form. In addition, a design and access statement should be produced and justified to access the full marks available.

Title:		Investigate the design, structural, and services aspects of a sustainable construction project	
Unit reference number:		Y/650/8396	
Level:		3	
Credit value:		10	
Guided learning hours:		60	
Learning outcomes The learner will:		Assessment criteria The learner can:	
1.	Be able to deliver a project.	1.1	Analyse relevant architectural precedents.
		1.2	Explore specific materials and their properties and justify material choices.
		1.3	Gather information using charts and tables to inform the sizes of rooms and spaces.
		1.4	Generate schedules of accommodation.
		1.5	Analyse the information and justify choice.
2.	Gather and analyse information to develop the structural elements.	2.1	Explore different structures within the built environment: frame, shell, and mass.
		2.2	Explore how forces affect structural elements: tension, compression, shear, torsion and bending.
		2.3	Gather information about different structural materials and compare their properties.
		2.4	Use charts and tables to define loading scenarios.
		2.5	Analyse the information and make choices as to the type of structure and materials that are most suitable.
3.	Gather and analyse information to develop the building services elements.	3.1	Explore what is meant by occupant comfort and how it can be measured.
		3.2	Gather information from case studies related to aspects of buildings services heating, ventilation and lighting.
		3.3	Use tables and charts to define lighting levels, temperatures and air exchange rate.

		3.4	Apply science and mathematics and use industry-standard software to calculate the need for different building services.
		3.5	Analyse the information and make choices as to the appropriate technologies to use.

Assessment Guidance:

All assessment criteria will be expected to be evidenced in the learner’s portfolio.

1.1: Learners will identify relevant precedents in terms of function and location and analyse to highlight features that could inspire and inform the architecture of their proposals.

1.2: Materials should be selected in terms of their aesthetics, sustainability, cost and performance. Learners will create a table that compares the materials and presents the data. Compare U values, cost and aesthetics.

1.3: Learners will refine the function and occupancy of each space, and use data from guidelines to calculate the area and height of spaces and rooms using correct units. Learners can measure the sizes of comparable rooms within the school building and use these to inform their designs.

1.4: Learners will produce a schedule of accommodation that can be used to inform and test the architectural model.

1.5: Learners will explain how their building meets their design brief.

2.1: This criterion presents students with the ideal opportunity to meet with their industry partners to explore buildings in the real world, where different structural forms have been used.

2.2: Learners will create a simple structural model (for example, using spaghetti and marshmallows or straws and connectors) and record what happens when different loads are applied.

2.3: Learners will compare the properties of reinforced concrete, steel, aluminium, brick and modern manufactured materials. Learners will compare their structural properties, for example, concrete is strong in compression, steel is strong in tension

2.4: Learners will research the dead loads of different materials and the imposed loads of different activities that will take place in their building.

2.5: Learners will use the research to make choices about the type of structure they think is most appropriate, and which materials they would use for the different elements.

3.1: Learners will research the different aspects of occupant comfort; thermal, visual, air quality and acoustic. Learners will explain how they can be measured (metrics) and achieved through the provision of building services.

3.2: Learners will research best practice in building services and identify strategies and technologies that could be applied.

3.3: Learners will collect data to define the recommended lighting levels (lux), temperatures and air exchange rates for the building types.

3.4: Learners will benefit from real-life examples presented by industry partners, this could include:

- Heat loss calculations using U Values
- Lighting calculation using free software such as Dialux
- Water consumption using online software
- Fire exits using information from building regulations Part B.

3.5: Learners will use the research to explain choices that will improve occupant comfort and be energy efficient.

Mathematics in Design, Engineering, and Construction in the Digital Built Environment

At Level 3, learners will be expected to have an understanding of the following mathematics concepts:

- Addition
- Subtraction
- Multiplication
- Division
- Rounding
- Fractions and simplifying fractions
- Percentages and increases/decreases by percentage
- Ratios and working to scale
- Perimeters and circumferences
- Area of shapes – Squares, rectangles (Area = width * length), triangles (Area = $\frac{1}{2} * b * h$), circles (πR^2)
- Area of rooms through subtraction and/or addition
- Pythagoras – $c^2 = a^2 + b^2$

Learners will be expected to have an understanding of basic arithmetic skills to support the calculation of various costs including:

- Addition, subtraction, multiplication, division, estimation, rounding and percentage calculations of various budget costs reported in £ and £/m² (or local currency).

Learners will be able to apply their mathematics knowledge to understand lighting and energy requirements and use this to compare efficiency including:

- Use of calculations to compare and contrast different options for lighting and energy requirements based on cost, and room size.
- Use of the following formulas to calculate lighting requirements:
 - Lumens = lux x area.
 - Bulbs required = lumens required/lumens of the light bulb.

- Learners will have an understanding of how volume and area of various building components are calculated or in situations concerning the functional requirement of a building and relative room sizes:
 - Common building elements include floors, walls and roofs.
 - Elements may take the shape of triangles, squares, circles, rectangles and trapeziums.
 - Calculation of various room sizes.
 - Calculation of volume of common building elements, for example:
 - Cube/Rectangle = length * width * height
 - Triangle = $0.5 * b * h * length$
 - Cylinders = $\pi r^2 * h$

Additionally, learners will be expected to demonstrate the following mathematics knowledge and skills within the portfolio component:

- Learners will be able to apply their mathematics skills to understand the calculation of area and volume within a building, along with being able to apply these calculations with consideration to contexts costings including:
 - Application of level 2 concepts of area and volume of shapes in combination or reduction, for example, a room and a roof or a roof with a window.
 - Combine costs and areas to make accurate costing calculations.
- Learners will be able to assess concept design to produce preliminary cost and lifecycle cost prediction including:
 - Application of mathematics skills to scenarios involving measurements in £/m^2 and £/ m^3 (or in local currency)
- Learners will understand how to calculate heat loss for various periods and materials using U-Values.
 - Surface Heat Loss (W) = U Value ($\text{W/m}^2 \text{ C}$) x Wall Area (m^2) x ΔT (C).
 - Compare and contrast different insulation materials to identify the most efficient.

Standard units

Learners may be required to convert units within the same measurement type.

Measurement	Standard Unit	Conversions
Money	Pound, £ / local currency	N/A
Length	Metre, m	Millimetre (mm) and Kilometre (KM)
Mass	Kilogram, kg	Gram (g)
Temperature	Celsius, (°C)	Kelvin, K
Power	Watts, W	Kilowatts, K

Force	Newton, N	Kilonewton (kN)
Light	Lumens, Lux	
Sound	Decibels, db	

Unit grading

Unit 1: Defining a sustainable construction project				
Learning outcome 1: Be able to research and convey the project remit				
	0	1-2	3-4	5-6
1.1: Identify a significant construction project for in-depth study.	No evidence submitted or fails to meet minimum requirement.	Brief outline of the project.	Some explanation of the need for the project.	The need for the project has been justified and evidenced.
1.2: Communicate the vision for the project.	No evidence submitted or fails to meet minimum requirement.	Simple vision outlined.	Vision outlined with some points explained.	Clear vision with illustrated and explained positive impacts.
1.3: Set the scene for the project in the context of the existing environment.	No evidence submitted or fails to meet minimum requirement.	Simple maps and 'street view' images with little explanation the area.	A more detailed description of the existing environment, transport, demographics.	Further detail provided with photos of the existing environment and explanation of how this could impact on the project.
1.4: Set the scene for the project in the context of the end user.	No evidence submitted or fails to meet minimum requirement.	Obvious end users such as customers or residents have been identified.	Simple explanations of a wider range of end users.	Detailed explanation of the needs of users from different contexts, employees, maintenance as well as more obvious customers.
1.5: Write a mission statement for the project.	No evidence submitted or fails to meet minimum requirement.	Generic mission statement.	Mission statement is specific to the project.	Mission statement is concise but specific to the project with clear criteria.

Learning outcome 2: Be able to set standards for sustainability in a construction project				
	0	1-2	3-4	5-6
2.1: Define commitments to positively impact	No evidence submitted or fails	Limited impacts identified.	Range of impacts identified.	Specific examples to the project explained.

the local community and the local environment.	to meet minimum requirement.			
2.2: Define and explain commitments to energy and water efficiency, and carbon reduction.	No evidence submitted or fails to meet minimum requirement.	Limited impacts identified.	Range of impacts identified.	Specific examples to the project explained.
2.3: Define commitments to minimise construction waste.	No evidence submitted or fails to meet minimum requirement.	Limited impacts identified.	Range of impacts identified.	Specific examples to the project explained.
2.4: Define and explain commitments to ethical sourcing of materials and responsible procurement.	No evidence submitted or fails to meet minimum requirement.	Limited impacts identified.	Range of impacts identified.	Specific examples to the project explained.
2.5: Define and explain sustainability monitoring and reporting procedures for the lifecycle of the project.	No evidence submitted or fails to meet minimum requirement.	Limited description of monitoring or reporting.	Some description of different methods of monitoring and reporting.	Explanation of BREEAM or other measure and examples of activities at different points in lifecycle.

Learning outcome 3: Be able to define site information required at pre-design phase

	0	1-2	3-4	5-6
3.1: Identify the importance of site analysis and the roles of professional consultants at the pre-design phase.	No evidence submitted or fails to meet minimum requirement.	Brief description of the need for site analysis.	Some explanation of the need for site analysis and the professionals involved.	Explanation of stages of survey (desk study, walk over and detailed survey) and increasing level of detail and expertise.
3.2: Determine what topographical information is required and outline appropriate, effective ways to collect accurate data for a particular site.	No evidence submitted or fails to meet minimum requirement.	Description of what a topographical survey is.	Some awareness of different methods of capturing data.	Comparison of the different methods of collecting data leading to most appropriate method being selected for their site.

<p>3.3: Identify information required to produce a geotechnical report and relate it to the specified project.</p>	<p>No evidence submitted or fails to meet minimum requirement.</p>	<p>General explanation of geotechnical data.</p>	<p>Map or visit but with limited analysis.</p>	<p>Site specific geotechnical data gathered and analysed for the site.</p>
<p>3.4: Identify information required to produce an ecological study and relate to the specified project.</p>	<p>No evidence submitted or fails to meet minimum requirement.</p>	<p>General explanation of ecological data.</p>	<p>Map or visit but with limited analysis.</p>	<p>Site specific Ecological data gathered and analysed.</p>
<p>3.5: Identify information required to produce a hydrology study and relate to the specified project.</p>	<p>No evidence submitted or fails to meet minimum requirement.</p>	<p>General explanation of hydrology data.</p>	<p>Map or visit but with limited analysis.</p>	<p>Site specific hydrology data gathered and analysed.</p>

Unit 2: Develop a sustainable construction project

Learning outcome 1: Be able to prepare a design brief and take steps to appoint an effective design team

	0	1-2	3-4	5-6
1.1 Explain the purpose of a design brief.	No evidence submitted or fails to meet minimum requirement.	Brief description of a design brief.	Some description of a design brief. Touches on its purpose.	Detailed description of a design brief. Purpose of the design brief is explained clearly.
1.2 Describe the role and responsibility of the client in a construction project	No evidence submitted or fails to meet minimum requirement.	Brief outline of the role of a client.	Some description of a client's role and responsibilities.	Detailed description of a client's role and responsibilities.
1.3 Prepare the design brief for a specific construction project and receive critical feedback for client sign off	No evidence submitted or fails to meet minimum requirement.	Simple design brief with few measurable criteria.	A design brief that includes a budget, timescale and deliverables.	Detailed design brief that includes a budget, timescale and deliverables. Evidence of feedback.
1.4 Formalise the appointment of an integrated project team	No evidence submitted or fails to meet minimum requirement.	An outline of BIM and its benefits.	A description of BIM and how the process could be applied to their project mentions PAS119:2 and EIR.	A detailed explanation of BIM and how can be applied to their project include details of what would be included in an EIR.
1.5 Produce an organogram outlining professionals and their roles at each phase of the project	No evidence submitted or fails to meet minimum requirement.	Produces a simple organogram.	Produces a more detailed organogram and an explanation of its use.	Produces an organogram that spans the whole project timeline and an explanation of its use.

Learning outcome 2: Be able to use building information modelling techniques for concept design

	0	1-2	3-4	5-6
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2.1: Create preliminary concept designs based on the design brief.	No evidence submitted or fails to meet minimum requirement.	A single concept that meets the brief.	More than one concept with annotation that describes how it meets the brief.	A range of different concept designs that are annotated to explain how they meet the brief.
2.2: Assess concept designs for space requirements, circulation and accessibility.	No evidence submitted or fails to meet minimum requirement.	Different spaces are identified.	Spaces are identified and different layouts explored (such as bubble diagrams).	Spaces are identified and different layouts explored (such as bubble diagrams) and evaluated.
2.3: Assess concept design to produce preliminary cost and lifecycle cost predictions.	No evidence submitted or fails to meet minimum requirement.	Benchmark cost calculated.	Benchmark costs for different concepts are calculated using rates.	Benchmark costs for different concepts are calculated using rates for building type and compared.
2.4: Perform energy analysis relative to form, orientation, weather, surfaces and glazing.	No evidence submitted or fails to meet minimum requirement.	Solar or energy analysis of concept.	Solar or energy analysis of different concept designs.	Solar and energy analysis of different concept designs with evaluation.
2.5: Present information for whole project lifecycle and provide validation for chosen model.	No evidence submitted or fails to meet minimum requirement.	Explanation of why concept is suitable.	Comparison of concepts and explanation of why the chosen concept is the most suitable.	Chosen concept justified by comparing the criteria from 2.1-2.4.

Learning outcome 3: Be able to prepare information and resources needed to support a planning application

	0	1-2	3-4	5-6
3.1: Explain the planning process for a specific construction project.	No evidence submitted or fails to meet minimum requirement.	Brief description of the planning process.	Explanation of national and local planning policy and the documents needed for a planning application.	Explanation of national and local planning policy and a detailed explanation of a relevant planning application.
3.2: Make use of current legislation and guidance.	No evidence submitted or fails to meet minimum requirement.	At least 3 different pieces of relevant legislation explained.	At least 3 pieces of relevant legislation described and related to their project.	At least 3 pieces of essential legislation applied to their development and justified in detail.

<p>3.3: Prepare a planning feasibility study for a specific construction project.</p>	<p>No evidence submitted or fails to meet minimum requirement.</p>	<p>A simple explanation of the feasibility of the project.</p>	<p>Explanation of how the project will benefit the area and meet planning policy (local or national).</p>	<p>A detailed explanation of the benefits that the project will bring with reference to relevant planning and legislation.</p>
<p>3.4: Describe what is meant by the term 'undesirable precedent' in planning decisions and provide an example of such.</p>	<p>No evidence submitted or fails to meet minimum requirement.</p>	<p>Brief description of an undesirable precedent.</p>	<p>Undesirable precedent described and a relevant example explained.</p>	<p>Example of undesirable precedent with a balanced explanation of the reason it is undesirable.</p>
<p>3.5: Formulate justification and present evidence for the approval of a specific project.</p>	<p>No evidence submitted or fails to meet minimum requirement.</p>	<p>Simple explanation of why their project should be built.</p>	<p>Planning application, including explanation why their project should be built.</p>	<p>A complete and fully justified planning application for their project.</p>

Unit 3: Investigate the design, structural and services aspects of a sustainable construction project

Learning outcome 1: Be able to deliver a project

	0	1-2	3-4	5-6
1.1: Analyse relevant architectural precedents.	No evidence submitted or fails to meet minimum requirement.	Images of different buildings collected with a brief description.	A number of different relevant precedents described in detail.	A range of relevant local, national and international precedents analysed.
1.2: Explore specific materials and their properties and justify material choices.	No evidence submitted or fails to meet minimum requirement.	Brief description of materials with some evaluation and comparison.	Different material choices explored and compared.	Materials for different building elements explored and evaluated in terms of sustainability, performance, aesthetics and cost.
1.3: Gather information using charts and tables to inform the sizes of rooms and spaces.	No evidence submitted or fails to meet minimum requirement.	Some relevant data collected.	Most size data collected and presented.	All relevant room and space sizes researched using charts, tables and own measurements.
1.4: Generate schedules of accommodation.	No evidence submitted or fails to meet minimum requirement.	A simple schedule generated.	Schedule includes numbers and sizes of rooms.	Detailed schedule generated using the data from 1.3.
1.5: Analyse the information and justify choice.	No evidence submitted or fails to meet minimum requirement.	Explained choices and decisions.	Choices are justified using research.	Different options are analysed, and most suitable choice is justified.

Learning outcome 2: Gather and analyse information to develop the structural elements

	0	1-2	3-4	5-6
2.1: Explore different structures within the built environment: frame, shell, and mass.	No evidence submitted or fails to meet minimum requirement.	Images of different structures have been collected and labelled.	Different structures examined, and their type defined.	A number of different structures have been analysed and their type and materials explained.

2.2: Explore how forces affect structural elements: tension, compression, shear, torsion and bending.	No evidence submitted or fails to meet minimum requirement.	Basic definitions of forces.	Definition of forces and basic explanations of how loads affect structures.	Modelling exercises that lead to explanations of the different forces on the elements of a structure.
2.3: Gather information about different structural materials and compare their properties.	No evidence submitted or fails to meet minimum requirement.	Most obvious structural materials (steel, concrete and timber) materials compared.	A broader range of structural materials compared, and their strengths and weaknesses identified.	A broad range of structural materials compared in terms of a range of factors such as performance, availability, fire resistance.
2.4: Use charts and tables to define loading scenario	No evidence submitted or fails to meet minimum requirement.	Types of loads defined, and limited data provided.	Types of loads defined and loading data provided for dead and live loads.	Types of loads defined, and comprehensive data collected for dead, live, snow and wind based on the building use.
2.5: Analyse the information and make choices as to the type of structure and materials that are most suitable	No evidence submitted or fails to meet minimum requirement.	The materials for structural elements have been chosen and explained.	A range of materials for elements have been compared.	Different types of structure and materials have been compared and choices have been justified.

Learning outcome 3: Gather and analyse information to develop the building services elements

	0	1-2	3-4	5-6
3.1: Explore what is meant by occupant comfort and how it can be measured.	No evidence submitted or fails to meet minimum requirement.	A brief explanation of what is meant by occupant comfort.	The 4 areas of occupant comfort have been explained.	4 areas of occupant comfort defined, and the methods of measuring explained.
3.2: Gather information from case studies related to aspects of buildings services heating,	No evidence submitted or fails to meet minimum requirement.	A simple case study explaining how building services are used.	More than one case study used to inform different options for heating, ventilation and lighting.	Several case studies used to provide information about the different options for heating ventilation and lighting.

ventilation and lighting.				
3.3: Use tables and charts to define lighting levels, temperatures and air exchange rate	No evidence submitted or fails to meet minimum requirement.	Values defined for overall lighting, temperature and air exchange rate.	Values defined for overall lighting, temperature and air exchange rate related to the use of the building.	Values defined for lighting, temperature and air exchange rate related to the use of different zones/areas.
3.4: Apply science and maths and use industry standard software to calculate the need for different building service.	No evidence submitted or fails to meet minimum requirement.	Software has been used to model and test one aspect building services.	Software and calculations have been used to model and test different building services.	Software and calculations have been used to model and test and compare different building services.
3.5: Analyse the information and make choices as to the appropriate technologies to us.	No evidence submitted or fails to meet minimum requirement.	The methods of heating lighting and ventilating the building have been explained.	Different methods of heating lighting and ventilating the building have been compared.	Different methods of heating lighting and ventilating the building have been compared and choices have been justified.