



Infrastructure

December 2025



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1 Introduction

This guide supports the Infrastructure pathway. It is designed to help you understand more about qualifying in this area.

You must use this guide in conjunction with the core assessment documentation, which is available on the RICS website and comprises of:

- Requirements and competencies guide
- Candidate guide for your RICS assessment, e.g. APC, Academic, Senior Professional, Specialist
- Counsellor guide.

You can download all the supporting guidance from the [Sector pathways](#) web page.

All RICS pathways are global, though it is appreciated that markets may vary from country to country. If you have any queries please contact your local office.

About the competencies

The RICS competency framework ensures those applying for the RICS qualification are competent to practise and meet the highest standards of professionalism required by RICS. There is a wide range of pathways available to qualify as an RICS professional covering many different areas of practice.

The RICS assessment aims to assess that you are competent to carry out the work of a qualified chartered surveyor. To be competent is to have the skill or ability to perform a task or function. The RICS competencies are also based on attitudes and behaviours. The competencies are presented in a generic way so they can be applied to different areas of practice and geographical locations.

It is important that you interpret them within the context of your own area of practice or specialism and location.

Each competency is defined at three levels of attainment. You must reach the required level in a logical progression and in successive stages.

Level 1 – knowledge and understanding

Level 2 – application of knowledge

Level 3 – reasoned advice, depth and synthesis of technical knowledge and its implementation.

The competencies are in three distinct categories:

Mandatory – the personal, interpersonal, professional practice and business skills common to all pathways and mandatory for all candidates.

Technical core – the primary skills of your chosen pathway.

Technical optional – selected as additional skill requirements for your pathway from a list of competencies relevant to the area of practice.

The mandatory competency requirements are set out in detail in the *Requirements and competencies guide*.

Choosing your competencies

It is important that you give careful thought to your choice and combination of competencies. Your choice will inevitably reflect the work you do in your day-to-day environment (driven by the needs of your clients/employer). Your choice and combination of competencies will be a reflection of your judgement.

At the final assessment interview, the assessors will take these choices into account. They will expect you to present a sensible and realistic choice that reflects the skills needed to fulfil the role of a surveyor in your field of practice.

This guide should help candidates and employers with a degree of assistance in choosing the competencies that are most appropriate to their area of practice.

RICS pathways are designed to include rules about competency selection.

- For pathways with a **core** competency required to Level 1, candidates **can choose** the same competency to Level 2 or Level 3 as part of their **optional** selection where it is permitted in the pathway guide.
For example, in the Building surveying pathway, Fire safety is **core** to Level 1. It is also **optional** and can be selected to a higher level.
- For pathways with a **core** competency required to Level 2, candidates **cannot choose** the same competency to Level 3 as part of their **optional** selection.

- Some pathways include **mandatory** competencies that can be selected to a higher level as part of the **core** or **optional** requirements.

Where this is the case, the competencies are grouped together as 'one' (see example below). Candidates can choose **only one*** as part of their overall selection.

Optional competencies

Three to Level 3

- Accounting principles and procedures
or Conflict avoidance, management and dispute resolution **or** Data management
or Sustainability

(* For the Building control pathway, candidates can select up to two of these competencies. This is because Client care and Data management are grouped as 'one' and Sustainability is listed separately.)

- Most pathways require candidates to choose at least one competency from the full list of technical competencies in the *Requirements and competencies guide* (see example below).

Plus, **one to Level 3** or **two to Level 2** from the full list of technical competencies, including any not already chosen from the optional list.

Where this is the case, a **mandatory** competency can only be selected:

- if it is listed as technical (**core** or **optional**) in the pathway guide **and**
- if grouped with other competencies as 'one' (see third bullet point above), no other competency from the group has already been selected.

Where to find help

RICS has fully trained teams across the globe who will be able to help you with any queries. For details of your local office, visit the [Contact us](#) web page.

2 About the pathway

Infrastructure includes a wide range of subsectors and this pathway covers the global delivery of projects in this arena. Hence, the general project and cost management of the process from inception to post-completion. Within the context of the sector, it also covers a number of competencies, namely project finance, building information modelling (BIM) management and asset management. The pathway seeks to fuse project and cost management competencies in order to reflect the global requirements in infrastructure.

RICS recognises the following fields below for the Infrastructure pathway. Candidates must select one to demonstrate their competence:

- transport: including road, rail, aviation and ports
- energy: including utilities, renewable sources and nuclear
- petrochemicals
- oil and gas
- mining and resources
- water.

RICS qualification

As a surveyor working in infrastructure you may be working as a consultant in private practice, for a developer, in the development arm of a major organisation (e.g. utility company or airport provider) or for a government organisation. On the contracting side, you could be working for a major national or international contractor, a local or regional general contractor, or for a specialist contractor or subcontractor.

Your work may include the following:

- understanding briefing and feasibility studies
- assessing procurement strategies
- considering options with regard to project funding and finance
- initiating and planning BIM management systems
- advising on tendering strategy and contract selection
- managing and analysing risk
- devising and managing cost and time control systems
- valuing construction work for interim payments, valuing change and agreeing final accounts
- devising and implementing asset management systems.

Chartered alternative designations

All candidates qualifying through this pathway will be entitled to use the designation 'Chartered Surveyor'. There is currently no alternative designation offered.

Profile of an infrastructure surveyor

The following are elements of the work of an infrastructure surveyor.

- systems engineering
- materials science
- cost planning
- cost analysis

- procurement
- tendering
- cost control
- time control.

You may work in a specific sector (water utility, airport or transport), or for a particular type of client (consultant, contractor, government department, airport operator), or in one geographical region (UK, USA, UAE). What is important is that you cover the principle elements of the role in a manner appropriate to your region. You should always have an awareness that things might be done differently in other sectors or in the industry within your region. Where the sector or client does things in a specific way, you should be aware of the industry norm.

You may not have gained experience of all aspects of the elements above: for example, you may not have experienced all types procurement and tendering, in this case you should try to undertake additional private study or try to make contact with someone who has experience in the area to lift your knowledge to the required level of competency. The chart on the following page shows how the competencies, skills and knowledge apply to specific tasks you are likely to undertake.

Task example	Skills and knowledge	Competency
Feasibility report	<ul style="list-style-type: none"> • report writing • understanding the client • cost and benefit techniques • technical infrastructure opportunities and constraints. 	<ul style="list-style-type: none"> • client care • engineering science and technology • cross cultural awareness in global business.
Preparing a project execution plan	<ul style="list-style-type: none"> • understanding roles and responsibilities • flow of information • international issues • brief and objectives • control systems. 	<ul style="list-style-type: none"> • stakeholder management • engineering science and technology • client care • cross cultural awareness in global business.
Benchmarking of cost	<ul style="list-style-type: none"> • data collection and analysis • technical knowledge of infrastructure. 	<ul style="list-style-type: none"> • cost predication and analysis • engineering science and technology.
Cost plan	<ul style="list-style-type: none"> • quantifying designs • data collection and analysis • technical knowledge of infrastructure • interpreting engineering solutions. 	<ul style="list-style-type: none"> • quantification, costing and price analysis • cost prediction and analysis • engineering science and technology.
Tender documents	<ul style="list-style-type: none"> • key legal requirements • contractors pricing methods • quantifying designs • interpreting engineering solutions. 	<ul style="list-style-type: none"> • contract practice • quantification, costing and price analysis • procurement and tendering • engineering science and technology.
Establishing a post-contract control system	<ul style="list-style-type: none"> • change control mechanisms • understanding programmes and methodologies • technical knowledge of infrastructure. 	<ul style="list-style-type: none"> • programming and planning • projects controls • engineering science and technology.
Forensic analysis	<ul style="list-style-type: none"> • understanding programmes and methodologies • understanding cause and effect and rate analysis. 	<ul style="list-style-type: none"> • programming and planning • engineering science and technology • quantification, costing and price analysis.

3 Pathway requirements

Mandatory	Core	Optional
<p>Level 3</p> <ul style="list-style-type: none"> • Ethics, Rules of Conduct and professionalism <p>Level 2</p> <ul style="list-style-type: none"> • Client care • Communication and negotiation • Health and safety <p>Level 1</p> <ul style="list-style-type: none"> • Accounting principles and procedures • Business planning • Conflict avoidance, management and dispute resolution procedures • Data management • Diversity, inclusion and teamworking • Inclusive environments • Sustainability 	<p>Level 3</p> <ul style="list-style-type: none"> • Engineering science and technology <p>Plus, four to Level 3</p> <ul style="list-style-type: none"> • Client care • Contract practice • Cost prediction and analysis • Procurement and tendering • Programming and planning • Project controls • Quantification, costing and price analysis • Risk management 	<p>Two to Level 2, including any not already chosen from the core list</p> <ul style="list-style-type: none"> • Asset management • Building information modelling (BIM) management • Compulsory purchase and compensation • Conflict avoidance, management and dispute resolution procedures or Sustainability • Contract administration • Cross cultural awareness in a global business • Leading projects, people and teams • Managing projects • Project finance • Stakeholder management • Supplier management <p>Plus, one to Level 2 from the full list of technical competencies, including any not already chosen from the core and optional lists.</p>

4 Technical competencies guidance

Asset management

This competency is about understanding and applying the principles of asset management in infrastructure so as to extend an asset's normal life cycle and optimise performance; applying asset management processes and activities across planning, strategy, record keeping, management and implementation.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the aims, objectives, strategies and processes of managing assets.

Examples of knowledge comprised within this level are:

- the benefits and objectives of infrastructure asset management
- the distinction between planned maintenance, repair and replacement
- how to compile a systematic record of individual assets
- how to develop strategies for maintaining the aggregate body of assets
- how to implement and manage information systems.

Level 2

Apply your knowledge to the processes and activities necessary including systematic record keeping, developing strategies of planned maintenance, repair and replacement and managing information systems.

Examples of activities and knowledge comprised within this level are:

- preparing an asset management strategy or plan
- establishing and managing an asset management information system
- designing and maintaining asset management records.

Level 3

Provide evidence of reasoned advice, based on the knowledge and experience gained, in order to improve decision making in asset management.

Examples of activities and knowledge comprised within this level are:

- detailed knowledge of how assets are separately identified and how this can vary within a transaction depending on the purpose of the apportionment valuation for financial reporting, litigation or fiscal purposes, including transfer pricing
- providing professional advice on the options available for asset management systems in the context of a corporate or project setting
- providing professional advice on the barriers and risks involved in both implementing and not implementing asset management in a corporate or project setting
- providing professional advice on relevant standards, procedures, protocols and datasets for asset management, including an evaluation of the various options and costs.

Auctioneering

This competency reflects the complex factors governing auctioneering. It includes aspects of law of sale and contract, misdescription, etc. as well as requiring the candidate to have knowledge of the auction process and the reasons for recommending sale by auction (or otherwise) over and above other methods of disposal.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the basic principles and legal obligations of auction. This should include preparation for, and procedures prior to or during, an auction.

Examples of knowledge comprised within this level are:

- the principles of the law governing auction and its implications
- an understanding of the process of how an auction works, including an understanding of the information required prior to auction and the process on the day.

Level 2

Provide evidence of the practical application of your knowledge to the preparation for the sale of real estate at auction and procedures prior to or during an auction.

Examples of activities and knowledge comprised within this level are:

- compiling information relating to real estate to be sold at auction
- assisting in the process of drawing up auction catalogues
- dealing with queries and issues raised prior to the auction in consultation with others
- dealing with issues arising post auction in consultation with others.

Level 3

Provide evidence of reasoned advice based on a thorough working knowledge and experience of the auction process, including experience of attending an auction and assisting with the auction process. It is possible to demonstrate this level of competency without rostrum experience.

Examples of activities and knowledge comprised within this level are:

- advising clients on the suitability of sale by auction
- advising clients on pricing
- attending an auction and assisting with the selling of lots
- assisting with taking of deposit and completion of memorandum of sale
- advising on pre- and post-auction sales.

Building information modelling (BIM) management

This competency encompasses the establishment and management of the information modelling systems on projects. It covers collaborative process and technological principles involved in implementing building information modelling (BIM) management.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the technical, process and collaborative aspects of the use of BIM on projects.

Examples of knowledge comprised within this level are:

- BIM strategies and implementation
- the various technical options and solutions for information modelling
- the collaborative processes necessary for BIM adoption
- standard classification systems and their use in infrastructure
- relevant internationally recognised management standards such as Construction Operations Building Information Exchange (COBie).

Level 2

Develop and apply management systems to facilitate the use of BIM on projects, including unified control and reporting procedures.

Examples of activities and knowledge comprised within this level are:

- preparation of a BIM execution plan
- design and implementation of a BIM management process
- analysing of comparative BIM solutions
- maintenance of an information model
- agreeing and implementing contractual aspects of BIM such as a separate protocol
- facilitating and managing project team members for BIM implementation.

Level 3

Provide evidence of how the knowledge and experience gained in this competency has been applied to advising clients and/or senior management on BIM strategy and implementation.

Examples of activities and knowledge comprised within this level are:

- analysing, assessing, evaluating and reporting on options for BIM strategies at a corporate or project level
- designing and advising on collaborative strategies for the successful implementation of BIM on projects
- advising on the contractual and commercial implications of using BIM on projects
- advising on options for software and protocols on BIM projects
- advising on technical information systems requirements for BIM at corporate or project level.

Client care

This competency is about defining and understanding the requirements of clients in the context of infrastructure where you are seeking to become engaged in providing change management solutions for a client. It explores how to identify and scope client needs including the use of techniques such as defining benefits and outputs for clients.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the need to collect data, analyse and define the needs of clients.

Examples of knowledge comprised within this level are:

- client requirements of pluralistic clients in the public sector
- types of information that should be collected about the client and their requirements
- terms of engagement
- negotiating and setting fees
- how to scope a client's requirements
- developing strategies and feasibility studies to meet client's requirements
- methods of engaging your client
- what qualitative and quantitative information is essential to your role
- how to handle sensitive information
- legislation relevant to data protection and data handling in the particular jurisdiction.

Level 2

Provide evidence of the practical application of that knowledge and understanding. This should include the development of strategies and methodologies and, where appropriate, undertaking feasibility studies, design proposals and costings.

Examples of activities and knowledge comprised within this level are:

- confirming instructions to clients
- developing a client/project brief
- undertaking a feasibility study
- agreeing terms of engagement
- analysis of data/information
- preparing costings/fee proposals
- cost-benefit analysis in infrastructure and benefits realisation.

Level 3

Provide evidence of developing appropriate strategies to meet the client's requirements under minimum supervision, based on analysis and interpretation. Demonstrate the ability to report on and present tailored strategies to the client.

Examples of activities and knowledge comprised within this level are:

- reporting to clients detailing strategies to meet client requirements based on the analysed data
- presenting to clients
- preparing scoping documentation identifying clients requirements and proposals for consultancy interventions.

Compulsory purchase and compensation

This competency is about the understanding and practical application, within the appropriate legal framework, of compulsory purchase powers, including the assessment of and claim for compensation. The candidate is expected to have an understanding from both the acquiring authority and claimant's position.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the powers and procedures of government and other bodies in relation to the compulsory purchase and compensation. This covers legal interests in real estate and of the rights of owners, occupiers and the impacts on third-party affected by works or developments associated with compulsory purchase.

Examples of knowledge comprised within this level are:

- the historical background, requirement for, and justification of, the use of compulsory purchase powers
- an overview of the various Acts of Parliament or any relevant statutory requirements covering acquisition of land and rights, planning and compensation or local equivalent
- the basic principles of compensation (the before and after principle), accommodation works, betterment, equivalence and the legal right to claim.

Level 2

Assist in the preparation of the various stages involved in the process and negotiations in relation to compulsory purchase including the estimation and settlement of compensation claims.

Examples of activities and knowledge comprised within this level are:

- outlining the stages and timing involved in making, confirming and implementing a compulsory purchase order
- an understanding of statutory abilities to acquire rights other than outright purchase, such as those exercised by utilities companies
- setting out heads of claim under a compensation claim
- relevant statutory and case law in the assessment of a claim for compensation.

Level 3

Provide evidence of reasoned advice in relation to the validity and level of a claim for compensation, using a variety of valuation methodologies appropriate for the circumstances of the claim. Take an active role in the negotiation and settlement of claims, using a variety of bases of statutory and other valuation methodologies.

Provide reasoned advice on the role of compulsory purchase in facilitating planning and regeneration initiatives.

Examples of activities and knowledge comprised within this level are:

- supplying and justifying evidence for a statement of claim using both valuation and logical techniques to back up the quantum of the claim
- dealing with best practice in the implementation of a compulsory purchase order on, for example, a road scheme
- developing a rationale for the use of compulsory purchase powers in order to enable development, taking into account human rights legislation
- the fee basis for chartered surveyors and the role of the Lands Tribunal as well as mediation/arbitration
- assisting in the preparation for and attendance at a public inquiry into a Compulsory Purchase Order including understanding of procedure and process.

Conflict avoidance, management and dispute resolution procedures

This covers the recognition, avoidance, management and resolution of disputes, involving an awareness of different dispute resolution processes and an understanding of the application of dispute resolution procedures appropriate to the area and jurisdiction of professional practice.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the techniques for conflict avoidance, conflict management and dispute resolution procedures including, for example, adjudication and arbitration, appropriate to your pathway.

Examples of knowledge comprised within this level are:

A basic knowledge and understanding of common causes of disputes appropriate to your market sector/areas of specialism

- common causes of disputes
- the contribution of some of the following to dispute avoidance:
 - risk management (its basic principles and techniques)
 - early warning systems
 - partnering techniques
 - clear and robust client briefings
- theories of negotiation and the role of effective communication and negotiation
- the primary features, advantages and disadvantages of a range of dispute resolution procedures and their surrounding statutory and/or non-statutory legal/judicial context (e.g. how forms of contract deal with dispute resolution, and the scope of such clauses):
 - mediation (could include contracted and project mediation) and conciliation
 - Dispute Resolution Boards (DRBs)
 - Dispute Resolution Advisers (DRAs)
 - adjudication
 - independent expert determination

Level 2

Provide evidence of practical application in your area of practice having regard to the relevant law.

Examples of activities and knowledge comprised within this level are:

- adopting – or encouraging the adoption of (as appropriate) – suitable dispute avoidance techniques
- negotiating actively on behalf of clients (e.g. performance failure, unavailability, contract variations, contract interpretations and payment) prior to third-party referral
- assisting in the collation or preparation of claims/counter-claims and submissions
- assisting in the identification, gathering and collation of facts and expert evidence for use in expert reports
- sufficient understanding of the main points of the statutory or non-statutory law relevant to/underpinning any particular dispute resolution process and its application.

Level 3

Provide evidence of the application of the above in the context of advising stakeholders in the various circumstances referred to above.

Examples of activities and knowledge comprised within this level are:

- advising clients of the most suitable means of dispute avoidance on their projects, and of dispute resolution procedures appropriate to their individual circumstances, demonstrating appreciation of when to seek further specialist advice and when to advise clients within the scope of the insurance cover of the candidate's organisation
- involvement in, or assistance with, a referral to a third-party resolution process and associated management of that process on behalf of client.

Note that the roles of acting as a third-party dispute resolver – or expert witness, are – for the vast majority of candidates – not likely to be an activity that is undertaken. It is only a small minority of candidates with substantive work experience for whom this is likely to be relevant.

Conflict avoidance, management and dispute resolution procedures (continued)

Level 1

- arbitration
- litigation
- the possible roles of a surveyor as an expert witness and/or an advocate, to include an awareness of the existence and scope of applicability of RICS standards and guidance for expert witnesses and advocates
- the range of nominating bodies and services available to resolve disputes, and particularly the role of the RICS Dispute Resolution Service and any specialised dispute resolution schemes it offers relevant to your market sector
- the current edition of RICS' *Conflicts of interest* and any appropriate RICS standards and guidance.

Level 2

Level 3

Contract practice

This competency covers the various forms of contract used in the construction industry, including all of the main standard forms of contract and a thorough understanding of contract law, legislation and the specific forms that they have used.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the various standard forms of contract used in the construction industry and/or your area of business.

Examples of knowledge comprised within this level are:

- basic contract law and legislation in the particular jurisdiction
- contract documentation
- the various standard forms of contract and subcontract
- when the different forms would be used
- basic contractual mechanisms and procedures at various stages of the contract
- third-party rights including relevant legislation and the use of collateral warranties.

Level 2

Apply your knowledge of the use of the various standard forms of contract at project level, including the implications and obligations that apply to the parties to the contract.

Examples of activities and knowledge comprised within this level are:

- producing contract documentation
- carrying out the contractual mechanisms and procedures relevant to the financial management aspects of the project, such as change procedures, valuations, loss and expense and final accounts
- understanding general contractual provisions such as letters of intent, insurances, retention, bonds, liquidated and ascertained damages, early possession, practical completion and other common contractual mechanisms.

Level 3

Provide evidence of reasoned advice, prepare and present reports on the selection of the appropriate form of contract and warranties for your chosen procurement route.

This should include advising on the most appropriate contractual procedure at the various stages of a construction or other contract.

Examples of activities and knowledge comprised within this level are:

- selecting the appropriate standard form of contract and/or subcontract for your chosen procurement route
- advising on the most appropriate contractual procedure at the various stages of a contract in the particular jurisdiction
- evaluating the appropriateness and implications of proposed contractual amendments.

Cost prediction and analysis

Commercial control (through the use of cost benchmarking, prediction, planning and analysis) is fundamental to successful built infrastructure projects. This competency covers the technique of cost predication and analysis, using empirical data allied with an understanding of the key cost drivers.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the main factors that affect design economics over the life of the asset. Demonstrate knowledge and understanding of how cost benchmarking and cost planning assists in the financial control of projects from inception to the commitment to proceed.

Examples of knowledge comprised within this level are:

- key drivers that affect the cost of infrastructure over the whole life of the asset
- methodology of collecting and analysing data for cost predication
- benchmarking of infrastructure capital and whole life costs
- methodology of construction and productivity cost factors in infrastructure
- financial and risk management information systems and understanding uncertainty in cost predication.

Level 2

Apply the knowledge to the cost management of design development and the whole life cycle. Prepare and submit cost data to in-house and/or external data collection agencies.

Examples of activities and knowledge comprised within this level are:

- preparing benchmark studies
- preparing estimates and cost plans including whole life cost plans
- preparing cost analyses
- assessing how the methodology of construction and the productivity of labour and plant will affect cost prediction and analysis
- presenting and preparing risks, assumptions and market factors to illustrate the accuracy of cost predication based on evolving design solutions.

Level 3

Give strategic and reasoned advice, including the preparation and presentation of reports with reference to cost, time, quality, logistics and methodology. Advise on various market factors and trends in costs. Comment on accuracy and risk.

Examples of activities and knowledge comprised within this level are:

- clearly presenting cost reports to clients, with emphasis on the degree of accuracy
- offering cost advice on alternative design and methodology solutions
- advising on value and risk management techniques
- assessing/evaluating market factors and trends in construction costs.

Cross cultural awareness in a global business

This competency deals with gaining an understanding and applying effective techniques in conducting business relationships on a global basis. Candidates should understand the key national cultural differentiators and use this understanding to achieve effective global project performance.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the way business is undertaken in different cultures, including the differing drivers, ethos, etiquette and assumptions prevalent in global business.

Examples of knowledge comprised within this level are:

- the various different business cultures worldwide
- the effects of the different cultures on contractual relationships
- the key techniques to improve relationships and global project performance when dealing with international teams.

Level 2

Apply the knowledge to different business skills, including client liaison, team-working, leadership, negotiation and communication.

Examples of activities and knowledge comprised within this level are:

- assessing client relationships, team performance and stakeholder interfaces on international projects
- preparing a management plan to address team-working issues on international projects.

Level 3

Provide evidence of reasoned advice to clients and senior management on strategies and tactics for dealing with cultural issues in global business in order to ensure effective corporate and project performance.

Examples of activities and knowledge comprised within this level are:

- preparing a strategy report on the cultural implications of operating in different jurisdictions
- advising on adapting technical solutions to meet cultural barriers
- tailoring communication solutions to address cultural issues effectively.

Engineering science and technology

This competency covers the design and construction of infrastructure assets and the science of the principal materials used in infrastructure. Candidates should understand the key design principles and the principal methodologies of construction, including the comparative characteristics and performance of construction materials.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the principles of the design, methodology, logistics and construction in the chosen field of practice.

Examples of knowledge comprised within this level are:

- key design principles including the process and stages of design and systems engineering
- key design constraints including legislation, sustainability, economics and technology
- importance of design co-ordination and inter-disciplinary working
- methodologies and logistics of construction
- operational and maintenance processes post contract
- materials science and how it applies to the design and methodology of construction.

Level 2

Apply the knowledge to an understanding of the systems, components, timing, methodologies and logistics of the construction of infrastructure projects in the chosen field of practice.

Examples of activities and knowledge comprised within this level are:

- understanding and assimilating design information in the context of project, cost and facilities management objectives
- understanding the collaborative design process so that management, time and cost techniques can be applied to the right information at the right time
- preparing studies or reports on alternative construction methodology strategies
- preparing studies or reports on the impact of alternative design and construction solutions on operational and maintenance considerations.

Level 3

Advise on the selection and application of particular processes within the area of experience. This should include liaison with specialists and consultants to develop project-specific design and construction solutions

Examples of activities and knowledge comprised within this level are:

- preparing and advising on the choice of construction solutions for the project
- advising on the impact of design, methodology and materials on cost, time and productivity
- being able to advise on new and emerging technologies and processes, for example:
 - off-site construction fabrication
 - lightweight construction (glass fibre)
 - materials handling – tagging and coding reports, smart technology
 - configuration management.

Leading projects, people and teams

Candidates in this pathway both lead and manage a range of construction related teams both large and small and across sectors. For example, a consultant project manager may lead and manage design teams and lead on the procurement of projects, a construction project manager may lead and manage a team of subcontractors and consultants and a client side project manager is likely to lead a team of external consultants that procure and administer a range of construction related projects.

Within each sector the project manager should be aware of how to manage people and teams and the role of leadership and motivation that enables those teams to function.

Examples of likely knowledge, skills and experience at each level

Level 1	Level 2	Level 3
Demonstrate knowledge and understanding of the characteristics and behaviour required to lead and manage teams.	Provide evidence of application of your role as a team and project leader and manager.	Provide evidence of how you have contributed to the improved performance of people and teams.
<p>Examples of knowledge comprised within this level are:</p> <ul style="list-style-type: none"> the different styles of leadership the different motivation theories effective organisational design and communication strategies the climate necessary for the creation of high performing teams the skills required to organise yourself and others an understanding of governance structures and communication strategies an understanding of how people behave in a range of scenarios human resource management legislation an understanding of how to measure and assess teams' performance. 	<p>Examples of activities and knowledge comprised within this level are:</p> <ul style="list-style-type: none"> using leadership and management skills and motivation theories in practice managing organisational and communication procedures in a project setting being actively involved in the interview and selection of people or consultants or contractors or subcontractors where you have assessed their relative merits against a client brief or KPIs having the skills to assess and identify poor performance and an understanding of potential corrective actions available. 	<p>Examples of activities and knowledge comprised within this level are:</p> <ul style="list-style-type: none"> advising on the structure and make up of project/delivery teams leading and managing people or consultants or contractors or subcontractors and reporting on their performance reviewing and analysing any skill gaps and making recommendations advising on the appointment or recruitment of people, consultants, contractors or subcontractors based on selection criteria suitable for the project adapting your natural leadership and/or management styles to improve personal and team performance identifying and recommending appropriate action when poor performance is observed. Implementing such actions as are agreed.

Managing projects

This competency is about the stages a project goes through during its life cycle and the role of the project manager in that process. This includes its inception, briefing, financial feasibility, quality controls, completion timescales and subsequent programming. It also includes the contractual and legislative/statutory requirements, stakeholder management, management reporting and auditing, and the assessment of the performance of a project and its individual stakeholders.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of all the stages of a project life cycle including the feasibility study process and the essential requirements of a project audit/closeout report.

Examples of knowledge comprised within this level are:

- the role of a project manager
- project team structures and procedures such as PIDs, PEPs and PMPs
- how and why tasks are carried out at a particular stage and when it's appropriate to deviate from the norm
- the principles of contractual, legislative and statutory requirements of projects (including town planning legislation and building regulations), document control, the requirements and information management systems, administrative processes, and management reporting requirements associated with a project
- the client's requirements and the development/project brief including the business case drivers for the development
- project risks and contingency planning
- the management of change.

Level 2

Apply the principles of the project life cycle process including the implementation of management procedures necessary for the smooth running of a project life cycle.

Examples of activities and knowledge comprised within this level are:

- preparing a project execution plan and/or other similar management tools
- implementing a development appraisal or feasibility study for a project
- managing document control, information management systems and management reporting systems
- using value management/value engineering techniques to advise on and improve the viability of the development
- carrying out a life cycle/whole life costing exercise including analysing reasons for, and implementation of, any design, cost and programme variations
- reporting on project processes and procedures, performance and lessons learned
- analysing the actual performance of the project and the team and identifying potential improvements.

Level 3

Provide evidence of reasoned advice to the client on the detailed procedures associated with the project life cycle.

Examples of activities and knowledge comprised within this level are:

- designing and advising on a project execution plan and/or other similar management tools
- providing reasoned and interpretive advice on development appraisals, feasibility studies and business plans
- advising on the contractual, legislative and statutory requirements for a project
- advising on and designing document control and information management systems and management reporting systems
- assessing and advising on the chosen procurement route, project team structures and procedures
- interpreting the results of a life cycle/whole life costing exercise and give advice on how these results can be used to improve a development's viability
- assessing potential design changes to improve the development viability
- assessing and advising on the performance of the project team
- preparing audit reports and advising the client including identifying lessons learnt and recommending appropriate responses.

Procurement and tendering

This competency covers how a project is structured and delivered in terms of risk allocation and contractual relationships and how tendering processes are used to establish a contract price. Candidates should have a clear understanding of the different types of procurement and tendering commonly used and the advantages and disadvantages of each to the parties involved. You should have a detailed working knowledge of the procurement routes and tendering procedures used on your projects.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the main types of procurement. Demonstrate knowledge and understanding of the tendering and negotiation processes involved in procurement.

Examples of knowledge comprised within this level are:

- the main types of procurement used in both the public and private sectors, both nationally and internationally
- tendering and negotiation processes involved in procurement
- ancillary processes such as partnering and framework agreements
- codes of practice and procedures commonly used
- industry bespoke standards
- supply chain engineering.

Level 2

Apply your knowledge to the implementation of the procurement routes selected for your projects and to carrying out tendering and negotiation processes relevant to them.

Examples of activities and knowledge comprised within this level are:

- implementing procurement routes such as traditional, design and build, Private Finance Initiative (PFI), Design – Build – Finance – Operate (DBFO), management forms, term and serial contracting and other types
- producing and/or compiling tender documentation such as letter of invitation, form of tender, health and safety documentation, design documentation and contractual details
- carrying out of tendering and negotiation processes such as single and two stage tendering, the use of codes of practice and electronic tendering.

Level 3

Give reasoned advice on the appropriateness of various procurement routes. Manage the tendering and negotiation process and present reports on the outcome.

Examples of activities and knowledge comprised within this level are:

- evaluating the appropriateness of various procurement routes
- managing the tendering and negotiation process
- preparing procurement and tendering reports
- ability to advise on procurement and tendering in your jurisdiction
- advising on management of supply chain engineering.

Programming and planning

This competency covers a surveyor's involvement with the programming and planning of infrastructure projects. It includes the various principles, techniques and issues that relate to the programming and planning of projects generally. They must have a thorough understanding of how these principles and techniques have been used and how specific issues have been dealt with on their projects.

Examples of likely knowledge, skills and experience at each level

Level 1

Describe the principles of financial and programme monitoring of projects, including planning techniques such as Gantt charts, etc. Demonstrate knowledge of the various types of programmes and schedules commonly used on projects.

Examples of knowledge comprised within this level are:

- the need for pre-contract planning and programming techniques
- different planning techniques, e.g. Gantt charts, network analysis and critical path analysis, etc.
- the principles of how a programme is affected by change
- the need for good programming when forecasting accurately materials, manpower, machinery and money
- the use of planning and programming when forecasting expenditure
- the importance of a project or a contract programme when used together with different forms of contract
- the programme requirements of different forms of contract.

Level 2

Assess, interpret and report on the programme control of projects.

Examples of activities and knowledge comprised within this level are:

- formulating and reporting on a project programme for different construction projects using planning techniques
- reporting the client's financial forecast expenditure of a project using planning techniques
- calculating a critical path network analysis and/or Program Evaluation and Review Technique (PERT) network analysis as appropriate to determine the longest path
- identifying the impact of contractual provisions on the effective planning of projects
- updating programmes for actual progress and in line with the requirements of different forms of contract.

Level 3

Provide evidence of reasoned advice on, or implement the principles of, executive programme control of projects. Your advice should demonstrate a good understanding of planning techniques (per diagrams, network analysis/critical path methods).

Examples of activities and knowledge comprised within this level are:

- interpreting the effectiveness of a project programme
- providing reasoned advice on the financial planning of construction projects (e.g. a client/developer might have a particular way of funding a project, either fully financed or generating finance from sales in phase one to finance later phases. This would give rise to very different strategies affecting both the timing and the cost of a project)
- analysing and advising on the possible outcomes in the event of a strategy change, e.g. financing provisions, time of construction, scope changes
- advising on a project programme when determining different procurement options.

Project controls

This competency deals with the control of time and cost on infrastructure projects. Candidates should be aware of the applicability of the various time and cost control techniques, including data analysis, productivity and resource analysis, earned value management and their practical use.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the tools and techniques associated with project controls, including work breakdown structures, earned value management, productivity and resource analysis and programming.

Examples of knowledge comprised within this level are:

- techniques for the effective control of time and cost during the construction phase of a project
- management of change including an understanding of the key change drivers such as legislation, design, co-ordination and methodology and the generation of options and solutions
- project time and financial management principles in reporting uncertainty: risk and contingency.

Level 2

Apply your knowledge of how to interpret, analyse and report on data produced by project control techniques to facilitate both forensic and predictive decision making.

Examples of activities and knowledge comprised within this level are:

- preparing a work breakdown structure report
- preparing an earned value management report
- preparing a productivity and resource analysis
- preparing a cost and time change management system
- preparing a project controls strategy report.

Level 3

Provide evidence of how you advise on strategies and procedures to analyse, predict and control time and cost on infrastructure projects.

Examples of activities and knowledge comprised within this level are:

- advising a client or senior on a project controls strategy
- establishing a communication and reporting regime for a project controls system
- advising on potential solutions to changes in programme or cost
- explaining and advising on the assumptions and risks in project control reports.

Project finance

In the infrastructure pathway, this competency deals with sources of funding and investment finance and financial modelling techniques.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of funding sources and the principal forms of investment finance in infrastructure projects. Demonstrate knowledge and understanding of the key project finance evaluation techniques, including their assumptions and limitations.

Examples of knowledge comprised within this level are:

- the various sources of funding, investment, finance alternatives in infrastructure
- the various financial modelling techniques in infrastructure
- financial evaluation risks and the techniques for quantifying risk.

Level 2

Apply the knowledge to identify the factors that affect the ability to obtain finance to fund an infrastructure project and the use of project finance evaluation techniques on infrastructure projects.

Examples of activities and knowledge comprised within this level are:

- preparing reports detailing possible alternative funding and investment options and their evaluation
- preparing financial models to assess the viability of projects and their key risks
- preparing sensitivity analyses.

Level 3

Provide evidence of reasoned advice to clients and senior management on strategies and tactics for dealing with funding and finance issues on infrastructure projects.

Examples of activities and knowledge comprised within this level are:

- strategic advice on project funding and finance applied to the particular project constraints and risks
- evaluative interpretation of financial models and reports considering particular project technical constraints and risks
- advising clients on the practical and technical implications of project funding and finance issues on the management of their projects.

Quantification, costing and price analysis

This competency covers the measurement and definition of infrastructure works in order to value and control cost and time. It also includes rate price analysis for the purposes of costing quantified descriptions of work.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the principles of quantification, costing and rate price analysis of works as a basis for the financial management of projects.

Examples of knowledge comprised within this level are:

- the quantification of infrastructure works (including both measurement and definition)
- the various standard methods of measurement pertaining to the field of practice including any emerging international standards
- the costing of infrastructure works and rate price analysis
- design specification classification systems in order to properly define measured works.

Level 2

Apply the knowledge to the quantification and costing of works, including the use of appropriate standard methods of measurement and forms of benchmarking and cost analysis. Apply price rate analysis in both forensic and predictive techniques.

Examples of activities and knowledge comprised within this level are:

- quantifying infrastructure works at the various stages of a project
- preparing pricing documents such as bills of quantities, schedule of work's or contract sum analyses
- carrying out first principle costing of infrastructure works by reference to labour, material and plant productivity rates and other methods such as tendered rates, quotations or day works
- undertaking a forensic analysis of pricing rates to determine the financial or time implications of change.

Level 3

Advise on strategies and procedures to analyse, predict and control time and cost on projects. Take responsibility for preparing and issuing pricing documents. Price or analyse such documents.

Examples of activities and knowledge comprised within this level are:

- advising on the benefits and limitations of measurement and costing
- selecting appropriate pricing documents
- negotiating and agreeing the valuation of infrastructure works at various stages of the project such as contract sum, during the construction phase and final account
- advising on the impact of change.

Risk management

This competency covers the management of risk on infrastructure projects, including the benefits to be gained and the techniques and processes used to manage risk.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate your knowledge and understanding of the nature of risk and, in particular, of the risks associated with your area of business/practice.

Examples of knowledge comprised within this level are:

- the principles of risk management
- how the various procurement routes deal with risk
- mitigation strategies
- the techniques used to quantify risk
- the effect of risk on programme and cost.

Level 2

Apply your knowledge to carry out risk assessments taking into account all relevant factors. Understand the application of the various methods and techniques used to measure risk.

Examples of activities and knowledge comprised within this level are:

- contributing towards the identification of risk
- identifying who owns the risk in relation to the chosen procurement route on your project
- contributing towards strategies to mitigate risk
- contributing data towards the quantification of risk
- considering the effect of risk on programme and management cost specific to their project.

Level 3

Provide evidence of reasoned advice and implement systems to manage risk by competent management in relation to specific projects.

Examples of activities and knowledge comprised within this level are:

- advising on the appropriate procurement route in relation to the client's attitude to risk
- advising on the appropriate methodologies and approach to risk on a project
- taking ownership of the risk register and advising on the appropriate risk mitigation strategies
- applying techniques to quantify risk and advising clients on the appropriate level of contingency.

Stakeholder management

This competency deals with the techniques associated with managing stakeholders on large, complex projects. Candidates should demonstrate an effective understanding and application of the various ways to identify, analyse and engage with the relevant project stakeholders.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of the principles and techniques associated with engaging and communicating with all relevant project stakeholders, including an understanding of decision-making in pluralistic clients.

Examples of knowledge comprised within this level are:

- the challenges, opportunities and benefits of stakeholder management
- the key aspects of the individual, team and the project with regards to stakeholder management
- the process of stakeholder management and tools such as the Iceberg Model.

Level 2

Apply the knowledge to ensure that all parties are aligned with the project objectives using identification, analysis, matrix and engagement techniques.

Examples of activities and knowledge comprised within this level are:

- preparing a stakeholder management strategy report covering planning and resourcing
- applying the techniques of discover, understand, plan, engage and assess value to undertake the management of stakeholder
- preparing a structure chart and a RACI (Responsible, Accountable, Consulting and Informed) table to clarify roles and responsibilities.

Level 3

Provide evidence of reasoned advice and implement systems to manage risk by competent management in relation to specific projects.

Examples of activities and knowledge comprised within this level are:

- advising on the options for stakeholder management, bearing in mind the size, complexity and objectives of the project
- advising on the benefits, value and costs of stakeholder management
- advising on different methodologies for stakeholder management bearing in mind the maturity of the client and geographic spread of the project.

Supplier management

This competency provides a framework for the effective management of the supply chain on infrastructure projects. It includes the various management techniques for identifying, engaging, procuring, assessing and motivating supply chain partners.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of how to manage suppliers using a logical process to ensure that the cost and quality of the service received meets organisational requirements.

Examples of knowledge comprised within this level are:

- contracts
- service level agreements
- key performance indicators
- performance monitoring
- benchmarking
- frameworks
- pain/gain mechanisms.

Level 2

Apply your knowledge and understanding by using an existing process to manage suppliers to ensure that the cost and quality of the service received meets organisational requirements.

Examples of activities and knowledge comprised within this level are:

- conducting performance review meetings
- auditing suppliers
- budgeting
- ordering variations to the service
- paying suppliers.

Level 3

Help define organisational requirements for supplier services and develop an appropriate approach to the management of an individual supplier or group of suppliers based on the scale of the service and the risk of service failure.

Examples of activities and knowledge comprised within this level are:

- using user/customer feedback to provide effective supplier management, ensuring that performance matches the needs of the organisation
- preparing management reports providing recommendations in relation to supplier management.

Sustainability

This competency covers the role of the surveyor in dealing with the impact of sustainability issues on infrastructure, including the various ways in which sustainability can impact on infrastructure. They must have a thorough understanding of the impact made by sustainability on their projects and have been involved with the financial management of that impact.

All candidates must achieve Level 1 in this competency, but you may choose to be assessed at Level 2 (as one of your optional competencies) if sustainability is a significant element in your professional role.

Examples of likely knowledge, skills and experience at each level

Level 1

Demonstrate knowledge and understanding of why and how sustainability seeks to balance economic, environmental and social objectives at global, national and local levels, in the context of land, property and the environment.

Examples of knowledge comprised within this level are:

- principles of sustainability within development and the construction process
- the relationship between infrastructure and the environment
- how national and international legislation, regulations and taxation relating to sustainability affect infrastructure
- criteria by which sustainability is measured in relation to infrastructure
- the principles of how design, technology and construction processes can contribute to sustainable infrastructure
- the principles of material resource efficiency within the supply chain.

Level 2

Provide evidence of practical application of sustainability appropriate to your area of practice, the circumstances in which specialist advice is necessary.

Examples of activities and knowledge comprised within this level are:

- carrying out capital cost and value engineering exercises to determine the impact of sustainability issues on design and construction processes
- carrying out life cycle cost exercises that take account of sustainability issues
- understanding the measures undertaken by governments and international bodies to encourage the reduction of the environmental impact of development.

Level 3

Provide evidence of reasoned advice given to clients and others on the policy, law and best practice of sustainability, in your area of practice.

Examples of activities and the application of knowledge comprised within this level are:

- providing reasoned advice/qualitative comment to clients or other stakeholders on the potential financial impact of sustainability on a property/project
- providing reasoned comment to clients or other stakeholders on the impact of sustainability legislation/policy

Note: Sustainability advice may be given in the course of providing conventional property advice to clients or other stakeholders (such as valuation, investment or property/asset management advice).

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