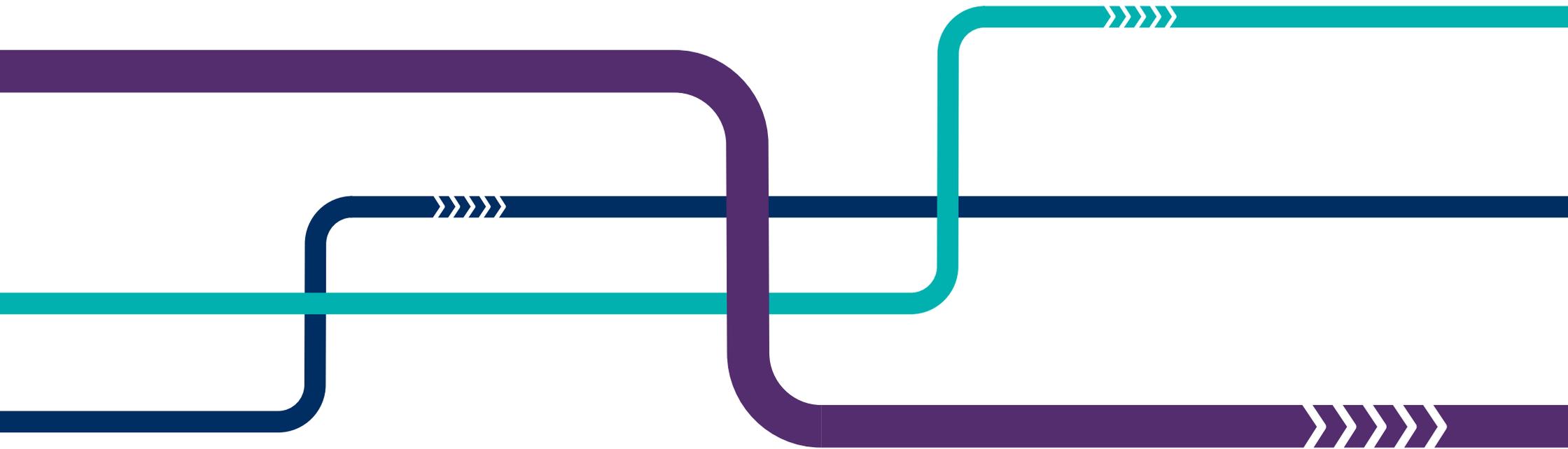




Associate Assessment

Hydrographic Surveying

February 2017



Hydrographic Surveying

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Introduction

In order to become an RICS Associate you must demonstrate that you have knowledge, understanding and practical ability relevant to a surveying role – in this case, Hydrographic Surveying.

This guide explains the competencies for your pathway, with examples of how you can show you meet the requirements.

Refer to this guide while preparing your submission for assessment.

The **Associate Assessment Candidate Guide** gives further essential information on how to prepare for the assessment.

Competencies

A competency is the knowledge, skills, abilities and behaviours needed for a particular role or task. RICS competencies equip you to work in your chosen pathway.

The technical competencies are the pathway-specific ‘hard’ skills needed for your role.

The eight mandatory competencies are the ‘soft’ business skills demonstrating your ability to work with colleagues, manage workloads and act with integrity. All candidates, regardless of their pathway, need these skills.

What is Hydrographic Surveying?

This is the science and study of spatially-related information focusing on the collection, interpretation/analysis and presentation of the natural, built, social and economic environments.

Geomatics is one of the fastest expanding global markets and a truly worldwide profession. Driven by technology and maintaining its role in land law and other socio-economic areas, leading chartered surveying firms realise the importance of geomatics, not only to the profession but to the future success of their businesses. This is particularly true in the day-to-day integration of geomatics with traditional forms of real estate management, land administration and construction.

The changing nature of mapping and spatial data management worldwide includes rapid advancements in Information Technology [e.g. GIS, Global Navigation Satellite Systems, ‘joined up government’ initiatives, digital cadastres, marine planning regimes and many more].

Geomatics is a diverse and complex area of practice and to reflect this, there are two pathways: one orientated towards Land/Engineering Surveying and a specific Hydrographic Surveying pathway.

The Land/Engineering Surveying pathway is primarily aimed at those candidates who do not spend the majority of their employment offshore and/or engaged in marine/hydrographic survey. Although chiefly aimed at those in ‘traditional’ land and engineering survey, this can also be taken by those in government agencies and those from more specialised areas of geomatics particularly practice areas such as measured building surveys and utilities surveying.

The Hydrographic Surveying pathway is designed for those who work within a hydrographic/marine surveying environment. This could be based offshore or on land [charting, post processing bathymetry for example].

Hydrographic Surveying competencies

You must achieve the following **two** technical competencies:

- Geodesy
- hydrographic [marine] surveying

Plus **four** from the following **five**:

- GIS
- legal/regulatory compliance
- mapping
- remote sensing and photogrammetry
- use of the marine environment.

You must complete all **eight** mandatory competencies:

- client care
- communication and negotiation
- conduct rules, ethics and professional practice
- conflict avoidance, management and dispute resolution procedures
- data management
- health and safety
- sustainability
- teamworking.

Technical competencies

Geodesy	
Description	<p>Geodesy is an interdisciplinary science which uses remotely sensed and ground-based measurements to study the shape and size of the earth and its temporal variations. Geodesy also includes the study of the earth's gravity field.</p> <p>Geodesy can be divided into: geomensuration, which is concerned with measuring the earth on a global scale; and surveying, which is concerned with measuring parts of the surface. Understanding the key elements of Geodesy is a primary skill required by all hydrographic surveyors.</p>
Requirements	<p>Demonstrate knowledge and understanding of the principles of geodesy, Global Navigation Satellite Systems, global/regional/national geodetic reference systems, geoids, datums and projections. Apply your knowledge in practice, specify and plan surveys and instrumentation needs. Be aware of error sources and 'fitness for purpose' of data. Use industry standard software and apply network adjustments and/or transformations.</p>
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> • the difference between the geoid and ellipsoid • the differences between types of projected and geographical coordinate reference systems • the applications and limitations of Global Navigation Satellite Systems • geodetic datums • the relationship between vessel and positional system reference frames • RICS and industry standard guidance on the use of Global Navigation Satellite Systems • industry guidance, specifications and related professional information • the levels of accuracy, data collection and processing strategies required for a variety of surveying tasks for control and dynamic positioning • the various modes of Global Navigation Satellite System positioning (i.e. static, rapid static, kinematic, real-time kinematic in relation to survey planning and meeting of specifications) • technology advances and the advent of new Global Navigation Satellite Systems such as Galileo and Compass and the re-structuring of existing systems such as Global Positioning System and Glonass. <p>Activities</p> <ul style="list-style-type: none"> • fitting captured data into the local/regional co-ordinate system • planning and executing Global Navigation Satellite System surveys to appropriate levels of accuracy, including data processing • mission planning with respect to Global Navigation Satellite System constellation integrity • using standard commercial Global Navigation Satellite System processing packages to process Global Navigation Satellite System data and applying pre-determined transformation routines to transform Global Navigation Satellite System based co-ordinates to national datums.

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Geodesy (cont.)

Examples of tasks undertaken

- observations for tidal level and water reduction
- planning and executing a Global Navigation Satellite System survey to appropriate levels of accuracy, including data processing
- mission planning with respect to Global Navigation Satellite System constellation integrity
- using standard commercial Global Navigation Satellite System processing packages
- rig moves and other offshore activities
- using Global Navigation Satellite Systems for renewable energy development and construction.

Hydrographic (marine) surveying	
Description	Hydrographic Surveying involves precise positioning and data acquisition in marine environments ranging from inland waters and rivers, to ports and the deep oceans. This competency is about providing precise three-dimensional position and measurement of various physical features within the marine environment such as bottom depth and structure, currents, tides and waves. This competency can also cover near shore, inshore, river, lake and estuary surveys, engineering surveys for marinas and offshore survey for oil/gas installations and/or construction.
Requirements	Demonstrate a working knowledge and understanding of the principles and limitations of hydrographic survey. Conduct measurements in the marine environment. Plan the conduct of marine surveys. Be fully aware of safety issues. Specify appropriate instrumentation and ensure correct calibration. Understand the principles of Geodesy on a local and international basis, and its application in a marine environment. Fully understand the principles, application and limitations of navigation, geophysical and marine survey instrumentation and software
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> ▪ navigation [positioning services] and hydrographic data collection ▪ marine data acquisition for hydrographic survey: <ul style="list-style-type: none"> – equipment capabilities and limitations of use – error sources and minimising system and errors during acquisition – data collection calibration/validation, acquisition and online quality control – data processing and analysis of data – production of reports and data deliverables ▪ calibration/validation methods and the relationship to data quality ▪ data collection for environmental monitoring, aquaculture and oceanographic research ▪ quality control and processing of marine data ▪ use of industry guidance, specifications and related professional information. <p>Activities</p> <ul style="list-style-type: none"> ▪ providing surveying support for dredging, coastal works, near-shore and/or off-shore construction projects ▪ presenting hydrographic data using a range of paper [chart] and electronic formats ▪ processing and subsequent error analysis of spatial data using industry standard software.

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Hydrographic (marine) surveying (cont.)

Examples of tasks undertaken

- project initiation and execution including assessment of survey requirements, equipment specifications and suitability
- conduct of mobilisation and data acquisition
- hydrography in support of a variety of potential customers including:
 - nautical charting hydrography
 - hydrography to support port management and coastal engineering
 - offshore seismic surveying
 - offshore construction support
 - military hydrography
 - inland waters hydrography
 - hydrography in support of the cable industry
 - marine renewables industry [i.e. installation of windfarms, tidal hubs]
 - coastal zone and habitat monitoring
- capture, processing, data analysis, quality control and method of presentation visualisation

Plus four of the following five competencies

GIS	
Description	<p>A GIS uses computer technology to integrate, manipulate and display a wide range of information to create a picture of an area's geography, environment and socio-economic characteristics. Beginning with a digital dataset as its base, a GIS overlays and integrates graphic and textual information from separate databases.</p> <p>The end result is a tool that can support decision-making and problem-solving and provide almost instantaneous answers to complex questions.</p>
Requirements	<p>Demonstrate knowledge and understanding of the principles of geographic information science and systems. Be aware of industry standard GIS, data structures, types and their applications, and of appropriate capture and output systems. Apply your knowledge and assess data quality; define and use appropriate input and data transfer methods; analyse data and prepare databases; identify digital data sources and assess 'fitness for use'. Understand and be aware of national and international data standards.</p>
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> the generic concepts in GIS appropriate to marine and coastal zone environment point, raster and vector data along with the advantages/disadvantages of each data capture techniques, methodology and limitations different output options geographical and geodetic parameters and projections in relation to marine and coastal GIS import and export of different formats according to user needs e.g. exporting data from GIS data store for CAD users or importing data from other systems industry guidance, specifications and related professional information regulatory requirements for the provision of metadata the principles underlying the analysis of spatial data and implementation of these with typical GIS algorithms using standard functionality. <p>Activities</p> <ul style="list-style-type: none"> preparing documentation and forms applying data management procedures such as updates to base data, control of access to data, publication to users and documentation of it.
Examples of tasks undertaken	<ul style="list-style-type: none"> data capture appropriate to the data source and the application spatial analysis of several layers of data using both database and spatial queries and subsequently providing results for adding to a report or presentation e.g. seabed characterisation operation of at least one commercially available off-the-shelf GIS software package e.g. create, store, access, view, analyse and plot spatial data identifying, assessing and sourcing data sets appropriate to user requirements and assessing their quality and fitness for purpose.

Or

Legal/regulatory compliance	
Description	Legal issues are at the heart of many areas of survey practice. All hydrographic/marine surveyors should have a good working knowledge of any legislation that may impact on their work whether it is health and safety legislation in engineering surveying, land law and/or cadastral regulations or the law of the sea. This competency will be especially applicable in an offshore context.
Requirements	Demonstrate knowledge and understanding of any legal regulatory compliance requirements in relation to your area of practice. Apply your knowledge to comply with legal/regulatory requirements in specific situations within your area of practice.
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> international/national legislation affecting sea areas copyright, data security, non-disclosure agreements and their relationship to the marine environment the legislative needs of land and marine survey work international and national standards for hydrographic survey such as IHO S44 legislative strictures such as health and safety legislation RICS ethical, regulatory and compliance frameworks. <p>Activities</p> <ul style="list-style-type: none"> surveying under the current regulations, licensing and laws applicable to your country.
Examples of tasks undertaken	<ul style="list-style-type: none"> application of the legal framework of statutory instruments for maritime zones compliance with health and safety legislation application of land or maritime law in an international/national and/or regional scenario.

Or

Mapping	
Description	Mapping and charting is the representation of captured data in a geospatial context.
Requirements	Demonstrate knowledge and understanding of the principles of mapping and geographic information sciences appropriate to your area of practice. Be aware of accuracy, scale, currency and fitness for purpose of hard copy and/or digital maps, drawings, imagery and plans. Apply your knowledge of mapping and geographic sciences in relation to your area of practice.
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> • data capture techniques and the issues regarding accuracy and precision of source data (including legacy data) • the types of source data • use of software packages used in mapping and charting production • map generalisation issues and potential effect on data representation • the potential pitfalls of scale issues • use of industry guidance, specifications and related professional information. <p>Activities</p> <ul style="list-style-type: none"> • using post processing survey/mapping software • using digital terrain modeling/digital elevation models.
Examples of tasks undertaken	<ul style="list-style-type: none"> • production of output for; [] refers to IHO S5 standard <ul style="list-style-type: none"> - nautical charting hydrography [S5 01] - hydrography to support port management and coastal engineering [S5 02] - offshore seismic surveying [S5 03] - offshore construction support [S5 04] - military hydrography [S5 06] - inland waters hydrography [S5 07] - hydrography in support of the cable industry - marine renewables industry (i.e. installation of windfarms, tidal hubs) - coastal zone and habitat monitoring.

Or

Remote sensing and photogrammetry	
Description	Remote sensing and photogrammetry are activities and methods within the geomatics profession related to provision of spatial information. This involves using photographs and digital imagery to provide information about the earth's surface and changes which occur within the landscape. It also covers the science and technology of making precise measurements on the imagery to model, in three dimensions, the landscape and features or structures on the earth's surface.
Requirements	Demonstrate knowledge and understanding of the principles of remote sensing and photogrammetry (both aerial and terrestrial). Apply your knowledge and be aware of scales, camera and satellite principles and different data capture techniques. Understand and undertake procedures for routine data capture, and analyse and/or adjust/transform data. Use standard industry software.
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> • basic principles of photogrammetry • camera geometry – scales, precision, ground sample distance • properties of photography • principles of remote sensing • sensors – geometric characteristics • image processing • types of imagery, the source of acquisition, and their practical application • multi and hyper spectral imagery • use of industry guidance, specifications and related professional information. <p>Activities</p> <ul style="list-style-type: none"> • interpreting specifications • setting up equipment • co-ordinating systems and transformations • processing analogue and digital imagery • using photogrammetric and imagery software.

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Remote sensing and photogrammetry (cont.)

Examples of tasks undertaken

- digital surface modelling techniques
- 3D data capture
- operation and calibration sensors
- quality control procedures utilised to ensure final data is fit for purpose
- production of output for (IHO standard S5)
 - nautical charting hydrography (S5 01)
 - hydrography to support port management and coastal engineering (S5 02)
 - offshore seismic surveying (S5 03)
 - offshore construction support (S5 04)
 - military hydrography (S5 06)
 - inland waters hydrography (S5 07)
 - hydrography in support of the cable industry
 - marine renewables industry (i.e. installation of windfarms, tidal hubs)
 - coastal zone and habitat monitoring.

Or

Use of the marine environment	
Description	<p>This competency covers the ability to appreciate the wide range of sea area usage; to apply national and international legislation; to conduct data acquisition and analysis; to present professional and scientific reports; to assist in sea area evaluation and preparation of planning applications; to assist clients in marine exploitation, with due regard to the environment.</p> <p>This competency can cover near shore, inshore, river, lake and estuary areas.</p>
Requirements	<p>Demonstrate an understanding of the principles of inshore and offshore resource development, exploitation and/or conservation. Be aware of the relevant legal guidance and environmental issues. Apply these principles to planning for the exploitation and/or use of marine resources. Use appropriate marine data capture and analysis software and/or instrumentation.</p>
Examples of likely skills, knowledge and experience	<p>Knowledge</p> <ul style="list-style-type: none"> the range of sea area utilisation and the concept of conflict management the concepts of sustainable development environmental data types and acquisition application of environmental data in the marine environment industry guidance, specifications and related professional information calibration methods and the relationship to data quality. <p>Activities</p> <ul style="list-style-type: none"> the range of sea area utilisation and the concept of conflict management the concepts of sustainable development environmental data types and acquisition application of environmental data in the marine environment industry guidance, specifications and related professional information calibration methods and the relationship to data quality.

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Use of the marine environment (cont.)

Examples of tasks undertaken

- environmental impact studies
- hydrography in support in the offshore renewables industry [i.e. installation of windfarms and tidal hubs]
- data collection for scientific investigation to determine allowable effluent discharged at sea
- geotechnical sampling – positioning of sensors
- environmental data collecting in support of a variety of potential customers including
 - nautical charting hydrography [S5 01]
 - hydrography to support port management and coastal engineering [S5 02]
 - offshore seismic surveying [S5 03]
 - offshore construction support [S5 04]
 - military hydrography [S5 06]
 - inland waters hydrography [S5 07]
 - hydrography in support of the cable industry
 - marine renewables industry [i.e. installation of windfarms, tidal hubs]
 - coastal zone and habitat monitoring

Mandatory competencies

Title	Requirement
Client care	<p>Demonstrate knowledge and understanding of the principles and practice of client care including:</p> <ul style="list-style-type: none"> the concept of identifying all clients/colleagues/third parties who are your clients and the behaviours that are appropriate to establish good client relationships the systems and procedures that are appropriate for managing the process of client care, including complaints the requirement to collect data, analyse and define the needs of clients. <p>Demonstrate practical application of the principles and practice of client care in your area of practice.</p>
Communication and negotiation	<p>Demonstrate knowledge and understanding of effective oral, written, graphic and presentation skills including the methods and techniques that are appropriate to specific situations.</p> <p>Demonstrate practical application of these skills in a variety of situations, specifically including where negotiation is involved.</p>
Conduct rules, ethics and professional practice	<p>Although this is demonstrated through the RICS ethics module [see Candidate Guide] you should still refer to it [where applicable].</p> <p>Demonstrate knowledge and understanding of the role and significance of RICS and its functions. Also an appreciation of your personal professional role and society's expectations of professional practice and RICS Rules of Conduct and regulations, including the general principles of law and the legal system, as applicable in your country of practice.</p> <p>Demonstrate practical application in your area of practice, being able to justify actions at all times and demonstrate personal commitment to the RICS Rules of Conduct and RICS ethical standards.</p> <p>Demonstrate that you have applied these in the context of advising clients.</p>
Conflict avoidance, management and dispute resolution procedures	<p>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.</p>
Data management	<p>Demonstrate knowledge and understanding of the sources of information and data, and of the systems applicable to your area of practice, including the methodologies and techniques most appropriate to collect, collate and store data.</p>
Health and safety	<p>Demonstrate knowledge and understanding of the principles and responsibilities imposed by law, codes of practice and other regulations appropriate to your area of practice.</p> <p>Demonstrate practical application of health and safety issues and the requirements for compliance, in your area of practice.</p>
Sustainability	<p>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 built environment.</p>
Teamworking	<p>Demonstrate knowledge and understanding of the principles, behaviour and dynamics of working in a team.</p>

Continuing professional development (CPD)

In your submission document you must record 48 hours of CPD, this must be 12 months prior to your associate assessment. The following are examples of the type of development relevant to this pathway.

Hydrographic (marine) surveying			
Activity type	Purpose	Description	Learning outcomes
Work-based	To develop my knowledge on the latest bathymetry software	Attended in-house training workshop on new software release	I developed an awareness and understanding of the capabilities and limitations of the new software
Geodesy			
Activity type	Purpose	Description	Learning outcomes
Work-based	To develop my understanding of GNSS positioning techniques at sea	Hands-on experience with latest company GNSS systems	I have an understanding of the need to fully understand and appreciate GNSS positioning techniques and local transformation/datum issues
Work-based	To develop my understanding of essentials of instrument calibration and checking	Completed an online internal company course on instrument calibration techniques and checking procedures	I have a better understanding of the need for constant adherence to the principles of calibration and checking

Use of the marine environment			
Activity type	Purpose	Description	Learning outcomes
Organised	Strengthen my knowledge of marine, coastal and related environmental issues	CPD Lecture – outlining the main issues within the marine environment and how surveying impacts on, for example, windfarm siting and developmen	I learnt that marine environment issues are covered by wide ranging legislation and that Environmental Impact Assessments are an essential element of a lot of marine based projects
Legal/regulatory compliance; Health and safety			
Activity type	Purpose	Description	Learning outcomes
Organised	The course aimed to make delegates familiar with relevant health and safety legislation and industry standards and procedures	Attended CPD training workshop on health and safety	The course provided a brief understanding of procedures and legal requirements regarding these subjects. It increased my knowledge of the systems and my potential role



Confidence through professional standards

RICS promotes and enforces the highest professional qualifications and standards in the development and management of land, real estate, construction and infrastructure. Our name promises the consistent delivery of standards – bringing confidence to the markets we serve.

We accredit 125,000 professionals and any individual or firm registered with RICS is subject to our quality assurance. Their expertise covers property, asset valuation and real estate management; the costing and leadership of construction projects; the development of infrastructure; and the management of natural resources, such as mining, farms and woodland. From environmental assessments and building controls to negotiating land rights in an emerging economy; if our professionals are involved the same standards and ethics apply.

We believe that standards underpin effective markets. With up to seventy per cent of the world's wealth bound up in land and real estate, our sector is vital to economic development, helping to support stable, sustainable investment and growth around the globe.

With offices covering the major political and financial centres of the world, our market presence means we are ideally placed to influence policy and embed professional standards. We work at a cross-governmental level, delivering international standards that will support a safe and vibrant marketplace in land, real estate, construction and infrastructure, for the benefit of all.

We are proud of our reputation and we guard it fiercely, so clients who work with an RICS professional can have confidence in the quality and ethics of the services they receive.

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