**Geospatial Engineering Competencies**

**Specialist Engineering Surveying**

**Specialist Engineering Surveying Competencies - 2025**

The Geospatial competencies are split into core and specialist competencies.   
  
**OPTIMUM STANDARDS**

Each of the activities under the competencies must be signed off to a specific standard, indicated by one of the letters A, K, E or B. The definitions of these are given blow.

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| **A** | **Appreciation** | A general awareness of the activity is required. This could be acquired by reading a magazine article or attending a CPD event. |
| **K** | **Knowledge** | This standard requires a more detailed level of knowledge understanding of the activity. This could be acquired by undertaking a training course or other type of study but not necessarily put into practice e.g. a subject area on a degree course. |
| **E** | **Experience** | To reach this standard the activity must have been performed independently or under supervision. This may be achieved by undertaking the activity in a work context over a period of time. Experience of the activity or subject should follow on and be additional to appreciation and knowledge in that subject area. |
| **B** | **Ability** | To be able, without supervision, to perform relevant functions and be able to supervise other less experienced staff. This may be evidenced by the undertaking of management roles or experience gained over time. |

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| **GEES01** | **Competency** | | **Undertake engineering surveying actions** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | K | B | Site reconnaissance, establishment of survey methodology and risk assessment. |  |  |  |  |
| **B** | E | B | Understanding requirements, accuracies, theory of error, and selection of appropriate instrument use for the task |  |  |  |  |
| **C** | E | B | Assessment and validation of existing survey information. |  |  |  |  |
| **D** | E | B | Use and understanding of GNSS surveying techniques: - Modes of GNSS positioning (static, postprocessed kinematic, local base station RTK, Network RTK, Precise Point Positioning) and their applications, constraints and limitations as appropriate to the task whilst considering any project or geographical constraints |  |  |  |  |
| **E** | E | B | Able to carry out engineering surveys, capture data including feature coding. Recording of survey information in the field. Create clear and unambiguous information. |  |  |  |  |
| **F** | E | B | Able to carry out verification and as-built surveys of the constructed works. |  |  |  |  |
| **G** | E | B | Communication of dimensional information to others. Using verbal, digital and written presentation of information. |  |  |  |  |

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| **GEES02** | **Competency** | | **Establishment of survey control networks and setting out** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Understanding, checking and establishment of appropriate survey control in line with accepted hierarchies. |  |  |  |  |
| **B** | E | B | Use of appropriate survey control network and measurements as appropriate to the task whilst considering any project or geographical constraints. |  |  |  |  |
| **C** | E | B | Height control – use of different methods of establishing heights e.g. levelling, GNSS, trig heighting. |  |  |  |  |
| **D** | E | B | Use and verification of design information, with photos as evidence as appropriate |  |  |  |  |
| **E** | K | E | Competent with setting out techniques and equipment for varying work types, e.g. marine, roads, tunnelling, rail, earthworks. |  |  |  |  |
| **F** | E | B | Methods of marking and communication of setting out positions on site. |  |  |  |  |

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| **GEES03** | **Competency** | | **Use and understanding of surveying instruments** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Instrument calibration and care. |  |  |  |  |
| **B** | E | B | Instrument and accessory adjustment. |  |  |  |  |
| **C** | E | B | Total Stations. |  |  |  |  |
| **D** | E | B | GNSS - Static – Kinematic. |  |  |  |  |
| **E** | E | B | Levels 1. Optical 2. Digital. |  |  |  |  |
| **F** | K | E | Construction Laser Devices (e.g. rotating laser, pipe laser). |  |  |  |  |
| **G** | K | K | Use of three dimensional machine control. |  |  |  |  |
| **H** | K | K | Subsurface mapping instruments. |  |  |  |  |
| **I** | K | K | Laser scanners 1. Static 2. mobile. |  |  |  |  |
| **J** | K | K | Monitoring instrumentation and remote sensing. |  |  |  |  |
| **K** | E | B | Other methods of measuring or mapping (e.g. UAV) |  |  |  |  |

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| **GEES04** | **Competency** | | **Application of geospatial principles** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Calculating 3 dimensional coordinate geometry using manual or computerised methods |  |  |  |  |
| **B** | E | B | 2D and 3D Survey control. Intersections, resections, free station, traverse, network and geometric configurations |  |  |  |  |
| **C** | E | B | Adjustment of survey measurements. Redundant observations. Principles of least squares, residuals, standard errors, error ellipses |  |  |  |  |
| **D** | E | B | Measurement of heights, use of height datum, datum transformations, geoid/spheroid separations |  |  |  |  |
| **E** | E | B | Error propagation |  |  |  |  |
| **F** | E | B | Adoption of co-ordinate reference systems and establishment of appropriate survey grid for task, including consideration of scale factor. |  |  |  |  |
| **G** | E | B | Understanding of cause of errors and relevant control measures. |  |  |  |  |

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| **GEES05** | **Competency** | | **Data processing, management and deliverables** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Processing of survey control networks and management of error. |  |  |  |  |
| **B** | E | B | Creation and presentation of relevant CAD models, including wireframe plan, section. |  |  |  |  |
| **C** | E | B | Use and manipulation of digital ground models. |  |  |  |  |
| **D** | K | E | Pointcloud registration, manipulation, classification and presentation. |  |  |  |  |
| **E** | E | B | Processing of survey data, for design, measurement, verification and as-built records. |  |  |  |  |
| **F** | E | B | Comparing as built data to design for verification purposes. |  |  |  |  |
| **G** | E | B | Understanding and integrating the use of relevant Quality Assurance processes. |  |  |  |  |
| **H** | E | B | Creation of survey reports and supporting data. |  |  |  |  |
| **I** | E | B | Robust data storage, backup, and versioning regimes, including Common Data Environments. |  |  |  |  |

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| **GEES06** | **Competency** | | **Commercial and Planning** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | K | E | Knowledge of the considerations behind materials, services and equipment procurement. |  |  |  |  |
| **B** | K | E | Capability to undertake material take-offs, including extracting volumes from 3D models. |  |  |  |  |
| **C** | E | B | Keep a full and accurate daily site diary, including any changes / variations, production outputs, subcontractors' attendance, and records of work-related discussions with client / designer / RE / project team. Understanding of the purpose of your reporting and associated risk. |  |  |  |  |
| **D** | K | E | Understand the impact of the engineering surveyors' tasks on the contract programme. |  |  |  |  |
| **E** | E | B | Efficient allocation and management of resources, including personnel, equipment, and technology, to maximise productivity and minimise costs. This also involves understanding resource constraints and optimising their use. |  |  |  |  |

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