**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/setting out and provide reports to clients and third parties** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Site reconnaissance, survey methodology and risk assessment |  |  |  |  |
| **B** | E | B | Understanding requirements, accuracies, theory of error |  |  |  |  |
| **C** | E | B | Retrieving existing survey information and linking this to design drawings. |  |  |  |  |
| **D** | E | B | Use of appropriate survey control stations and measurements e.g. closed, well-conditioned traverse |  |  |  |  |
| **E** | E | B | Use and understanding of GNSS surveying techniques:   * Modes of GNSS positioning (static, post-processed kinematic, local base station RTK, Network RTK, Precise Point Positioning) and their application e.g. survey control, detailing, setting out * Role of base stations, baseline lengths, session durations * Error sources and mitigation: orbits and clocks, ionosphere, troposphere, multipath, antenna phase centres, geometry effects, interference * Post-processing and analysis of GNSS data * Quality control of GNSS-based positions * Multi-GNSS: benefits and limitations |  |  |  |  |
| **F** | E | B | Height control – use of different methods of establishing heights e.g. levelling, GNSS |  |  |  |  |
| **G** | E | B | Methods of marking and maintaining dimensional control information on site |  |  |  |  |
| **H** | E | B | Data capture and feature coding. Recording of survey information |  |  |  |  |
| **I** | E | B | Communication of dimensional information to others. Using verbal, digital and written presentation of information |  |  |  |  |

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| Supervisor’s Signature: | Date: |
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| **GEES02** | **Competency** | | **Use and understanding of surveying instruments** | | | | |
| **Item** | **Optimum** | | **Activity Detail** | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Total Stations |  |  |  |  |
| **B** | E | B | GNSS - Static – Kinematic |  |  |  |  |
| **C** | A | K | **Levels**   1. Optical 2. Electronic 3. Digital |  |  |  |  |
| **D** | E | B | Construction Laser Devices |  |  |  |  |
| **E** | E | B | Use of three dimensional machine control |  |  |  |  |
| **F** | K | K | Instrument checking |  |  |  |  |
| **G** | E | B | Instrument adjustment within the boundaries and limitations of the equipment in use along with associated checking and procedures |  |  |  |  |
| **H** | E | B | Instrument adjustment within the boundaries and limitations of the equipment in use along with associated checking and procedures |  |  |  |  |
| **I** | E | B | Accessories; checking and adjustment |  |  |  |  |
| **J** | E | B | Other methods of measuring distance |  |  |  |  |

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| **GEES03** | **Competency** | | **Application of geometric 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 |  |  |  |  |

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| **GEES04** | **Competency** | | **Ability to use ICT in surveying** | | | | | | |
| **Item** | **Optimum** | | **Activity Detail** | | | **Date of Assessment** | | | |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | E | B | Transfer of survey data between instrument and computer. | | |  |  |  |  |
| **B** | E | B | Electronic processing of coordinate geometry data including geometric networks | | |  |  |  |  |
| **C** | E | B | Use and manipulation of digital ground models | | |  |  |  |  |
| **D** | E | B | Use of design data for dimensional control | | |  |  |  |  |
| **E** | E | B | CAD - general principles, structure, layering, UCS | | |  |  |  |  |

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