**GEOSPATIAL ENGINEERING COMPETENCIES**

**CORE COMPETENCIES**

**February 2025**

**GEOSPATIAL ENGINEERING COMPETENCIES CORE 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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| **GECORE01**  | **Competency** | **Project Specification, Scope and Management** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | One activity at E, the rest at K | 4 activities at B, the rest at E | Analysis of client requirements |  |  |  |  |
| **B** | One activity at E, the rest at K | 4 activities at B, the rest at E | Development and / or interpretation of project specification and scope |  |  |  |  |
| **C** | One activity at E, the rest at K | 4 activities at B, the rest at E | Agree and / or develop project deliverables  |  |  |  |  |
| **D** | One activity at E, the rest at K | 4 activities at B, the rest at E | Define and/or recommend, then adopt, appropriate data standards e.g. RICS, PAS128, BS1192 etc.  |  |  |  |  |
| **E** | One activity at E, the rest at K | 4 activities at B, the rest at E | Plan required resources to deliver surveys to agreed programme and budget  |  |  |  |  |
| **F** | One activity at E, the rest at K | 4 activities at B, the rest at E | Communicate on progress/problems  |  |  |  |  |
| **G** | One activity at E, the rest at K | 4 activities at B, the rest at E | Communicate completion and close out  |  |  |  |  |

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| **GECORE02** | **Competency** | **Spatial Data** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | Two activities at E, one at K and the rest at A | Three activities at B, one at E and the rest at A | **Data Creation** 1. Total station data collection
2. Scanning including laser scanning
3. Surveying methods to be adopted
4. GNSS and its benefits over other methods
5. Photogrammetry / UAV or Remote Sensing
6. GPR / buried services
7. GIS data capture and transfer
8. Other - please specify:
 |  |  |  |  |
| **B** | One activity at B, one at E and the rest at K | Two activities at B, one at E and the rest at K | **Data Processing** 1. Control Processing Computation including an understanding of trig. and traverse computations
2. Data abstraction, classification, selection
3. Processing of survey data using CAD software
4. Processing of points clouds, laser scans, LiDAR or photogrammetrical data
5. GIS ETL (extract, transform, load) e.g. Shapefile
6. Other - please specify:
 |  |  |  |  |
| **C** | One activity at E, the rest at K | Two activities at B, the rest at E | **Data representation** 1. 2D or 3D representation/model DXF, DGN, DWG
2. Scan data formats e.g. E57, LAS/LAZ, POD, RCS, XYZ?
3. PDF or similar output
4. Textual e.g. metadata, schedules
5. Paper e.g. contract drawings e.g. boundary
6. GIS formats: e.g. .gdb, .shp
7. DTM’s and DSM’s
8. Other - please specify
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| **D** | One activity at B, one at E and the rest at K | Two activities at B, the rest at E | **Quality Control**1. Appropriate on-going checking procedures
2. Problems of currency or source e.g. old data
3. Verification of survey data – field
4. Verification of 2D and 3D data – office
5. Other - please specify:
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| **E** | One activity at E and the rest at K | Two activities at B, One at E and the rest at K | **Data Management**1. BIM, including the security implications of this and similar management tools
2. Upload / download of data to common data environment (CDE)
3. GDPR implications e.g. post code
4. Version control
5. Archiving e.g. retention schedule
6. Digital licences i.e. who owns the survey data, copyright issues
7. Other - please specify:
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| **F** | One activity at E, the rest at K | One activity at B, one at E and the rest at K | **Quality Assurance**1. Adhere to internal procedures for field work / equipment
2. Adhere to internal procedures for office work / data processing
3. Quality Management Systems ISO 9001 Certification
4. Other - please specify:
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| **GECORE03** | **Competency** | **Geospatial data referencing** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | One activity at E, two at K and the rest at A | One activity at B, two at E and the rest at K | **Geo-referencing Systems** 1. Geographic coordinate systems e.g. latitude & longitude, GNSS systems
2. Rectilinear coordinate systemse.g. Cartesian coordinate systems and national / international systems.
3. Linear referencing systems e.g. rail or pipeline chainage
4. Principles and use of scale factors, earth curvature effects
5. Coordinate conversions e.g. Cartesian to geographic and vice versa
6. Other - please specify:
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| **B** | One activity at E, one at K | 1 activity at B, one at E | **Datums**1. Datums and an understanding of the different origin of horizontal and vertical control e.g. GNSS
2. Datum transformation methods and their pros and cons e.g. shift, conformal 7 parameter
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| **C** | One activity at E, the rest at A | One activity at B, one at E and one at K | **Geodesy** 1. Map projections e.g. Mercator
2. Scale factors – when to apply and impact of
3. Other - please specify:
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| **GECORE04** | **Competency** | **Cartography & Digital Mapping** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | One activity at B, two at E and the rest at K | Three activities at B, one at E and the rest at K | 1. Presentation i.e. use of type face, no overwriting
2. Scale & generalisation i.e. correct scale for the job
3. Colour, Typography, Symbology & Font
4. Appropriate line styles
5. Checking CAD level errors
6. Alignment between digital and paper world / 3d vs 2D perspective
7. Imagery and OS background data compatibility
8. Other - please specify:
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| **GECORE05** | **Competency** | **ICT within Geospatial Engineering** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | One activity at E, two at K and the rest at A | One activity at B, one at E and the rest at K | 1. CAD software e.g. AutoCAD, TurboCAD, Vectorworks, MicroStation
2. GIS software e.g. MapInfo, ArcInfo, ArcGIS
3. Hydrographic / hydrospatial modelling
4. Use of 3D design data (compatibility)
5. Survey data processing packages (LSS, n4ce, Civil 3D)
6. Relational databases
7. Software as a service (SAAS) and Data as a Service (DAAS)
8. API use and integration
9. Other - please specify:
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| **GECORE06** | **Competency** | **Demonstrate an appreciation and general awareness of other geospatial engineering techniques** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | A | E | Land Surveying |  |  |  |  |
| **B** | A | K | Measured Building Surveying |  |  |  |  |
| **C** | A | K | Engineering Surveying e.g. setting out, machine control, volume calculations |  |  |  |  |
| **D** | A | K | Appropriate use of GNSS |  |  |  |  |
| **E** | A | K | Hydrospatial Surveying |  |  |  |  |
| **F** | A | K | UAV / pedestrian drone, photogrammetry, Laser Scanning and Remote Sensing |  |  |  |  |
| **G** | A | K | PAS128 Utility Surveying |  |  |  |  |
| **H** | A | K | Geographic Information Systems (GIS) |  |  |  |  |
| **I** | A | K | Other – please specify |  |  |  |  |

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| **GECORE07** | **Competency** | **Risk Management** |
| **Item** | **Optimum** | **Activity Detail** | **Date of Assessment** |
| **Technical** | **Member** | **A** | **K** | **E** | **B** |
| **A** | K | E | Understand the Health and Safety consequence of spatial data accuracy e.g. understanding what stated scale accuracy means in relation to buried services |  |  |  |  |
| **B** | K | K | Environmental Management Systems ISO 14001 Certification |  |  |  |  |

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