

## Use geospatial data in environmental surveys

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### Overview

This standard is about using geospatial data in environmental surveys. It covers the knowledge, understanding and skills required to use digital systems for both mapping and spatial data analysis during environmental surveys.

Field location uses satellite-based measuring systems. Satellite and aircraft-mounted imaging systems can remotely sense the characteristics of the Earth's surface in a spatially continuous manner. Manipulation and interpretation of spatial data relies on Computer Aided Design (CAD) or Geographical Information System (GIS) software. This standard requires an appreciation of the technologies involved, field skills in the use of satellite-based location systems, drones, sources of imagery and use of relevant software to process and interpret both imagery and field survey location data. These skills can be effectively applied at relatively simple levels to provide everyday tools for environmental practitioners. They should be regarded as normal aids to study, in the toolbox alongside skills such as photography, word-processing or spreadsheet-based data analysis.

You will require knowledge and understanding of models of the Earth's ellipsoid (datum), how angular position measurements are converted to Cartesian coordinates (xyz) using map projection systems, the international satellite positioning systems that are available and how they work, sources of land and sea surface imagery and the principles of digital data-mapping systems and interpretation of this type of data. In terms of field skills you will need to be able to set up a survey during which points, transects and polygons are mapped to appropriate levels of accuracy, demonstrating suitable data safety and quality control procedures. Data processing competence will involve working with a standard dataset (containing field data you have collected, satellite imagery, current published maps and historical maps) using a CAD or GIS system that you have selected to generate specified interpretive outputs. You will also need an understanding of how this information is commonly used in environmental management practices.

This standard is for those with responsibility for carrying out environmental surveys.

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### Performance criteria

#### You must be able to:

1. plan environmental surveys using satellite-based positioning equipment, making use of public maps, historical maps, satellite images and aerial photographs that are available to you
2. carry out risk assessments before beginning survey activities
3. carry out your work in accordance with the relevant environmental and health and safety legislation, risk assessment requirements, codes of practice and policies of your organisation
4. prepare and deploy satellite-based positioning or drone equipment to meet specific survey requirements in terms of precision, data density and quality assurance.
5. establish temporary benchmarks for re-survey
6. report and archive data sets you have acquired as latitude and longitude and Cartesian coordinates to two different datums
7. acquire raster imagery that will inform your survey maps, which could include satellite or aerial imagery, published or historical maps, or any combination that will help in interpreting aspects of the geospatial data you have collected
8. enter all your vector and raster datasets into suitable Geographical Information Systems (GIS) or Computer Aided Design (CAD) software and prepare layered maps at effective scales, extension and orientation, with supporting metadata files that describe the data
9. generate new map layers based on manual methods (drawing lines, polygons, text), querying and gridding and contouring
10. generate output maps for a range of presentation formats that meet the requirements of your survey specification
11. contribute to discussions on the value of the information you have generated as an environmental management and/or interpretation tool

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### Knowledge and understanding

#### You need to know and understand:

1. the datums that are in common usage
2. the map projections and their differing applicability to mapping tasks
3. the importance of carrying out risk assessments before beginning survey activities
4. your responsibilities under the relevant environmental and health and safety legislation, risk assessment requirements, codes of practice and the policies of your organisation
5. the deployment of drones or satellite-based positioning equipment
6. good practice and quality assurance routines for surveys using satellite-based positioning equipment for position fixing and/or guidance
7. the factors that can affect field data precision
8. the specifications and acquisition of satellite and aerial images
9. how to import and export spatial data using Geographical Information Systems (GIS) or Computer Aided Design software
10. how to edit spatial data using Geographical Information Systems (GIS) or Computer Aided Design (CAD) software
11. how to finalise and interpret spatial data using Geographical Information Systems (GIS) or Computer Aided Design (CAD) software
12. the limitations and advantages of specific map styles and formats to effectively communicate geospatial information

## Glossary

**Datums** WGS84, OSGB, (European and non-European systems)

**Digital spatial data types:** vector and raster, metadata

**Factors that can affect *\*field data precision\**:**

- effects of satellite geometry
- differences between commercially available satellite fleets
- stand-alone
- differential and RTK methods
- weather conditions

**Mapping software:** GIS (commonly used proprietary and free-ware), CAD (commonly used proprietary and free-ware)

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**Map presentation *\*formats\**:** paper publication, public presentations, web usage

**Map projections** UTM, OSGB, (conic and plane)

**Processing spatial data (GIS or CAD):** data input routines (metadata, point data, image geo-referencing, import and export between systems), creating maps using layers, drawing and tracing, text, data manipulation and interpretation (gridding, contouring, querying, thematic mapping)

**Satellite *\*and aerial images\**:** orbit types/overpass frequency, resolution, optical bands, radar

**Satellite-based *\*positioning equipment types\**:** handheld, backpack, vehicle/vessel-mounted, micro (tracking systems), simple guidance methods, electronic map-based guidance systems.

**Satellite-based *\*position/height\** *\*measurement precision\**:** stand-alone, differential and RTK methods, real-time and post-processing

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