



Australian Government

**Department of Health and Ageing
Office of the Gene Technology Regulator**

MAPPING PROTOCOL

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Monitoring and compliance activities are under continual improvement and will evolve as systems are assessed and validated. This document is intended as a guide only. Readers of this document should also familiarise themselves with the gene technology legislation.

MAPPING PROTOCOL

1. Introduction

GMO Trial Site locations are provided to the Gene Technology Regulator as part of requirements under the *Gene Technology Act 2000* (the Act). Elements of these location details form a part of a licence for site trials and are a part of the Record of GMOs and GM Products. Site conditions and locations are publicly available on the Office of the Gene Technology Regulator (OGTR) internet site (<http://www.maps.ogtr.gov.au/jsp/index.jsp>) unless they are subject to Confidential Commercial Information (CCI) status or consideration.

Organisations providing the Regulator with geographic information of GMO Trial Site locations should follow this protocol.

A uniform and scientifically credible approach by organisations when collecting trial site locations is critical to our compilation of a valid and comparable map of GMO field trials.

Should you already be conversant with protocols for the collection of nationally-consistent geographic data, our preferred coordinate reference system is latitude/longitude information in decimal degrees using GDA 94 obtained on a GPS (Global Positioning System) with better than 20 meters accuracy.

Providing site points together with the physical location details discussed below is sufficient data for the purposes of providing location information to the Regulator.

To facilitate the collection of this information the OGTR has developed the OGTR Mapping Practice Note (which takes the form of a questionnaire to fill in for each site), which you can download from <http://www.ogtr.gov.au>.

2. Physical Location Details

Physical location details are used to validate the location coordinates and assist the implementation of monitoring and record requirements under the Act. The following physical location details need to be provided:

- Trial site property name;
- Trial site physical address (i.e. street address etc, and/or roadside drop box number);
- Description of vehicle access route to the trial site from the nearest main road (which may be provided as a sketch with features named);
- Local Government Area;
- Trial site coordinator and contact details (i.e. address, phone and email);
- A sketch of the site showing the position of the trial and buffer, and identifying at least one GPS or geographic coordinate point for a feature on the sketch;
- Trial site grower name and contact details;
- Trial site owner and contact details; and
- Size of the trial in hectares.

3. The need for accuracy in providing trial site location coordinates

You can provide geographic location coordinates using one of a number of formats and methods (discussed further below). Please note that correctly telling us which format and methods used and being consistent in their use is critical. This will ensure that location errors are minimised in the mapping of the location data that you provide to the Regulator. Accuracy will also enable the OGTR to find and visit the site.

4. OGTR preferences for location coordinate information

Our preferred coordinate reference system is latitude/longitude information in decimal degrees using GDA 94 obtained on a GPS with better than 20 meters accuracy.

You should tell us what geographic datum and/or projection your mapping coordinates conform to.

What is *Datum*?

Datum is the combination of parameters and control points used to accurately define the three dimensional shape of the Earth (spheroid) in maps and geographic information systems.

What is *Projection*?

Projection is a mathematical method for representing the shape of the earth on a flat plane; a formula that converts latitude-longitude locations on the earth's spherical surface to X, Y locations on a map's flat surface. It is a system of intersecting lines, such as the grid of a map, on which part or all of the globe or another spherical surface is represented as a plane surface. The result may have distortion in distance, area, orientation and/or scale.

How do I find out what the datum/projection is?

Information on which datum or projection you are using can usually be obtained within a GPS device under the *properties* or *settings* menus, or can be found on or near the *legend* of any appropriate map used to derive your site map coordinates. The *legend* is an explanation of the symbols, codes, names, given variables, and other information appearing on a map drawing or chart. It includes a sample of each symbol, line pattern, shading or hatching appearing on the map along with annotations describing the meaning of each.

The following datums and projections are the basis for Australian maps and coordinates. You will need to select one of the following:

- Datum AGD 66;
- Datum AGD 84;
- Datum GDA 94;
- Datum WGS 84;
- Projection AMG 49, AGD 66;
- Projection AMG 50, AGD 66;
- Projection AMG 51, AGD 66;
- Projection AMG 52, AGD 66;
- Projection AMG 53, AGD 66;
- Projection AMG 54, AGD 66;

- Projection AMG 55, AGD 66;
- Projection AMG 56, AGD 66;
- Projection AMG 49, AGD 84;
- Projection AMG 50, AGD 84;
- Projection AMG 51, AGD 84;
- Projection AMG 52, AGD 84;
- Projection AMG 53, AGD 84;
- Projection AMG 54, AGD 84;
- Projection AMG 55, AGD 84;
- Projection AMG 56, AGD 84;
- Projection MGA 49, GDA 94;
- Projection MGA 50, GDA 94;
- Projection MGA 51, GDA 94;
- Projection MGA 52, GDA 94;
- Projection MGA 53, GDA 94;
- Projection MGA 54, GDA 94;
- Projection MGA 55, GDA 94;
- Projection MGA 56, GDA 94;
- Other (Please specify official Datum and/or Projection).

What accuracy issues do I need to be careful of regarding Datums/Projections?

Datums and projections vary across Australia and around the world. Older maps will also use different datums or projections to that of current maps. It is important to correctly identify projection and datum to ensure that:

- The OGTR can accurately find the geographic locations that you provide;
- Location errors are minimised in the mapping of the location data you provide to the Gene Technology Regulator; and
- All coordinates for field trials can be credibly and consistently stored, translated and compared on a map or a geographic information system (GIS). This is particularly important as we need to express all coordinates in one common datum and one coordinate reference system when we build maps or a GIS of the trial sites.

Conversion from datum type to datum type (with plus or minus error expressed in metres)

The approximate accuracy differences between different datums are as follows:

AGD66 to AGD84	+/- 0–5 m
AGD66/84 to GDA94	+/- 200 m
AGD66/84 to WGS84	+/- 200 m
GDA94 to WGS84	+/- <1 m

Providing us with the correct datum type is therefore important.

5. Determining the site location coordinates

You will be using appropriate maps or GPS information with accuracy levels equal to, or better than, 20 meters to identify the site locations.

For consistency purposes we refer to coordinates as *(X,Y) coordinates*. X is equivalent to Longitude (or Easting), and Y is equivalent to Latitude (or Northing).

6. Format of the coordinate numbers

The information you provide should be in one of the following geographic formats, our preferred coordinate reference system is latitude/longitude information in decimal degrees using GDA 94 obtained on a GPS (Global Positioning System). You will need to select one of the following and inform us which applies to the set of coordinates that you are providing.

- Latitude/longitude information in Standard Degrees, Minutes and seconds; or
- Latitude/longitude information in Decimal Degrees; or
- Eastings and Northings in decimal metres.

Correct selection and advice of format is critical. Correctly identifying this information ensures that location errors are minimised in the mapping of the location data you provide to the Gene Technology Regulator.

What is *Latitude* and *Longitude*?

Latitude describes the angular distance that a location is north or south of the equator, measured on the meridian of the point. A *meridian* is a great circle of the earth passing through the poles and any given point on the earth's surface.

Longitude describes the angular distance east or west on the earth's surface. It is measured along the equator by the angle contained between the meridian of a particular place and some prime meridian, as that of Greenwich, or by the corresponding difference in time. A *prime meridian* is a meridian from which longitude east and west is reckoned, usually that of Greenwich, England.

What is *Easting* and *Northing*?

Within a coordinate system (e.g. as provided by a GPS or a map grid reference system), *Eastings* are the vertical grid lines which divide a map from East to West and *Northings* are the horizontal lines dividing the map from North to South. The squares formed by intersecting eastings and northings are called grid squares. On 1:100,000 scale maps each square represents an area of 100 hectares or one kilometre square.

7. Entering the coordinates

The site location coordinates will need to be provided into one of the following formats:

A. Four (X,Y) coordinates (in either Longitude/Latitude **or** Easting/Northing), as discussed above.

Limits (Listed in clockwise order)	X	Y
Northern Coordinate		
Southern Coordinate		
Eastern Coordinate		
Western Coordinate		

Or

B. One (X,Y) coordinate (in either Longitude/Latitude **or** Easting/Northing), as discussed above for the centre of the plot for the site.

Limits	X	Y
Centre of Plot Coordinate		

You will need to attach a sketch of the site showing the position of the trial and buffer, and identifying a point for at least one set of the coordinates on the sketch.

8. Source of location information

8.1 Map Readings

If you are using a map to derive (i.e. take the 'reading' for) your coordinates rather than a GPS, you should provide the Map details, namely:

- Map Name;
- Map Scale;
- Map Datum (if latitudes and longitudes are quoted);
- Map UTM zone (If eastings and northings are quoted);
- Date; and
- Publisher.

We require map scales of at least, or better than, 1:25,000.

Every error of 1 millimetre in deriving a coordinate on a map of 1:25,000 approximately equals a 25 metre error in the real world location of the site. Coordinates derived from maps with scales of greater than 1:25,000 are likely to be invalid.

8.2 GPS Readings

If you are using a GPS please indicate the level of accuracy indicated on the GPS unit used to obtain the site coordinates provided:

- Better than 5 meters accuracy; or
- Better than 10 meters accuracy; or

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- Better than 15 meters accuracy; or
 - Better than 20 meters accuracy; or
 - Not better than 20 meters accuracy, and tell us what the level of accuracy is.

If you are using a GPS, please ensure that you are using at least 4 satellites. Readings with less than 4 satellites are likely to be invalid.

9. Recommended Reading and Web Site Tools

- The OGTR Mapping Practice Note (<http://www.ogtr.gov.au/moncomp/protocol.htm>).
- Useful tools, free downloads and documents explaining mapping terms and best practice from the Geoscience Australia (<http://www.ga.gov.au/>), for example:
 - Map Reading Guide - How to use topographic maps
<http://www.ga.gov.au/nmd/products/maps/publications.htm>
 - Datums and Coordinates
<http://www.ga.gov.au/geodesy/datums/aboutdatums.jsp>
- Australian Local Government Guide (<http://www.localgovernments.com.au/>).
- ANZLIC – the spatial information Council internet site (<http://www.anzlic.org.au/>) provides Information on the Geocentric Datum of Australia:
<http://www.anzlic.org.au/icsm/gda/index.html>.
- ERIN, the Environmental Resources Information Network (<http://www.environment.gov.au/erin/index.html#erin>), part of Environment Australia, provides online environmental information. This includes 'Australian Natural Resource Atlas' (http://audit.deh.gov.au/ANRA/atlas_home.cfm) with many online layers of information and tools useful for expressing geographic coordinates.
- Public Sector Mapping Agencies internet site (<http://www.pdma.com.au/>).